



Pension Markets in Focus

2018

This annual report reviews trends in the financial performance of funded and private pension plans, including investment returns and asset allocation. The data for the tables and graphs, plus a statistical annex, can be found in Excel format at www.oecd.org/daf/pensions/pensionmarkets.

The Survey of Large Pension Funds and Public Pension Reserve Funds, part of the OECD project on Institutional Investors and Long-term Investment (www.oecd.org/finance/lti), provides information at the pension fund level.

More information about pensions-related work is available at www.oecd.org/pensions and www.iopsweb.org.

The report is the result of close co-operation between the OECD, the IOPS, the World Bank and the various national bodies that provided data and comments. It has been prepared by Romain Despalins under the supervision of Pablo Antolin and Stéphanie Payet. It has benefitted from comments from Diana Hourani and Jessica Mosher. Editorial and communication support was provided by Pamela Duffin. For further information, please contact: Romain Despalins (romain.despalins@oecd.org).

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FOREWORD

This annual report, which now covers 87 jurisdictions, gives an overview of funded and private pension systems worldwide and outlines the latest developments. It monitors the size of assets in funded and private pensions across reporting countries, describes how these pension assets are invested in financial markets, and looks at how investments of these assets performed, both over the last year and over the longer term.

Pension assets continued to rise in 2017, exceeding USD 40 trillion in the OECD area for the first time ever, with almost all countries showing positive investment results. This can be attributed to the strong investment performance of pension assets that benefitted from buoyant stock markets. Average annual returns calculated over the longer term are also positive for most reporting countries, regardless of the financial crisis.

The funding ratios of defined benefit (DB) plans, however, are still below their pre-financial crisis level in most countries. Traditional DB plans embed a benefit promise to plan members that plan sponsors (usually employers) guarantee. Plan sponsors may have to contribute more in these plans when assets do not cover the liabilities arising from the pension promise (i.e. when they are underfunded).

A special feature in this report describes the main factors driving the evolution of the funding position of DB plans (i.e. the ratio of their assets over their liabilities). Various factors affect the evolution of assets and liabilities of DB plans such as the amount of contributions paid into these plans, the evolution of interest rates and the increase in the period that pension benefits have to be paid due to higher life expectancy.

The data used to prepare this report have been collected from national authorities within the framework of the OECD's Global Pension Statistics project. The OECD's partnership with the International Organisation of Pension Supervisors (IOPS) and the World Bank means that the geographical coverage of this project now extends well beyond the 36 OECD countries to encompass 87 jurisdictions.

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HIGHLIGHTS

>> Pension assets in the OECD area hit a record level in 2017

Pension assets in the OECD area achieved a record USD 43.4 trillion in 2017. The overall amount of assets has grown every year since the financial crisis (except in 2015) and is well above the 2007 pre-crisis level. A majority of these assets are held in pension funds (USD 28.5 trillion).

>> High investment returns from booming stock markets partly explain the growth of pension assets

The real net investment rate of return on pension assets exceeded 4% on average, both inside and outside the OECD area in 2017. Real investment rates of return, net of investment expenses, were above 5% in 22 (including 12 OECD countries) out of the 60 reporting jurisdictions. Booming stock markets worldwide underpinned these positive results, with jurisdictions where equities form the largest part of the investments of pension asset managers (e.g. Australia and Poland) benefitting in particular. Pension assets achieved a 7.5% real net investment rate of return in the United States, the largest pension market in terms of assets.

>> The investment performance of pension assets over the last 15 years is positive in most countries

It is important to assess investment performance of funded and private pensions over the long term as saving for retirement has a long-term horizon. Most reporting countries have achieved positive real average annual net investment rates of return since 2002. The strongest real average annual return (net of investment expenses) over the last 15 years among the 21 jurisdictions for which this calculation is possible was achieved in Colombia (6.9%), followed by Canada (5.5%) and the Netherlands (5.3%).

>> The funding position of defined benefit plans has deteriorated in the last decade in many countries as liabilities grew faster than assets

Some of the largest markets (e.g. Canada, Switzerland and the United States) still hold a significant share of assets in defined benefit (DB) plans. Although assets kept growing in most reporting countries with DB plans, they were not able to keep pace with the growth of liabilities. This has led to a deterioration of the funding ratio of DB plans at the national level in many countries. In Iceland, Indonesia, Mexico, the United Kingdom and the United States, ratios, already below 100% for some time, fell even further. Inflows from contributions and investment income in DB plans were higher than outflows from benefit payments and other expenses. The further increase in liabilities is probably due to increases in life expectancy and declines in interest rates. Changes in the benefit formula or declines in maximum accrual rates have been insufficient to control the increase of liabilities at the national level.

PENSION MARKETS IN FOCUS

Overview of funded and private pension systems and latest developments

This study covers all funded pension arrangements - irrespective of whether they are publicly or privately administered, whether they cover public or private sector workers, and whether assets are accumulated in pension funds, through pension insurance contracts or other vehicles - and employers' book reserves (private unfunded arrangements).¹

The first part of this report assesses the importance of funded and private pensions by examining:

- the amount of assets accumulated in funded and private pension plans,
- the number of active members covered by a plan,
- the payments from these plans.

This section also looks into the allocation of pension assets and their performance. It ends with a short description of the structure of funded and private pension systems.

Assets

The amount of assets in pension plans provides a measure of the size of funded and private pensions in each country.²

Pension assets are unevenly distributed worldwide

The amount of assets in pension arrangements, which hit a record USD 43.4 trillion in the OECD in 2017, varied widely across countries. Pension assets amounted to less than USD 0.2 trillion in 78% of the reporting jurisdictions, while 8% of jurisdictions exceeded USD 1 trillion.

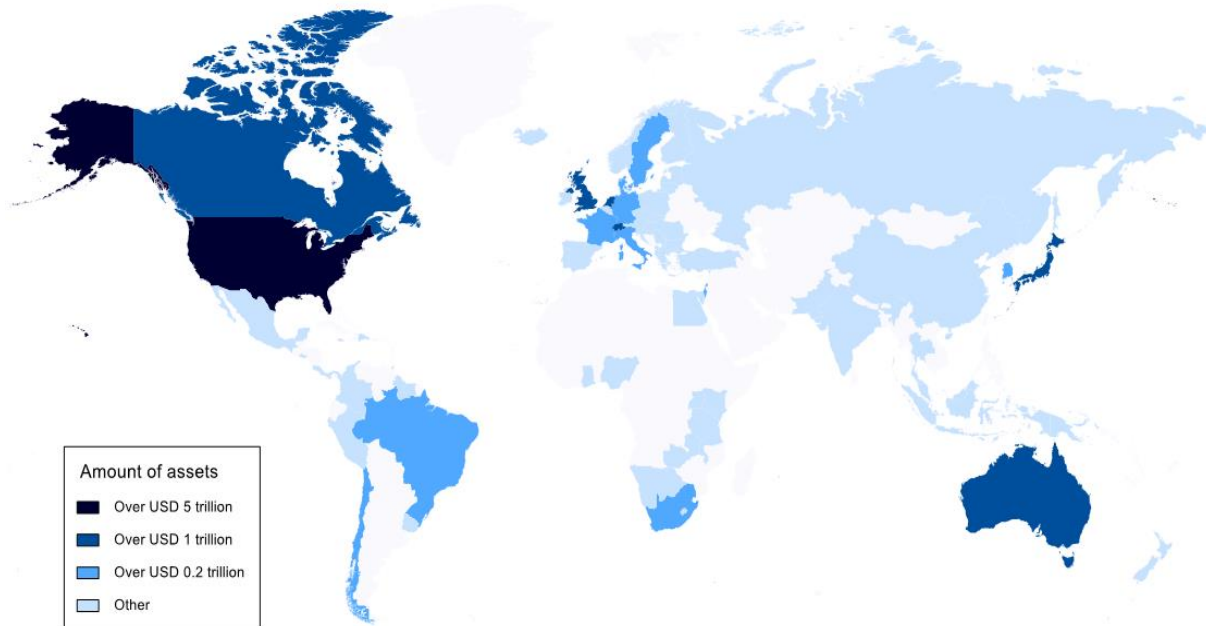
The largest amounts of pension assets are located in some of the largest economies with a long history of pension savings. Assets exceeded USD 1 trillion in seven OECD countries: Australia, Canada, Japan, the Netherlands, Switzerland, the United Kingdom and the United States (Figure 1). Funded pensions were introduced early in these countries, such as in Canada (1874 for the first employer-sponsored plan) or the United States (1857 for the first plan for public sector employees and 1875 for the first plan covering private sector workers).

¹ The 2017 edition of *Pension Markets in Focus* covered all funded and private pension systems to the extent possible for the first time. Prior to this, the report covered pension funds only which limits the comparison of data between editions.

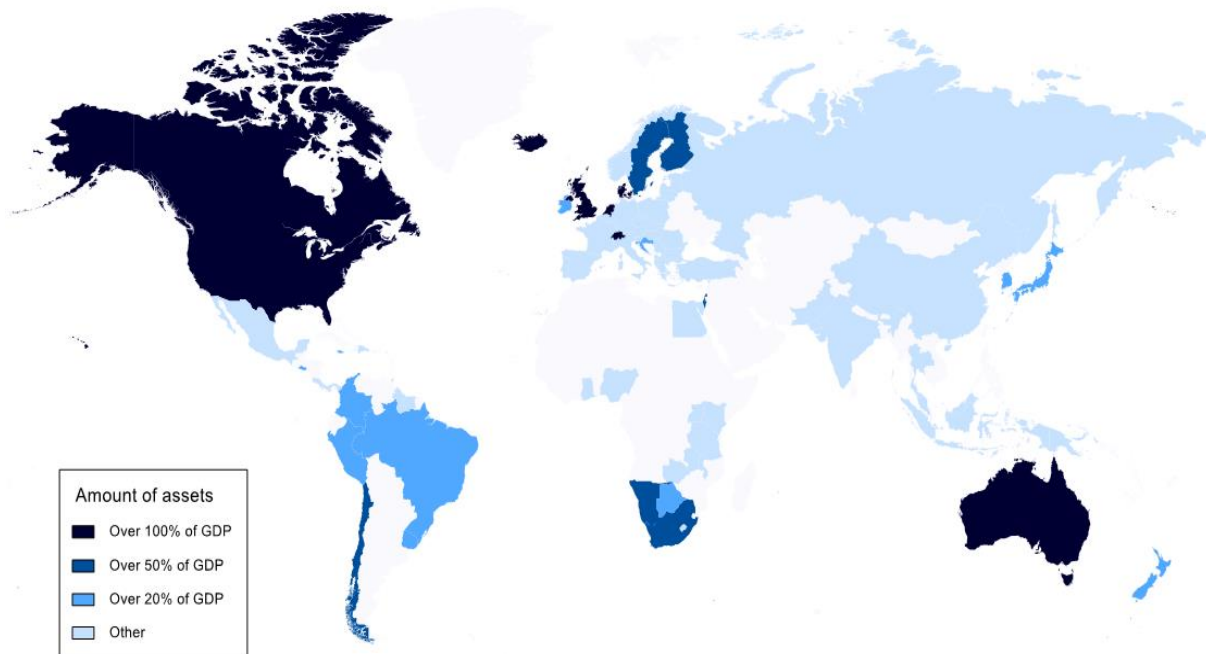
² The amount of investments of funded and private pension plans is taken as a proxy for the amount of assets in these plans throughout this report. Box 1 in the 2016 edition provides an explanation of potential differences between investments and assets.

Figure 1. Size of assets in funded and private pension arrangements, 2017

A. In USD trillion



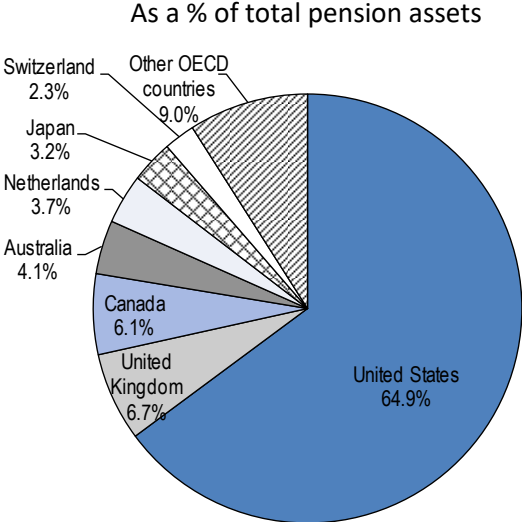
B. As a percentage of GDP



Note: Please see the methodological notes at the end of the report.
Source: OECD Global Pension Statistics.

The seven countries with assets in excess of USD 1 trillion, held more than 90% of pension assets in the OECD area in 2017 (Figure 2). The largest amount of pension assets among OECD countries was held in the United States in 2017 (64.9% of the total assets in the OECD area, with USD 28.2 trillion of assets), followed by the United Kingdom (6.7%, USD 2.9 trillion), Canada (6.1%, USD 2.6 trillion), Australia (4.1%, USD 1.8 trillion), the Netherlands (3.7%, USD 1.6 trillion), Japan (3.2%, USD 1.4 trillion) and Switzerland (2.3%, USD 1.0 trillion). The other 29 OECD jurisdictions shared the remaining 9.0% of assets (or USD 3.9 trillion).³

Figure 2. Geographical distribution of pension assets in the OECD area, 2017



Note: Please see the methodological notes at the end of the report.
 Source: OECD Global Pension Statistics.

Pension assets were also unevenly distributed within regions. South Africa was the only reporting country in Africa with more than USD 0.2 trillion of pension assets in 2017. Brazil and Chile stand out in South America as they were the only two countries in the region where pension assets exceeded USD 0.2 trillion in 2017, probably as a result of the relative seniority of their funded/private pension systems. The regulations related to closed pension funds – sponsored by employers, trade unions or associations in Brazil - were issued in 1977. Chile reformed its pension system and introduced funded pension plans in 1981.

In some fast developing economies (e.g. China and India), the amount of pension assets still remained relatively low in 2017 compared to other countries.⁴

³ Tables A.1 and A.2 in annex provide the amount of pension assets in 2017 and over the last ten years in millions of national currency and USD for all reporting jurisdictions.

