UBS

UBS International Pension Gap Index

UBS Chief Investment Office
Wealth Management white paper

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Foreword

Dear reader,

Pension systems represent a major achievement of modern welfare states. Germany under Otto von Bismarck was the first country to establish a government-administered pension system in the late 1880s. Since then the fundamental idea of workers securing a stable income for their retirement has not changed.

The mechanisms are simple. Either current workers finance present retirees in a pay-as-you-go system or they (and their employers) set money aside during their working career for retirement, and then access the accumulated capital or a pension annuity upon leaving the workforce. Governments often oversee this process.

There are three key issues that challenge the sustainability of pension systems as we know them today. The first is demographic change, which has two reinforcing aspects. Across the OECD fertility rates have been falling from 2.7 children per woman in 1970 to 1.7 today. So the working-age population is shrinking in some parts of the world. Likewise, life expectancies rose from 69 years on average to 81 over the same period. Old-age dependency ratios are rising – in the EU there are only 3.5 people working per retiree compared to almost seven in 1950. This means that relatively fewer economically active people have to support a growing number of retirees for a longer period.

The second factor is public finances. Many governments already spend a large share of their budgets on pension payments. On average OECD countries spend 8.1% of their GDP on pensions today, up from 5.7% in the 1980s. Given high public debt, their scope for fiscal maneuverability is restricted. The third issue relates to the challenging investment environment. Pension funds are often mandated to invest the bulk of their funds in safe assets like bonds. In the current low interest rate environment, it is difficult for them to find adequate return opportunities.

The UBS International Pension Gap Index has evaluated 12 pension systems worldwide. It estimates how much workers have to save privately, if they want to enjoy an adequate lifestyle during retirement, to supplement the promised pension income they receive from the mandatory pension system in the country where they live.

We see great variability in the schemes that governments have designed. Some provide a suitable income, though their sustainability is questionable in light of the issues mentioned above. Others, while sustainable, provide surprisingly little income and require citizens to take responsibility themselves for funding their retirement.

This analysis shows that mandatory pension systems at best only ensure a minimum income to cover basic needs. Current and future retirees cannot rely on them if they want to maintain their lifestyle. Nor should they be overly optimistic that the challenges these systems face will be resolved quickly.

So what can people do? Private savings are crucial. Many pension systems provide additional voluntary savings options, often combined with tax incentives. It is important that people prepare for retirement by using these options. Equally important is for them to invest their savings in a smart and diversified way. Lastly, while it is never too late to start thinking about your pension, the earlier you start, the better your prospects for a secure and enjoyable retirement.

I hope this report provides you with a useful guide to your personal pension situation and wish you a pleasant read.

Sincerely,

Sergio P. Ermotti
Group CEO, UBS

Executive summary

The UBS International Pension Gap Index reviews the mandatory pension systems of 12 countries worldwide. We created a representative person – "Average Jane" – a 50-year-old single woman who has led a good but simple urban life and has not yet thought much about retirement. For each city she lives in we estimated Jane's cost of living if she maintained a basic lifestyle after she stops working. We calculated the pension income she can expect from the mandatory system over her whole retirement. If Jane spends more than she takes in, she will face a gap. We then computed the percentage of her monthly income Jane needs to put aside to plug this gap; these required savings rates are then used to rank the cities covered in our UBS International Pension Gap Index.

Our results show that no mandatory system provides enough for the "average" Jane to finance her favored lifestyle in retirement. Replacement rates vary by country, but it is fair to say that no retiree should expect to receive as much from her pension as she earned during her career.

The required savings rates differ widely, from rather low to vertiginously high. Several factors influence these numbers in one direction or the other. An individual's savings needs rise as retirement lengthens, whether due to an early retirement age, a long life expectancy or both. Her needs also increase as her cost of living and the inflation rate where she lives climb. Not all countries adjust payments to inflation, so the gap between cost of living and pension income increases exponentially over time. Investment returns also differ from country to country and affect the required savings both ways. The sustainability of promised pension payments is questionable and the individual's necessary savings must be higher still. Therefore, we applied an uncertainty discount. Last but not least, some countries levy taxes on pension income and others don't.

> Our results are based solely on the mandatory part of each country's system.

We don't take non-mandatory schemes into account, such as occupational pensions or private real estate, that are often widely used and form a substantial part of many people's pension provisions. Factoring this in would reduce the savings requirements. Across all systems, savings rates differ between men and women, singles and couples. We focus on a single female, who generally has the highest saving requirements. Living costs for a single person are usually higher on a per capita basis than they are for couples. Women have lower pensions due to lower incomes on average.

The difference in promised pension payments results from the structure and variety of pension schemes. Some systems don't promise high pension income, and citizens are aware of this. Others pledge higher payouts, but workers don't realize how such pledges might engender a false sense of security. This also highlights the difference in system sustainability. Pension systems in Asia are new relative to the established ones in continental Europe. The Asian schemes are mostly rather "small," so private savings requirements are higher on average. European schemes are more generous, but their long-term sustainability is questionable. Anglo-Saxon countries fall somewhere in the middle.

The challenges that confront pension systems as a whole are important for the individual to consider. The more indebted a government is and the more it spends on pensions, the less scope it has to maneuver. This could affect individual pension payments greatly in the decades ahead. Additionally, longer retirements require more funds. Lower investment returns make achieving them a more daunting exercise.

It is important to recognize that it is never too early to think about retirement. Neither is it ever too late. Most countries offer voluntary retirement savings options in addition to their mandatory systems, precisely because governments want to motivate personal responsibility. This report highlights that citizens are advised to take full advantage of these opportunities. While many use the voluntary options, they often delay their decision to do so. Savings are only one part of the equation; investing those savings wisely is equally important. Over the many years that people spend in the workforce and can save for retirement, the compound interest effect is substantial. The fruit of planning early for retirement and investing those savings well is often lasting peace of mind.

The pension challenge

Pension realities

Pensions are a pillar of modern welfare systems

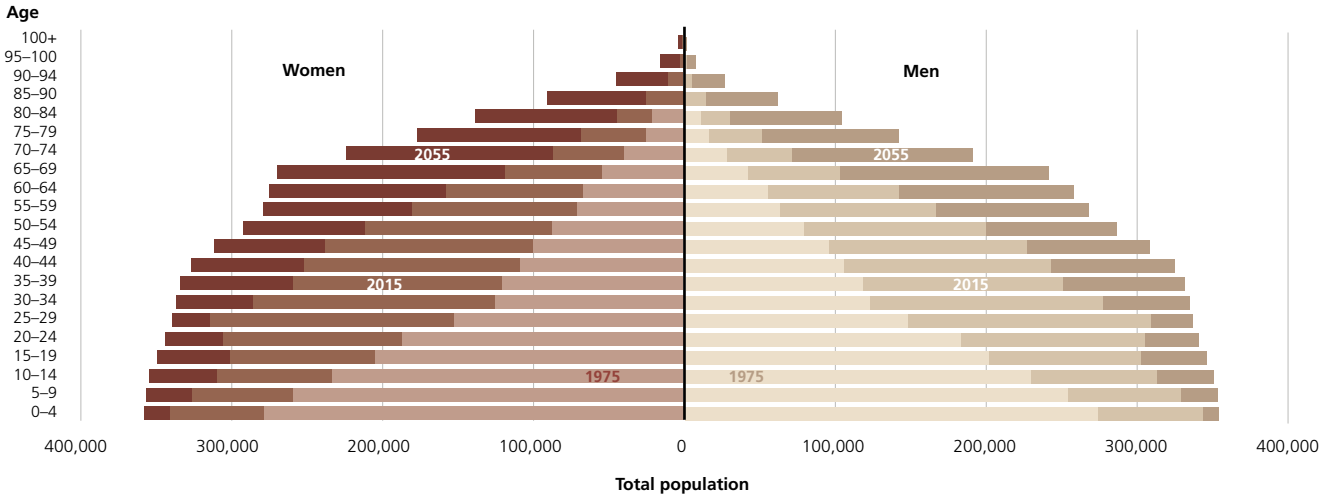
Pension systems are a relatively new invention. Their origins can be traced to the 17th century, when they were introduced as a safety net for widows. In the era of industrialization the need for organized social security structures increased, as did the role of the state. Germany under Bismarck was the first country to establish a government-administered pension system in the late 1880s. Today, public systems and private pension funds manage billions of assets and are a vital part of social insurance.

Pension systems built in the 19th and 20th century are struggling to adjust to changing conditions

Modern pension systems come in various forms, with each facing its own challenges. Plans funded on a pay-as-you-go basis, in which current workers finance the benefits retirees receive, may struggle to continue to pay out what they have promised. Other pension plan structures don't pledge a fixed payout at retirement and leave retirees with whatever is left in the end, which increases the risk of poverty in old age. The driving force is demographic change (Fig. 1). Higher life expectancies and lower birth rates reduce the ratio of working to retired people. For example, Germany had five workers to finance one retiree in the 1950s; today this ratio stands at only three to one.

> Pensions are simple. To receive an income during retirement, one needs to accumulate funds while working.

Fig. 1: Demographic change



Source: UN World Population Prospects 2017, UBS 2017

> Small versus large government highlights the trade off between pension sustainability and comfort.

Many other countries share the same fate. While Europe and the Americas currently have higher old age dependency ratios, Asia's are deteriorating more rapidly (Fig. 2).

Large and small governments play a dominant role

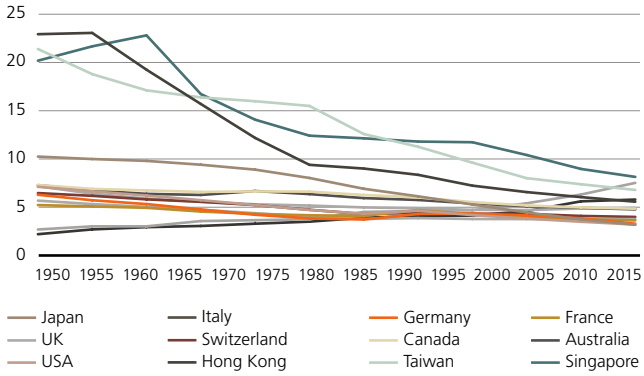
Politics has taken a paramount role in pension regulation, which can complicate matters. In some cases, politicians use social security issues for their own purposes, particularly during elections, and make promises that can't be kept. This makes necessary reforms, such as raising the statutory retirement age or worker contributions, a delicate undertaking. But high public debt and the already large outlays governments make to provide pensions (Fig. 3) reduce their scope to maneuver.

Generally, countries with "small" governments intervene less and thus provide a smaller state-sponsored pension than "large" governments who mandate more. This highlights the tradeoff between system sustainability and comfort. The latter is appealing to voters but its viability is questionable.

