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Impact Evaluation to Support the Development of an ICS for the REF

**Stochastic Modelling of Pension
Assets and Liabilities**

(King's College London)



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EXECUTIVE SUMMARY

This evaluation report is part of a wider submission to the Research Excellence Framework (REF). Impact is considered in terms of reach and significance and includes (non-academic) factors such as culture, the economy, and public policy.

The Financial Mathematics (FM) group at King's College London (KCL) has worked with the Pensions Policy Institute (PPI) to develop a mathematical model that describes the future development of the most important risk factors affecting the investment returns and cash flow liabilities of the typical pension insurer. The group also writes computer code for simulation of the model (Economic Scenario Generator).

The PPI has played a significant role in disseminating the pensions modelling system through its use in a sizeable number of research projects. The testimonial from Chris Curry and the information in Appendix 2 is testament to this.

Crucially, the modelling process has been used by the Department for Work and Pensions (DWP) to inform the auto-enrolment scheme implemented throughout the UK. This is incredibly significant in terms of impact.

Across the pensions field, policymakers and regulators have been affected by the pensions modelling system, specifically the Economic Scenario Generator (ESG) from King's College London. The gender pensions gap and the pensions triple lock have used the models to forecast pension outcomes.

The PPI, through its research, aims to achieve a better and wider understanding of retirement pension issues. It is the only organisation that uses the KCL pensions modelling system.

Publications such as The DC Future Book have enabled informed pension planning and forecasting. The testimonials in this report provide the context and narrative that best exemplify the impact of the modelling system.

PPI events and seminars have ensured that the information and learning from the models has reached a bigger audience. Journalists, writers, and influencers have quoted information that has been compiled through the use of the modelling.

The findings, discussion, and impact section provide the substance of the impact and cites the topic areas where most of the impact has been found. Clearly, the impact has been widespread and has been felt beyond academia. There is also an acknowledgement of the central role of the PPI.

The remainder of this report provides examples of impact that are backed up by testimonial evidence and secondary research. In summary, this report evaluates the impact and validates the claims made in the individual case study to support impact.

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1. INTRODUCTION

This impact evaluation report is intended to support a REF 2021 impact case study on the stochastic modelling of pension assets and liabilities, on behalf of the Mathematics Department at King's College London. The modelling will be evaluated, with an emphasis on how widely it has been used and the benefits and resulting outcomes for the PPI and other significant organisations.

1.1 Description of the models: how they work and what they do

The FM group has developed mathematical models and simulation tools that describe the future development of the most important risk factors affecting the investment returns and liability cash flow of a typical pension fund or an insurer. The models were implemented in the R and Python programming languages into Economic Scenario Generators (ESGs), which allow for efficient numerical analysis of financial risks.

The models and ESGs describe future investment returns in various asset classes, as well as the development of UK mortality, price and wage inflations, and other macroeconomic factors. Such factors have a strong influence on the finances of a pension fund, but their values are highly uncertain over the lifetime of typical pension liabilities. The models provide a consistent description of the uncertainties and are able to incorporate user views on some or all of the risk factors.

The ESG is widely used by the PPI for a variety of research projects and reports. PPI's aggregate and individual models can be enhanced by using an ESG that provides outcomes influenced by the uncertainty of future economic assumptions. The PPI has used these models in their work, which act as a gateway for the dispersal of knowledge and insight, impacting the pensions sector as a result.

1.2 The role of the PPI and the relationship between KCL academics who created the model and the PPI

The PPI is an independent research charity that was established in 2001. It informs the policy base by providing evidence-based research on the pensions landscape. In addition, it produces a large number of research reports on a variety of pension topics. Further information on these reports is provided in this impact evaluation. Most of the research reports are available to download.

The PPI hosts events and seminars, which are widely attended by the pensions industry, to illustrate their findings. It has used these models in many of their findings. This has been a key determinant in developing a greater understanding on pensions issues. The FM group at King's College London facilitated progress in helping to apply the research outside of the university.

From 2017 to 2019, the PPI has used the ESG pension models from King's College London in 35% of their published research reports. In addition, there has been significant usage of the models in the production of briefing notes and other reports.