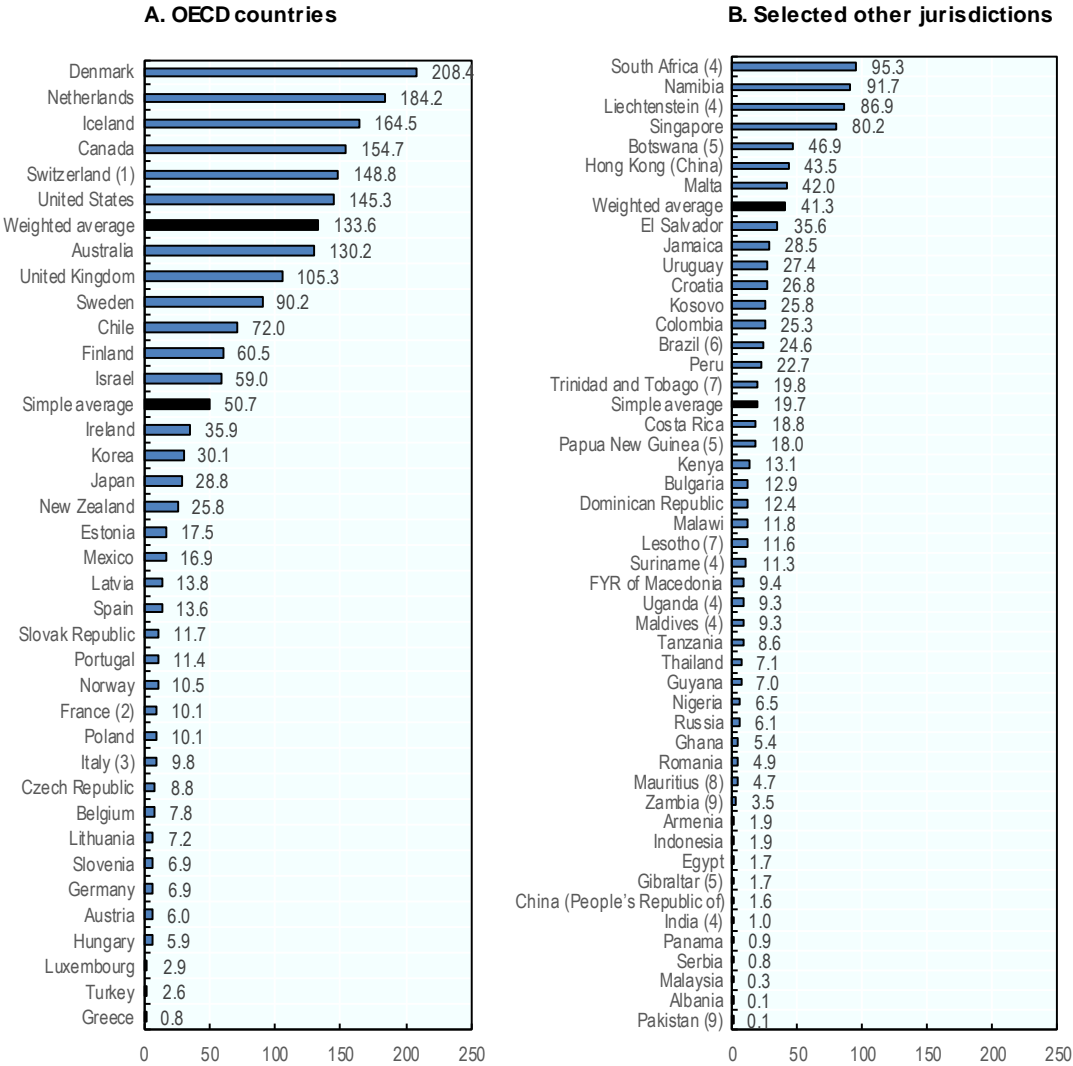
⁴ Statistics for China and India only cover a part of the funded and private pension system. Please see the methodological notes at the end of this report to know more about the data coverage.

The amount of pension assets compared to the size of the domestic economy provides an indication of the importance of funded and private pension systems at the national level.

On average, pension assets accounted for 50.7% of GDP in the OECD area and 19.7% of total GDP in the sample of non-OECD jurisdictions in 2017 (Figure 3). The weighted average was even higher: 133.6% in the OECD area and 41.3% outside the OECD.⁵

Figure 3. Total assets in funded and private pension arrangements, 2017

As a percentage of GDP



Note: Please see the methodological notes at the end of the report.
 Source: OECD Global Pension Statistics.

Averages in the OECD and non-OECD areas, however, hide disparities across countries. The amount of pension assets exceeded the size of the GDP in 8 OECD countries among the 83 reporting jurisdictions

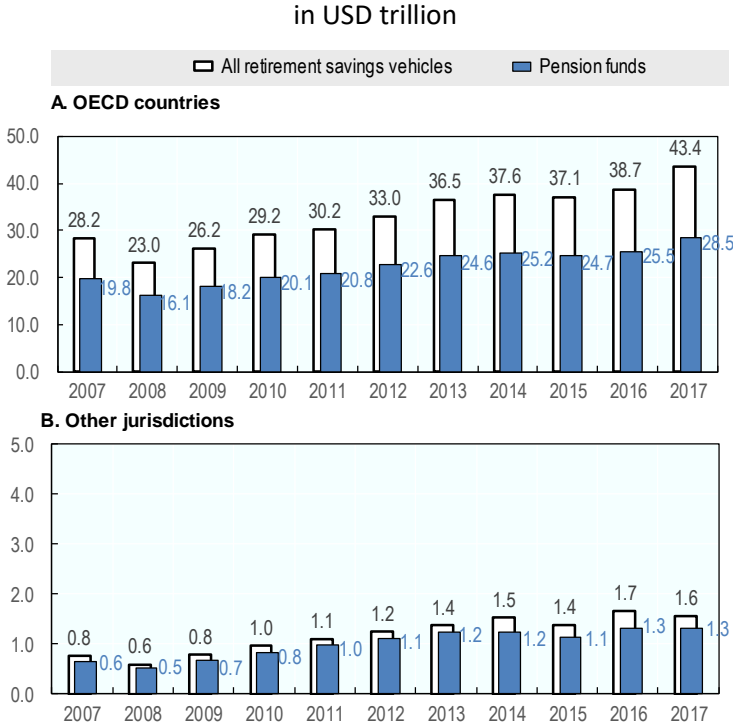
⁵ Weights are based on the amount of pension assets in USD terms in a given country compared to the amount of pension assets in the whole area considered.

(Figures 1 and 3). Denmark is at the top of the ranking among OECD countries with pension assets worth 208.4% of GDP, followed by the Netherlands (184.2%) and Iceland (164.5%). By contrast, the lowest amounts of assets (relative to GDP) were observed in Greece (among OECD countries) and Pakistan (among non-OECD jurisdictions), with assets worth less than 1% of GDP (although the statistics for Pakistan only cover voluntary pension funds and do not include occupational saving schemes). The amount of pension assets was below 20% of GDP in more than 50 jurisdictions, and even below 2% of GDP in 12 of these (including China, India and Indonesia). However, statistics for these twelve countries often only cover a part of the system (e.g. enterprise annuity only for China, National Pension System schemes and the contributory scheme Atal Pension Yojana for India, and voluntary pension plans in Indonesia).⁶

Pension assets in the OECD kept growing and hit a record USD 43.4 trillion in 2017, with USD 28.5 trillion in pension funds

The overall amount of assets has been growing almost every year since the financial crisis (except in 2015) to reach USD 43.4 trillion in 2017, a level well above the pre-crisis amount of USD 28.2 trillion (Figure 4). Around two thirds of pension assets were held in pension funds (USD 28.5 trillion in 2017).

Figure 4. Total amount of assets in retirement savings vehicles (including pension funds) in the OECD and in other jurisdictions, 2007-2017



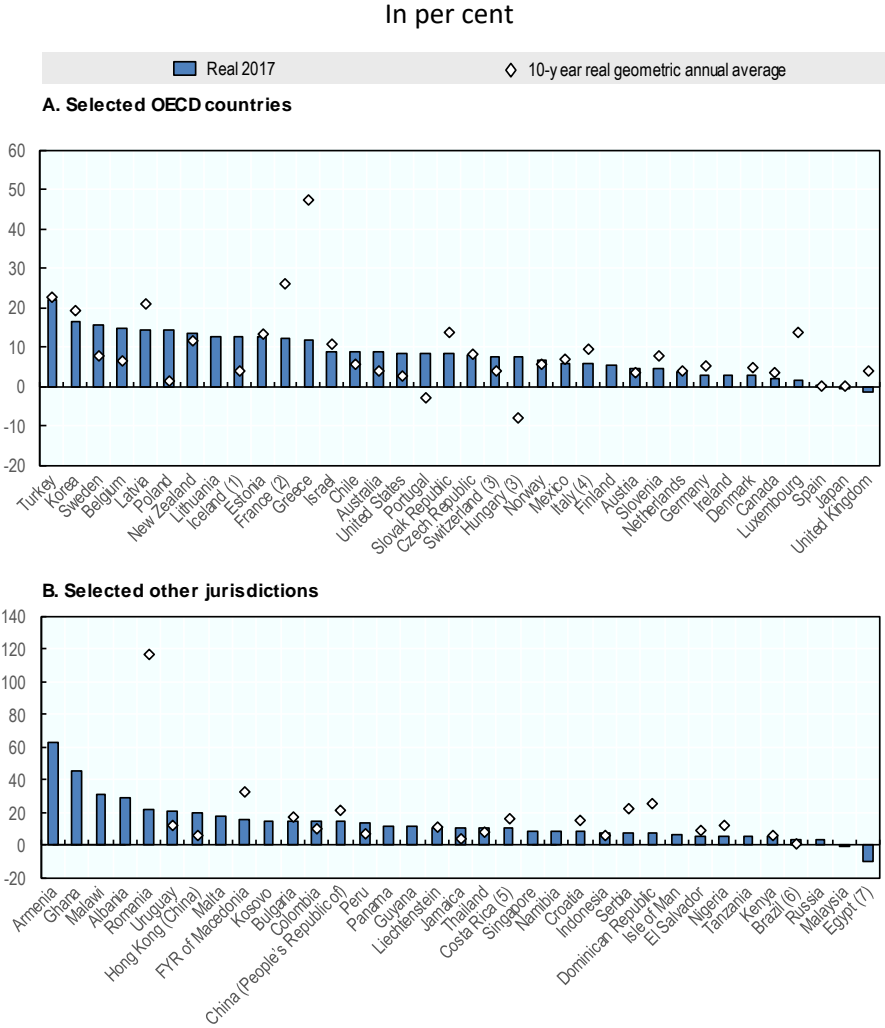
Note: Please see the methodological notes at the end of the report.
 Source: OECD Global Pension Statistics.

⁶ Table A.3 in annex shows the evolution of pension assets as a percentage of GDP over the last ten years.

The value of pension assets is much lower outside the OECD area (USD 1.6 trillion in 2017), and is also mostly held by pension funds (USD 1.3 trillion in 2017). Assets in pension funds and retirement savings vehicles are also rising globally, although the uneven country coverage across the years hampers a rigorous analysis of the trend.

Pension assets grew in most countries in 2017. All countries experienced an increase of pension assets in 2017 in real terms, except in Egypt, Japan and Malaysia where assets grew in nominal terms only (Figure 5).⁷ Armenia recorded the highest growth of assets in 2017 (63% in real terms), following the implementation of mandatory funded pension arrangements in 2014. The value of assets in pension plans increases as individuals join mandatory plans and contributions accumulate.

Figure 5. Annual growth rate of pension assets, in 2017 and over the last ten years



Note: Please see the methodological notes at the end of the report.
 Source: OECD Global Pension Statistics.

⁷ Pension assets grew in nominal terms in the United Kingdom as well. However, the 2017 value of pension assets is an early estimate taking only into account the flow of transactions in 2017 and not the value changes.

Over the last ten years, pension assets rose in real terms in 51 out of the 53 reporting countries, with the largest increases recorded in the Former Yugoslav Republic of Macedonia, Romania and Greece. Increases in pension assets in the first two countries may partly be the result of the inflows of contributions to mandatory plans starting in 2006 in the Former Yugoslav Republic of Macedonia and in 2008 in Romania. In the case of Greece, the large rise of pension assets is due to the transformation of four funds operating on a pay-as-you-go basis into funded occupational schemes in 2013.

In contrast, the size of the funded and private pension systems shrank in a couple of countries over the last decade. This happened in Hungary, where average real annual growth rate was -7.5% over the last decade and Portugal, where real growth was -2.4%. Following a pension reform, since 2011 new entrants to the labour market in Hungary have been enrolled in the public pay-as-you-go system only and no longer in a funded pension plan, while members of the previously mandatory funded pension plans were given the choice of keeping their accounts or transferring their assets into the pay-as-you-go system. Most of the participants chose to switch back to the pay-as-you-go system (Freudenberg et al., 2016), leading to a large drop in pension assets in 2011. In the case of Portugal, the decline in pension assets can be attributed to the transfer of assets in pension funds of some of the largest banks to the public pension system in 2011.

Poland and the Czech Republic also reformed their funded pension systems in 2014 and 2016 respectively, limiting the growth of assets in retirement savings vehicles. Poland transferred domestic sovereign bonds held by open pension funds into the social security system in 2014. While this reform led to a sharp decline in assets by almost 50% between 2013 and 2014, assets grew after 2014. Assets in pension plans in Poland were higher in 2017 (PLN 201 billion in 2017) than ten years before (PLN 142 billion in 2007), but still lower than before the reform (PLN 310 billion in 2013). In the Czech Republic, retirement funds with savings in the second pension pillar were terminated and wound up by the end of 2016. Assets in these funds were either paid in cash to individuals or transferred to voluntary pension plans. Despite this, the Czech Republic still recorded positive growth rates of assets in 2017 and over the last ten years.

Active members

Coverage rates are usually higher among countries with mandatory plans

The coverage rate of pension plans is another measure of the importance of funded and private pensions within each country. This coverage rate can be measured by the number of active members of a pension plan over the working age population (i.e. individuals aged 15 to 64 years old). Active members are individuals with assets in a pension plan and who are not retired yet. They may be actively contributing or may be holding rights in a plan.

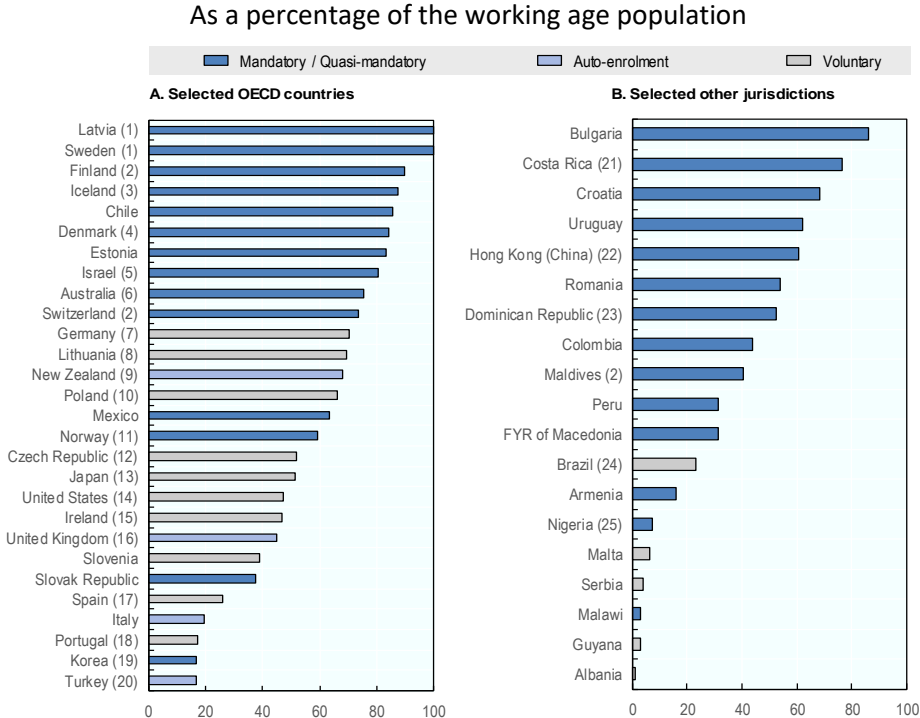
Individuals may be members of several plans in some countries. They may participate in mandatory or quasi-mandatory plans and/or in one or several voluntary plans. A plan is mandatory when employers have to set up a plan for their employees (e.g. Norway) or when employees have to contribute to a state funded pension scheme (e.g. Denmark, Latvia) or a private pension fund of their choice (e.g. Chile, Mexico). This report considers a plan as quasi-mandatory when employers are requested to set

up a plan for their employees as a result of labour agreements (e.g. Korea, Netherlands). A plan is voluntary if there is no compulsion for employers to set up a plan nor for employees to participate in a plan (e.g. Portugal, Lithuania). In some countries, employers have to enrol their employees in a pension plan under certain conditions, but employees have the option to opt out of the plan within a certain timeframe. These automatic enrolment programmes are set up at the national level in New Zealand, Italy, Turkey and the United Kingdom.⁸

Administrative data may count individuals as members several times if they hold accounts in several funds and there is no way to match duplicate records. If this is the case, administrative data are only useful to provide an estimate of the upper limit of what the true coverage is. The use of survey data (when possible) can solve the multiple counting issue when they allow to calculate the proportion of individuals having one or several pension plans among the surveyed population.

Available data show that the coverage of funded and private pension plans was the highest in 2017 in countries where participation in a plan was mandatory (Figure 6). More than 70% of the working age population was covered by a pension plan in 2017 in most of the OECD countries where participation in a plan was mandatory (e.g. Australia, Chile, Denmark, Estonia, Finland, Iceland, Israel).