Low interest rates make the investment environment challenging

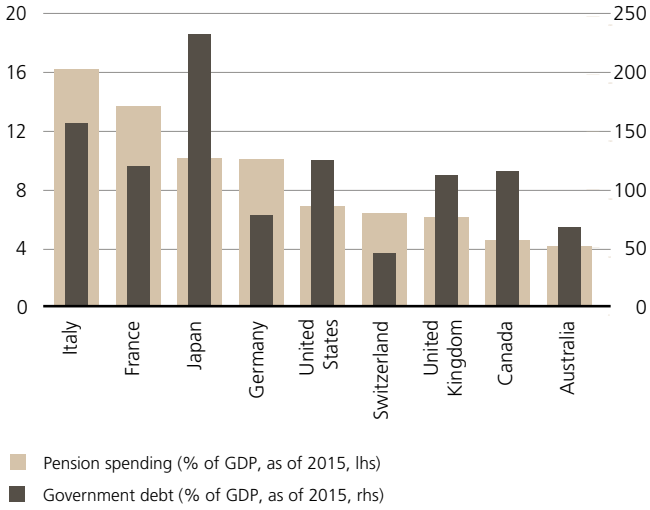
Pension fund investment strategies are often regulated. To finance their future payments the funds are mandated to invest a large share of their capital in safe assets, such as government bonds. In this respect the current low interest rate environment presents an added challenge. While safe assets profited from declining interest rates in recent years, they will suffer once rates rise (Fig. 4). This is an issue that all types of fund schemes are confronted with. In a defined contribution system (DC), the retiree will be left with less money to fund her retirement. In a defined benefit system (DB), the fund's balance sheet will deteriorate as an increasing number of people want to eat from a pie growing at a slower rate. Both types could be supported by higher contributions. The DB system would also benefit from lower payouts, but neither higher contributions nor lower payouts are popular.

Fig. 2: Active workers per retiree



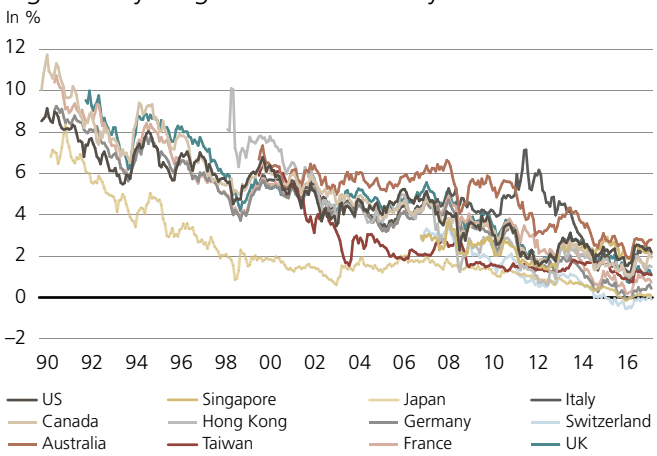
Source: UN World Population Prospects 2017, UBS 2017

Fig. 3: Public finances



Source: OECD 2015, UBS 2017

Fig. 4: 10-year government bond yields



Source: Bloomberg 2017, UBS 2017

Personal challenges

When it comes to personal retirement challenges, men and woman face different issues but also non-gender factors can have an impact. Women face particular challenges, mainly due to the gender role division women have historically faced during their working lives. Put simply, the more you earn the more you can contribute to your pension fund and also set aside privately. As women traditionally have lower wages, work part time or take time off to care for the family, they accumulate less pension capital. This also often leads to financial disadvantages for women in divorce situations. On average across the world, woman have higher life expectancies compared to men. Therefore, they also need more capital to finance their retirement.

Lifestyle and living costs matter, too. Urban lifestyles are usually more expensive compared to rural ones. Single persons face higher living costs than if they can be shared with a partner. Health conditions often have a substantial financial impact in old age. Some of these factors can be taken into account early, others are uncertain until they materialize.

There is no one-size fits-all solution to these challenges. They have to be considered individually in each country's or person's context. What is clear, though, is that, for individuals, the best way to master these challenges is to start thinking about retirement early, save privately and invest wisely.

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The best way to master these challenges is to start thinking about retirement early, save privately and invest wisely.

Introducing "Average Jane"

Jane is a single 50-year-old woman with one adult child. She has worked her whole life in the same city since she started her career at age 20. With the exception of a three-year break at 30, she has been continuously employed in full-time positions and will stay employed until she retires at the statutory retirement age.

Today, Jane enjoys a basic urban lifestyle. She earns the median wage[1] that a woman working full-time receives in her city and enjoys moderate regular increases in income. In our analysis, Jane lives in any of 12 different cities around the world, namely, Hong Kong, London, Milan, Munich, New York, Paris, Singapore, Sydney, Taipei, Tokyo, Toronto and Zurich. This enables us to compare the 12 countries' pension systems based on Jane's specific characteristics[2].

Jane has had a good life but has not saved for anything more than a rainy day until now. At age 50, she still has at least 10 years of work before she retires.

> Jane realizes that she needs to start thinking about the "longest holiday" of her life. The future is by definition uncertain, as are her retirement benefits. But planning ahead today will increase her peace of mind for the future.

So what does she have to consider today to be prepared?

On the one hand, Jane needs to think about the lifestyle she desires and will be able to afford, and any special circumstances she might face and the costs associated with them. Most likely the first half of her retirement phase will be more active than the second. Jane is realistic and knows that she will not easily be able to finance a luxurious lifestyle in retirement. Nonetheless, she aims to continue her basic urban lifestyle after she stops working. It includes living in a two-room[3] rental apartment in a middle-class outer city neighborhood. This will represent her single largest cost. While some work-related expenses such as regular commuting will drop, other cost items will rise. Since she has more free time, she will enjoy more leisure activities, spending time with family and friends. In secret she is already planning to go to the zoo regularly with her grandchildren. She will also place more value on meeting with friends over food and coffee. Additional recreational spending will have to be on a small scale, for an occasional local vacation rather than regular overseas journeys. Toward the latter part of her retirement, Jane also has to consider her health and potentially rising medical and frail-care costs.

On the other hand, Jane needs to think about the income she can expect from the mandatory retirement system and the additional private savings she needs to support her lifestyle. Until now she only contributed the minimum required amount to the mandatory pension system. This most likely means she will face a gap between the pension payments she receives and the money she needs to finance her retirement – unless she starts to save now.

[1] The median is the number that divides a ranked scale into two parts – 50% of the numbers will be lower and 50% higher. So the median is not as affected by outliers as an arithmetic average would be by extremely high or low wages.
[2] Jane as we created her is not representative of a particular person nor entirely true to individual cultural norms. Nonetheless, a standardized persona is needed for our analysis to ensure comparability across countries.
[3] Two room = single bedroom, single living room

Results

Pension systems worldwide face pressure from aging populations, weak public finances and low investment returns.

No mandatory pension system provides enough income for citizens to lean back and relax

Our results are a call to action. Whether you can identify with Jane and her lifestyle or not, they are clearly applicable to people more broadly. In each country Jane faces a pension gap. In other words, her income from the mandatory schemes will likely not cover her total cost of living. A widely used statistic, the replacement rate, confirms our results. Her net pension income divided by her last net employment income is less than 100% in all the countries we looked at (Fig. 5). This means Jane needs to save part of her income from age 50 until she retires to afford her lifestyle in retirement. These savings are necessary in addition to the mandatory pension payments. Clearly, many countries offer supplementary voluntary savings schemes, such as 401k in the US or 3a in Switzerland. Our analysis shows that the mandatory payouts alone will not be enough. Private saving and investing by using these voluntary options as early as possible is in individuals' best interests.

Challenges to the sustainability of pension payouts

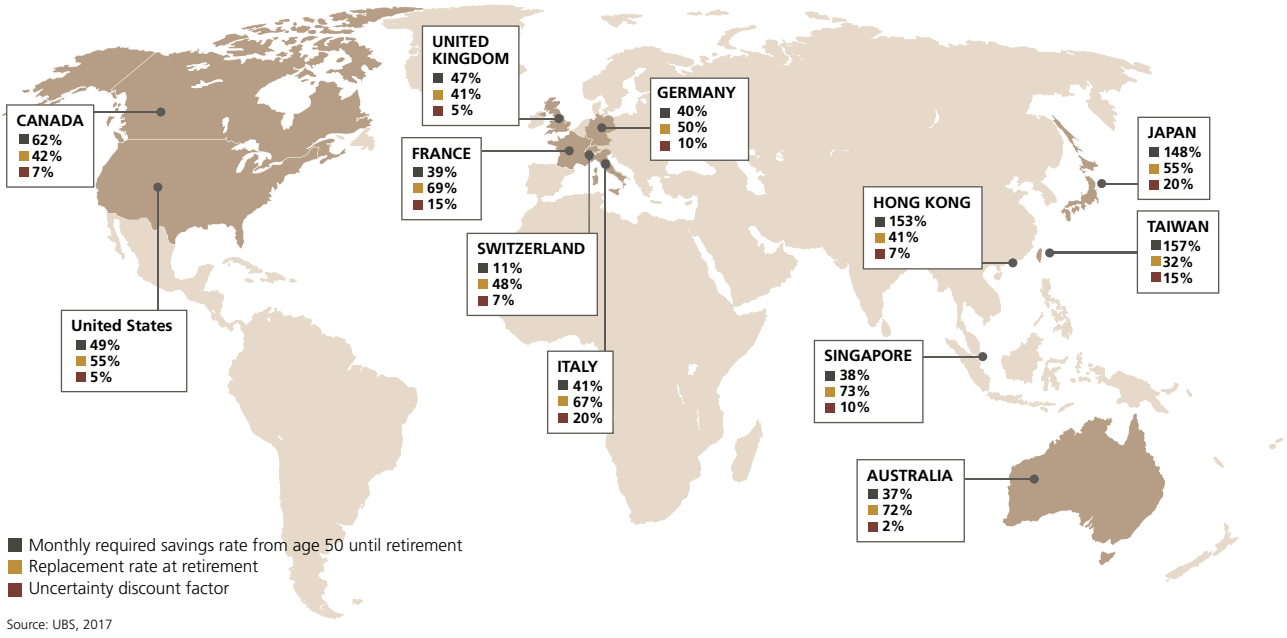
The projections of pension payouts using current information are not wholly reliable. First, we estimate payouts today that will only materialize one or two decades from now. Second, pension systems worldwide face pressure from aging populations, weak public finances and low investment returns. Additionally, each country has individual issues to tackle. So we apply an "uncertainty discount," a factor that increases the monthly savings rate based on a qualitative assessment of each country's score on factors such as demographics, public finances and future pension system prospects (Fig. 5).

Results vary widely due to different mechanisms

Switzerland comes out on top in our UBS International Pension Gap Index (Fig. 5). Living in Zurich requires the lowest extra percentage of savings of all cities in scope. Jane needs to put away only 11% of her income in addition to her mandatory pension system contributions to finance a basic urban retirement lifestyle. Given that Switzerland has one of the highest household savings rate in the OECD, this seems achievable. Yet the Swiss population is aging fast and people would be wise to consider the duration of their retirement period when planning their savings.

Second- and third-placed Australia and Singapore already require substantially higher savings, at 37% and 38% respectively. In Singapore Jane has the highest replacement rate in our sample.

Fig. 5: UBS International Pension Gap Index statistics



Source: UBS, 2017

> The option to reduce living standards exists but is rarely a desired choice to make. So starting as soon as possible to save for retirement is the wisest route to take.

