



# THE LOOMING PENSION CRISIS PART II: GOVERNMENT PENSION PLANS

Author:



**Konstantin Boehmer, MBA**  
Vice President,  
Portfolio Manager  
Mackenzie Fixed Income Team

## Key takeaways

- Our model shows that despite pension assets exceeding 175% of GDP, Canada is only “middling” in its pension preparedness
- We believe the movement toward more populist regimes will continue if people cannot trust in a brighter future. This will create challenges for governing as age related issues will determine party affiliation and consequently might result in governments continuing to overpromise and under-prepare
- The model allows for a more wholesome assessment of country specific risk and therefore better relative value decisions. Over time, progress or the lack thereof will inform which countries are vulnerable to rising funding costs and credit downgrades

[Our first paper](#) in this three-part series laid out the significant issues facing both public and private pension plans. We looked at the societal importance of public pension promises and why promises made, need to be kept. To do so, difficult choices will have to occur very soon.

Since the industrial revolution, subsequent generations usually had more opportunities, greater wealth and lived healthier and longer lives. Everyone was working towards a better future, which was generally believed in. Today, concerns are being raised. There is rising fear that we may be reaching the crossroads where the dream of a brighter future for all is looking less likely. Growing income inequality and a lack of upward mobility are behind this change in sentiment especially in society’s most vulnerable segments. It is precisely these individuals that generally rely most heavily on government pensions during retirement. However, despite years of economic expansion, many countries’ government coffers have not been replenished. Which raises the question, should society have faith in government pension systems to provide for them after decades of contributions? And if not, what is the cost of that lost confidence?

## Preparedness and Ability

This second paper in our pension series focuses on the preparedness and ability of governments to deal with their pension challenges. No pension system in an unpredictable world can entirely succeed in providing a predictable foundation of retirement income and be perfectly sustainable at the same time. Nonetheless, as asset managers, we aim to identify the challenges and opportunities of individual nations to more fully understand this evolving theme. Our analysis is built on projections and assumptions about the future and employs a robust framework allowing us to elicit implications for societies and global markets.

## Government Pension Plans: The Funding Worry

Core to the premise of our work is that countries are already struggling under the burden of total debt (government, corporate, household) which is three times greater than global GDP. Unfortunately, this does not capture the whole picture as governments (federal and local) as well as corporations possess large amounts of [underfunded pension liabilities](#).

Underfunded pension liabilities of corporations and local governments are generally documented and publicly disclosed. Within the annual financial accounting those numbers need to be accounted for. It is probably worth repeating that those numbers ought to be treated carefully as they are based on (sometimes unrealistic) assumptions. On the federal side, the public pension debt is usually undocumented and significantly larger in size. This has therefore a bigger potential impact on markets and societies. A question we have spent some time on is whether it makes sense to worry about the underfunding of sovereign pension plans the same as we do for corporate or local government plans. The principal difference stems from the notion that governments are (in theory) an indefinite system while companies have much shorter life-spans. Firms such as General Electric, Deutsche Bank, or Kraft Heinz which appeared rock-solid for decades are now struggling. It is reasonable and even prudent to wonder how solid they will be in 20 years. Governments on the other hand have a history of surviving centuries. Argentina has survived many ups and downs while defaulting eight times. Given the indefinite life expectancy of governments and their ability to tax and generate revenue from their citizens, we would argue that government pension plans should not be judged solely on their

current asset-liability mismatch but should also include a projection of future contributions. This suggests that a pay-as-you-go (PAYG) pension system could still be in equilibrium despite currently not having sufficient or even any assets to pay out retirees. In theory, public pension funds that are supported by a societal promise ensuring their liquidity and indefinite existence do not require the same level of funding as corporate pension plans.

## Our Model Evaluates the Ability of Governments to Protect the Pension Promise

The team at Mackenzie has significant experience in building models and tools to evaluate data and search for opportunities across the spectrum of fixed-income assets and in countries around the world. Given our capabilities and our assertion that the pension promises made by governments to their citizens will be very important to the stability of countries and the global community, we took on the challenge of building a model to monitor whether the pension promises can be kept or not. Our model allows us to understand the current landscape, look for improvements or deterioration which could eventually alter the outlook and credit worthiness of sovereign debt.