King's College London retains the intellectual property of the ESG, but the output of the model, for example in a PPI report, will belong to the PPI. The mathematical and simulation tools created and developed in the university setting have been successfully dispersed for wider use in the external environment.

1.3 Evidencing impact

The bulk of this report will explain how the models have been used and the impact that they have had. Crucially, this is supported by the testimonials that have been provided.

2. FINDINGS/DISCUSSION/IMPACT

2.1 Evidence of impact (2015-2020)

This evaluation report provides evidence of the impact of the stochastic pension models between January 2015 and July 2020. These models have been used extensively by the PPI as part of their research work and are mentioned in many of their reports. A full list of the PPI reports that use the models is provided in Appendix 2.

Most significantly, the models were used for the work to devise the auto-enrolment pension scheme by the DWP and HM Government. Auto-enrolment has led to an increase in the uptake of workplace pensions in the UK from 55% in 2012 to 78% in 2016. The models were also used when assessing pension schemes for the self-employed.

Media coverage and articles evidence wider impact in the pensions sector. The pensions landscape, in general, and pensions forecasting have been impacted by using the models. PPI publications such as the annual DC Compendium and The Future Book, are acknowledged as key pensions industry forecasters.

Further afield and external to the PPI, the insurance industry has been influenced by research reports that have incorporated the models.

The main sources of information in this report are testimonials from stakeholders and internet-based secondary research.

2.2 PPI impact in general

The PPI is a leading independent think tank and research charity in the UK, and the stochastic models provide a framework for evidence-based research in the pensions industry. The PPI leads the policy debate through producing research reports and briefing notes, which are dynamic, informative, and accessible.

The models are used extensively in the work of the PPI. The use of these tools has undoubtedly increased and enhanced the professional reputation of the organisation. Some of the reports are sponsored by key players in the industry. This is evidence of the growing respect that the pension industry has for the PPI.

Because the models can quantify risk and assess liabilities, they are incredibly useful to practitioners and policy makers across the public and private sectors. The use of the models has enhanced the reputation of the PPI and has made it a leader in the pensions policy debate.

The testimonial provided by Chris Curry reaffirms the importance of pension modelling to the PPI, which is acknowledged as the authoritative voice on policy and pensions (PPI testimonial 20/6/20). The ESG has been used to support numerous reports in recent years and continues to occupy a central role in pensions policy and research work at the PPI.

2.3 PPI awareness-raising/information sessions

The PPI runs a large number of awareness-raising and information events. Since 2015, the PPI has run 46 events on various aspects of the pensions landscape. Often, the event runs in conjunction with the release of a research report or other publication. Information on past events can be found on the PPI website at <https://www.pensionspolicyinstitute.org.uk/events/>.

These events extend the possibility of significantly higher impact and reach. A list of organisations that have attended these events is provided in Appendix 3.

3. MEDIA ARTICLES AND CITATION RESULTS

A limited amount of quantitative information on the impact of the stochastic pension models has been compiled with the help of the PPI. This provides evidence of the scope and extent of coverage.

Between 1 February 2018 and 31 January 2019, 56,900 research reports were downloaded from the PPI website. During the same timeframe, 27,900 briefing notes were downloaded.

The latest annual PPI media report (covering 2019) provides some insight into the most popular pension topics that gained publicity.

The Supporting Later Life research series uses the individual model and the ESG. Two reports were released during 2019. They were sponsored by Age UK, DWP, the People's Pension, and WEALTH at work. The media report provides three citations to articles that refer to these reports in FinancialReporter.co.uk, MoneyAge.co.uk, and FtAdvisor.com.

Another significant piece of research that makes good use of the modelling tool is the research report, 'Pension charging structures and beyond; an outcomes-focused analysis'. This report was released in September 2019. The media report cites three online articles that discuss PPI research in Pensionsage.com, Moneyobserver.com, and ft.com.

The work on auto-enrolment, which made particular use of the modelling system, was mentioned in seven articles. Particular mention was made of the gender pay gap and a deficit in pension pot savings for mothers. The full media report is provided in Appendix 4.