This is due to the fact that Singaporeans can use part of their pension fund to finance real estate purchases and Jane is a rare exception in not having done so. Therefore she receives more benefits at retirement. In addition, the pension capital earns a fixed promised return and thus faces fewer uncertainties. But Singaporean Jane has to cover the longest retirement with her funds. Australians benefit from a government sponsored pension in addition to their pension fund. The result is further aided by higher investment return expectations compared to other countries and thus lower savings are needed.

At the other end of the spectrum are Asian countries such as Hong Kong, Taiwan and Japan, where the pensions from the mandatory system are low and the extra savings needed to close the pension gap reach significant levels at over 100% of current income. One reason for that is the long retirement period that needs to be financed. Japan, for instance, has the highest life expectancy in the world. For Jane this translates into 27 years of retirement. In Taiwan the duration is almost as long because it has the lowest statutory minimum retirement age in our sample at 60. Hong Kong has a relatively new mandatory system. Jane can only accumulate pension capital over the last half of her career.

Countries like France, Germany, Italy, the UK, the US and Canada occupy the middle of our rankings. In them Jane needs to save 39%–62% of her current income to afford her basic lifestyle. If we take into account the voluntary savings options that many people use, the savings gap will be lower and more manageable. Countries with a higher retirement age and lower life expectancy, such as the UK and Germany, appear closer to the top of our ranking. While other countries may pay higher absolute pensions, their citizens have a higher life expectancy and the retirement age is lower. In general European countries, except for Switzerland, have a comparably lower life expectancy than Australasian countries. Many of them have also introduced reforms in recent years to raise the legal retirement age to 67. Both factors make the system more sustainable. Locations with higher living costs as a share of income also face greater savings requirements. This is also true within a country, so people living outside metropolitan areas might find a lower amount of savings sufficient.

Specific characteristics influence the results

Our results are influenced by the specific assumptions we make and the characteristics of our fictitious persona Jane. One of the most important assumptions is that Jane rents a flat and does not own any property. In some countries it is more common to own property than in others. Rental costs often make up half of a person's living expenses in a metropolitan city. In countries like Switzerland where the norm is to rent, our results are more representative of required savings than they are in Singapore, where home ownership accounts for more than 90% of the housing market. Putting aside savings is easier in countries with lower living costs as a share of income. This holds true in retirement, too.

Also, we only examine the mandatory pension system. If widely-used voluntary savings options are factored in, the savings gap narrows. By age 50, many people have been able to accumulate savings; they aren't starting from scratch as Jane is. So there are reasons why our savings gap may be overstated. On the other hand, we did not consider tax payments on gains from invested savings, as they are highly individual, which may understate the gap.

Further, we use a woman as the basis for our analysis. While urban female wages are higher than rural ones in the majority of countries globally, female wages are lower than those of men. This means women also amass less pension fund capital. Often they are further disadvantaged by the time they take off from work to care for children and older family members. Generally, using the median wage means there are many people who earn less and subsequently have to save more than our results indicate, as well as many people who earn more and have to save less.

All in all, the average person will likely need private savings. Starting to accrue them at age 50 remains in some cases early enough, though in others that is not the case. The option to reduce living standards exists but is rarely a desired choice to make. So starting as soon as possible to save for retirement is the wisest route to take.

Curious about your own situation?

Visit **ubs.com/cio** and play our pension simulation game.

The way forward

There are as many pension systems as there are countries and no two are alike. Each one has evolved based on unique political and economic conditions and has its individual benefits and shortfalls. While our pension gap index illustrates the challenges for an individual like "Average Jane" our results also indicate substantial challenges at the systemic level.

> While each country's system needs to be considered on its own, there are some common remedies to address these challenges and make pension systems fit for the future.

Overall, substantial progress has been made all over the world to increase universal mandatory pension insurance coverage during the past few decades. But as many countries face substantial demographic challenges and an extremely low interest rate environment, further adjustments and in some cases substantial reforms are necessary. Contribution rates need to be carefully calibrated to ensure sufficient pension income in old age. This is especially important for women, who on average still have lower pensions due to more disrupted working lives.

In countries where the mandatory pension system provides only a minimal pension income, firms and workers should be incentivized to provide additional occupational pensions and save privately. Otherwise, countries with very low replacement rates may see old-age poverty become a significant issue as baby-boomer generations enter into retirement. This may prompt claims to increase coverage and/or benefits and put those parts of the social security systems supporting impoverished elderly people under financial strain.

Things look somewhat different in countries with relatively generous mandatory pension schemes that provide a high replacement rate. As demographic change takes place at an unprecedented speed, these countries will see their pension system come under stress due to the combined effects of baby boomers retiring, life expectancies rising and an ongoing low interest rate environment.

> If worst comes to worst, the inability to reform their systems may force governments to resort to more drastic measures such as confiscating pension assets or imposing a wealth tax on private households.

The likelihood of this happening increases if an already unsustainable pension system should be hit by a prolonged bear market in equities and other risk assets.

Aging populations and longer life expectancies require higher or even flexible retirement ages. But this is only sensible if older generations can be kept in the workforce. This could be facilitated by a flexible or step-wise transition from working to retirement, avoiding the usual full stop. Pension payment streams are often determined based on contribution time and/or retirement length. Using the latest life tables, which also take increasing life expectancy into account, is important as using lower-than-actual life expectancies leads to overly generous pension payments and depletes redistributive pension funds faster. As the number of people leaving the workforce or the ratio between workers and retirees is not constant, one could also think of a dynamic adjustment process. Generations that are larger in number could either contribute more, receive less pension or work longer compared to smaller cohorts. Such an auto mechanism would also depoliticize the pension debate.

Improving the prospects of pension systems as well as education, information and transparency efforts will also increase workers' and pensioners' trust in the system. This is crucial to raise awareness about the importance of saving privately for old age. Considering the above-mentioned measures will not necessarily mean that the pension gap we calculated in the UBS International Pension Gap Index will become smaller for the individual. Making mandatory pension systems sustainable might as well mean that individuals will have to take on even more responsibility. While it should be clear that individual private savings and an early enough planning will be key to maintain a certain lifestyle in retirement, challenges on a systemic level need to be addressed as well.

Jane around the world

Zurich
Switzerland

Jane's numbers

Savings rate
11%

Replacement rate
48%

Retirement age
64 years

Life expectancy*
90 years

*Life expectancy of a 50-year old woman in 2017, not life expectancy at birth.

Pension system strength founded on two mandatory pillars

Switzerland is one of the few countries with two mandatory pension pillars that are both financed by employer and employee. Pillar one is the government-administered old-age insurance scheme *Alters- und Hinterlassenenversicherung* (AHV). It ensures a minimum income above poverty level. Pillar two is the private corporate pension fund (BVG), which mainly takes the form of defined benefit plans. Together the two aim to achieve a total pension income of 50–70% of pre-retirement income.

The AHV mechanism is a pay-as-you-go distribution, which means money collected from the working population is redistributed to retirees. The pension funds follow a funded principle, every person saves for himself. Besides these two pillars, Switzerland has a third pillar (3a), which is not mandatory and not considered in our calculations. It includes private tax-incentivized savings schemes and life insurance plans.

Swiss Jane needs to save the least for retirement

Switzerland ranks highest on our pension gap index. Jane has to save the least across our sample of cities to afford a basic urban standard of living and can rely on the mandatory features of their retirement system, at least today.

If Jane lived in Zurich, she would only have to save about 11% of her monthly income to sustain her basic lifestyle in retirement thanks to two factors. First, both mandatory pillars are financed by worker and company contributions. Second, the redistribution system is considered generous. The two pillars provide Jane with a replacement rate of about 48% of her prior income. With a life expectancy of 90, however, she needs to finance 27 years of retirement, the longest period in Europe.

Reforms under way to make the pension system more sustainable

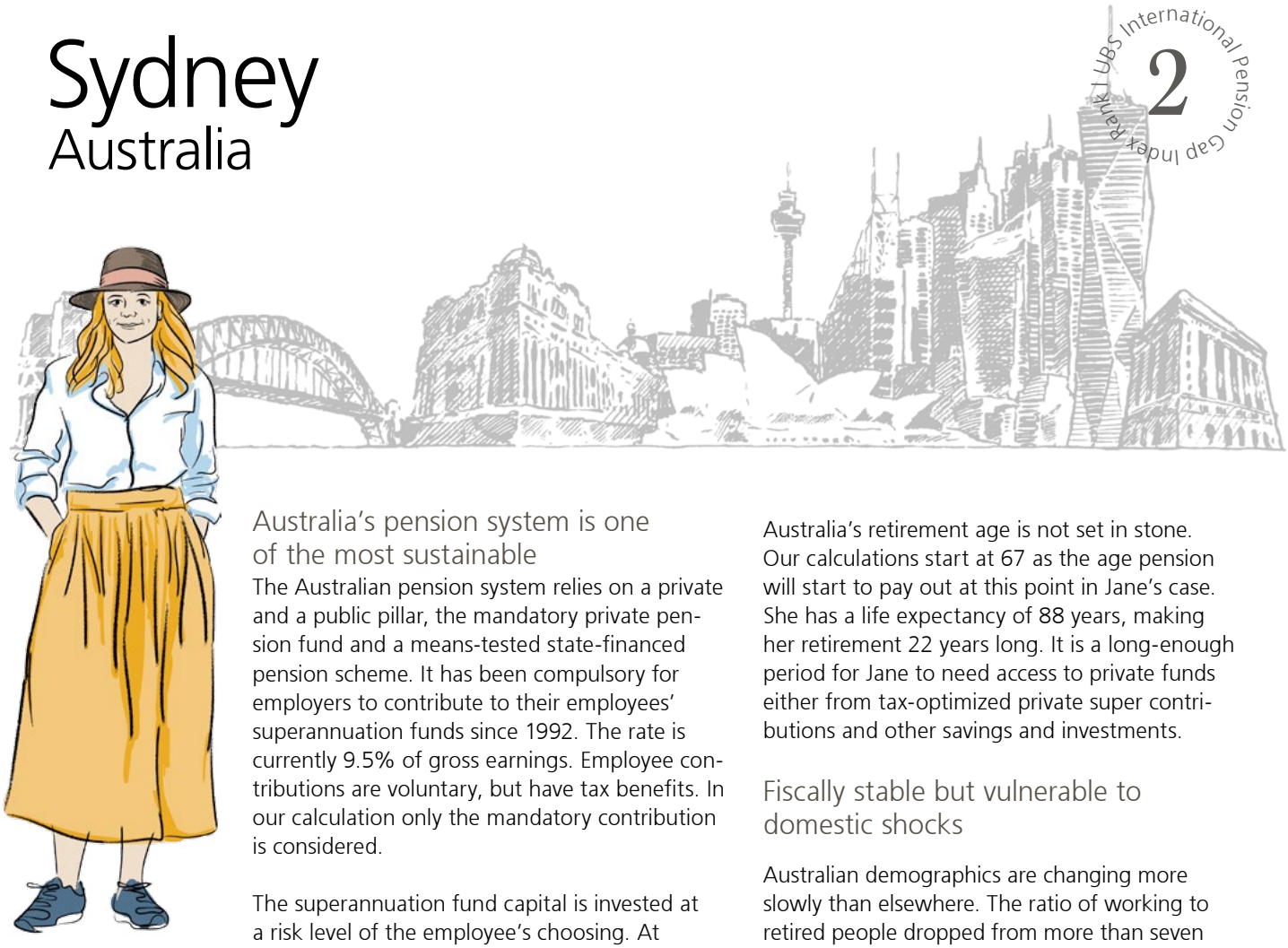
Switzerland's population is aging, with the workforce projected to barely grow over the coming decades. The ratio of active to retired lives was as high as five to one in 1970, but is only three-and-a-half to one today. In a referendum on 24 September 2017, the proposed reform to the pension system was rejected.