Our model analyzes 43 countries and determines the sustainability of governments to provide retirement security for their citizens. The model has seven major indicators, each of which is comprised of multiple sub-indicators. Further, the indicators and sub-indicators of this research have different weights based on their relative importance. In the table below, we provide a description of each of the indicators.

Indicator	Sub-Indicators	Description
Demographics	8	Includes current demographics and demographic trends, specifically with relation to retirement age and time spent in retirement
Assets and Contribution	2	Total public pension assets of a given country and the breadth of contributions into that pool
Government Health	4	Government health can be a backstop for imbalances. This indicator looks at debt levels, budget constraints and the ability to use monetary policy as signals of government health
Government Stress	4	Current expenditure on old-age benefits as well as the relative size of direct government employees
Private Health	5	The balance sheet of individuals with their assets (overall wealth) and liabilities (household debt) provides insights into the ability of a population to finance its government
Mark-to-market Risk	2	Funded pension schemes are subject to mark-to-market risk; higher concentration on more volatile asset classes magnifies that risk
Sustainability Gap	7	The adequacy or generosity of retirement plans often stands in contrast to the sustainability of such plans. The gap between adequacy and sustainability offers insights into the potential for disappointment/stress

## Findings by Indicator



### Demographics:

Based on our analysis it appears that the “Old Continent” (Europe) is indeed most affected by demographic changes. The old-age dependency ratio (the population greater than 65 years of age relative to the working age population of 20-64 years) has deteriorated meaningfully over the past 10-15 years. This leaves fewer working adults to pay for retirees which is particularly worrisome in PAYG schemes. Emerging markets such as South Africa, Argentina, Mexico but also Israel and Ireland are significantly better positioned from a demographics perspective. While pure demographics tell an important story – the most crucial aspect of the analysis has been the estimation of years in retirement. The United States, Argentina, and Mexico look compelling and similarly so does South Africa but that is only due to its terribly low life expectancy. France, Saudi Arabia, Luxembourg, and Brazil display the worst results. In France, citizens spend on average 23 years in retirement compared to approximately 16 years in the United States. Paying for an additional seven years is a big ask for the French government to finance. Canada’s scores were average for most of our demographic indicators but Canada’s poor expected old-age dependency ratio (which suggests that the retirement wave is just starting in Canada) is the data point that pushed Canada down in rank.



### Assets and Contribution:

Several countries around the globe possess at least partially funded schemes – which are a superior form of pension preparedness. Denmark and The Netherlands, but also Canada have accumulated assets exceeding 175% of GDP. Other countries such as Austria, Greece, Germany, Hungary, and Turkey are in the single-digit area. In fact, pension assets in the single digits relative to GDP is relatively common. The difference in philosophy between PAYG versus funded schemes is in full display. Besides accumulating assets, we believe it is also important to look at contribution levels – how much is contributed by each citizen and what percentage of the population is contributing to old-age schemes. This indicates acceptance of the scheme. Regarding contribution amounts, Canada is somewhat toward the low end relative to other countries we researched.



### Government health:

Global debt levels are at record levels and many countries still have sizeable budget deficits despite being in the tenth year of economic expansion after the Great Financial Crisis. Even in countries with record low unemployment, governments have been unable to exercise fiscal discipline, allowing spending to

grow faster than tax revenues. This means governments are less able to foot the bill for any hiccups on their public pension plans. At the end of the day – the bill is generally paid by its citizens, but the capacity to bridge finance during times of stress has significantly declined over the past few decades.

Debt levels (included in the net debt calculation are sovereign wealth funds, FX and gold reserves) range from outrageous in Japan and Greece (~200% of GDP) to average in places such as Germany, Mexico or Poland (~45%) to phenomenal in Estonia and Saudi Arabia (~0%) with Norway near -100% being in a league of its own with an entire year’s worth of GDP in savings (Canada looks good by this measure with net debt at approximately 28% of GDP). Budget balances similarly display a great variety with positive balances in 11 out of 43 countries and negative ones in the rest. Lack of economic diversification (for example a high reliance on oil) contributes to weaker government health. A lack of economic diversification means Canada’s government health is more tenuous – who knows what the demand for fossil fuels will be in 30 years? The last resort of government health is the ability to monetize debt. If a country is able to ‘print money’ to fund liabilities, the immediate illness can be covered up. However, unintended consequences of such actions such as greater wealth inequality and fears of an inflationary spiral could emerge. We can further cross-check those results with our proprietary sovereign risk assessment.