The scale of the impact of the pensions modelling system can be seen clearly through the Future Book series. This report will provide further detail about the impact, but evidence is found from the citations provided in the short media report provided by the PPI, which registered five press mentions between 19 September 2019 and 28 May 2020.

The wider influence and reach of the pensions research provides robust evidence to back up the statements and assertions made in the individual case study about stochastic modelling of pensions assets and liabilities.

3.2 SMART pensions

A SMART pension enables employers to automatically enrol staff in a workplace pension. It often refers to the technology that enables auto-enrolment. In essence, it involves a form of salary sacrifice. The funds are then put into a smart pension master trust. This is governed by the trustees and regulated by the Pensions Regulator.

Prior to auto-enrolment, employees could choose whether they wanted to go into the pension scheme. By 1 February 2018, it was a legal requirement that all eligible workers should have been enrolled into their workplace pension scheme. The stochastic pensions models have been used by the DWP to assist in the development of the SMART pensions auto-enrolment scheme.

3.3 DWP and Automatic Enrolment

DWP used the results of PPI studies using the stochastic pensions models to develop new practices in UK pensions. The simulation models were a critical part of the process that enabled auto-enrolment. Since 2012, workplace pensions have been characterised by a default 'opt in'. By February 2018, all new employers were using auto-enrolment.

It is fair to say that the pensions landscape has been revolutionised by the introduction of auto-enrolment. The transformative changes that have taken place have provided pensions security for a much larger group of society. Pension participation has increased from a low of 55% in 2012 to 78% in 2016.

The ESG was used to calculate pensions risks and liabilities taking consideration of the key factors of earnings, inflation, and investment returns. In terms of projected outcomes, there are some inequities in terms of the gender pay gap. There are calls for pension pot top-ups and the provision of affordable childcare to address this.

Automatic enrolment is available to everyone between the ages of 22 and the state pension age that is earning at least £10,000 per annum (other than the self-employed). This system was developed by using the stochastic pensions models. 'Maintaining the Momentum', the report that reviewed the pension scheme and was released in 2017, suggested that the scheme should be made available to the self-employed. At the end of 2018, a report was launched, which outlined plans for research and trials to help build evidence to find ways to help the self-employed save for retirement.

The DWP has confirmed that the impact of the use of the stochastic models has been significant and that it has enabled considerable pensions policy development (DWP testimonial – 26/6/20).

3.4 The DC Future Book

The DC Future Book is an annual statistical compendium and review, which has been published by the PPI since 2015. The focus is on the Direct Contribution (DC) pensions market. The latest edition was published in September 2019 and was sponsored by Columbia Threadneedle Investments. The aim of the publication is to promote a better understanding of the DC pensions market in the UK.

The Future Book uses the Aggregate and ESG pension models to forecast the DC pensions landscape. This analysis is completed by the publication of articles and thought pieces that aim to increase stakeholder engagement from policymakers, regulators, activists, and pension scheme trustees.

The statistical models provide a projection of future trends for up to 20 years. In the most recent edition, this led to an analysis of how to increase DC savers pension pots to pinpoint methods of delivering the most value at the point of retirement. The models are integral to the construction of the compendium.

The DC Future Book is recognised as an industry leader in pension forecasting and the assessment of risks and challenges. When a new edition is published, the PPI hosts a launch event that includes speakers who debate about issues covered in the report. Media and social media report on the launch of the compendium, which ensures wider dissemination. The report can be downloaded directly from the PPI website.

Chris Wagstaff comments on the continuing influence of the Future Book on the work of Columbia Threadneedle Investments. It has helped them to gain more ground and commercial advantage. The research potential for DC-related pensions has yet to be fully realised (Columbia Threadneedle testimonial – 3/6/20).

3.5 CASPER

Casper is a collaborative project by the PPI, the University of East Anglia (UEA), and the London School of Economics (LSE) and is funded by the Nuffield Foundation. It aims to investigate the long-term societal impact of both long-term care and state pension reforms in addition to their potential interactions.