The main points of the proposed reform included raising the retirement age of women from 64 to 65, the same as the current retirement age for men. Additional proposals included increasing pension fund contributions, while lowering the rate used to convert this capital into monthly payments. The reform also proposed raising benefits for future retirees in the first pillar by CHF 70 per month, financed mainly by a value added tax (VAT) increase and an increase in AHV contributions.

Had the reform been passed, it would have helped our 50-year-old Jane as she would have had to save less as she does currently for her retirement. Furthermore, it would have enabled the current system to remain financially sound for some 10 years longer than is currently the case – but at the expense of future generations, in our view. The Swiss system needs urgent reform, and we believe it is highly likely a new proposal will be voted on in the coming years. We apply an uncertainty discount[4] of 7% to Jane's expected pension income.

[4] See page 28 for explanation.

Sydney
Australia



Jane's numbers

Savings rate
37%

Replacement rate
72%

Retirement age
67 years

Life expectancy
88 years

Australia's pension system is one of the most sustainable

The Australian pension system relies on a private and a public pillar, the mandatory private pension fund and a means-tested state-financed pension scheme. It has been compulsory for employers to contribute to their employees' superannuation funds since 1992. The rate is currently 9.5% of gross earnings. Employee contributions are voluntary, but have tax benefits. In our calculation only the mandatory contribution is considered.

The superannuation fund capital is invested at a risk level of the employee's choosing. At retirement the balance is converted into annual installments. If income and the value of existing assets are below a certain threshold, retirees receive additional social security benefits from the age pension paid by the government and funded by tax revenues.

Superannuation fund supplemented by social security payments

Jane is eligible for the age pension. In fact it would contribute almost two-thirds of her pension income. This is partially influenced by the fact that her employer only started contributing to her pension fund in 1992. The age pension is also intended to provide lower- to median-income earners such as Jane with better pension prospects compared to higher income earners, who receive progressively lower age pension payments. Together with the superannuation capital she receives, Jane will have a replacement rate of around 72% of her final salary. Despite a higher replacement rate than in Zurich, she has to save 37% privately in addition to the mandatory system. Compared to Switzerland, this is due to higher living costs relative to wages and higher expected inflation in Sydney. It is mitigated by the relatively high investment return expected in Australia.

Australia's retirement age is not set in stone. Our calculations start at 67 as the age pension will start to pay out at this point in Jane's case. She has a life expectancy of 88 years, making her retirement 22 years long. It is a long-enough period for Jane to need access to private funds either from tax-optimized private super contributions and other savings and investments.

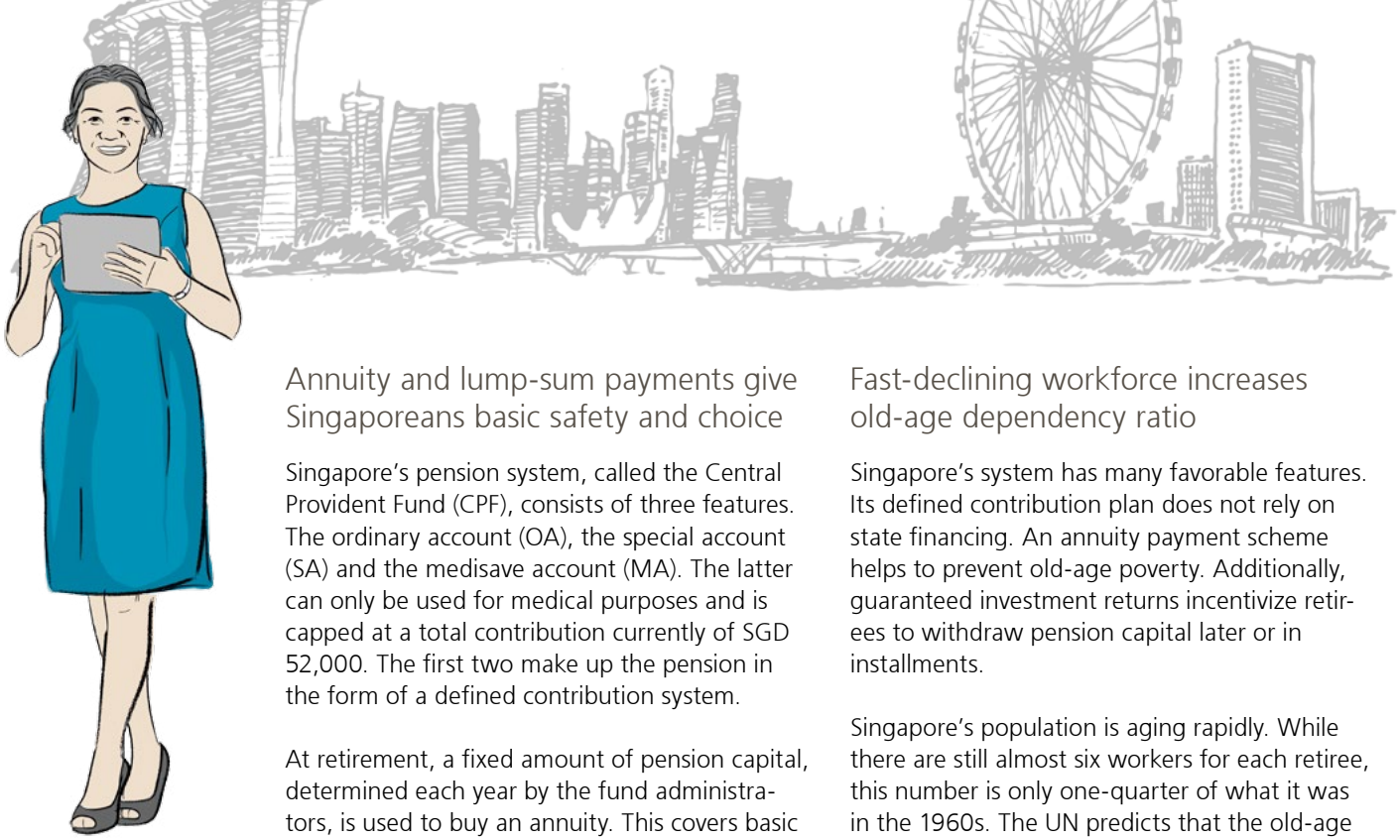
Fiscally stable but vulnerable to domestic shocks

Australian demographics are changing more slowly than elsewhere. The ratio of working to retired people dropped from more than seven to four over the past six decades. From this perspective, it appears the Australian system is more sustainable than others. Despite the government-sponsored age pension, public pension spending is fairly low. Given its modest debt-to-GDP ratio, the government has room to maneuver.

The Australian economy depends heavily on natural resources, leaving it vulnerable to price shocks. Further, future superannuation funds might have concentrated positions in the Australian market and could be exposed to domestic shocks, especially in the housing market. It is important to mitigate those risks with an internationally diversified investment approach for private savings. We apply an uncertainty discount of 2% to Jane's pension income.

Singapore
Singapore

UBS International Pension Gap Index Rank | 3



Jane's numbers

Savings rate
38%

Replacement rate
73%

Retirement age
62 years

Life expectancy
90 years

Annuity and lump-sum payments give Singaporeans basic safety and choice

Singapore's pension system, called the Central Provident Fund (CPF), consists of three features. The ordinary account (OA), the special account (SA) and the medisave account (MA). The latter can only be used for medical purposes and is capped at a total contribution currently of SGD 52,000. The first two make up the pension in the form of a defined contribution system.

At retirement, a fixed amount of pension capital, determined each year by the fund administrators, is used to buy an annuity. This covers basic needs. The rest is paid out in a lump sum, but can also be deferred until after the legal retirement age of 62. The capital still earns a fixed rate of return as long as it is not withdrawn, so the incentive to keep saving is high. Singaporeans can access their OA early to finance real estate purchases and many do so. We assume Jane has not.

Private savings requirements are highly influenced by rental expenses

If Jane lived in Singapore she would receive a replacement rate of roughly 73%. This would still require her to save an additional 38% of her monthly earnings to maintain her basic urban lifestyle when she stops working.

Jane rents an apartment, and high rents in Singapore are the chief reason she needs to save quite a bit, despite her relatively high replacement rate. This might overstate our results for the average citizen because property ownership in Singapore stands at more than 90%[5]. On the other hand, many people use their pension fund assets when young to buy real estate. This reduces their pension fund capital at retirement. While real estate brings security it also ties up assets in a concentrated position.

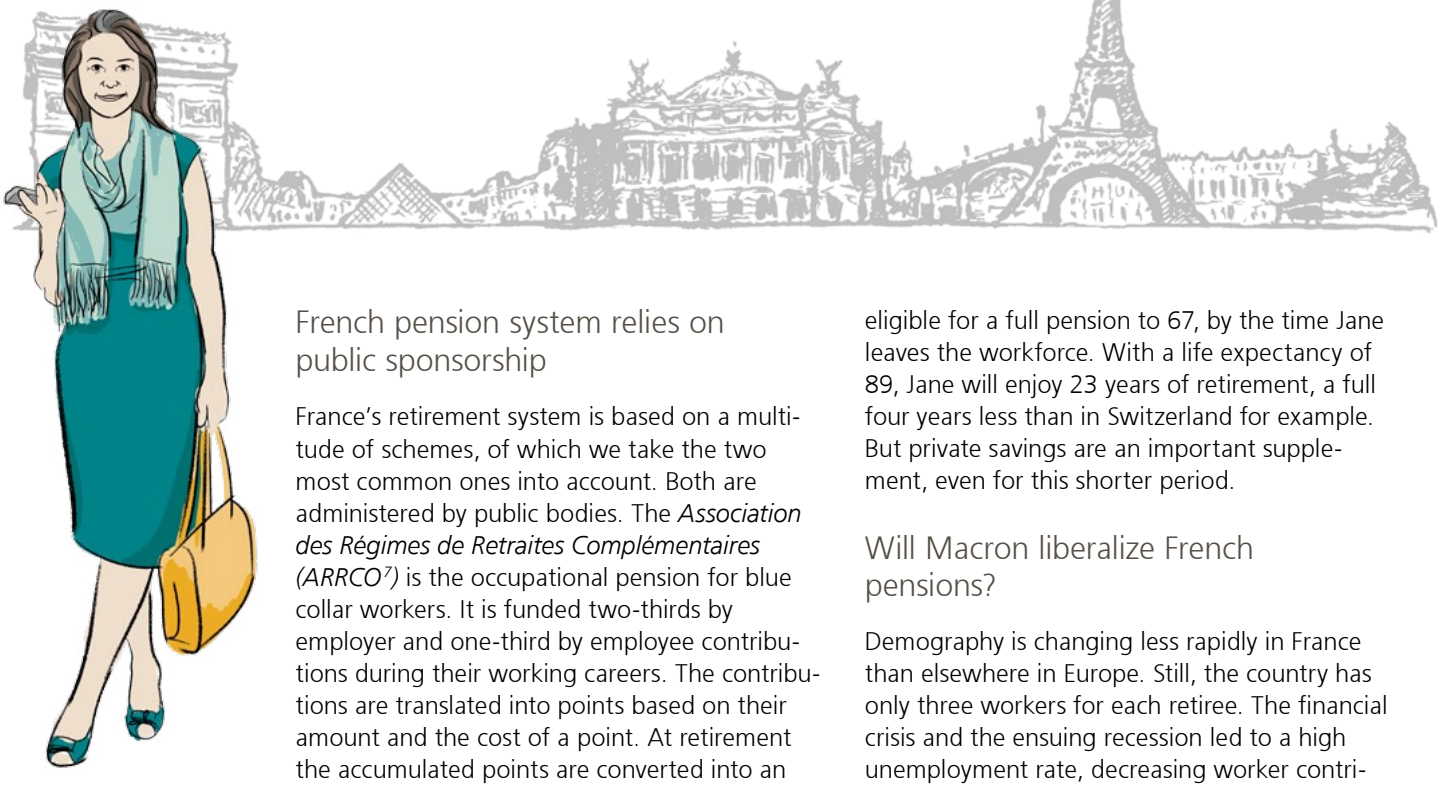
Fast-declining workforce increases old-age dependency ratio

Singapore's system has many favorable features. Its defined contribution plan does not rely on state financing. An annuity payment scheme helps to prevent old-age poverty. Additionally, guaranteed investment returns incentivize retirees to withdraw pension capital later or in installments.