### Government Stress:

Countries with large public sectors are generally more exposed to drains on their public coffers than nations which are lean in that regard. European countries with their rich histories of public sector workers and more mature pension markets score worse than most emerging markets and newly developed countries. Old-age expenditure, a key input factor for the indicator, has risen for almost all countries over the past couple of decades – but the differences between countries are large. The strongest countries in the governments stress indicator are: Indonesia and Chile with Iceland also ranked highly. On the other end of the spectrum we have France, Finland, Hungary and Portugal. Canada fares relatively well as the sub-indicator of public expenditure on old age benefits lifts its overall ranking into the middle second quartile.



### Private health (or wealth):

Personal financial health or wealth provides the foundation from which governments can exist, it can be measured in a variety of ways. The wealthier citizens are, the greater the potential to collect taxes from them. Median wealth rather than the average is our preferred choice, as inequalities are significant in many

countries researched. High net worth individuals are generally mobile, connected and creative citizens which lowers the ability to tap their wealth. On the liability side, household debt to GDP continues to provide insights into which countries are already stretched on the citizen level. There appears to be a correlation between the pension assets of a country to household debt. While we are not certain why a correlation exists, one theory is that citizens living in these countries have a high degree of confidence that they will be provided for in retirement which removes pressure to save more during their working lives. Denmark, Canada, the Netherlands, Australia, and Switzerland all have significant household debt outstanding as well as significant pension assets.



### Mark-to-market risk:

We have already highlighted the desirability of public pension assets versus running a PAYG scheme, there is however a drawback known as mark-to-market risk. This is a risk almost exclusive to pension plans with significant assets. And the higher the weight in risky assets the greater the odds are that the value of the plan could fall substantially. Overall, we still believe that there is a net benefit to having a funded pension scheme, however if that scheme were to lose 30% of its value, market participants will notice and the sustainability of the plan would be called into question. Funded (or partially) pension plans tilted toward equity investments that could be the most exposed are Australia, Canada, and United States – all three were bottom performers on a mark-to-market basis.



### Sustainability gap:

The generosity of a pension system generally is at odds with its sustainability. The “sustainability gap” measures the difference between what was promised and what can be delivered – the bigger the promise, the bigger the potential for disappointment. Our sustainability gap indicator assesses the adequacy of pension plans and assigns a score on that basis. It is based on the replacement ratio (the percent of salary to be received in retirement), for average and above average salary workers, the total pension wealth in multiples of median income and the breadth of coverage (how many people are covered under the scheme). The Netherlands, Luxembourg, and Austria are the most generous systems based on the analysis and therefore rank toward the bottom of all countries in our research. We compare that ranking against the total of the other factors (mark-to-market risk, private health, government health, assets and contribution and demographics) to calculate the sustainability gap.

## Model’s Overall Findings

We ranked the results from our model from top “most prepared” to the bottom “least prepared” (see page 6 for the full results). While not entirely surprising, there are some countries which we expected to be positioned slightly different. The most

unexpected results from our model was the determination that Iceland was most prepared, South Africa was in the top quartile of preparedness, Canada in the bottom half of the second quartile and Austria close to the bottom. Some of this can be explained relatively easily. For example, South Africa appears pension ready because its citizens have an average life expectancy of 63 years which is about 20 years less than in Canada and 18 years less than in Austria suggesting a low time span in retirement that needs to be paid for.

Iceland’s rank is surprising given the deep financial crisis it suffered in 2008-2009 followed by an IMF bailout. Propelling Iceland into the top spot according to our pension preparedness study, is wealth (government, private and pension). Further, the mark-to-market risk on those assets is less than Canada or the Netherlands due to a lower exposure to risky assets. Furthermore, Iceland’s pension promises are modest resulting in little stress on the government to meet old age expenditures. In Canada’s case, the significant benefit derived from having large pension assets was partly offset by relatively low contribution amounts and the mark-to-market risk from our significant equity exposure. Also lowering Canada’s pension preparedness was our high household debt. The single largest factor however was unfavorable demographics – too few young people relative to the number of people at or near retirement age.