Figure 6. Coverage of funded and private pension plans, latest year available



Note: Please see the methodological notes at the end of the report.
 Source: OECD Global Pension Statistics.

⁸ Some provinces in Canada (e.g. Quebec) and the United States give employers the possibility and choice to set up an automatic enrolment scheme for their employees or to incorporate automatic enrolment provisions in their existing scheme (OECD, 2014a).

Participation rate in mandatory plans was, however, lower in some OECD and non-OECD countries for various reasons. The coverage rate of mandatory plans was still relatively low in Armenia in 2017 (16%) as mandatory plans were only introduced recently. High rates of informal work in Mexico and Peru (ILO, 2016) may explain the relatively lower participation in mandatory plans (covering formal workers) compared to other OECD countries. In Malawi, the participation rate was also low in 2017 at 3.1%, as the Reserve Bank of Malawi reported that a considerable number of employers have not joined the mandatory pension system yet. In the case of the Slovak Republic, the coverage rate of mandatory plans may be lower than in other OECD countries as members have been given several opt-out windows since the inception of mandatory plans in 2005.

Pension coverage improved in countries that introduced automatic enrolment programmes such as New Zealand and the United Kingdom

The introduction of automatic enrolment has successfully led to higher coverage rates in New Zealand and the United Kingdom. The objective of automatic enrolment programmes is to increase the participation of individuals in a pension plan, relying on behavioural economics (e.g. inertia). The number of KiwiSaver members has kept increasing over the last years (FMA, 2017), and the coverage of funded and private pension plans in New Zealand (68%) was close in 2017 to most OECD countries with mandatory plans (Figure 6). The Department for Work & Pensions (DWP) in the United Kingdom found that the introduction of automatic enrolment in October 2012 improved the participation rate of working-age adults in a pension plan.⁹

The success of automatic enrolment was more limited in Italy as only 20% of the working age population was covered by a pension plan in 2017.¹⁰

Turkey still has a relatively low coverage compared to other countries as automatic enrolment has only been introduced recently and is gradually being phased in. Employees below 45 are enrolled in a pension plan at different dates depending on the size of the company, starting with the largest companies (i.e. companies with 1,000 or more employees) in January 2017 and ending in January 2019 for the smallest (i.e. companies with 5 to 9 employees). It is therefore still too early to know to which extent the coverage of funded and private pension plans will rise.

Some other countries have also just introduced automatic enrolment programmes (e.g. Germany in 2018 for occupational defined contribution pension plans for private sector employees in the case of deferred compensation, if specified in collective agreements) or are preparing legislation in this respect (e.g. Ireland, Lithuania and Poland).

⁹ See the outcomes of DWP's Family Resources Survey: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692771/family-resources-survey-2016-17.pdf

¹⁰ See OECD (2014a) for a detailed discussion on automatic enrolment programmes.

Payments from funded and private pension plans

Mature pension markets paid the largest amount of benefits in 2017

Payments from funded and private pension plans can take several forms depending on the country, such as lump sum payments, pensions or a combination of the two. Benefit payments can be paid as a full or partial lump sum under certain conditions in some countries. In Switzerland for instance, members can claim a payment of a quarter of their retirement assets as a lump sum benefit. Some countries allow full lump sum payments if the accumulated amount is too low (e.g. below EUR 12 300 since 1 January 2018 in Austria) or would not provide members a pension that is high enough compared to a threshold (as in Lithuania). A part of the lump sum payments may however be reinvested in alternative savings vehicles after the lump sums are taken out.

Individuals may have the option of receiving a pension from the entity managing their assets or from another entity. They can for instance purchase an annuity from a life insurance company such as in Chile. In this case, assets will be transferred from the entity in charge of the asset accumulation phase (i.e. AFPs in Chile) to the ones in charge of paying benefits to retirees.

The entity in charge of the pay-out phase may be a public entity such as in Latvia or Poland. Individuals in Latvia can choose to transfer their assets to the State Social Insurance Agency that will pay benefits combined with the ones from their notional account from the pay-as-you-go system. In Poland, open pension funds are now accumulation vehicles only since the pension reform in 2014. The accumulated assets are transferred to the Social Insurance Institution for the benefit payments to retirees.

Payments from pension providers to retirees or to entities in charge of the pay-out phase were the largest in Australia (6.9%), Denmark (5.5%), Iceland (5.8%), Switzerland (6.8%) and the United States (8.0%) among OECD countries, and South Africa (7.0%) and Liechtenstein (5.1%) among non-OECD jurisdictions (Figure 7). These countries tend to have mature pension systems with large amount of pension assets accumulated (over 80% of the GDP in all of them).

Figure 7. Benefit payments from funded and private pension arrangements, 2017

As a percentage of GDP

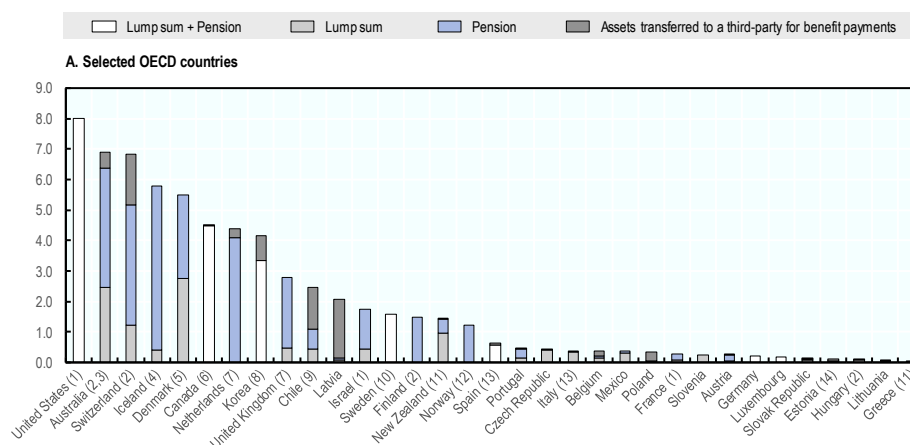
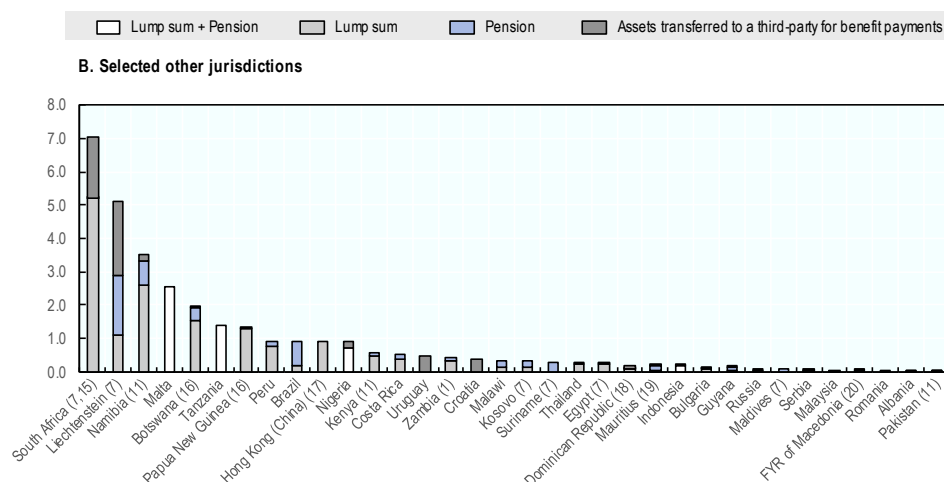


Figure 7. Benefit payments from funded and private pension arrangements, 2017 (cont'd)



Note: Please see the methodological notes at the end of the report.

Source: OECD Global Pension Statistics.

Among OECD countries, the largest transfers of assets to a third party were observed in Latvia (1.9% of GDP) and Switzerland (1.7% of GDP) in 2017.

Allocation of pension assets

Pension assets are mostly exposed to bills, bonds and equities in over 80% of reporting jurisdictions

Pension assets are mainly invested in fixed income securities and equities in over 80% of reporting jurisdictions. Bills, bonds and equities accounted for more than 50% of the investments of pension assets in 66 out of the 79 reporting jurisdictions (Figure 8). Pension assets may be invested in these instruments either directly or indirectly through collective investment schemes. For some countries however, the look-through of the investments of collective investment schemes is not available, e.g. Sweden (in which 65% of assets are invested) and the United Kingdom (28% of investments). The overall exposure of pension assets to fixed income securities and equities is therefore unknown in these cases and underestimated when considering direct investments in these instruments only.

Equities represented more than 50% of the investments of pension assets in five jurisdictions in 2017: Australia (58.2%) and Poland (85.2%) among OECD countries; and Hong Kong (China) (63.4%), Namibia (65.1%) and Mauritius (56.0%) among non-OECD jurisdictions.¹¹

Investments in bills and bonds alone accounted for more than half of the investments of pension asset managers in almost half of the reporting countries (36 out of 79). Pension assets were almost fully invested in bills and bonds in 2017 in the Dominican Republic (99.9% of assets). Other countries with

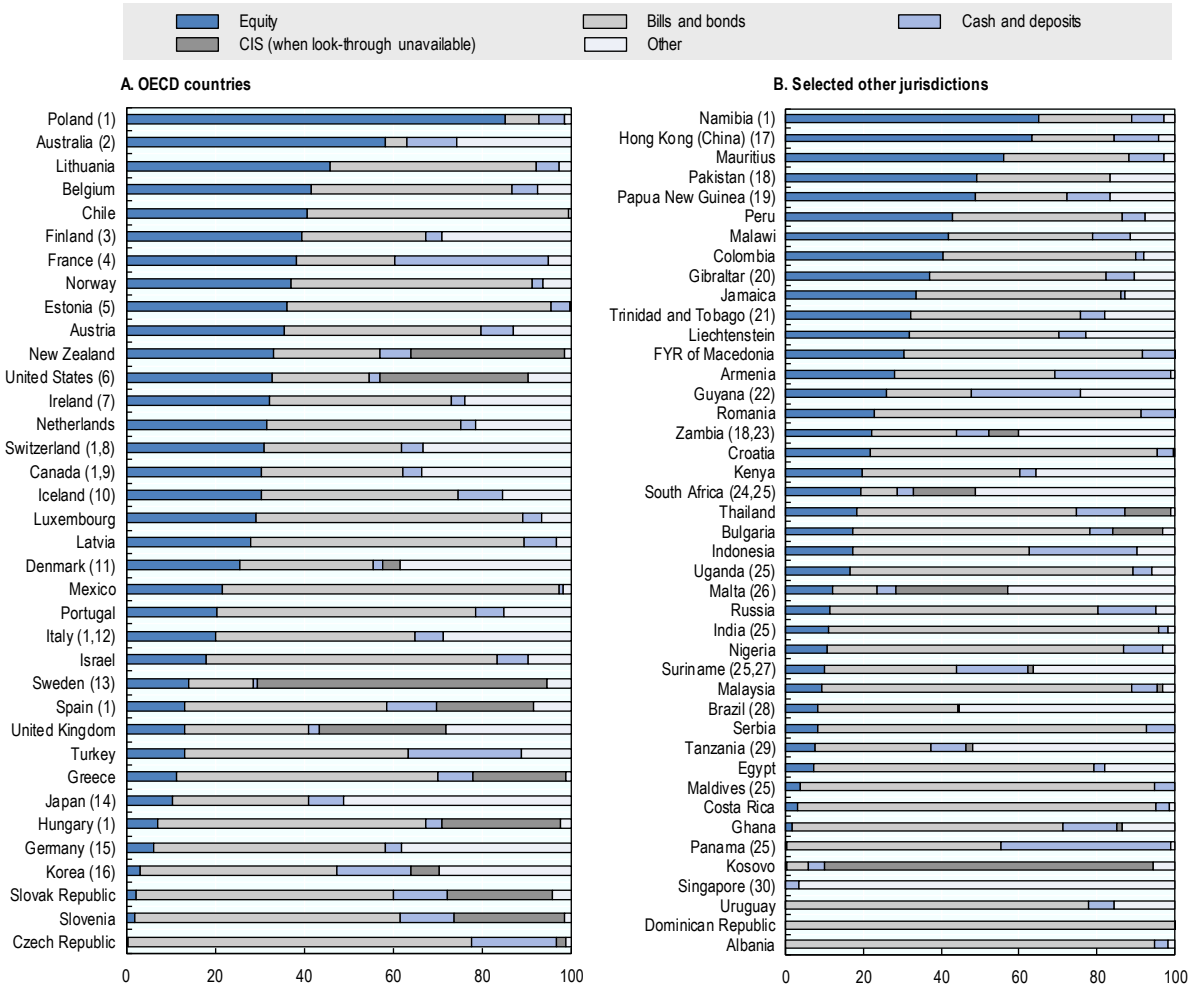
¹¹ The value for Hong Kong, China (63.4%) refers to the proportion of assets of MPF schemes and MPF-exempted ORSO registered schemes invested in equities. MPF schemes invested 70.0% of assets in equities in 2017.

more than 90% of investments in bills and bonds include Albania (94.7%), Costa Rica (92.1%) and the Maldives (91.1%).

Several reasons may account for the high proportion of investments in bonds in some countries. One of the reasons may be a lack of investment opportunities domestically, as reported by some national authorities (e.g. Albania, Malawi, Serbia). Albania has created a stock exchange only recently (the Albanian Stock Exchange) that may enable a greater diversification of pension fund assets, which are currently almost fully invested in bills and bonds.

Figure 8. Allocation of pension assets in selected investment categories, 2017

As a percentage of total investment



Note: Please see the methodological notes at the end of the report.
Source: OECD Global Pension Statistics.

Some pension funds looked for traditional investments providing a fixed and guaranteed income (e.g. Korea and the Czech Republic). Pension funds in Korea invested a significant share of their assets in interest-guaranteed products (e.g. deposits and bonds). Transformed pension funds offering a non-negative nominal guarantee to plan members in the Czech Republic invested in bills and bonds to receive a fixed income and be sure to meet their promise.

Investment regulations may also restrict pension fund investment into some less traditional asset classes. Most countries restrict or completely forbid investments in real estate (at least direct investments), private investment funds and/or loans (OECD, 2018a). Regulation may also require pension funds to hold a minimum proportion of pension assets in some instruments (e.g. in Poland, pension funds must hold at least 15% in equities in 2017 while investments in treasury bonds are banned).

Some countries have, however, loosened investment limits over the last years and encouraged investments in long-term projects or in companies adhering to ESG projects, such as in Mexico. In Croatia, the Mandatory Pension Funds Act from 2014 expanded investment opportunities for mandatory pension funds, allowing them to invest in infrastructure projects directly and in alternative investment funds.

Three African countries have more than 40% of assets in alternative investments in 2017

This report defines alternative investments as investments in asset classes other than cash, deposits, bills, bonds and equities.

Three African countries invested more than 40% of their assets in alternative investments in 2017: South Africa (51.3%), Tanzania (51.9%) and Zambia (40.3%). Investments in land and buildings partly explain this high value of alternative investments in Tanzania (where land and buildings represented 24% of total investment in 2017) and Zambia (21% of total investment). A significant share of pension assets in Tanzania was also invested in loans (27%). In South Africa, pension funds that fall under the Pension Funds Act held 48% of assets in unallocated insurance contracts.

Investment performance

Investment performance was positive in most jurisdictions in 2017

Pension assets achieved positive real net investment returns in most jurisdictions in 2017. Real investment rates of return of pension assets (net of investment expenses) were positive in 57 out of 60 jurisdictions, exceeding 5% in 22 of them (12 OECD countries and 10 other jurisdictions). Both the simple average real net investment rate of return and the average weighted according to the size of the pension system in terms of assets were above 4% in the OECD and outside the OECD area (Figure 9).