The pensions models are applied to fit in with future scenarios based on demographic, social, and financial trends. The ESG model was developed to simulate the long-term situation in the social care sector. This was combined with forecasting tools from the LSE and the UEA to assess the combined financial and social outcomes over time.

In February 2019, Casper provided written evidence to Parliament's Economic Affairs Committee Inquiry into Social Care Funding in England. This is published and made available on the PPI website (<https://www.pensionspolicyinstitute.org.uk/media/3116/20190225-economic-affairs-committee-inquiry-into-social-care-funding-evidence-from-the-casper-team.pdf>). Certain groups of people would end up paying more or less for their social care based on existing legislative thresholds. Rebalancing of this situation could be analysed through these models.

This research project is able to consider state pension reforms and care reforms and to look at how the two systems interact. Their combined effects have received little attention despite the obvious interactions between the two systems.

3.6 Gender pension gap

In 2019, the PPI produced a Briefing Note (114) by Daniela Silcock, which stated that the gender pension gap meant that women have significantly lower pension savings and income than men (<https://www.pensionspolicyinstitute.org.uk/research/research-reports/2019/briefing-note-114-the-gender-pensions-gap-can-it-be-closed/>). Women of pension age are much more likely to be living in poverty. The Equalities Act has done nothing to improve the situation for women. The main reasons for the substantial pension inequality are related to women most often taking on caring responsibilities, which causes them to leave the paid workforce for some time, and women being paid less than men when they are in the paid workforce. In 2018, women's earnings are approximately 18% lower.

The stochastic pension models have been used by the PPI on research studies that analyse the inequities of the gender pension gap. As a result of this work, some independent advisors (such as Quantum Advisory, Serina Sandhu, the PPI, and Kim Kaveh) began calling for a pensions pot top-up for women. The gender pension gap is currently twice the size of the total gender pay gap, and so the impetus for change is apparent.

Forecasting and modelling, when used in this way, can alert policymakers to necessary changes required to create a fairer and more equitable pensions landscape for everyone. The gender pension gap is an important issue that needs to be acted upon. The PPI has facilitated the wider debate by producing reports and briefing notes that highlight the research.

3.7 State pensions and the triple-lock

The triple-lock on state pensions was introduced in 2010 as part of the Government's coalition agreement. It works by ensuring that the annual increase of both the Basic State Pension (bsp) and the New State Pension (nsp) is calculated in a consistent way.

The triple-lock is whichever is highest: price inflation (CPI), earnings growth, or 2.5%. PPI research on state pensions and the triple-lock uses stochastic modelling to work out what is needed to continue with the current system, and to assess the economic impact.

The PPI has also used the ESG to assess economic conditions if the triple-lock is removed. The uncertainty of future economic conditions affects the outcomes. The ESG is a particularly useful tool to use to consider the interaction of various factors. Chris Curry's testimonial said that the interaction of different inflationary measure cannot be understood if the assessment was done on a deterministic basis (PPI testimonial – 20/6/20). Different economic scenarios can be used as part of the modelling exercise.

3.8 Supporting Later Life (research series)

Supporting Later Life, which was published in October 2019, is the second part of a research series that released an earlier report, 'Living Through Later Life', in July 2019. The PPI is

leading on this work, which is sponsored by Age UK, DWP, The People's Pension, and WEALTH at work.

The stochastic models are used to map out the different stages of life as people get older. Three phases are mentioned: independent, decline, and dependent. Life choices can be restricted as people get older by financial, health, and family concerns. This needs to be balanced against growing life expectancy amongst a diversity of life experiences.

Age UK use the state pension age-related data for policy projections (Age UK testimonial – 9/6/20). The supporting information comes from the use of the stochastic models.

In addition to launch events for the reports, the research has gained some interest from other commentators and industry leaders. Articles discussing the series have appeared in online journals (Financial Reporter, FT Advisor, and MoneyAge), which is evidence of wider influence and reach.

3.10 Pension charging structures and beyond

The PPI published a research report about pension charging structures in September 2019. The report was sponsored by Smart Pensions and emphasised that it was an outcome-focused analysis. The increase in the number of people paying into workplace pensions has led to an interest in charging structures and how they affect the retirement outcomes of savers.