Singapore's population is aging rapidly. While there are still almost six workers for each retiree, this number is only one-quarter of what it was in the 1960s. The UN predicts that the old-age dependency ratio will quadruple by 2050[6]. At 62 the retirement age is one of the lowest in Asia. Given a life expectancy of 90, Jane has to finance a rather long 29-year retirement period, the longest in our sample. This makes it incumbent on Singaporeans to plan privately. We apply a 10% uncertainty discount.

[5] Department of Statistics Singapore 2017.
[6] UN 2015

Paris
France



Jane's numbers

Savings rate
39%

Replacement rate
69%

Retirement age
67 years

Life expectancy
89 years

French pension system relies on public sponsorship

France's retirement system is based on a multitude of schemes, of which we take the two most common ones into account. Both are administered by public bodies. The *Association des Régimes de Retraites Complémentaires (ARRCO*[7]*)* is the occupational pension for blue collar workers. It is funded two-thirds by employer and one-third by employee contributions during their working careers. The contributions are translated into points based on their amount and the cost of a point. At retirement the accumulated points are converted into an annuity payment based on the value of a point.

Additionally, all French workers are eligible for the *Régime Général Sécurité Sociale (RGSS)*. This social security benefit is based on the employee's average last 25 years of annual salary. It is financed by tax revenues specifically levied for RGSS. Both ARRCO and RGSS work on a pay-as-you-go basis and are subsidized by public money.

France offers Jane the highest pensions in the EU

For Jane, living in Paris, RGSS will provide about two-thirds of her pension benefits while ARRCO is responsible for the remaining one-third. In total Jane will receive about 69% of her last employment income from RGSS and ARRCO. She would have to save about 39% of her current salary to supplement her retirement income from the mandatory system. The savings rates for France and Germany are almost identical, while Jane has a higher life expectancy in France she also has a higher replacement rate there.

Legally employees can leave the workforce at age 62 if they are prepared to take cuts. But France has recently introduced legislation that will raise the retirement age at which people are eligible for a full pension to 67, by the time Jane leaves the workforce. With a life expectancy of 89, Jane will enjoy 23 years of retirement, a full four years less than in Switzerland for example. But private savings are an important supplement, even for this shorter period.

Will Macron liberalize French pensions?

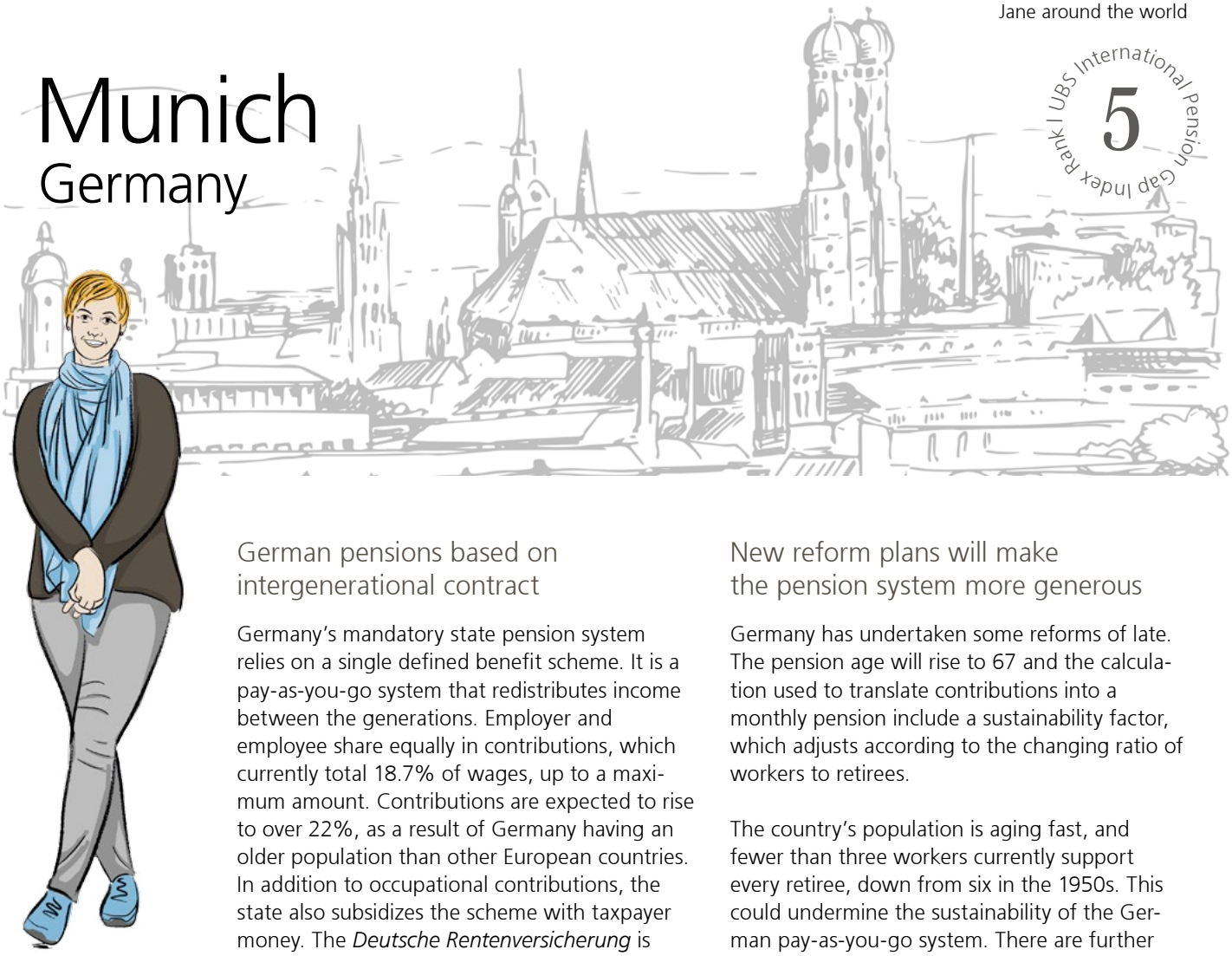
Demography is changing less rapidly in France than elsewhere in Europe. Still, the country has only three workers for each retiree. The financial crisis and the ensuing recession led to a high unemployment rate, decreasing worker contributions. In addition, public debt is high, leaving the government little room to fund more.

Recent reforms include a higher minimum age for early retirement as well as a decrease of the ARRCO points conversion rate. Furthermore, President Emmanuel Macron has proposed aligning the different employee pension schemes to make the system easier to manage and reduce its administrative burden. Nonetheless, the sustainability of the French system is dampened by large public debt. We apply a 15% uncertainty discount.

[7] The schemes for managers and civil servants have different names but similar mechanisms.

UBS International Pension Gap Index Rank | 5

Munich
Germany



Jane's numbers

Savings rate
40%

Replacement rate
50%

Retirement age
67 years

Life expectancy
87 years

German pensions based on intergenerational contract

Germany's mandatory state pension system relies on a single defined benefit scheme. It is a pay-as-you-go system that redistributes income between the generations. Employer and employee share equally in contributions, which currently total 18.7% of wages, up to a maximum amount. Contributions are expected to rise to over 22%, as a result of Germany having an older population than other European countries. In addition to occupational contributions, the state also subsidizes the scheme with taxpayer money. The *Deutsche Rentenversicherung* is responsible for its administration.

Pension payments are determined by a formula based on number of years and amount of contributions. Germany's second pillar, the occupational pension, and the *Riesterrente* are not mandatory and thus not considered in our calculations. As they offer tax incentives, many Germans make use of them, which our calculations show is wise to do from an early age.

Low life expectancy but still high savings needs

In Munich, Jane would have to save 40% of her current wage to sustain her lifestyle. Her replacement rate of 50% based on the mandatory part of the pension system is lower than in other European countries since our German Jane has higher wages. Given the high living costs in Munich, she has to save roughly as much as in Paris and Milan.