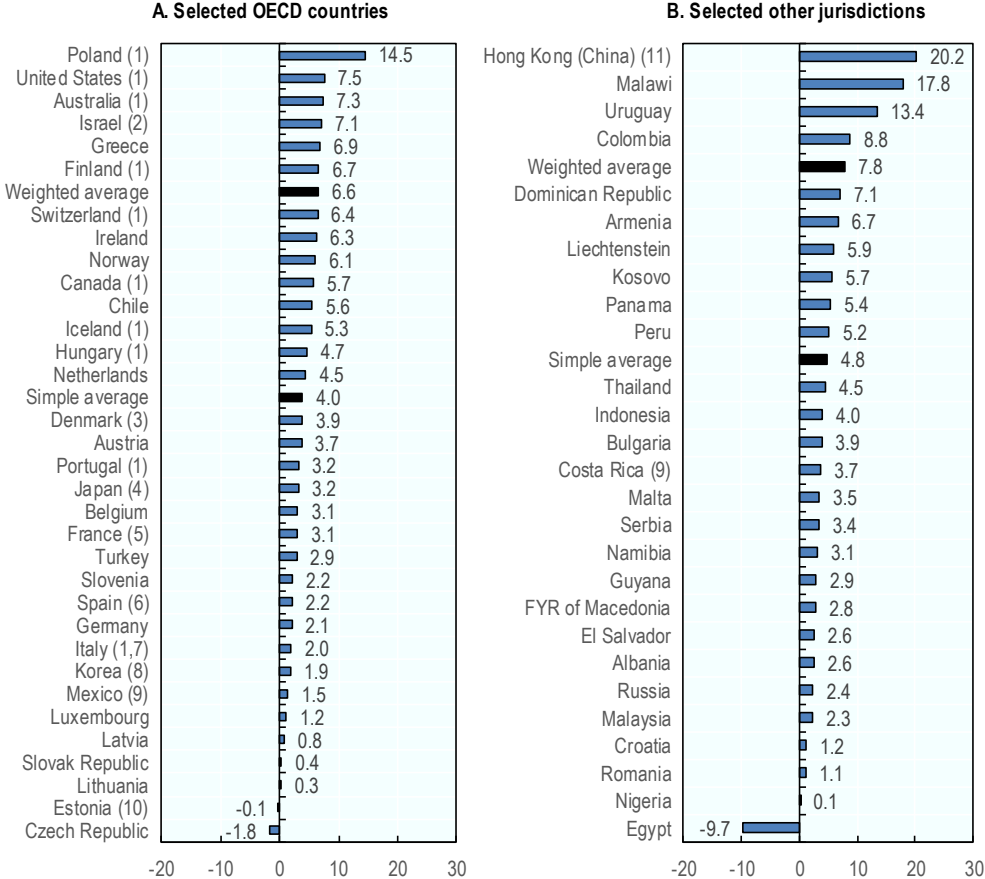
Booming stock markets in 2017 have probably driven these positive investment returns of pension assets worldwide. Major stock indices recorded a significant rise in their levels at the end of 2017 compared to the year before: by 9.3% for CAC 40 (France), 12.5% for DAX (Germany), 14.7% for FTSE 250 (United Kingdom) and 19.4% for S&P 500 (United States).¹²

¹² Source: Market Data Center of the Wall Street Journal. These results are year-to-date percent changes, given from the standpoint of a local investor.

Not surprisingly, countries that observed the highest real net investment returns were also among those where pension assets were invested the most in equities in 2017. The strongest real net investment rate of return in the OECD was achieved in Poland (14.5%), followed by the United States (7.5%) and Australia (7.3%). Pension asset managers achieved the highest real net investment rate of return in Hong Kong (China) (20.2%) and Malawi (17.8%) outside the OECD area. In these five jurisdictions, equities represented from 30% of investments (33% of investments for the United States) up to 85% of investments (in Poland). Mandatory provident funds in Hong Kong, China that exhibited the strongest real net investment rate of return worldwide in 2017, invested 70% of their assets in equities in 2017.

Figure 9. Real investment rates of return of pension assets, net of investment expenses, 2017

In per cent



Note: Please see the methodological notes at the end of the report.

Source: OECD Global Pension Statistics.

By contrast, pension assets did not yield positive net returns in real terms in three countries: the Czech Republic (-1.8%), Egypt (-9.7%) and Estonia (-0.1%). Different factors may explain this low performance in 2017: conservative investments bringing low returns below inflation (the Czech Republic) or high inflation (over 20% in Egypt), for instance.

Most countries achieved positive real average annual net investment rates of return since 2002

Returns over the long-term are even more important than short-term returns as assets are built up over a long time period.

Average annual net returns were positive in nominal terms in the 48 reporting jurisdictions over the last five years (Table 1). After adjusting for inflation over the same time period, average annual net returns remained positive in almost all jurisdictions except the Czech Republic (-0.1%), Nigeria (-0.4%), Russia (-0.5%) and Turkey (-0.8%) where real average annual net returns were close to but below 0%.¹³

Table 1. Nominal and real geometric average annual investment rates of return of pension assets, net of investment expenses, over the last 5, 10 and 15 years

In per cent

| | A. Selected OECD countries | | | | | | B. Selected other jurisdictions | | | | | | |
|-----------------|----------------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|---------------------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|-----|
| | Nominal | | | Real | | | Nominal | | | Real | | | |
| | 5-year annual average | 10-year annual average | 15-year annual average | 5-year annual average | 10-year annual average | 15-year annual average | 5-year annual average | 10-year annual average | 15-year annual average | 5-year annual average | 10-year annual average | 15-year annual average | |
| Australia | 9.6 | 4.9 | 6.7 | 7.5 | 2.5 | 4.2 | Albania | 5.1 | 6.0 | .. | 3.3 | 3.8 | .. |
| Austria | 4.8 | 2.9 | 4.0 | 3.3 | 1.1 | 2.0 | Bulgaria | 4.7 | 1.6 | 4.5 | 4.7 | -0.4 | 0.9 |
| Belgium | 6.4 | 3.9 | 6.1 | 5.1 | 2.1 | 4.0 | Colombia | 7.0 | 10.7 | 11.7 | 2.5 | 6.3 | 6.9 |
| Canada | 8.1 | 5.6 | 7.3 | 6.5 | 4.0 | 5.5 | Costa Rica | 8.8 | 8.2 | .. | 6.4 | 3.7 | .. |
| Chile | 7.5 | 5.1 | 7.4 | 4.0 | 2.0 | 4.1 | Dominican Republic | 10.3 | 11.5 | .. | 7.3 | 7.0 | .. |
| Czech Republic | 1.1 | 1.6 | 2.3 | -0.1 | -0.1 | 0.2 | El Salvador | 3.4 | 3.8 | .. | 2.7 | 2.1 | .. |
| Denmark | 5.3 | 5.8 | 6.3 | 4.6 | 4.4 | 4.7 | FYR of Macedonia | 6.2 | 5.0 | .. | 5.7 | 3.3 | .. |
| Estonia | 3.2 | 1.0 | 3.0 | 2.1 | -1.3 | -0.2 | Hong Kong (China) | 5.3 | .. | .. | 2.4 | .. | .. |
| Finland | 6.3 | .. | .. | 5.6 | .. | .. | Kosovo | 5.4 | .. | .. | 5.0 | .. | .. |
| Germany | 4.0 | 3.9 | 4.1 | 2.9 | 2.6 | 2.6 | Liechtenstein | 5.5 | 2.8 | .. | 5.7 | 2.8 | .. |
| Hungary | 6.8 | .. | .. | 5.9 | .. | .. | Malawi | 22.9 | .. | .. | 3.2 | .. | .. |
| Iceland | 7.1 | 5.6 | 8.1 | 4.8 | 0.8 | 3.2 | Malta | 2.1 | .. | .. | 1.2 | .. | .. |
| Israel | 6.0 | 5.5 | .. | 5.9 | 4.0 | .. | Nigeria | 11.4 | .. | .. | -0.4 | .. | .. |
| Italy | 3.5 | 3.0 | 3.7 | 3.0 | 1.7 | 2.0 | Panama | 5.1 | .. | .. | 3.7 | .. | .. |
| Korea | 3.5 | 4.0 | 4.1 | 2.3 | 1.8 | 1.6 | Peru | 5.5 | 4.1 | 8.0 | 2.4 | 1.0 | 5.0 |
| Latvia | 2.9 | 2.6 | 3.5 | 2.0 | 0.5 | -0.5 | Romania | 6.4 | 9.5 | .. | 5.5 | 6.2 | .. |
| Lithuania | 4.8 | .. | .. | 3.7 | .. | .. | Russia | 7.1 | .. | .. | -0.5 | .. | .. |
| Luxembourg | 3.9 | 2.9 | .. | 2.9 | 1.3 | .. | Serbia | 10.1 | 8.1 | .. | 7.9 | 2.6 | .. |
| Mexico | 4.8 | 6.2 | .. | 0.7 | 1.9 | .. | Thailand | 3.7 | .. | .. | 3.0 | .. | .. |
| Netherlands | 7.1 | 6.0 | 6.9 | 6.0 | 4.4 | 5.3 | Uruguay | 13.0 | 14.4 | .. | 4.5 | 6.0 | .. |
| Norway | 7.0 | 5.3 | 6.7 | 4.6 | 3.2 | 4.7 | | | | | | | |
| Portugal | 4.1 | 2.1 | 4.5 | 3.5 | 0.9 | 2.8 | | | | | | | |
| Slovak Republic | 2.1 | 1.2 | .. | 1.7 | -0.3 | .. | | | | | | | |
| Slovenia | 6.0 | 5.9 | .. | 5.5 | 4.6 | .. | | | | | | | |
| Spain | 4.4 | 3.0 | .. | 4.0 | 1.7 | .. | | | | | | | |
| Switzerland | 4.9 | 3.0 | 3.9 | 5.1 | 3.0 | 3.5 | | | | | | | |
| Turkey | 8.1 | 9.9 | .. | -0.8 | 1.3 | .. | | | | | | | |
| United States | 5.7 | 2.1 | 3.9 | 4.2 | 0.5 | 1.7 | | | | | | | |

Note: Please see the methodological notes at the end of the report.

Source: OECD Global Pension Statistics.

Calculating the 10-year average annual return was possible for 37 jurisdictions, all achieving positive average annual net returns in nominal terms over December 2007 – December 2017. In real terms, only four European countries had a negative net return during this 10 year-period that covered the financial crisis: Bulgaria (-0.4%), the Czech Republic (-0.1%), Estonia (-1.3%) and the Slovak Republic (-0.3%).

Calculating the 15-year average annual net return was possible for 21 jurisdictions, and was positive for all of them in nominal terms. After adjusting for inflation, the strongest average annual net return

¹³ Tables A.4 and A.5 in annex provide the nominal and real annual net investment rates of return from 2007 to 2017.

was achieved in Colombia (6.9%). Real average annual net returns over the last 15 years were also above 5% in Canada (5.5%) and the Netherlands (5.3%), and around 5% in Peru.

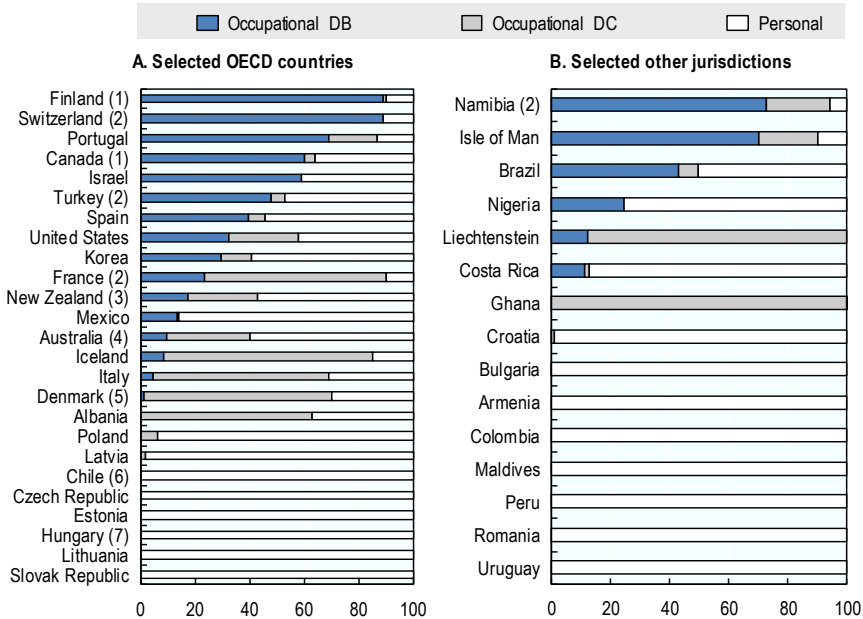
Structure of funded and private pension systems

Some of the largest markets still hold a significant share of assets in DB plans

Pension plans can be occupational or personal. Among occupational plans, there are defined benefit (DB) plans and defined contribution (DC) plans. The OECD taxonomy (2005) provides detailed definitions of these different types of plan.

Some of the largest markets still held a significant share of assets in DB plans in 2017. The majority of the assets were in DB plans in 7 out of 40 reporting jurisdictions in 2017 (Figure 10). More than half of pension assets were held in DB plans in Canada, Finland, Israel, Portugal and Switzerland among OECD countries, and Isle of Man and Namibia among non-OECD jurisdictions. In the United States, occupational DB plans accounted for 32% of pension assets in the country in 2017, still more than occupational DC plans (such as 401(k) plans) that represented 26% of pension assets.

Figure 10. Split of pension assets by type of plan, 2017
As a percentage of total assets



Note: Please see the methodological notes at the end of the report.
Source: OECD Global Pension Statistics.

Traditional DB plans are losing ground in some countries. The OECD (2016) showed that the proportion of assets or members in DB plans was shrinking compared to other plans in Australia, Iceland, Israel, the Netherlands, Mexico, New Zealand, Sweden and the United States for instance. This shift away from traditional DB plans to DC plans in some cases may be partly due to the cost for the plan sponsor to guarantee the financial sustainability of these plans by covering their funding shortfall. Broadbent et al. (2006) noted that the acceleration of the trend away from DB towards DC plans seemed to be

linked to pension underfunding. By contrast, the OECD (2016) did not observe a shift away from DB to DC plans at the national level in Canada over the period 2000-2015. At the end of 2017, DB plans held 60% of all pension assets in Canada.

This shift away from DB plans continued in Iceland with a reform at the end of 2016. This reform transformed the A-division of pension plan for state and municipal employees from DB to DC, removing the benefit guarantee of the employer.

Some countries have recently introduced new DC type pension plans. For instance, Germany has introduced a new DC plan in 2018 where employers are only responsible for paying the contributions into a pension fund or insurance company. Employers sponsoring these plans will not be responsible for guaranteeing a specified amount of benefits (BaFin, 2018). The new DC plan in Germany can only be concluded by social partners in a collective agreement and only annuities are permitted for the pay-out phase.

There is nowadays a full range of plans between traditional DB plans where plan sponsors bear all the risks (e.g. investment, inflation and longevity risks) and individual DC plans where individuals bear all the risks. The features of these plans may be closer to DB or DC plans but all have some risk sharing components between the different parties.

Special feature: Evolution of the funding position of defined benefit plans and its drivers

Sponsors of DB plans, usually employers, take on a liability as they commit to pay a certain amount of pensions, based on a formula generally linking wages and contributing period. There is a pension benefit promise. In the case of DB plans funded with dedicated assets, contributions are used to buy and accumulate assets to back those promises. When the value of assets is less than the value of liabilities, a DB plan is said to be underfunded. Plan sponsors are responsible for guaranteeing the funding of these plans. Under IAS 19, sponsors of DB plans have to report the difference between the fair value of assets and the liabilities of the DB plans in the statement of financial position. This shortfall can be seen as a form of long-term debt of employers held by employees. As this shortfall grows, the probability of default of plan sponsors also increases as it may be more expensive for plan sponsors to finance themselves and roll over their other debts.

The potential risks and the costs that underfunded DB plans may represent for plan sponsors have often been seen as one of the factors explaining the shift away from these plans towards DC plans. In DC plans, employers are not responsible for any shortfall, if any.