## The Political and Economic Risks

After a decade of economic growth, the fear or at least the narrative for the global economy has shifted from synchronized strength to synchronized weakness. The growth phase from 2009 through to 2018 was unusual in a few ways. First, the strong growth rates achieved in previous recoveries was not reached. A second extraordinary feature of this cycle was that many governments did not curtail spending and have added to their indebtedness. We believe that many may not be well prepared for the next downturn.

Important to our discussion on pension preparedness is the belief that the burden of large obligations will likely limit future global growth potential. And this is a significant tail risk to pension payments. Realizing and accounting for this new reality will have a profound impact on our society and on financial markets given its [interconnected nature](#).

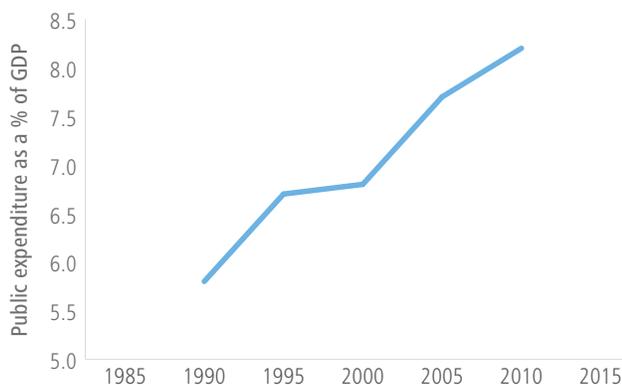
While we believe that social security schemes do not necessarily need to be fully funded, the contribution base is eroding and the [demographic pyramid](#) is putting exorbitant stress on the pension system in most of the countries we studied. The primary risk of PAYG systems lie in their impact on government budgets and/or increasing contribution rates for employees and employers. This in turn will affect growth and debt levels as well as contribute to intergenerational conflict.

The political implications of our research cannot be overlooked either. Many lower-ranked countries have been in the media regarding their pension plans. Greece was center-stage during

the European debt crisis. More recently, the election of Jair Bolsonaro in Brazil was in part decided by the various approaches put forward by candidates to deal with its inevitable pension reform. Political polarization should become more prevalent as the intergenerational conflict is almost sure to increase further. Political parties will need to position themselves on the critical question of whether to extend and honor the pension promise or solve the issues head-on. This will probably lead to even greater divisions where party affiliation will be defined more by age and pension preparedness rather than ideology or gender.

Over the last decades the debt financing capacity of individuals has been put under constraints from a variety of factors, which limits a government’s ability to increase contribution rates and/or taxes. Experience has shown that the phased increase of contribution rates under a pure PAYG or a scaled premium approach has substantial political risks. Italy for example had achieved positive pension adjustments under the previous government, only to see them being rolled back under the current populist regime. It is politically popular or at least welcomed by an electorate to introduce a pension scheme with a generous formula and an initially low contribution rate, since the scheme has only a few pensioners during the first one or two decades. But when expenditures surge, as they typically do during later years of the maturation phase contribution rates need to be increased. The problem is that governments often wait too long before raising the contribution rate, as each contribution hike, even if perfectly normal and foreseeable financially, is politically unpopular. Waiting too long means either running the scheme into liquidity problems or having to raise contributions further out in the future. Politicians often use consolidation measures, which imply the reduction of benefit levels or the tightening of eligibility conditions. However, maintaining the financial equilibrium by adjusting benefits has become common practice, often necessary but certainly not always with good governance. Reductions in benefits are generally detrimental to the public credibility of the scheme, which is its most important asset.

### Global Public Expenditures on Retirement or Old Age Benefits Over Time



Source: OECD Pensions at a Glance 2017.