The importance of charging structures is considered in the context of ensuring that people have a retirement income to meet their needs. The stochastic models enable an approach that increases the understanding and implications of charging structures.

4. CONCLUSION

This report is an impact evaluation of an individual case study for the stochastic modelling of pension assets and liabilities. The modelling system was produced by the Mathematics Department at King's College London. This report considers the impact that has occurred between 1 January 2015 and 31 July 2020. The impact evaluation was compiled and written up between April 2020 and July 2020, mostly while under lockdown during the pandemic. There were some delays and practical obstacles as a result.

Most of this report covers findings, discussion, and impact. Subject areas are given headings and the key impacts are outlined. The salient part of the report, however, is the testimonials that were given by representatives from four organisations that have benefited from using the models, the most significant of these being the Pensions Policy Institute itself. The testimonials in full are produced in the next section, and are supported and expanded upon by desk research conducted during this time (as detailed in the earlier Findings/Discussion/Impact section).

In terms of measuring impacts, first-hand recollection of the impact of the models is reinforced through the evidence provided in reports and research analysis. Qualitative (and some quantitative) research outputs are quoted.

The wider impact of the pensions models (outside of the organisations mentioned) cannot be understated. Media reports give a glimpse into how widespread the impacts have been in terms of shaping the policy debates and influencing popular opinion about pensions. The PPI's extensive use of stochastic models gives them more credibility and coverage. The independent charitable status of the PPI helps them gain extra publicity when it comes to the subject of pensions planning.

For the purpose of this evaluation report, the PPI has provided a gateway to essential evidence-based information on the impact of stochastic pensions modelling. The testimonial from PPI provides useful contextual information on how the modelling work fits around the specific objectives of the organisation. The PPI has created its own unique pension models that it can use alongside the pension models of King's College London (PPI testimonial – 20/6/20).

The Research Excellence Framework is particularly interested to see how academic research can influence real world research and have an impact on the wider society. This impact evaluation report presents information that supports this contention for the stochastic pensions modelling. The impact is not confined.

In the following quote, Chris Brooks from Age UK talks about PPI research. The research in question is derived from the pensions modelling system of King's College London. It exemplifies how wide the influence is.

“The PPI’s research is used by other charities, unions, insurers, and the Department for Work and Pensions UK as well; it assists people from across the board and various sections of society in illustrating their opinions, making for a healthy discussion around pensions policy.”

Christopher Brooks, Age UK, 8/6/20.

The pensions modelling system has a great deal of potential. The social and economic consequences of the recent pandemic put different variables into the pensions equation. Modelling and forecasting will become increasingly useful as we navigate our way into an uncertain future.

5. TESTIMONIAL FROM COLUMBIA THREADNEEDLE INVESTMENTS

The King's College financial mathematics department's stochastic model for pensions and investments is used in the annual publication of the PPI's The DC Future Book, produced in association with Columbia Threadneedle Investments (CTI) since its inception in 2015.

The DC Future Book is a compendium of UK workplace defined contribution (DC) scheme statistics, a frame of reference for the current state of play in the DC workplace pensions market, and seeks to identify the likely future direction of workplace pensions and how the DC pension landscape might evolve over the next 20 years under a variety of economic and demographic assumptions.

The model itself is used for forecasting the pensions landscape. This part of the report is popular with all stakeholders including policymakers, regulators, NGOs, trustees, advisors, and commentators. Two models are used – the Economic Scenario Generator (ESG), and the Aggregate Model.

The ESG model derives 1,000 random scenarios (called Monte Carlo scenarios) from official source data. Then it calculates the likely (or median) longer run values for key macroeconomic variables, such as the CPI, wage growth, and GDP growth, and the likely long run returns from assets such as cash, government bonds, equities, and real estate. It then uses these assumptions to underpin its forecasts, overlaying the statistics with a qualitative thought process.