Although most of the risks lie with plan sponsors in the case of DB plans, especially traditional DB plans, members may face benefit cuts if the employers go bankrupt while the plan is underfunded. Some countries have introduced pension protection schemes to guarantee (partially) the benefit promise (e.g. in Germany, in the United Kingdom and in the United States).

This special feature examines the funding position of DB plans (aggregated at the national level) and its evolution over the last years among countries participating in the OECD/IOPS/World Bank Global

Pension Statistics (GPS) exercise. The funding position of DB plans is the ratio of assets and liabilities of the plans. Readers should not compare this ratio across countries as each country calculates it differently. The objective of this report is to identify long-term trends and potential underlying drivers.

Aggregated data hereafter show that the funding ratio deteriorated in most reporting countries compared to 2007, and was below 100% in 2017 in Iceland, Indonesia, Mexico, the United Kingdom and the United States. Multiple factors, sometimes unrelated, account for the evolution of assets or liabilities of DB plans to a variable extent, among them, the evolution of contributions paid into DB plans, improvements in life expectancy and changes in discount rates used to value liabilities. Policy makers should therefore remain vigilant about the evolution of this gap and its driving forces.

Measuring the funding position

Valuation of assets and liabilities

Assets and liabilities may be valued in different ways. Assets can be expressed at book or mark-to-market values. Liabilities may be valued differently depending on the assumptions on current members and new entrants (Eurostat, European Central Bank, 2011). One of the possibilities is to estimate accrued-to-date liabilities of the plan. This case excludes both additional rights that current workers could accrue after the valuation year and new entrants. Another possibility is to consider that current workers will continue to accrue rights, the scheme being open until the death of the last member with no new entrant joining the plan. This measures the current workers' and pensioners' liabilities (CWL). Another option is to examine open-system liabilities, taking into account new entrants in the valuation of the liabilities.

There are two main approaches to value accrued-to-date liabilities: the accrued benefit obligation (ABO) and the projected benefit obligation (PBO). The ABO approach measures the liabilities of the plan as if it were terminated immediately. Future benefit payments are calculated based on the salary and past service at the time of the valuation (Russell Investments, 2014). The PBO approach measures the liabilities of the plan taking into account the expected future increases in salaries. These increases in salaries may come from promotions that the plan members would get and/or to general increases of salaries (Eurostat, European Central Bank, 2011).

Liabilities may be measured for different purposes, such as accounting or regulatory purposes. Accounting standards define how to calculate liabilities of pension plans for reporting purposes in the financial statements. For instance, in the United States, the Federal Accounting Standard Board (FASB) requires an assessment of the liabilities following a PBO approach. The regulatory valuation of liabilities enables supervisors to assess if the plan meets the funding requirements set in the law. In the United States, the federal law ERISA (Employee Retirement Income Security Act) requires the use of a unit credit valuation method for determining minimum funding requirements for single-employer plans. This method defines the accrued liability based on the past service of plan members and their salary at the date of the valuation (GAO, 2014). This valuation is carried out on a similar basis as ABO in this case (Western Asset, 2011).

Evolution of the funding position of DB plans

This report calculates the funding position of DB plans as the ratio between investments of DB pension plans and the technical provisions, net of reinsurance, over the period 2007-2017 (or the longest period available). Calculations are based on data provided by national authorities participating in the OECD/IOPS/World Bank GPS exercise. These estimates may differ from the national authorities' own estimates and are not directly comparable across countries.

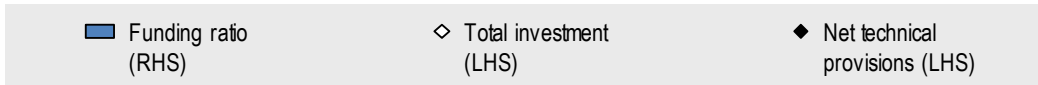
Investments of DB plans may be a low estimate of total assets. Assets of DB plans include investments in financial markets as well as receivables for the pension providers. These receivables are values that pension providers expect to receive but do not have yet. For instance, the Federal Reserve Bank of the United States includes claims of pension funds on plan sponsors as an asset of the pension funds. These claims reflect the amount of additional contributions that pension funds could claim against the sponsor of the plan to cover the funding shortfall. These claims are not part of the investments of the pension funds, as the plan sponsor has not paid them yet.

Technical provisions represent the amount that needs to be held to pay the actuarial valuation of the benefits that members are entitled to. This is the minimum obligation (liability) for all DB pension funds in all countries. These technical provisions may be valued differently across countries. Regulators may also require pension funds to hold more as a buffer to cover adverse scenarios and/or the cost of securing the transfer of full benefit payments to an insurer (i.e. solvency or buy-out) like in the Netherlands.

The aggregate funding position of DB plans deteriorated in most reporting jurisdictions over the last years. This position was lower in 2017 (or the latest year available) than in 2007 (or the first year available) for 9 out of the 15 reporting jurisdictions (Figure 11). By contrast, six jurisdictions, Denmark, Finland, Germany, Guyana, Liechtenstein and Luxembourg, had a higher funding ratio in 2017 than at the beginning of the period analysed, as assets (or more precisely investments) grew faster than liabilities (or more precisely net technical provisions) in all of them but Liechtenstein. In the case of Liechtenstein, the funding ratio improved as liabilities declined more than assets. The Financial Market Authority of Liechtenstein reported that many DB plans were converted into DC plans, leaving a single well-funded DB plan in the market.

The biggest drop in the aggregate funding ratio of DB plans between 2007 and 2017 happened in the Netherlands (difference of 47 percentage points (pp) between 2007 and 2017), in Mexico (24 pp difference) and Hong Kong (China) (22 pp difference). The fall of the funding ratio was particularly sharp in the Netherlands between 2007 and 2008, as pension fund investments declined in 2008 while their technical provisions increased. The ratio remained more or less the same since, between 100% and 110% (except in 2011). In Mexico, the decline was more progressive as liabilities increased more than investments between 2007 and 2017. In Hong Kong (China), while the funding ratio fluctuated up and down during the period, investments always exceeded net technical provisions, resulting in a funding ratio of DB schemes consistently higher than 100% during the period.

Figure 11. Assets and liabilities of DB plans (in billions of national currency) and their ratio (in per cent) in selected jurisdictions, 2007-2017



A. Improving funding ratio

A1. Funding ratio above 100% in the last year available

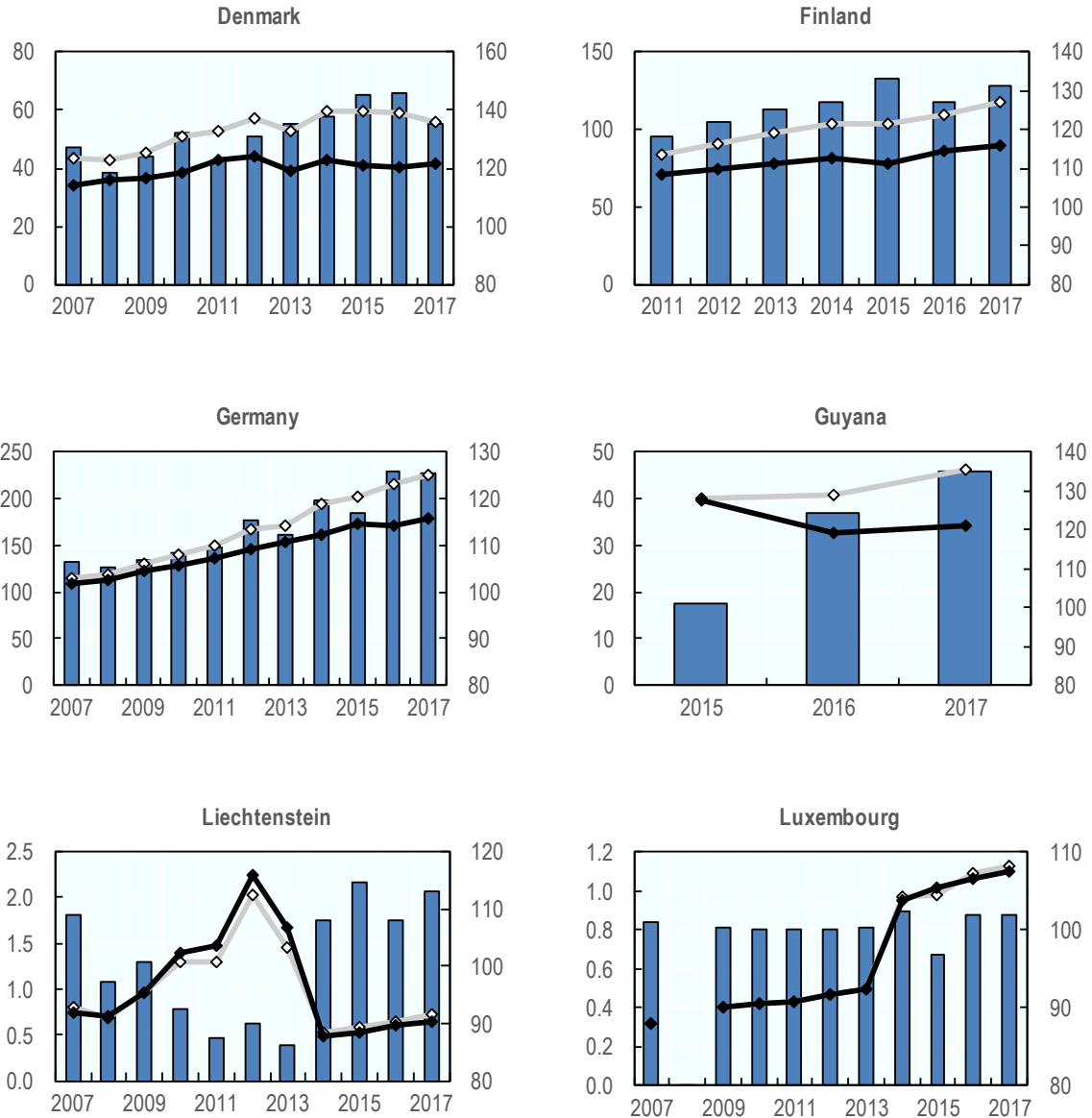
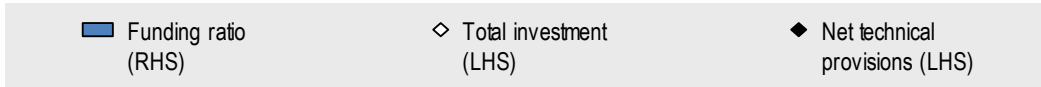


Figure 11. Assets and liabilities of DB plans (in billions of national currency) and their ratio (in per cent) in selected jurisdictions, 2007-2017 (cont'd)



B. Declining funding ratio

B1. Funding ratio above 100% in the last year available

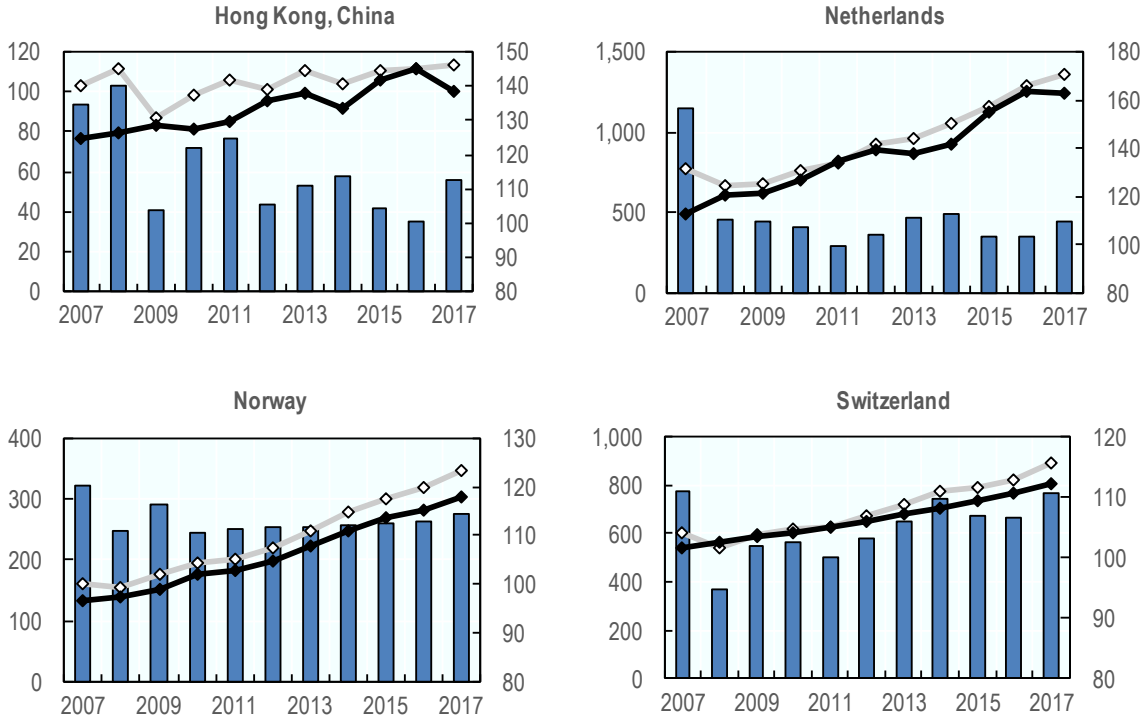
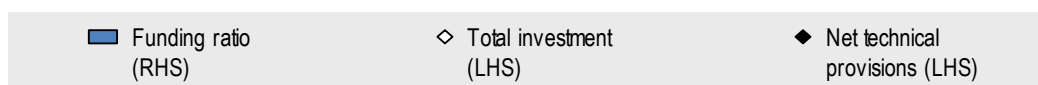
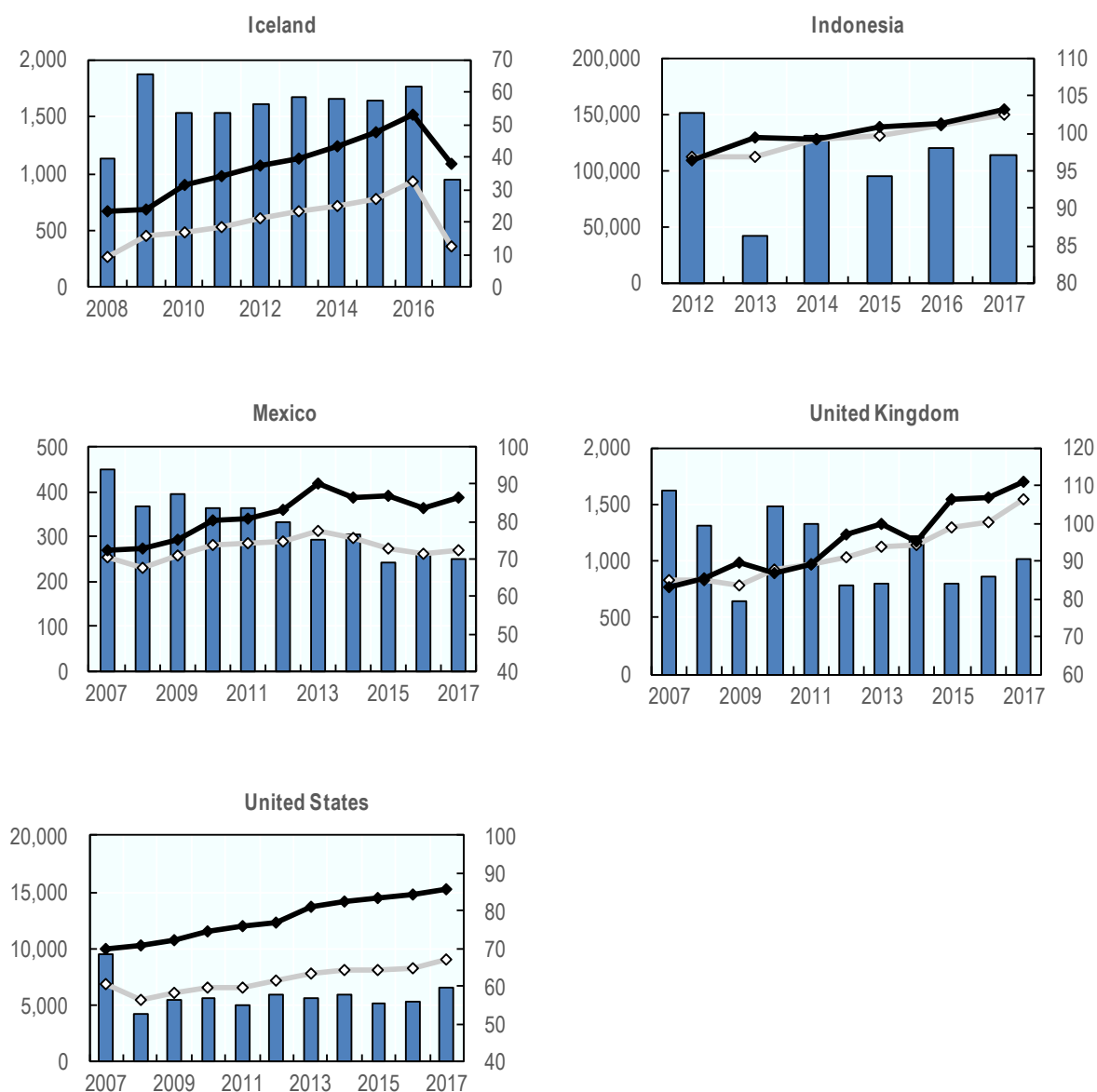