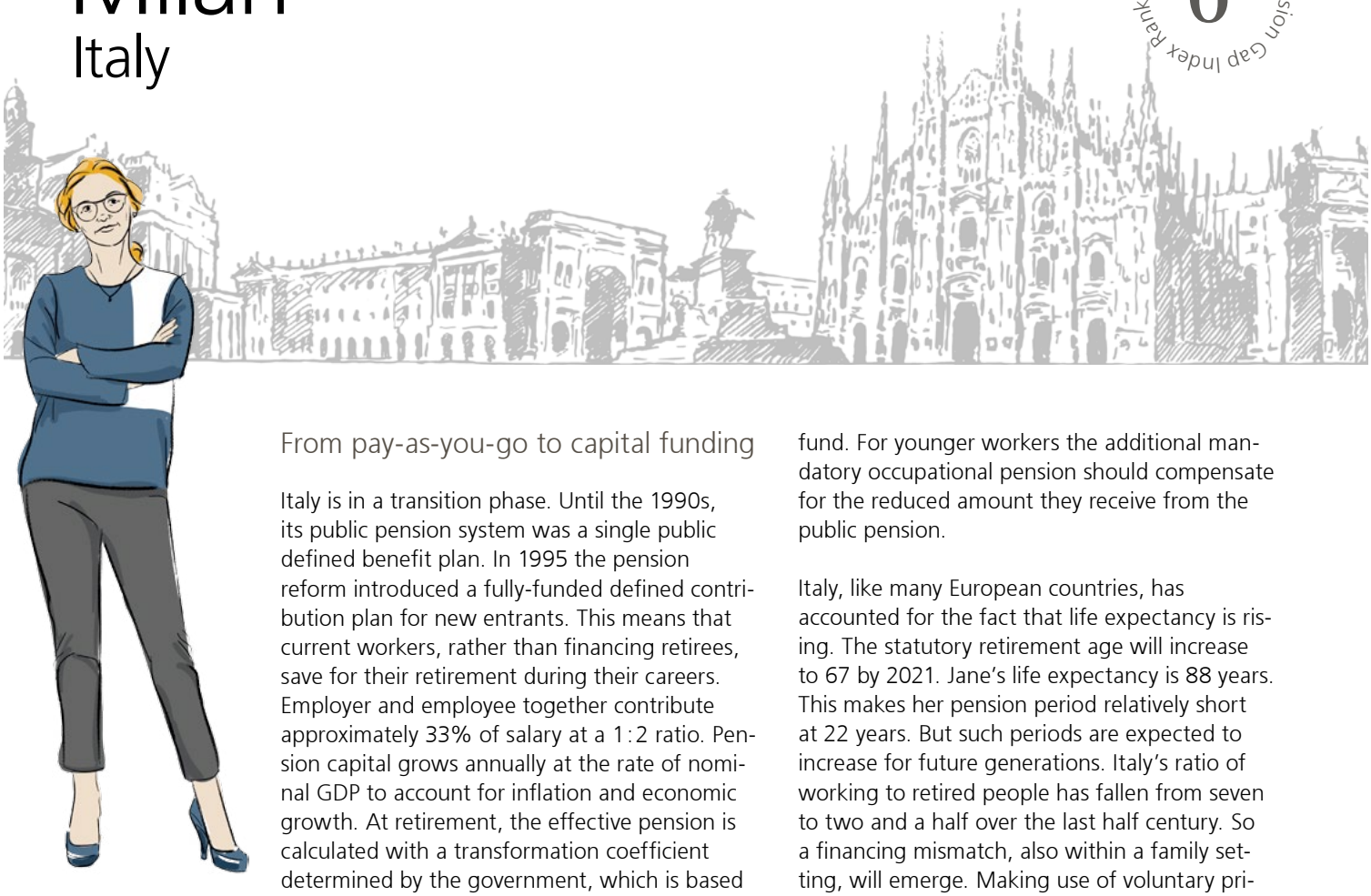
Munich-based Jane has one of the lowest life expectancies in our European cities. She can expect to live until only 87. So her retirement will likely last 21 years. Nonetheless, private savings are essential to make her retirement enjoyable.

New reform plans will make the pension system more generous

Germany has undertaken some reforms of late. The pension age will rise to 67 and the calculation used to translate contributions into a monthly pension include a sustainability factor, which adjusts according to the changing ratio of workers to retirees.

The country's population is aging fast, and fewer than three workers currently support every retiree, down from six in the 1950s. This could undermine the sustainability of the German pay-as-you-go system. There are further reform plans to equalize pension payments in east and west Germany, as well as to raise payments for early retirees. This is to be financed by higher contributions and state subsidies. As Germany already spends about 10% of GDP on pensions, the sustainability of the system is reduced further and we apply an uncertainty discount of 10% to our result.

Milan
Italy



Jane's numbers

Savings rate
41%

Replacement rate
67%

Retirement age
67 years

Life expectancy
88 years

From pay-as-you-go to capital funding

Italy is in a transition phase. Until the 1990s, its public pension system was a single public defined benefit plan. In 1995 the pension reform introduced a fully-funded defined contribution plan for new entrants. This means that current workers, rather than financing retirees, save for their retirement during their careers. Employer and employee together contribute approximately 33% of salary at a 1:2 ratio. Pension capital grows annually at the rate of nominal GDP to account for inflation and economic growth. At retirement, the effective pension is calculated with a transformation coefficient determined by the government, which is based on contributions and life expectancy. Under the new law, full eligibility is reached after 35 working years.

In addition, the new pension system also mandates workers to save approximately 7% of their salary in a private occupational pension fund. This so-called *Trattamento di Fine Rapporto (TFR)* existed before but was earmarked to cover periods of unemployment and held by the employer. Now it goes directly into the private pension fund.

Generous replacement rate will decline

Since Jane entered the job market before 1995, when the crucial pension reform was introduced, she can still expect to receive roughly 67% of her final salary. This is far higher than younger workers who entered the workforce after 1995 can expect based on the new pension scheme. Jane's pension is calculated as a mix of both systems. This means she must save about 41% a month privately until retirement to finance her basic urban lifestyle in Milan. Importantly, this result is only based on the public pension as we assume Jane will keep her TFP with the employer rather than in the pension fund. For younger workers the additional mandatory occupational pension should compensate for the reduced amount they receive from the public pension.

Italy, like many European countries, has accounted for the fact that life expectancy is rising. The statutory retirement age will increase to 67 by 2021. Jane's life expectancy is 88 years. This makes her pension period relatively short at 22 years. But such periods are expected to increase for future generations. Italy's ratio of working to retired people has fallen from seven to two and a half over the last half century. So a financing mismatch, also within a family setting, will emerge. Making use of voluntary private savings will become ever more important in the coming years.

Further austerity means pensions will fall further

On the back of the reforms phased in over the last two decades, the initial generous replacement rates will keep declining – to as low as 50% for the generations that join the workforce after 1995, in our view. Along with a rising pension age, this adjustment will ensure the system remains sustainable, in spite of complex demographic factors.

Still, in the near term, sustainability issues remain. Italy's public pension spending remains one of highest among the countries in our sample as a percentage of GDP. Given its elevated gross debt ratio, the government may consider further austerity measures by reducing the replacement rate or increasing the retirement age once again. Further, in a weak economic environment, pension capital linked to GDP growth will suffer. We apply a 20% uncertainty discount.

London
United Kingdom

Jane's numbers

Savings rate
47%

Replacement rate
41%

Retirement age
67 years

Life expectancy
87 years

The UK recently introduced a mandatory earnings-related pension

For a long time the only guaranteed pension income in the UK came from the State Pension, which covers basic necessities. It offers a flat-rate payment, currently capped at GBP 159 per week, adjusted for previous National Insurance contributions and price developments. It is financed by the government and no contributions are necessary. New workers only reach full eligibility after 35 years of employment compared to the previous 30 years.

The Pensions Act 2008 introduced a mandatory occupational pillar, which was phased in beginning in 2012. As a result people who entered the workforce before 2012 will have lower pension capital at retirement compared to younger ones. The total compulsory contribution rate is 2% for 2012–2017, 5% for 2018 and, as of now, 8% for all subsequent years, shared by employer and employee. Employees can contribute more, voluntarily, or can even opt out of the plan if they have equivalent private options available.

The pension capital will be invested until retirement, when the amount of money saved will be available for discretionary use. It can be withdrawn all at once or in installments, immediately or at a later point. Up to 25% can be taken tax free while the other 75% is taxed whether it is withdrawn in cash or as an annuity.

Shorter contribution period reduces pension payout and increases private savings needs

The two mandatory pension pillars provide Jane, living in London, with a replacement rate of just 41% of her final income. Until she retires at 67, Jane would need to save an additional 47% each month to finance her basic urban lifestyle. This highlights that the system relies heavily on private provisions. The UK provides a good example of how starting late in life will require more sacrifice to catch up. Jane benefits from this scheme for 22 years only. Later generations will benefit for their whole working lives.

With a life expectancy of 87 years, Jane can expect to enjoy retirement for 21 years. Using the voluntary options such as company-offered defined contribution and defined benefit plans, as well as other third-party arrangements, will improve Jane's prospects.

Less state funding makes the pension system more sustainable

Other reforms were introduced along with the mandatory occupational pillar. They include tax incentives to leave pension funds untouched for longer, or to take the money in installments rather than all at once. Tax-optimized savings options have also become available. This is important as the average UK household has a negative savings rate of –1%, one of the lowest among OECD countries[8].

Additional reforms include a rise in the retirement age from 65 to 67. While demographic change is taking place more slowly in the UK than elsewhere in Europe, the ratio of workers to retirees has dropped from five to little more than three. The occupational scheme is a variation of a defined contribution plan, whereas the State Pension relies partially on state funding. We apply a 5% uncertainty discount.

[8] OECD 2015

UBS International Pension Gap Index Rank | 8

New York
United States of America

Jane's numbers

Savings rate
49%

Replacement rate
55%

Retirement age
67 years

Life expectancy
83 years

The US relies on a taxpayer-financed social security system that covers only basic needs

The US mandatory pension system is a means-tested social security scheme, officially called the Old-Age, Survivors and Disability Insurance Program (OASDI). The replacement value provided by the system is progressive, meaning the initial dollars of income receive a higher replacement value to ensure basic survival of lower-income households. The subsequent dollars receive progressively lower replacement rates.

Social security is financed by taxpayers. Currently, employer and employee pay 6.2% of gross wages each. It works on a pay-as-you-go basis, meaning current tax contributions are used to pay benefits to receivers. The money not needed to pay benefits is held in a social security trust. But this trust is expected to be depleted by 2035[9] and from then on only 75% of pensions can be covered. Pension payments are based on social security credits accumulated over time. Currently, one credit is earned for every USD 1,300 in earnings, with a maximum of four credits per year.

Social security is not intended to replace the majority of income

The notion of social security is to provide only the basis of a person's pension income. As Jane is in the 50th percentile of earnings, and due to the progressive nature of the system, her replacement rate will still be around 55%. Nonetheless she has to save around 49% of her monthly wage to finance her basic urban lifestyle in retirement.

New York is one of the most expensive cities in the world, which explains part of the high savings requirements. But as Americans are widely aware, private savings are needed to supplement social security to maintain a basic urban lifestyle. For example, the 401k, which encourages tax-deferred contributions, is a popular scheme. As it is not compulsory for employers to offer the 401k scheme, it is not available to every employee and thus not considered in our calculations. But due to a contribution cap it would most likely not be able to fill the gap completely.

A relatively young population makes reform less pressing

The US has raised the retirement age in recent years to cope with demographic change. By the time Jane leaves the workforce, she will be 67. America is the country with one of the lowest life expectancies in the developed world. Jane can plan to live until the age of 83, leaving her only 17 years of retirement. Moreover, the American population is one of the youngest and thus the effects of demographic change will materialize more slowly than elsewhere. Currently there are still four workers for every retiree. These factors make the system more sustainable and reforms less pressing for now. But the large baby-boomer generation will also strain the system once it fully reaches retirement. We subtract 5% for uncertainty.

[9] UN 2015

Toronto
Canada

Jane's numbers

Savings rate
62%

Replacement rate
42%

Retirement age
65 years

Life expectancy
88 years

Canada introduces reforms to increase pension payments

The Canadian Pension Plan (CPP) is the main pension pillar for all Canadian provinces except Québec. It is a federally administered scheme financed from employment income. The pension amount is determined by an individual calculation based on the number of months worked and the relevant pensionable earnings. Pensionable earnings are determined according to the ratio between a worker's actual income and a certain maximum amount set by the government each year. There is a cap on the maximum amount paid per month.

The CPP is a defined benefit plan and provides a replacement rate currently of about 25% of final salary from age 65. As of 2019 Canada will introduce reform measures that will raise contributions but also increase pension payout to replace about 30% of last employment income. Jane will also receive a higher CPP payment as a result.