The Aggregate Model looks at changes in the composition and growth of the UK population and in the labour market. It also considers the sensitivities around that data through scenario analysis: what could change, and what could compromise expected outcomes. This is, obviously, crucial as people become increasingly reliant on their DC pension pots, given the significant risks and challenges they face both in accumulation and decumulation. Crucially, these models calculate the likely future value of pension pots.

The profile of CTI has risen dramatically as a consequence of its association with The DC Future Book - CTI now being recognised as a genuine thought leader in the DC space. This has been matched by an enhanced media presence.

Moreover, The DC Future Book continues to influence and assist CTI's thinking around how DC pension savers and investors might achieve better outcomes and has allowed us to gain traction with both policymakers and regulators.

The models are a dominant feature of The DC Future Book and will continue to be so. Each year, a different DC theme is considered within Chapter 4 of the publication, with the models playing an integral part of the resulting research insight. Additionally, industry specialists compete to write articles and opinion pieces for Chapter 5.

Without exaggeration, The DC Future Book itself has been a catalyst for change in the pensions industry and remains a unique publication. Crucially, the independence of the PPI has driven much of the success of the publication. Although The DC Future Book has a significantly higher profile than the models themselves, it is important to state that the

pensions models are integral to the publication and everything that it seeks to achieve. Moreover, there is the potential to use the King's College models for other DC-related research.

Chris Wagstaff, Head of Pensions and Investment Education, Columbia Threadneedle Investments

3 June 2020

6. TESTIMONIAL FROM AGE UK

I am Senior Policy Manager at Age UK, which is a charity that campaigns and lobbies the government and the pensions industry on various issues around the economic and social wellbeing of the elderly population in the UK. As such, I am in a suitable position to corroborate the distinct and material contribution of the research conducted by the Pensions Policy Institute (PPI) over the past few years.

Their most recent research and analysis has been based on a stochastic model developed by the financial mathematics department of King's College London. The findings from the use of the model help provide a strong and credible evidence base to support Age UK's thinking and approach to problems. The findings themselves and the PPI's reports have assisted in influencing key stakeholders; and guiding and informing Age UK's policy decisions as well as those of the DWP and the wider pensions industry.

This 2019 research by the PPI was commissioned by Age UK with the goal of understanding the pensions landscape and forecasting its future, obtaining data and statistical backing for policy arguments. This modelling project, like the previous Age-UK-commissioned modelling projects around the State Pension Age and Triple Lock, has delivered on its goal. As evidenced by the Triple Lock modelling, the findings of these analyses can be useful years after they are conducted. Age UK continues to use the State Pension Age related data for current arguments being put to the government. It also still considers the projections on how many pensioners will be left in poverty if the Triple Lock is removed while making policy decisions.

These analyses get some media coverage as well. For instance, *Express UK* ran figures from the PPI's modelling on Triple Lock a couple of weeks ago, and quoted Age UK of their own volition in their article. The PPI's own publication is well-known and reputable as well; so, their findings and policy-related reports are read by a wide range of individuals and stakeholders, without Age UK's intervention.

This recognition of the PPI's modelling work speaks of the merits of the work itself. But it is bolstered by the PPI's good reputation and credibility. The PPI's work is trusted by many people, and we see the difference that this makes in how well our arguments are received when backed by data modelled by the PPI. Such use of the PPI's work also helps lay the foundations of an evidence-based way of making pensions policy. This has had significant demonstrable impact on protecting certain useful policies such as auto enrolments in difficult times such as this present COVID-19 pandemic when businesses are leaning towards suspending auto enrolment to save money.

There is other research besides the PPI's that informs pensions policies, but the PPI's work definitely feeds into them in a significant way. The PPI's research is used by other charities, unions, insurers, and the Department for Work and Pensions UK as well; it assists people from across the board and various sections of society in illustrating their opinions, making for a healthy discussion around pensions policy.

Christopher Brooks, Senior Policy Manager, Age UK.

9 June 2020

7. TESTIMONIAL FROM THE PENSIONS POLICY INSTITUTE

7.1 The Pensions Policy Institute (PPI)

The PPI is an educational, independent research organisation with a charitable objective to inform the policy debate on pensions and retirement income provision. The PPI's aim is to improve information and understanding about pensions and retirement provision through research and analysis, discussion, and publication. It does not lobby for any particular issue or reform solution but works to make the pensions and retirement policy debate better informed.