Figure 11. Assets and liabilities of DB plans (in billions of national currency) and their ratio (in per cent) in selected jurisdictions, 2007-2017 (cont'd)



B. Declining funding ratio

B2. Funding ratio below 100% in the last year available

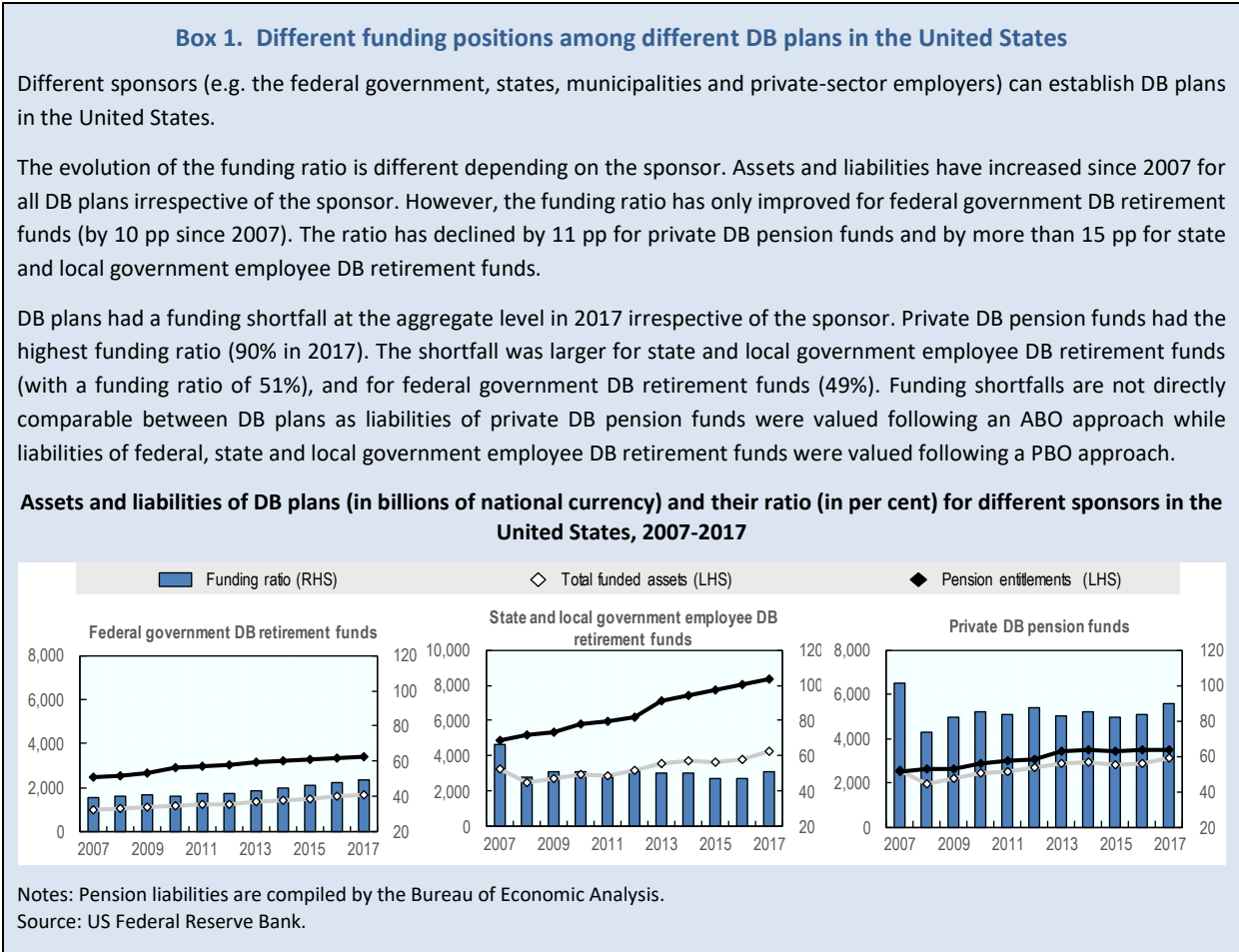


Note: Please see the methodological notes at the end of the report.
Source: OECD Global Pension Statistics.

Assets and liabilities of DB plans grew in general in countries where the funding ratio deteriorated. However, the growth of liabilities outpaced the growth of assets.

The latest estimates available show a funding ratio above 100% (at the aggregated level) in all reporting countries but Iceland, Indonesia, Mexico, the United Kingdom and the United States. The aggregated funding position of DB plans was lower in 2017 than ten years ago in these five countries. A worsening of the funding ratio occurred between 2016 and 2017 in Iceland due to a sharper decline of assets than liabilities as a public-sector scheme for state and municipal employees (one of the most funded) was converted into a DC plan.

The results examined are at the national level and thus hide differences between DB plans within countries. Box 1 provides an illustration for the United States.



The evolution of the number of DB plans may have an impact on the evolution of the funding position of DB plans aggregated at the national level. The number of funds with DB plans has declined in most reporting countries over the last decade except in Canada, Luxembourg (relatively steady number of CSSF-supervised pension funds managing DB schemes), Israel (no change), Namibia (no change) and Nigeria (Table 2).

Table 2. Number of DB funds (or DB plans) in selected jurisdictions in 2007, 2012 and 2017

| Jurisdiction | Number of: | 2007 | 2012 | 2017 |
|---------------------|---|--------|--------|--------|
| United States (1,2) | private DB plans | 48,982 | 43,601 | 45,672 |
| Canada (3,4) | DB trustee pension funds | 5,201 | 7,675 | 7,308 |
| United Kingdom (5) | DB schemes | .. | 5,590 | 4,960 |
| Switzerland (4,6) | occupational pension funds | 2,543 | 2,073 | 1,713 |
| Mexico | pension funds managing DB plans | 1,020 | 790 | 664 |
| Ireland (7) | DB schemes subject to funding standard | 1,444 | 933 | 640 |
| Hong Kong (China) | DB ORSO schemes | 1,304 | 585 | 439 |
| Brazil (8) | occupational DB schemes | 362 | 344 | 327 |
| Netherlands (4) | pension funds | 714 | 385 | 272 |
| Indonesia (9) | EPF DB funds | 216 | 201 | 169 |
| Germany | Pensionsfonds and Pensionskassen | 178 | 177 | 167 |
| Portugal | pension funds managing DB plans | 174 | 153 | 136 |
| Norway | pension funds | 109 | 85 | 85 |
| Belgium (10) | DB pension funds | .. | 103 | 82 |
| New Zealand (11) | DB superannuation schemes | 122 | 98 | 78 |
| Guyana | DB pension schemes | .. | .. | 36 |
| Nigeria | pension funds managing DB plans | 17 | 23 | 24 |
| Israel | old pension funds | 19 | 19 | 19 |
| Denmark | company pension funds | 36 | 27 | 17 |
| Italy (12) | DB pre-existing autonomous pension funds | 23 | 20 | 16 |
| Luxembourg (2) | CSSF-supervised pension funds managing DB plans | 6 | 5 | 6 |
| Iceland | pension funds for public-sector workers | 21 | 12 | 5 |
| Costa Rica | complementary mandatory occupational DB schemes | .. | .. | 5 |
| Namibia (4,13) | DB funds | .. | 2 | 2 |
| Liechtenstein | DB funds | 4 | 7 | 1 |

Note: Please see the methodological notes at the end of the report.

Source: OECD Global Pension Statistics.

A reduction in the number of schemes may be the result of the termination of DB plans, mergers of pension schemes and funds or a consolidation in the pension sector.¹⁴ According to the Dutch Central Bank, the financial position of the funds, the tightening of funding requirements and the costs of pension administration are potential explanations for the decision to liquidate or merge DB plans.¹⁵ DB plans that are liquidated might be those with the largest funding gap. In this case, their termination would be expected to reduce the gap between assets and liabilities at the national level. It is however difficult to detect and precisely assess the sole effect of termination, merger and consolidation of some DB plans on the overall funding gap of all DB plans at the aggregate level.

Box 2. Freeze and termination of DB plans

Sponsors of DB plans (usually employers) may have different possibilities to move away from the costs and risks that underfunded DB plans may bring depending on the country:

- Employers can freeze the plan: the plan is still open but usually closed to new members. Employers can continue to pay contributions to cover any funding shortfall. Benefits may continue to accrue for existing members (soft freeze) or stop accruing (hard freeze).

¹⁴ Box 2 provides a brief explanation of the difference between termination and freeze of a DB plan.

¹⁵ See DNB Bulletin, "Pension fund consolidation continues – general pension funds are gaining market share" published in 2017: <https://www.dnb.nl/en/news/news-and-archive/dnbulletin-2017/dnb362426.jsp>

- Employers can terminate the DB plan. In this case, the funding position of the plan is fixed. Benefits are distributed to employees as a lump sum (if allowed by the law or plan rules) or assets in the plans are transferred to a third-party in charge of paying benefits to members (e.g. an annuity provider).

The termination of a plan may be subject to some conditions or specific cases. The bankruptcy of the sponsor can trigger the termination of DB plans. The Pension Benefit Guaranty Corporation in the United States allows plan sponsors who are not in financial distress to terminate a DB plan but the plan has to be fully funded.

Factors driving the evolution of assets in DB plans

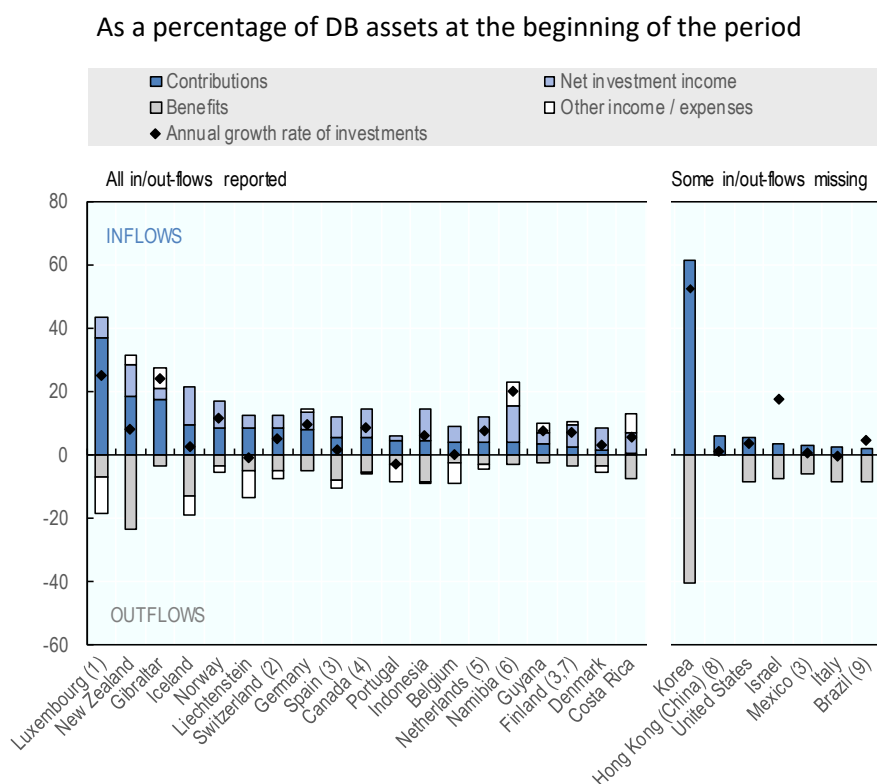
The evolution of assets in DB plans can be the result of several factors. Some of these factors, such as contributions to DB plans, automatically lead to an increase of the amount of assets while others, such as operating expenses of pension funds and benefits paid to retirees, reduce the amount of assets in the plans. Investment performance may either increase or reduce the amount of assets in the plan depending on developments of financial markets.

Assets in DB plans have continued to grow in most countries as inflows in DB plans have exceeded outflows. DB plans received more contributions and other income than they paid in benefits or incurred with other losses or expenses over the last decade. Figure 12 shows that contributions represented the largest share of inflows in DB plans in seven reporting jurisdictions: Germany, Gibraltar, Liechtenstein, Luxembourg, New Zealand, Portugal and Switzerland.

The amount of contributions paid into DB plans mostly depends on the number of members contributing, wages and contribution rates for employers and/or employees. The number of DB plan members is declining in some countries such as Ireland or the United Kingdom, but remains stable or has even further increased in some of the largest pension markets such as Canada, Switzerland and the United States (OECD, 2016). Annual wages have increased in real terms in most OECD countries over the last decade, except in Greece, Italy, Mexico, Portugal and the United Kingdom (OECD, 2018b). The contribution rates usually depend on the plan rules (such as in Germany, Ireland, Japan, Portugal) and actuarial valuation of the plans (such as in Brazil). Contributions (especially employer contributions) may be tied to the funding position of the plan and employers may be requested to contribute more to cover funding shortfalls. This happened for instance in Portugal in 2014 where DB plan sponsors made additional contributions to maintain adequate funding levels following the increase of the liabilities of DB plans resulting from a change in actuarial assumptions (ASF, 2015).

Financial markets also contributed to the increase of assets in DB plans in all reporting countries. The average investment income was positive in all 19 reporting jurisdictions over the reporting period and exceeded investment expenses, which are already deducted from investment income in Figure 12. Investment income was the main driver of the increase of pension assets on average in 11 out of 19 reporting jurisdictions, exceeding the annual average amount of contributions to the plans. This was the case in Iceland and Namibia where DB assets yielded a relatively high income compared to the amount of assets in the plan.

Figure 12. Average annual income and expenses of DB plans in selected jurisdictions, 2007-2017 (or the longest time period possible)



Note: Please see the methodological notes at the end of the report. Countries where some of the inflows (such as net investment income) or outflows (such as benefits paid) are missing are shown separately in the chart.

Source: OECD Global Pension Statistics.

Benefits paid represented the largest outflows of DB plans in 15 out of the 19 reporting jurisdictions. However, they did not exceed the amount of inflows in any of these 15 jurisdictions.

While benefit payments reduce the amount of assets in DB plans, it is important to note that benefit payments to pensioners also reduce the pension obligations to these pensioners. Benefit payments therefore affect both the asset and liability side of the balance sheet of DB plans.

Factors driving the evolution of liabilities of DB plans

Parameters of the benefit formula: wages, tenure and accrual rates

Members' entitlements in traditional DB plans are usually based on their wages, number of years of employment in the sponsoring company and an accrual rate. A change in any of these three parameters may affect the evolution of the liabilities of DB plans.