In addition, the Canadian government offers the Old Age Security (OAS) benefit to all qualifying residents. Since the income threshold for OAS is high, the majority of Canadians receive it. A second social security benefit is called Guaranteed Income Supplement (GIS). This is intended to prevent poverty in old age and provides only a basic payment, again depending on other income and assets. Both OAS and GIS are funded by government revenues.

Low-income households benefit from social security supplement

If Jane lived in Toronto, 62% of her monthly income would have to be put aside to finance her basic urban lifestyle during retirement. Since her pension income in Toronto would likely be below a certain threshold, she would receive the full OAS and a small amount of GIS additionally. Along with the CPP she receives, she would enjoy a total replacement rate of around 42%.

Pension payments start at 65. With Jane's life expectancy of 88, she has to cover 24 years of retirement, which makes it especially important for her to consider additional retirement savings options, such as employer-sponsored plans or third-party investment.

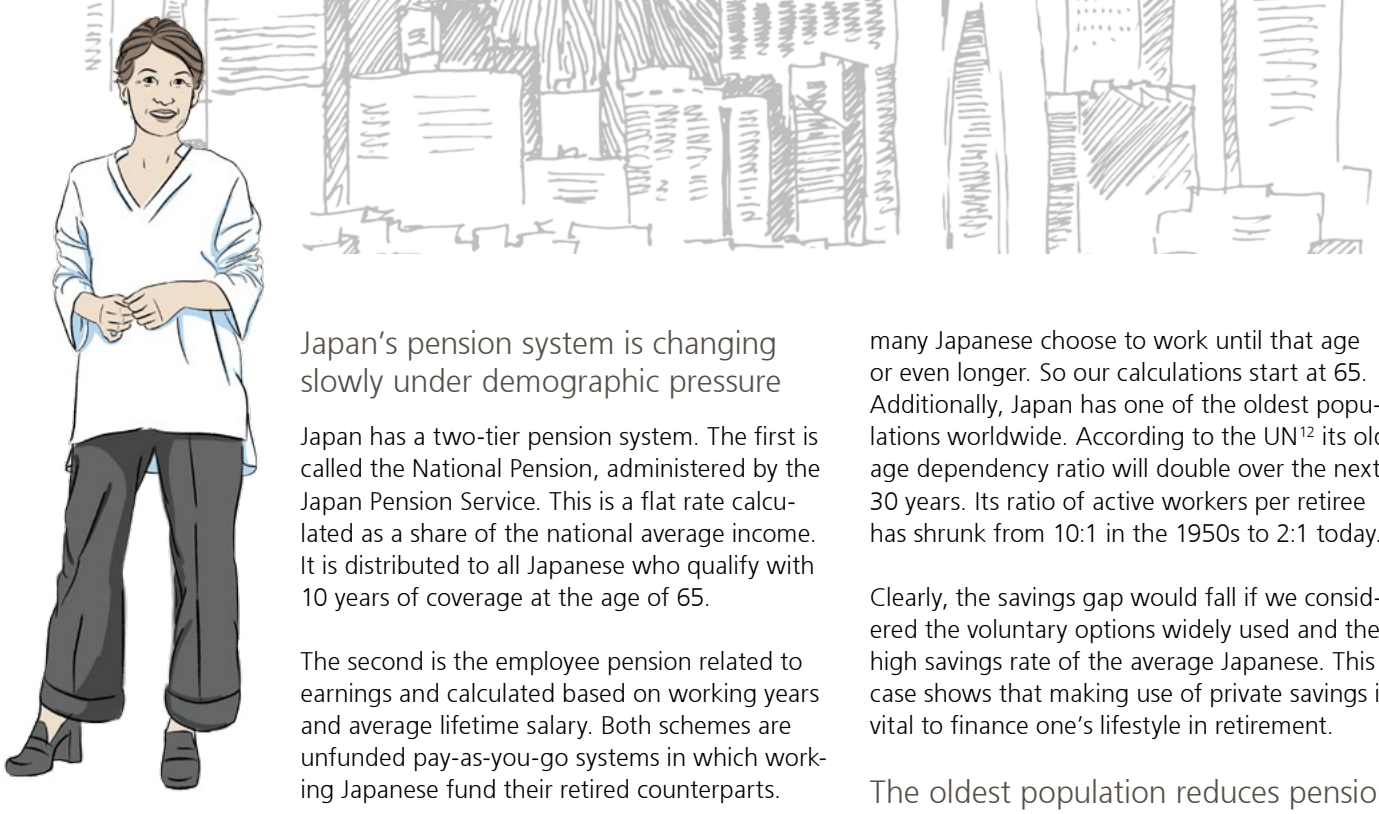
Canadians have one of the highest life expectancies in the Americas

Demographics in Canada are changing less rapidly than in European countries. There are still almost four workers for every retiree. But in Canada Jane has the longest life expectancy in the Americas and financing this period means Jane, as well as many other Canadians, needs to save privately. The country's household savings rate is only 4–5%[10].

Further, the economy depends highly on natural resources, and thus is susceptible to price swings. Future pension fund investments might be concentrated in this area and thus private savings should be invested in a diversified global strategy to reduce the risk. We apply a 7% uncertainty discount.

[10] OECD 2015

Tokyo
Japan



UBS International Pension Gap Index Rank | 10

Jane's numbers

Savings rate
148%

Replacement rate
55%

Retirement age
60 years

Life expectancy
91 years

Japan's pension system is changing slowly under demographic pressure

Japan has a two-tier pension system. The first is called the National Pension, administered by the Japan Pension Service. This is a flat rate calculated as a share of the national average income. It is distributed to all Japanese who qualify with 10 years of coverage at the age of 65.

The second is the employee pension related to earnings and calculated based on working years and average lifetime salary. Both schemes are unfunded pay-as-you-go systems in which working Japanese fund their retired counterparts.

Both pensions pay annuities that are adjusted for inflation. There are reforms underway that will amend the adjustment mechanism. Japanese pension contributions to the National Pension and the Employee Pension Insurance are invested in the largest pension fund in the world, the Government Pension Investment Fund (GPIF), with approximately USD 1.35 trillion of assets as of 1Q17[11]. While it was set up by the government, it is administered independently.

Highest life expectancy in the world weighs on savings requirements

In Tokyo, Jane would have to put aside a striking 148% of her monthly salary, in addition to the mandatory pension system contributions, to maintain her lifestyle when retired. Her pension income is only 55% of her final employment income. The result is not surprising, as Japan is struggling with the consequences of demographic change. Its population has the highest life expectancy in the world, and because Jane can expect to live until age 91 she needs to finance 27 years of retirement.

While the country's statutory retirement age is 60, pension benefits are only paid out at 65 and many Japanese choose to work until that age or even longer. So our calculations start at 65. Additionally, Japan has one of the oldest populations worldwide. According to the UN[12] its old-age dependency ratio will double over the next 30 years. Its ratio of active workers per retiree has shrunk from 10:1 in the 1950s to 2:1 today.

Clearly, the savings gap would fall if we considered the voluntary options widely used and the high savings rate of the average Japanese. This case shows that making use of private savings is vital to finance one's lifestyle in retirement.

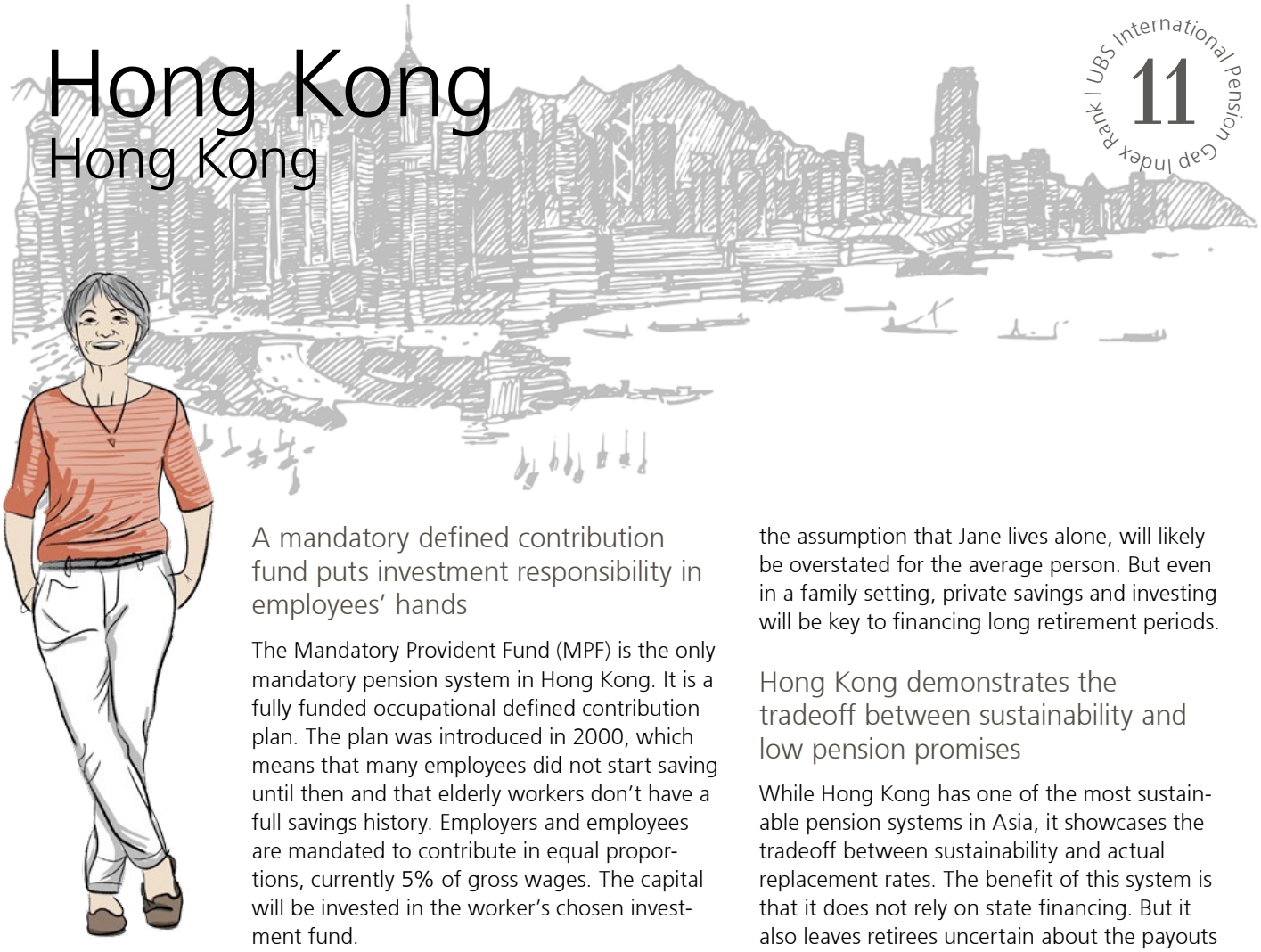
The oldest population reduces pension sustainability

Japan's working-age population is shrinking, while the number of retirees and pension benefit payments are rising. The government has undertaken steps to reform the system in recent years. The pension calculation mechanism was adjusted to account for an aging population with the so-called macroeconomic slide, which keeps the rise in pension payouts below the rise of prices and wages. Starting in 2018, this adjustment will not only be done when prices rise but also when they fall. Further, starting in 2021, pension payouts will no longer be adjusted to the change in inflation but to the change in wages, whether they increase or decrease. There are also discussions to raise the retirement age to 67. Japan's government debt and its already high spending on pensions as a share of GDP leave little room for maneuver. We apply an uncertainty discount of 20%.