The PPI is funded by donations, grants, and benefits-in-kind from a range of organisations, as well as being commissioned for research projects.

Pensions affect everyone. But too few people understand them and what is needed for the provision of an adequate retirement income. The PPI wants to change that. We believe that better information and understanding will lead to a better policy framework and a better provision of retirement income for all. The PPI aims to be an authoritative voice on policy on pensions and the provision of retirement income in the UK.

The PPI has specific objectives to:

- Provide relevant and accessible information on the extent and nature of retirement provision
- Contribute fact-based analysis and commentary to the policy-making process
- Extend and encourage research and debate on policy on pensions and retirement provision
- Be a helpful sounding board for providers, policy makers, and opinion formers
- Inform the public debate on policy on pensions and retirement provision

We believe that the PPI is unique in the study of pensions and retirement provision, as it:

- Is independent, with no political bias or vested interest
- Is led by experts focused on pensions and retirement provision
- Considers the whole pension framework: state, private, and the interaction between them
- Pursues both academically rigorous analysis and practical policy commentary
- Considers a long-term perspective on policy outcomes on pensions and retirement income
- Encourages dialogue and debate with multiple constituencies

7.2 The PPI's use of modelling to provide evidence

The PPI uses its modelling capability to enhance its evidence throughout its work and publications. This allows it to weigh up the financial costs and benefits of pension policy.

7.2.1 Summary of models

The PPI has constructed a suite of micro-simulation models to analyse long-term outcomes from the current UK pensions system and possible reforms. These represent the current pensions system and allow for particular scenarios to be modelled. The models can also illustrate projections of the impact on both an individual's post-retirement income and on future pensions

systems revenue and expenditure cashflows to the Exchequer. The suite of models includes:

- A. **The Individual Model** – the PPI’s tool for modelling illustrative individuals’ income during retirement. It can model income for different individuals under current policy or look at how an individual’s income would be affected by policy changes. This income includes benefits from the State pension system and private pension arrangements, and can also include income from earnings and equity release. It is useful to see how changes in policy can affect individuals’ incomes in the future.
- B. **The Aggregate Model** - which projects long-term government expenditure on pensions and contracted-out rebates, the private pension system, and the fiscal cost of tax relief.
- C. **The Distributional Model** - which is a static microsimulation model. This means that it contains a representative set of households from the pensioner population. It projects the future distribution of pensioner incomes. Based on this projection, it calculates Pension Credit entitlements and income tax liabilities.
- D. **The Dynamic Model** – which projects outcomes for individuals and benefit units taken from the English Longitudinal Study of Ageing (ELSA) dataset. It has the capacity to make decisions on the timing of retirement for individuals based upon prospective outcomes assessed as replacement rates or the Minimum Income Standard.

Both the Individual Model and the Aggregate Model can be enhanced through the use of an economic scenario generator based upon the original stochastic modelling developed by KCL. This allows the PPI to quantify the uncertainty of the projections in relation to the future economic outlook.

7.3 How modelling enhances the PPI’s work

We believe that better information and understanding will lead to a better policy framework and a better provision of retirement income for all. The PPI aims to be an authoritative voice on policy on pensions and the provision of retirement income in the UK. This includes the use of modelling and projection tools.

The rigour of the work undertaken and the independent perspective of the PPI confers an authority upon these figures. This allows policy makers to better weigh up the costs and benefits of policy options.

7.4 The original use of the KCL stochastic model

7.4.1 Pension adequacy

Stochastic modelling of pensions undertaken by KCL underpinned the PPI report *What level of pension contribution is needed to obtain an adequate retirement income?* published in 2013. This report was part of a series sponsored by ABI, DCIF, DWP, IFoA, B&CE, Prudential and Legal & General. It was used to demonstrate the potential outcomes available from different pension contribution levels into a defined contribution pension scheme. This work has been published as an academic paper, which has been cited by other academics.