But pension payments are not the only strain on government budgets. In fact, rising healthcare cost (another mainly age-related expense) suggests more difficult times will be ahead for public funding. Understanding the pressures on budgets coming from old-age spending will be crucial given that it is already one of the largest items in government budgets. Public expenditure on old age benefits have been rising steadily as a percentage of GDP. Since the primary revenue stream for governments is the public itself, much of the budgetary stress will be off-loaded to individuals. The room to maneuver for governments is getting tighter. Therefore, individuals will need to make more realistic assessments of the likelihood that governments are able and/or willing to keep their pension promise. Data in our analysis unfortunately suggests a relatively low probability for many countries.

## The Investment Implications

The investment implications for the Mackenzie Fixed Income Team are manifold. For portfolio construction, we will consider the output from this model in our country selection by monitoring developments over time. We believe that countries that improve their overall standings are likely to be rewarded in the marketplace by being able to issue debt at more favorable rates. Countries that show significant deterioration are more likely to see their debt costs rise. So simple spread trades, such as avoiding (or shorting) poorly ranked countries relative to well-prepared countries seems an obvious option. The findings from our pension preparedness model is however just one information set that the Team considers in portfolio construction and positioning. Further, this research must be seen in context to other factors related to the ability and willingness (including a country’s default history, current account balance, etc.) of nations to repay their debt.

Over the last decade, the Fixed Income Team at Mackenzie has bolstered their ability to analyze vast amounts of data and make non-biased comparisons to rank assets, currencies, countries or companies on relevant criteria. We believe that this is an edge in successfully managing fixed-income assets in a world that feels increasingly more complex and more interrelated. Our model for analyzing pension preparedness is one example, another is our model for evaluating and ranking countries on environmental, social, and governance criteria. We will continue to expand our quantitative capabilities so that we can practically analyze data from the major themes that we believe are likely to drive fixed-income returns over the coming years and decades.

## Public Pension Sustainability Ranking by Indicator

	Demographics	Assets & Contributions	Government Health	Government Stress	Private Health	Mark-to-market Risk	Sustainability Gap	Most Prepared
MOST PREPARED ↑	South Africa	Denmark	New Zealand	Indonesia	Iceland	Slovenia	Chile	Iceland
	Argentina	Netherlands	Norway	Chile	Belgium	Czech Republic	Korea	Korea
	Israel	Canada	Korea	South Africa	Japan	Germany	Switzerland	Australia
	Mexico	Iceland	Sweden	New Zealand	Switzerland	Greece	Norway	Chile
	Ireland	United States	Czech Republic	Iceland	Italy	Hungary	South Africa	Norway
	Norway	Switzerland	Denmark	Australia	Israel	Luxembourg	Australia	Israel
	United States	Sweden	Luxembourg	Saudi Arabia	New Zealand	Slovak Republic	Czech Republic	Switzerland
	Hungary	Australia	Switzerland	India	France	India	Mexico	Czech Republic
	Indonesia	United Kingdom	Russian Federation	Korea	Australia	Latvia	New Zealand	New Zealand
	India	Finland	Chile	Mexico	Norway	Estonia	Russian Federation	South Africa
	Denmark	South Africa	Iceland	Switzerland	Ireland	Turkey	United Kingdom	Denmark
	Iceland	Israel	Germany	Netherlands	United Kingdom	Russian Federation	Estonia	Indonesia
	Czech Republic	Chile	Turkey	China	Slovenia	Indonesia	Iceland	Russian Federation
	Russian Federation	Brazil	Estonia	Canada	Korea	Mexico	Indonesia	Mexico
	Chile	Japan	Australia	Argentina	Denmark	Korea	Israel	United Kingdom
	Australia	Korea	Saudi Arabia	Israel	Austria	Portugal	Latvia	Netherlands
	United Kingdom	Saudi Arabia	Poland	Brazil	Netherlands	Argentina	Ireland	Sweden
	Slovak Republic	Latvia	Canada	Germany	Hungary	Italy	Denmark	Canada
	Turkey	Italy	Latvia	Russian Federation	Luxembourg	Israel	Sweden	Ireland
	Sweden	Spain	China	Estonia	Greece	Spain	Germany	India
	Korea	Ireland	Netherlands	Slovak Republic	Canada	Brazil	India	Estonia
	Estonia	Luxembourg	Finland	United States	Spain	Chile	Japan	Latvia
	Latvia	Hungary	Austria	Ireland	Germany	France	Slovenia	Luxembourg
	Portugal	Czech Republic	Indonesia	Latvia	Finland	Austria	Poland	Germany
	Belgium	France	Slovenia	United Kingdom	India	Norway	Hungary	United States
	China	Norway	Mexico	Poland	Estonia	Japan	United States	Hungary
	Netherlands	Estonia	Hungary	Czech Republic	Czech Republic	Belgium	Canada	Saudi Arabia
	New Zealand	Portugal	South Africa	Turkey	Sweden	Saudi Arabia	Luxembourg	Argentina
	Luxembourg	China	Slovak Republic	Japan	United States	China	Netherlands	China
	Finland	Slovenia	United Kingdom	Sweden	Saudi Arabia	United Kingdom	Greece	Japan
	Poland	India	Ireland	Austria	Chile	Iceland	Saudi Arabia	Slovak Republic
	Saudi Arabia	New Zealand	Argentina	Norway	Latvia	Ireland	Slovak Republic	Finland
	Italy	Austria	Israel	Luxembourg	Portugal	New Zealand	Finland	Turkey
	Switzerland	Russian Federation	Portugal	Belgium	Mexico	Netherlands	Belgium	Italy
	Canada	Poland	United States	Spain	China	Poland	Argentina	Belgium
	Austria	Slovak Republic	Brazil	Slovenia	Indonesia	Switzerland	Italy	Poland
	Brazil	Belgium	Italy	Denmark	Slovak Republic	Finland	France	Slovenia
	Spain	Germany	India	Italy	Argentina	Sweden	Turkey	Brazil
	Germany	Turkey	Japan	Greece	Turkey	Denmark	Brazil	Portugal
	Japan	Argentina	France	Portugal	South Africa	Canada	China	Austria
	Greece	Greece	Belgium	Hungary	Russian Federation	South Africa	Spain	Spain
	France	Mexico	Greece	Finland	Poland	United States	Austria	France
LEAST PREPARED ↓	Slovenia	Indonesia	Spain	France	Brazil	Australia	Portugal	Greece