Calculations of members' entitlements may be based on different formulas that can use their final salary or an average salary calculated over a certain number of years, for instance. Both types of formula (final salary or career-average salary) are used in Canada, Germany, the Netherlands and the United Kingdom. In career-average salary schemes, the amount of benefits that members could expect

from their plans could be lower than in final salary schemes (for similar accrual rates) when salaries at the beginning of the career are lower than the final salary and early salaries are not indexed to inflation and wage growth.

DB plans offering benefits based on career-average salary are gaining prominence in some countries such as Canada and the Netherlands. Career average salary schemes accounted for 46% of all defined benefit registered pension plans in 2017, which is more than in 2007 (43%) and in 2002 (31%).¹⁶ In the Netherlands, many pension funds changed the benefit calculations from a final salary to a career average salary basis (Pensions Policy Institute, 2014). The proportion of pension funds offering career average rather than final salary schemes rose from 16% in 1998 to 57% in 2014 in the Netherlands according to the Pensions Policy Institute (2014).

In both final and career average salary schemes, an increase in wages lifts the amount of contributions and therefore the assets but may also lead to changes in the estimation of the net present value of the liabilities of the plans, *ceteris paribus*. Changes in wages that deviate from what pension funds expected may lead to changes in the estimation of liabilities. Liabilities may therefore increase if wage growth was underestimated in previous valuations.

Changes in accrual rates also have an impact on the evolution of liabilities of DB plans. Any increase (decrease) in the accrual rates would increase (decrease) the liabilities of the plan, *ceteris paribus*.

Regulators may cap accrual rates, such as in the Netherlands. The Netherlands sets a maximum accrual rate for career-average DB schemes and final-pay schemes. This ceiling increases as members delay their retirement date. In 2015, the maximum accrual rate for career-average schemes declined from 2.15% to 1.875% in the Netherlands.

Benefit payments may be indexed. In this case, the evolution of the index on which benefits are pegged also affects the value of the liabilities. Members' benefits may be indexed to inflation in order to guarantee the amount of benefits that members will receive in real terms. Different indices may be chosen (e.g. retail price index, consumer price index). Annual inflation was positive but below 3% in the OECD area over the last years.¹⁷

Life expectancy

Improvements in life expectancy increase the value of the liabilities of DB plans, *ceteris paribus*. Increases in life expectancy result in longer periods of benefit payments to retirees for DB pension funds for a given retirement age. The OECD (2017) showed that life expectancy has increased for both men and women in the OECD over the last decades.

¹⁶ Results come from data published by Statistics Canada in Table 11-10-0111-01 (formerly CANSIM 280-0017).

¹⁷ See the OECD Consumer Price Index press release of July 2018: <http://www.oecd.org/sdd/prices-ppp/OECD-CPI-09-2018.pdf>

Pension funds face the risk of failing to account accurately for future improvements in life expectancy and mortality. Pension funds use mortality tables to assess how long benefits will have to be paid to plan members and to calculate their liabilities. These mortality tables need to take into account future improvements in life expectancy to avoid underestimating the liabilities of DB plans. They should also be updated regularly to reflect the outcomes of the latest experiences and observations (OECD, 2014b). Any deviation between the predicted and actual life expectancy of plan members would result in an increase in liabilities (as happened in the United Kingdom according to DWP (2017)) which assets have not been accounted for.

Discount rates

Liabilities are the net present value of future benefits. The stream of future payments need to be discounted to bring it to today's terms. The lower the discount rates, the higher the present value of future benefit payments.

The choice of the discount rate varies across and sometimes within countries depending on the purpose of the valuation of the liabilities. In Germany, the maximum discount rate for the calculation of technical reserves is set at 0.9% by regulation. The discount rate for Pensionskassen and Pensionsfonds offering insurance-like guarantees becomes fixed for the term of the contract. Pensionsfonds use a discount rate based on the expected returns on assets if they do not offer insurance-like guarantees. In the Netherlands, pension funds can use an Ultimate Forward Rate (UFR) for the valuation of liabilities. The UFR is based on an average of annual real interest rates and on inflation expectations. Pension plans in Canada must calculate liabilities and be fully funded on both a going concern and solvency basis, each using different discount rates. In the case of a going concern valuation (that assumes that the plan will continue indefinitely), liabilities are discounted at an expected return on assets or yield on fixed income investments. By contrast, they are discounted at another rate based on the yield of long-term government bonds for the solvency valuation (that assumes a winding up of the plan and the purchase of an annuity).

A decline in long-term interest rates may put upward pressure on liabilities. Long-term interest rates have declined and reached low levels for a prolonged period (OECD, 2015). As they fall, these long-term interest rates increase the value of liabilities when they are used as discount rates for the valuation of liabilities. The OECD (2015) further discusses the impact of changes in interest rates on the value of DB plan liabilities as well as on their assets, as pension funds may have to re-invest proceeds of maturing long-term government bonds into lower-yield bonds.

Concluding remarks

The funding ratio of DB plans was below their pre-financial crisis levels in most reporting countries in 2017 but remained above 100% in all of them but in Iceland, Indonesia, Mexico, the United Kingdom and the United States. In these five countries, the funding ratio had already been below 100% for several years. Assets and liabilities in DB plans have continued to increase in most countries despite the shift away of plan sponsors from DB to DC plans that is happening in some of them (such as the United States), but the growth rate of liabilities outpaced the growth rate of assets.

Various factors drive the evolution of assets and liabilities of DB plans. Some only affect the asset or liability side of DB plans. For instance, accrual rates only affect the liabilities and have no (direct) impact on the level of assets. Some other factors influence both the assets and the liabilities, e.g. the number of members, benefits paid, wages. The effect of the evolution of membership on the assets and liabilities depends on the age structure of members. Benefits paid to retired members reduce plans' assets and the liabilities at the same time. Changes in wages affect directly assets, but only affect liabilities to the extent that changes deviate from what pension funds were expecting as they would need to update their parameters to estimate liabilities. Inflation also affects all the financial components in the calculations of the funding ratios.

If liabilities of DB plans continue to grow faster than assets as can be seen in many countries, declining funding ratios may be a source of concern even in countries where the ratios are currently above 100%. Policy makers therefore need to monitor the evolution of funding ratios and continue to examine options to protect plan members and sponsors against risks stemming from underfunded pension plans.

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Methodological notes

The primary source material for this report is provided by national pension authorities as part of the framework of the OECD Global Pension Statistics (GPS). Data come from official national administrative sources and are revised on an on-going basis so as to better reflect the most recent figures for every past year. Caution should be exercised when interpreting some statistics given possible divergences with national reporting standards and different methods for compiling certain data for the Global Pension Statistics exercise. For this reason, countries are regularly requested to provide methodological information relevant for developing a thorough understanding of their submission under the GPS framework. The general and specific methodological notes below provide some explanations in this respect.

General notes

- Conventional signs: “..” means not available; “LHS” means left-hand side axis; “RHS” means right-hand side axis.
- The GPS exercise covers all pension plans (occupational and personal, mandatory and voluntary) irrespective of the population covered (e.g. public or private sector workers), of the pension provider and manager, as long as these plans are funded. Book reserved pension plans (i.e. employers’ provisions or reserves in their balance sheets for occupational pension plan benefits) are also in the scope of the GPS exercise. The definitions of pension plans by the OECD’s Working Party on Private Pensions are available in the publication *Private Pensions: OECD Classification and Glossary*, available at www.oecd.org/daf/pensions.
- This report provides statistics for the whole funded and private pension system of the reporting jurisdictions unless specified otherwise and except for: Austria (Pensionskassen only), Belgium (Institutions for Occupational Retirement Provision (IORPs)), Germany (Pensionskassen and Pensionsfonds), Greece (occupational plans), Hungary (pension funds only before 2016), Ireland (occupational schemes and personal retirement savings accounts from 2014 onwards), Israel (old, new and general pension funds), Luxembourg (pension funds under the supervision of the Luxembourg Financial Supervisory Authority (CSSF) or the Insurance Commission (CAA)), Netherlands (pension funds), Norway (pension funds), Portugal (closed and open pension funds and personal retirement saving funds), Switzerland (occupational plans only before 2013), Turkey (personal plans) and the United Kingdom (pension funds) among OECD countries; and Armenia (mandatory pension funds), Brazil (closed pension funds only before 2014), China (People’s Republic of) (enterprise annuity schemes for employees), Costa Rica (personal plans only before 2015), Gibraltar (occupational plans), India (National Pension System (NPS) schemes and the contributory scheme Atal Pension Yojana (APY)), Indonesia (employer pension funds and financial institution pension funds), Malaysia (annuity plans regulated and supervised by Bank Negara Malaysia), Mauritius (voluntary occupational plans), Pakistan (voluntary pension funds authorised under the Voluntary Pension System Rules), Singapore (Central Provident Fund (CPF)), Suriname (company pension funds), Tanzania (mandatory schemes and personal voluntary schemes run by approved administrators) and Thailand (Thai provident funds) among non-OECD jurisdictions. Data on book reserve plans in Finland are not available.
- This report is mainly based on the answers of national authorities to an annual survey. Statistics for some jurisdictions come from publicly available reports, databases or websites of other national or international organisations: Japan (Bank of Japan) and Switzerland (Federal Social Insurance Office publication *Statistique des assurances sociales suisses* for personal plans) among OECD countries; and Argentina (International Association of Pension Funds Supervision (AIOS)), Bolivia (AIOS), China (People’s Republic of) (Ministry of Human Resources and Social Security (MOHRSS)), Croatia (website of the Croatian Financial Services Supervisory Agency (HANFA) before 2014), the Dominican Republic (AIOS before 2014), El Salvador (AIOS), Panama (AIOS), Singapore (CPF Board Annual Reports) and Uruguay (AIOS before 2016) among non-OECD jurisdictions.
- The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of International law. Data for Israel refer to old, new and general pension funds only.
- The reference period is the calendar year, except for: Australia and Egypt (up to 2016 included) where the reference period is the financial year ending in June; and New Zealand (until 2014). Data for New Zealand up to 2014 are based on a 31 March balance date for most of the schemes.
- Data on pension funds for 2017 are preliminary estimates for Switzerland and the United Kingdom. Data for the year 2017 on occupational pension plans in Switzerland refer to the first trend calculations. The value of pension fund investment in the United Kingdom at the end of 2017 is an early estimate based on the 2016 level of assets and the flow of transactions in 2017, and does not take into account value changes.
- This report uses four main additional reference series: exchange rates to convert values in US dollars, GDP, the variation of the consumer price index (CPI) and population:

- This report uses end-of-period exchanges rates for all variables valued at the end of the year, and period-average rates for variables representing a flow over the year. These rates come from the IMF International Financial Statistics database.
- GDP values for OECD countries are extracted from the OECD Annual National Accounts and Quarterly National Accounts databases. GDP values for non-OECD jurisdictions come from the IMF *World Economic Outlook* published in April 2018, except for Gibraltar (*Abstract of Statistics 2015* of the Statistics Office of Gibraltar) and Liechtenstein (UN National Accounts Main Aggregates Database).
- Consumer price indices are from the OECD Main Economic Indicators database for OECD countries, and from the IMF International Financial Statistics database for non-OECD jurisdictions except for Gibraltar (*Abstract of Statistics 2015* of the Statistics Office of Gibraltar) and Isle of Man (*Isle of Man Inflation Historic Datasets* of the Economic Affairs division of the Cabinet Office).
- Data on population (in most cases individuals aged 15 to 64) are from the OECD Labour Force Statistics database for OECD countries (except the Czech Republic and New Zealand) and from the World Bank World Development Indicators for all the other jurisdictions.

Specific notes

Figure 1:

These maps show the amount of assets in funded and private pension arrangements (in USD trillion and as a percentage of GDP) in a selection of jurisdictions in 2017, except for Botswana (2013), Gibraltar (2013), India (2016), Lesotho (2012), Liechtenstein (2016), Maldives (2016), Pakistan (2015), Papua New Guinea (2013), South Africa (2016), Suriname (2016), Trinidad and Tobago (2012), Uganda (2016) and Zambia (2015).

Figure 2:

The geographical distribution was calculated as the amount of total pension assets in a country relatively to the whole OECD area. Data for personal plans for Switzerland refer to 2016 instead.

Figure 3:

The weighted averages in and outside the OECD area are calculated by using weights based on the share that pension assets in a given country represent compared to the overall amount of pension assets in the area considered. (1) Data for personal plans for 2017 refer to 2016 instead. (2) Data on PERCO plans for 2017 come from the French Asset Management Association (AFG) and refer to end 2017. Data on pension insurance contracts for 2017 refer to 2016 instead. (3) Net technical provisions are taken as a proxy of pension assets in book reserves. (4) Data refer to 2016. (5) Data refer to 2013. (6) Values for personal plans refer to the total amounts of assets of all companies whose retirement savings products represent the majority of their premium revenues. A part of these amounts may however include assets related to non-pension products. (7) Data refer to 2012. (8) Data refer to some occupational voluntary pension schemes only. (9) Data refer to 2015.

Figure 4:

Totals in a given year are calculated on all the countries for which a value is available. The number of countries that the totals include may therefore vary over the years. Totals are expressed in current prices.

Figure 5:

These charts show the growth rate of pension assets between 2016 and 2017 and the geometric average annual growth rate over the last years (in real terms). (1) Data exclude pension insurance contracts. (2) Data refer to PERCO plans only. (3) Data refer to pension funds only. (4) Net technical provisions are taken as a proxy of pension assets in book reserves. (5) Data refer to personal plans only. (6) Data refer to closed pension funds only. (7) The growth rates of pension assets in 2017 are calculated over the period June 2016-December 2017.

Figure 6:

Data refer to 2017, unless stated otherwise. (1) The coverage is close to 100%. (2) Data refer to 2016. (3) The coverage rate includes foreign workers in Iceland. (4) This result is the ratio of ATP members below the retirement age and paying contributions in 2017 over the population aged 15 to 64. (5) Data refer to new pension funds only. A saver can be an active member in more than one pension fund. (6) Source: ABS Survey of Income and Housing 2015-16. (7) Source: Federal Ministry of Labour and Social Affairs ("Survey on Pension Provision 2015"). The coverage rate refers to 2015 and is expressed with respect to employees aged 25 to 64 subject to social insurance contributions. (8) Data refer to the membership of the 2nd pillar only. (9) Source: KiwiSaver website. Data include individuals below 18. (10) Data refer to members of open pension funds only. (11) Source: Finance Norway. The coverage rate of mandatory plans is based on the number of active members in private group pensions and municipal group pensions. It is compulsory for government employees (who represent a

significant part of the Norwegian working population) to be members of the Norwegian Public Service Pension Fund, financed by the Norwegian State Budget. This Fund is out of the scope of this report and members of this Fund are therefore not taken into account in this chart. (12) The coverage of pension plans in the Czech Republic is calculated over the population below 65 as children may be members of plans opened by their parents. (13) Source: Ministry of Health, Labour and Welfare. (14) Chapter 4 of the *OECD Pension Outlook 2012*. (15) Source: Quarterly National Household Survey, Module on Pensions Q4 2015. The coverage rate represents the proportion of workers aged between 20 and 69 with a pension plan. (16) Data come from DWP's Family Resources Survey 2016/2017. (17) Source: Spanish Survey of Household Finances (EFF) 2014 by Bank of Spain. The result shows the percentage of households with a pension scheme (or a unit-linked or mixed life insurance product). (18) Source: Inquérito à Situação Financeira das Famílias (ISFF) (2013 edition). The value refers to the proportion of households having a voluntary pension plan. (19) Data refer to 2016. (20) The coverage rate for Turkey shows the number of individuals who are members of a private pension plan and/or an auto-enrolment plan among the working age population. Individuals who are members of several plans are only counted once. (21) Data refer to the number of members of mandatory supplementary pension schemes only. (22) Data refer to the number of members of MPF schemes and other retirement schemes. The coverage rate would be 85% if the employed population was used as the denominator instead of the working age population. (23) Data refer to all the affiliates of the private pension system. Only half of the affiliates were contributing in 2017. (24) Data refer to the active participants of open pension funds only. (25) Data refer to the number of members of contributory pension schemes.