[11] Source: Government Pension Investment Fund, http://www.gpif.go.jp/en/, 2017
[12] Source: UN World Population Prospects 2017

Hong Kong

Hong Kong



Jane's numbers

Savings rate
153%

Replacement rate
41%

Retirement age
65 years

Life expectancy
88 years

A mandatory defined contribution fund puts investment responsibility in employees' hands

The Mandatory Provident Fund (MPF) is the only mandatory pension system in Hong Kong. It is a fully funded occupational defined contribution plan. The plan was introduced in 2000, which means that many employees did not start saving until then and that elderly workers don't have a full savings history. Employers and employees are mandated to contribute in equal proportions, currently 5% of gross wages. The capital will be invested in the worker's chosen investment fund.

At the statutory retirement age of 65, retirees receive a lump-sum payment they can use at their discretion. Hong Kong also has a social security system that provides support for the needy. However, given its late start, the system can't provide the same income yet as do fully fledged multi-pillar Western pension systems. Further private third-party options are available on a voluntary basis.

Very high private savings requirements due to a relatively new system

If Jane lived in Hong Kong, her relatively short contribution period would leave her with a pension income of only 41% of her previous salary. So her required savings are a striking 153% of current income. This rate is further stretched by the fact that Jane's life expectancy in Hong Kong is 88 years, making her retirement phase a total of 24 years.

Due to her low pension income she will receive an additional social security payment called the old-age living allowance. Much of Jane's cost of living and thus her significant income gap are tied to rental prices. As Asians often live in extended family settings, our result, based on the assumption that Jane lives alone, will likely be overstated for the average person. But even in a family setting, private savings and investing will be key to financing long retirement periods.

Hong Kong demonstrates the tradeoff between sustainability and low pension promises

While Hong Kong has one of the most sustainable pension systems in Asia, it showcases the tradeoff between sustainability and actual replacement rates. The benefit of this system is that it does not rely on state financing. But it also leaves retirees uncertain about the payouts they will receive, as they depend on investment returns.

Nonetheless, the city's old-age dependency ratio is predicted to more than double by 2050, while its fertility rate is one of the lowest in the world, according to the UN[13]. Today there are only one-fifth as many workers per retiree as there were six decades ago. This will make financing retirees more costly for the state as well as for families. Thus private savings and investing have to take center stage. We apply an uncertainty discount of 7%.

[13] UN 2015

UBS International Pension Gap Index Rank | 12

Taipei
Taiwan

Jane's numbers

Savings rate
157%

Replacement rate
32%

Retirement age
60 years

Life expectancy
85 years

Without a compulsory retirement age many people choose to work longer to afford retirement

Taiwan's occupational pension for private-sector workers is called the Labor Pension and is administered by the Bureau of Labor Insurance. It is a defined contribution plan in which employers have to contribute at least 6% of an employee's gross salary, while the employee can decide to voluntarily contribute up to 6% additionally. The pension fund capital earns a guaranteed investment return at least equal to the two-year deposit rate. The funds are handed to the workers at retirement to use at their discretion. Retirement age in Taiwan is not set in stone. Workers are eligible to retire at 60. Since the financial crisis many are deciding to work a few years longer.

In addition, the Taiwanese government offers the Old Age Benefit under its Labor Insurance scheme to all private and public workers. It is financed by contributions from employees, which currently stand at around 10% of their monthly insured wage and will rise to 13% over the next few years. When employees retire, if their insurance period is less than 15 years they will be offered a lump-sum payment. If they were insured for more than 15 years they can choose between a lump sum and a monthly pension. In the latter case the pension payment is adjusted for inflation and paid until death.

High household savings rate benefits Taiwanese in retirement planning

Jane, who lives in the capital Taipei, has to save 157% of her salary per month, assuming she retires at 60, based on what she receives from the Labor Pension and the Old Age Benefit. If Jane were to delay leaving the workforce by a few years, as many Taiwanese do, this figure would fall substantially. The pension benefit will provide her with a replacement rate of 32%, one of the lowest in our sample. Taiwan's life expectancy of 85 is near the bottom of the Asian countries we're looking at, but the country also has one of the lowest statutory retirement ages in our sample. This gives Jane little time to save for her 26 years of retirement.

Taiwan's household savings rate of 23% on average over the last 40 years is one of the highest in the world[14]. Therefore, many Taiwanese might be better prepared for retirement than Jane at age 50. Moreover, Jane's monthly savings rate is high because rent payments make up 50% of her cost basket. Here, again, the actual costs for many Taiwanese will be lower since homeownership rates are around 85%[14].

Taiwan achieved rapid growth in pension coverage over the last few decades

Taiwan's economic growth has been rapid. Likewise its pension system has expanded over the last couple of decades. By now the majority of Taiwanese are covered by the labor insurance scheme. Like that of so many other Asian countries, Taiwan's demographics are changing at a rapid pace, which is putting further pressure on the pension system. The ratio of active workers to retirees is currently four and a half compared to 22.5 in the 1950s. While the Labor Pension is more sustainable with its defined contribution system, the Old Age Benefit is financed via redistribution. This will be harder to sustain if the old-age-dependency ratio shrinks. We apply an uncertainty discount of 15%.

[14] Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. (Taiwan) 2016

Methodology

Calculation

The key statistic of the UBS International Pension Gap Index is the monthly savings rate Jane needs from age 50 until retirement to support a basic urban lifestyle under each country's conditions and is calculated as follows (Fig. 6):

1. Estimate average monthly cost of living by creating a retirement cost basket consisting of housing, staples and personal care items, transportation, recreation, medical care, and gifts and donations.
2. Analyze the retirement and social security system to determine the expected pension income.
3. Inflate prices to reflect nominal costs and income at each point in time.
4. Adjust income for tax obligations.
5. Apply the uncertainty factor to adjust expected net income.
6. Take the difference between total costs and total net income to calculate surplus or deficit for each year of retirement.
7. Apply net present-value (NPV) calculation, assuming a conservative investment return from fixed income instruments, to arrive at the total pension gap when retirement starts.
8. Perform a second present-value calculation with result from step seven over the remaining working period to estimate the absolute amount of money needed to be saved, assuming a slightly higher investment return from a mix of equities and bonds.
9. Divide the result from step eight by the current net income to receive the percentage of required savings. This final number is the savings gap. All calculations are performed in the local currency.

Fig. 6: UBS International Pension Gap Index Methodology explained

Savings required to close the pension gap including investments

Source: UBS, 2017

Economic assumptions

All of Jane's country-specific characteristics, like retirement age and life expectancy, stem from the most recently available country-specific data. The country's median female gross full-time equivalent income is mostly available on local statistics office data bases[15]. It is important to remember that we use the female median wage, which is often lower than the male counterpart and thus accumulated pension capital is lower. For most countries we made assumptions about wage developments. We used historically available data as well as UBS expectations on future productivity growth and inflation.

Tax rates come from government sources. The required savings amounts are based on the assumption that the savings as well as the pension capital is invested. During working life we assume an investment strategy in a balanced mix of equities and fixed income. In retirement we calculate with investment returns based on a less risky fixed income strategy. All investment returns are based on the UBS Capital Market Assumptions.

Uncertainty discount factor

Jane's estimated pension payout is adjusted with an "uncertainty discount." It accounts for the fact that her pension payout starting in about 15 years and continuing for two decades or more, is not certain today. The uncertainty factor takes into account country-specific demographic developments, public finance to support the current pension system and the structure of the pension system itself. Our discount factor is based on a framework developed by Allianz,[16] which analyzed several criteria related to the three categories for 54 countries and allocated scores between 1 and 10 to each. From this score we derive a percentage discount factor for the 12 countries we have examined. In addition to the Allianz ranking, we considered the mechanism of each country's pension system and our assessment of potential reforms. From this we qualitatively derived a percentage discount between 0–20% for each country (Fig. 7).

Fig. 7: Uncertainty discount factor

Australia	2%
UK	5%
USA	5%
Canada	7%
Hong Kong	7%
Switzerland	7%
Germany	10%
Singapore	10%
Taiwan	15%
France	15%
Italy	20%
Japan	20%

Source: UBS, 2017

[15] Taiwan was not able to produce median income data for women; here we used the total gender average and adjusted for a female discount and a median discount.

[16] Allianz SE 2016, 2016 Pension Sustainability Index, International Pension Paper 1/2016.

Glossary

Baby Boomer generation: The generation born between the mid-1940s and the mid-1960s. This demographic cohort stands out as it is relatively large compared to the previous and following generations and thus has a particularly strong impact on the pension system.

Defined benefit (DB) plan: A pension plan in which an employer/sponsor promises a specified pension payment, lump sum or combination thereof on retirement. This benefit is usually predetermined by a formula based on the employee's earnings history, tenure of service and age rather than depending directly on individual wage contributions and investment returns. The financial risk lies primarily with the employer/sponsor of the scheme.

Defined contribution (DC) plan: A type of retirement plan in which the employer, employee or both make contributions (deducted from the employee's gross wages) to a registered retirement account on a regular basis. Regular or lump sum pension payments are then made from the cumulated savings and the returns on them during retirement. As these payments depend on the investment performance of the funds in the account, a DC fund provides much less income security for the employee, and more limited obligation for the employer, than a defined benefit pension plan, i.e. the employee bears the investment and longevity risk.

Life expectancy: The statistical measure of the average lifetime of a specified set of people grouped by age, usually measured as life expectancy at birth. For this report we take life expectancy at age 50 from the specific mortality tables.

Lump-sum payment: A one-time payment of total or partial retirement benefits.

Mandatory pension system: A country's prevailing pension scheme that citizens and residents are legally obliged to participate in and from which they can expect a pension payment in the future.

Old-age dependency ratio: The ratio of people aged 65+ to individuals aged 20–64.

Pay-as-you-go pension system: In an unfunded defined benefit pension, no assets are set aside and the benefits are paid for by the employer or other pension sponsor as and when they are paid. Pension arrangements provided by the state in most countries in the world are unfunded, with benefits paid directly from current workers' wage contributions and taxes.

Pension annuity: A stream of payments over a defined period or until death of the recipient.

Pension gap: The difference between pension income and cost of living in retirement, usually negative.

Replacement rate: The ratio of first net-retirement income and last net-working income.

Uncertainty discount: A discount factor applied by UBS in this study on future pension income. We apply these uncertainty discount factors to account for differences in the financial sustainability of the countries' pension systems covered in the study. Our calculations are based on the assessed sustainability of the pension system by Allianz.

Voluntary retirement savings schemes: Along with mandatory retirement schemes in which workers are mandated to contribute by law, voluntary options exist. They are provided by government agencies, companies or private third parties. Some of them benefit from tax incentives.

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Authors
Jackie Bauer – jackie.bauer@ubs.com
Veronica Weisser – veronica.weisser@ubs.com
Daniel Kalt – daniel.kalt@ubs.com

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