The content of this document (including facts, views, opinions, recommendations, descriptions of or references to, products or securities) is not to be used or construed as investment advice, as an offer to sell or the solicitation of an offer to buy, or an endorsement, recommendation or sponsorship of any entity or security cited. Although we endeavour to ensure its accuracy and completeness, we assume no responsibility for any reliance upon it.

This document includes forward-looking information that is based on forecasts of future events as of March 31, 2019. Mackenzie Financial Corporation will not necessarily update the information to reflect changes after that date. Forward-looking statements are not guarantees of future performance and risks and uncertainties often cause actual results to differ materially from forward-looking information or expectations. Some of these risks are changes to or volatility in the economy, politics, securities markets, interest rates, currency exchange rates, business competition, capital markets, technology, laws, or when catastrophic events occur. Do not place undue reliance on forward-looking information. In addition, any statement about companies is not an endorsement or recommendation to buy or sell any security

#### Reference:

Magnus, G. (2009). *The age of aging: How demographics are changing the global economy and our world*. Singapore: John Wiley & Sons (Asia).

Marin, R. A. (2013). *Global pension crisis: Unfunded liabilities and how we can fill the gap*. Hoboken, NJ: Wiley.

Andonov, A. & Rauh, J., The Return Expectations of Institutional Investors (2019, February 1). Stanford University Graduate School of Business Research Paper No. 18-5; 9th Miami Behavioral Finance Conference 2018. From <https://ssrn.com/abstract=3091976> or <http://dx.doi.org/10.2139/ssrn.3091976>

Pal, R. (n.d.). *The Pension Crisis* (Publication). GMI - Global Macro Investor.