Figure 7:

(1) Data refer to 2015. (2) Data refer to benefit payments from pension funds only. (3) Lump sum payments include lump sums paid on death and disability. (4) Data on benefit payments from pension insurance contracts refer to 2016 instead of 2017. (5) Data refer to benefit payments from ATP, LD, company pensions, life insurance companies and pension funds held in life insurance companies. (6) Data do not include benefit payments from personal registered retirement saving plans (RRSPs). (7) Data refer to 2016. (8) Data refer to benefit payments from pension funds and pension insurance contracts only. (9) Data refer to benefit payments from AFPs only. Lump sum payments include bequests, mortuary fees, tax-free available surplus and voluntary account withdrawals. Premiums paid by the AFPs to the insurance companies in charge of paying annuities to members are reported as assets transferred to a third party. (10) Data refer to benefits paid in 2013 by life insurance for occupational pensions, benevolent societies and pension foundations (data not available but same size as benevolent societies) and from assets accumulated in the premium pension system. (11) Data refer to 2014. (12) Data refer to benefit payments from DB pension funds and pension insurance contracts. Most pension plans pay benefits as a pension (except capital insurance products). (13) Data refer to benefit payments from pension funds and employers' books only. (14) Data refer to benefit payments from mandatory pension plans. (15) Data refer to pension funds supervised under the Pension Funds Act. (16) Data refer to 2013. (17) Data refer to MPF schemes only. (18) Data refer to payments from mandatory individual accounts only. (19) Data cover some plans only. (20) Data on lump sum include money transferred to the state fund for payment of disability and survivor benefits, as well as lump sum for members who do not fulfil the requirements for old-age benefits.

Figure 8:

The "Other" category includes loans, land and buildings, unallocated insurance contracts, hedge funds, private equity funds, structured products, other mutual funds (i.e. not invested in equities, bills and bonds or cash and deposits) and other investments. The GPS database gathers information on investments in Collective Investment Schemes (CIS) and the look-through of these investments in equities, bills and bonds, cash and deposits and other. Data on asset allocation in these figures include both direct investment in equities, bills and bonds, cash and deposits and indirect investment through CIS when the look-through of CIS investments is available. When the look-through is not available, investments in CIS are shown in a separate category and data only show the direct investments of assets in equities, bills and bonds and cash and deposits. (1) Data refer to pension funds only. (2) Source: Australian Bureau of Statistics. Data refer to superannuation funds. The high value of the "Other" category is partly driven by land, buildings and equipment (7% of total investment) and net equity in life office reserves (6% of total investment). (3) The high value of the "Other" category is partly driven by land and buildings (10% of total investment). (4) Source: AFG. Data refer to PERCO plans only. (5) Data refer to mandatory plans only. (6) The category "bills and bonds" includes investments in open market paper, treasury securities (both marketable and nonmarketable government securities), agency and GSE backed securities, municipal securities, corporate and foreign bonds. (7) Data refer to DB plans only. (8) The high value of the "Other" category is mainly driven by direct and indirect investments in land and buildings (19% of total investment). (9) The high value of the "Other" category is mainly driven by collective investment schemes investing in foreign securities, pooled mortgage funds and other pooled funds (that represent altogether 19% of total investment). (10) Data do not include pension insurance contracts. (11) Data refer to ATP, LD, company pensions, life insurance companies and pension funds held in life insurance companies. (12) The high value of the "Other" category is mainly driven by unallocated insurance contracts (21% of total investment). (13) Data do not include the investment allocation of assets in pension foundations. (14) The calculation of the asset allocation is based on data from Bank of Japan and excludes claims of pension funds on pension managers. The high value of the "Other" category is mainly driven by outward investments

in securities (26% of total investment). (15) Data are estimates; the breakdown of investments through CIS has not been approved by external auditors and is not available for "Pensionsfonds". (16) Data refer to pension funds and pension insurance contracts only. The high value of the "Other" category is mainly driven by unallocated insurance contracts (13% of total investment) and loans (12% of total investment). (17) Data refer to MPF schemes and MPF-exempted ORSO registered schemes. The asset allocation of MPF schemes was the following at the end of 2017: 70.0% in equities, 17.9% in bills and bonds, 12.0% in cash and deposits. (18) Data refer to 2015. (19) Data refer to 2013. (20) Data refer to 2014. (21) Data refer to 2012. (22) The high value of the "Other" category is mainly driven by unallocated insurance contracts (17% of total investment). (23) The high value of the "Other" category is partly driven by land and buildings (21% of total investment). (24) Data refer to pension funds supervised under the Pension Funds Act only. The high value of the "Other" category is mainly driven by unallocated insurance contracts (48% of total investment). (25) Data refer to 2016. (26) The high value of the "Other" category is mainly driven by unallocated insurance contracts (34% of total investment). (27) The high value of the "Other" category is mainly driven by land and buildings (20% of total investment). (28) The high value of the "Other" category is mainly driven by unallocated insurance contracts (45% of total investment). (29) The high value of the "Other" category is mainly driven by loans (27% of total investment) and land and buildings (24% of total investment). (30) Central Provident Fund (CPF) savings in Singapore are invested in risk-free Special Singapore Government Securities (SSGS), which are non-tradeable Government bonds issued to the CPF Board that are fully guaranteed by the Singapore Government. The Government invests the SSGS proceeds together with its other assets and takes investment risks aimed at achieving good long terms returns. Investments in the SSGS allow Singaporeans to earn up to 6% interest per annum on their CPF savings, while enjoying minimum interest rates of 2.5% per annum on CPF Ordinary Account monies and 4% per annum on monies on CPF Special, MediSave and Retirement Accounts monies.

Figure 9:

Data have been calculated using a common formula for the average nominal net investment return (ratio between the net investment income at the end of the year and the average level of assets during the year) for all the jurisdictions except for: France, Ireland, Israel, Japan, the Netherlands, Turkey and the United States among OECD countries; and El Salvador, Hong Kong (China) and Panama for which values have been provided by national authorities or come from other national or international official publications (e.g. AIOS). Returns are calculated over the period end-December 2016 and end-December 2017 for all countries, except: Australia (end June 2016 - end June 2017) and Japan (end March 2016 - end March 2017). The average real net investment returns are calculated using the nominal rates of return (as described above) and the variation of the consumer price index over the relevant period. The amounts of assets in funded and private pension arrangements in USD terms are used to build the weights to calculate the weighted average. (1) Data refer to pension funds only. (2) Data refer to new pension funds only. (3) Data refer to ATP, LD, company pensions, life insurance companies and pension funds held in life insurance companies. (4) The result is an average calculated on a sample of approximately 600 DB plans for the fiscal year 2016 (ending in March 2017). (5) Source: AFG. Data refer to PERCO plans only. (6) Data refer to pension funds and book reserves only. (7) Investment returns are net of taxes. (8) Data refer to pension insurance contracts only. (9) Data refer to personal plans only. (10) Data refer to mandatory plans only. (11) Data refer to MPF schemes only.

Table 1:

This table is based on the annual nominal and real net rates of investment return reported in the statistical annexes of this publication. Please refer to the notes of these statistical annexes for more country-specific notes. The 5, 10 and 15-year annual averages are calculated over the periods Dec 2012-Dec 2017, Dec 2007-Dec 2017 and Dec 2002-Dec 2017 respectively, except for Australia (June 2012-June 2017, June 2007-June 2017 and June 2002-June 2017).

Figure 10:

(1) Data refer to 2015. (2) Data refer to 2016. (3) Data refer to 2014. (4) Data refer to 2013. (5) Data under occupational plans cover company pension plans, life insurance companies and pension funds held in life insurance companies. Data under personal plans cover ATP, LD and individual plans in banks. (6) Data about Collective Voluntary Pension Savings that are managed by the AFPs are classified together with personal plans, although these plans are occupational. (7) There is one institution for occupational retirement provision operating in Hungary. Its market share is negligible compared to voluntary privately managed pension funds and voluntary private pension funds. The last two types of funds administer personal pension plans.

Figure 11:

The funding ratio has been calculated as the ratio of total investment and net technical provisions for occupational DB plans using values reported by national authorities in the OECD template. The ratios may differ from previous publications which included results calculated directly by national authorities or coming from publications. Data for Denmark refer to DB plans in company pension funds. Data for Finland only refer to DB plans in pension funds only. Data for Luxembourg refer to DB traditional plans under the supervision of the CSSF. All liabilities of DB plans are considered for Mexico (DB plans in pension funds only) and the United States. Data for the Netherlands and Switzerland include all types

of pension funds. Data for the United Kingdom come from the Purple Book 2017 published by the Pension Protection Fund. Liabilities for Hong Kong, China refer to the amount of aggregated past service liability in DB ORSO schemes. Data for Indonesia refer to EPF DB funds and come from OJK Pension Fund Statistics reports before 2016.

Table 2:

(1) Data come from the website of the US Department of Labor. (2) Data refer to 2015 instead of 2017. (3) Data are biannual and come from the Census of Trusteed Pension Funds that is conducted every two years. The number of funds in odd years in an OECD estimate and is calculated as the average of the numbers of funds in the previous even year and the following one. (4) Data refer to 2016 instead of 2017. (5) Source: The Pensions Regulator. (6) Data refer to all occupational pension funds, irrespective of the type of plan managed (i.e. occupational plan in benefit primacy or occupational plan in contribution primacy). (7) Source: Annual Report and Accounts from the Pensions Authority. (8) Data refer to 2011 instead of 2012. (9) Source: OJK. Data refer to 2008 instead of 2007. (10) Source: FSMA. (11) Data refer to 2014 instead of 2017. (12) Source: COVIP Annual Reports. (13) Data refer to 2013 instead of 2012.

Figure 12:

This chart is based on the cumulative amounts of contributions paid into DB plans, net investment income of DB plans, benefits paid to members and other income/expenses of the plans over the longest time period possible. These amounts are expressed as a percentage of the assets in DB plans at the beginning of the period under review, and are divided by the length of the time period to get an annual average. The average annual growth rate of investments is calculated as the ratio of the difference of investments at the end and at the beginning of the period over the investments at the beginning of the period, the result being then divided by the length of the time period. The period under analysis starts in 2007 in all jurisdictions except Belgium (2015), Costa Rica (2015), Finland (2011), Gibraltar (2011), Guyana (2015), Indonesia (2014), Namibia (2010) and Spain (2010). It ends in 2017 in all jurisdictions except Canada (2016), Gibraltar (2013), Israel (2015), Namibia (2016), Netherlands (2016) and New Zealand (2014).

(1) Data refer to DB traditional plans under the supervision of the CSSF. (2) Data refer to all occupational plans, i.e. occupational plans in benefit primacy and occupational plans in contribution primacy. (3) Data refer to DB plans in pension funds only. (4) Data on net investment income is not available for 2008, potentially distorting the result for categories "Net investment income" and "Other income / expenses". (5) Data refer to all pension funds. (6) Data on contributions, net investment income and benefits are not available for 2015, potentially distorting the results of all categories. (7) Data on net investment income is not available for 2015, potentially distorting the result for categories "Net investment income" and "Other income / expenses". (8) Data only refer to ORSO DB schemes in pension funds. (9) Data on contributions and benefits are not available for 2012. The average for these two variables is calculated over 9 years instead of 10.

Tables A.1 – A.3:

The Slovak Republic adopted the euro in 2009, Estonia in 2011, Latvia in 2014 and Lithuania in 2015. The whole time series of investments (in millions of national currency) are expressed in millions of euro for these countries (even before their adoption of the euro). (1) The break in series in 2011 comes from the exclusion of public buffer funds, including before. (2) Data on PERCO plans for 2017 come from the French Asset Management Association and refer to end 2017. Data on pension insurance contracts for 2017 refer to 2016 instead. (3) The break in series in 2013 comes from the transformation of four funds operating on a pay-as-you-go basis into funded occupational schemes. (4) The drop of investments in 2011 comes from a pension reform that suspended payments to mandatory individual schemes and redirected all the contributions to pay-as-you-go public pension schemes, unless workers chose to keep these individual pension schemes by the end of January 2011. The break in series in 2016 is due to the inclusion of individual retirement accounts (available through banks and investment companies) and pension insurance products, not included before. (5) Data do not include retirement annuity contracts. Data on personal retirement savings accounts are included from 2014 onwards. The decrease in assets for Ireland in 2016 arose from a change in methodology from estimation based on industry reports to aggregation of data submitted on an annual basis to the pensions supervisor by individual DC schemes. (6) Net technical provisions are taken as a proxy of pension assets in book reserves. (7) The drop in investments in 2014 is due to the reversal of the mandatory private pension system that led to a transfer of domestic sovereign bonds held by open pension funds into the social security system. (8) The drop of investments in 2011 is the result of the transfer of assets in pension funds of some of the largest banks to the public retirement system. (9) The break in series in 2013 is due to the inclusion of personal plans. Data for personal plans for 2017 refer to 2016 instead. (10) The break in series in 2011 is due to a change in legislation, withdrawals and the unavailability of data from one of the three funds that was operating under the old framework. (11) A pension reform led to the transfer of pension fund assets to the National Social Security Administration. (12) The break in series in 2014 is due to the inclusion of open entities (under the supervision of SUSEP), not included before. Values for personal plans refer to the total amounts of assets of all companies whose retirement savings products represent the majority of their premium revenues. A part of these amounts may however include assets related to non-pension products. (13) Data include occupational plans from 2015 onwards. (14) Data for one DB pension scheme is missing for 2014, hampering the data comparability with previous years.

(15) Data refer to some occupational voluntary pension schemes only. (16) Totals in a given year are calculated on all the countries for which a value is available. The number of countries that the totals include may therefore vary over the years.

Tables A.4 – A.5:

Data have been calculated using a common formula for the average nominal net investment return (ratio between the net investment income at the end of the year and the average level of assets during the year) for all the jurisdictions except for: Austria (2011-2012), Finland (2015), France, Ireland, Israel, Japan, the Netherlands (2017), Sweden, Turkey (2011, 2013-2014, 2016-2017) and the United States among OECD countries; and Armenia (2014), Egypt (2014-2015), Ghana, Guyana (2015), Hong Kong (China), India (2011, 2013-2014), Kenya (2011), Malawi (2013), Maldives (2015-2016), Malta (2011), Mauritius, Namibia (2016), Romania (2010), Russia (2013), Suriname, Tanzania (2015), Ukraine (2010) and Zambia (2014) for which values have been provided by the jurisdictions or are from national official publications. Data for Argentina, Bolivia, Costa Rica (2007), Dominican Republic (before 2014), El Salvador, Panama and Uruguay (2007-2015) are from AIOS. Returns for the year N are calculated over the period end-December of year N-1 and end-December of year N for all countries, except: Australia (over end-June N-1 and end-June N); Japan and New Zealand (over end-March N-1 and end-March N) and Egypt (over end-June N-1 and end-June N, for 2014-2016). Real returns are calculated using the nominal rates of return (as described above) and the variation of the consumer price index over the relevant period.

(1) Data refer to pension funds only. (2) Data refer to ATP, LD, company pensions, life insurance companies and pension funds held in life insurance companies. (3) Data refer to mandatory plans only. (4) Source: AFG. Data refer to PERCO plans only. (5) Data refer to new pension funds only. (6) Investment returns are net of taxes. (7) The result is an average calculated on a sample of approximately 600 DB plans for the fiscal year 2016 (ending in March 2017). (8) Data refer to pension insurance contracts only. (9) Data refer to personal plans only. (10) Data refer to pension funds and book reserves only. (11) Data refer to MPF schemes only. (12) Data for 2015 and 2016 refer to the investment fund of the Maldives Retirement Pension Scheme. (13) Results are provided by the Financial Services Commission of Mauritius, calculated over a sample of plans that changes over the years. (14) Data refer to pension funds supervised under the Pension Funds Act only.

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