Melbourne Mercer Global Pension Index 2018. (n.d.). Retrieved December 10, 2018, from <https://www.mercer.com.au/our-thinking/mmgpi.html>

DIMINISHING RETURNS: WHY INVESTORS ... - McKinsey & Company. (n.d.). Retrieved November 16, 2018, from [https://www.mckinsey.com/~media/McKinsey/Industries/Private\\_Equity\\_and\\_Principal\\_Investors/Our\\_Insights/Why\\_investors\\_may\\_need\\_to\\_lower\\_their\\_sights/MGI-Diminishing-returns-Full-report-May-2016.ashx](https://www.mckinsey.com/~media/McKinsey/Industries/Private_Equity_and_Principal_Investors/Our_Insights/Why_investors_may_need_to_lower_their_sights/MGI-Diminishing-returns-Full-report-May-2016.ashx)

OECD Pensions Outlook 2016. (n.d.). Retrieved November 06, 2018, from <http://www.oecd.org/pensions/Highlights-2016-Pensions-Outlook.pdf>

The Public Wealth Of Nations - Citi Global Perspectives & Solutions. (2018, October 29). Retrieved November 06, 2018, from <https://www.citivelocity.com/citigps/public-wealth-nations/>

White Paper We'll Live to 100 – How Can We Afford It? (n.d.). Retrieved November 06, 2018, from [http://www3.weforum.org/docs/WEF\\_White\\_Paper\\_We\\_Will\\_Live\\_to\\_100.pdf](http://www3.weforum.org/docs/WEF_White_Paper_We_Will_Live_to_100.pdf)

Global Wealth Report. (n.d.). Retrieved December 12, 2018, from <https://www.credit-suisse.com/corporate/en/research/research-institute/global-wealth-report.html>

Pensions & Investments / Willis Towers Watson 300 analysis. (n.d.). Retrieved November 06, 2018, from <https://www.willistowerswatson.com/-/media/WTW/PDF/Insights/2016/09/The-worlds-300-largest-pension-funds-year-ended-2015.pdf>

Palacios, R., Zvinieni, A., & Holzmann, R. (2010, July 01). Implicit pension debt: Issues, measurement and scope in international perspective. Retrieved October 31, 2018, from <http://documents.worldbank.org/curated/en/947731468762352221/Implicit-pension-debt-issues-measurement-and-scope-in-international-perspective>

Global Pension Assets Study 2018 - willistowerswatson.com. (n.d.). Retrieved February 07, 2019, from <https://www.willistowerswatson.com/-/media/WTW/Images/Press/2018/01/Global-Pension-Asset-Study-2018-Japan.pdf>

Surviving the Global Pension Crisis. (2016, September 21). Retrieved October 31, 2018, from <https://blogs.cfainstitute.org/investor/2014/07/30/surviving-the-global-pension-crisis/>

The Coming Pension Crisis- Citi Global Perspectives & Solutions. (2016, March). Retrieved October 31, 2018, from <https://www.citivelocity.com/citigps/coming-pensions-crisis/>

A look at how different countries deal with discount rates ... (n.d.). Retrieved October 30, 2018, from <https://www.benefitscanada.com/pensions/db/a-look-at-how-different-countries-deal-with-discount-rates-in-pension-plans-88050>

Pozen, R., & Hamacher, T. (2012, August 19). Subscribe to the FT to read: Financial Times A realistic discount rate for pensions. Retrieved November 07, 2018, from <https://www.ft.com/content/b5e7a3bc-e133-11e1-9c72-00144feab49a>

The Widening Gap Update - pewtrusts.org. (n.d.). Retrieved November 07, 2018, from [https://www.pewtrusts.org/~media/legacy/uploadedfiles/pcs\\_assets/2012/pewpensionsupdatepdf.pdf](https://www.pewtrusts.org/~media/legacy/uploadedfiles/pcs_assets/2012/pewpensionsupdatepdf.pdf)

De Castro, F., Salto, M., & Steiner, H. (2013, October). The gap between public and private wages: New evidence for ... Retrieved November 07, 2018, from [http://ec.europa.eu/economy\\_finance/publications/economic\\_paper/2013/pdf/ecp508\\_en.pdf](http://ec.europa.eu/economy_finance/publications/economic_paper/2013/pdf/ecp508_en.pdf)

Miksa, B. (2015, August 26). The Future is Old by Brigitte Miksa. Retrieved November 07, 2018, from <https://www.project-syndicate.org/commentary/economic-consequences-rising-life-expectancy-by-brigitte-miksa-2015-08>