7.4.2 Collective Defined Contributions pensions

KCL developed additional stochastic modelling of Collective Defined Contribution (CDC) pensions based upon the same scenario generating model. This was sponsored by DWP to look at a potential CDC scheme under different assumptions to determine whether CDC produces better results compared to DC and in what circumstances. This was referenced by the House of Commons Work and Pensions Committee (<https://publications.parliament.uk/pa/cm201719/cmselect/cmworpen/580/580.pdf>), which

feeds into their recommendations.

7.5 Subsequent use of KCL stochastic modelling

7.5.1 Application of the ESG

The economic scenario generator underpinning the original stochastic modelling has been used extensively by the PPI. Deterministic projections have shortcomings when it comes to being able to understand and analyse the certainty of outcomes. Pension outcomes have an inherent degree of uncertainty in their outcomes. Without an ability to quantify this uncertainty, the PPI projections are diminished. Features such as the Triple Lock, by which the State Pension has been increased, rely upon the interaction of different inflationary measures which cannot be fully assessed on a deterministic projection.

7.5.2 Continued use of the Economic Scenario Generator

The PPI has continued to use the Economic Scenario Generator as part of the modelling that has supported numerous reports in recent years. The use of the modelling has included consideration of both state and private saving. This has enabled the PPI to project the value of features such as Defined Contribution pension assets under management in *The DC Future Book*. How the State Pension may increase to help meet income standards as well as the cost it would require to support it has been addressed under *How would removal of the State Pension triple lock affect adequacy?* These reports received support and endorsement at launch events where panel sessions included representatives covering:

- Trade press, represented by Jonathan Stapleton, Editor-in-Chief, Professional Pensions and Workplace Savings & Benefits
- Pension providers, represented by Mastertrusts such as tPP
- Investment managers, represented by companies such as Columbia
- Threadneedle Investments
- Government, represented by the DWP
- Regulators, represented by the tPR
- Employers, represented by the TUC
- Consumer representatives, represented by groups such as Age UK

The PPI organized 13 events in 2019 supporting and launching its research. We published 12 reports and 6 briefing notes and responded to 4 consultations and calls for evidence. This is based on our research and modelling, which we believe leads to a better policy framework and a better provision of retirement income for all.

7.6. Conclusions

Modelling forms a critical part of the PPI's analysis that helps cement the PPI at the heart of the UK Pension's Policy debate.

"I really value the rigour of the PPI's research and analysis, backed by their independence and impartiality. As someone who is interested in policy development and improving the wider environment for pensions and pension savers, supporting the PPI is a no brainer as they push forward a proactive programme of evidence-based policymaking."

Darren Philp, Director of Policy and Communications, Smart Pension

"The Pension Policy Institute provides expert, independent and robust analysis of all things pensions. They recruit talented colleagues to deliver analysis and insight to complete"

challenging assignments across the total width of the pension landscape. Their assignments are ambitious and their outputs and events are industrious. They also happen to be jolly nice people to work with."

Stephen Lowe, Group Communications Director, Just Group PLC

Chris Curry, Director, Pensions Policy Institute.

20 June 2020

8. TESTIMONIAL FROM THE DEPARTMENT OF WORK AND PENSIONS

The following is an impact summary from the DWP on the stochastic pensions modelling system.

The team at DWP have used the results from the King's College financial mathematics department's stochastic model for pensions and investments to inform policy development. Information presented in the DC Future Book and the 2019 research report on Pension Charging Structures and Beyond, has been utilised.

The forecasts of Defined Contribution scheme assets up until 2039 have been especially useful for informing our evidence base and supporting longer term policy thinking.

The Pensions Charges Survey for 2020 has been compiled with reference to the outputs from the models that were presented in the *Pension Charging Structures and Beyond* report on the median impact of various charging structures on fund values.

The stochastic model could be more useful to DWP if it had the ability to split outcomes by occupational and contract-based schemes.

Helen Oginsky | Joint Heads of Private Pensions Analysis | Pensions and Later Life Analysis Division | Department for Work and Pensions

26 June 2020.

9. APPENDIX 1 – METHODOLOGY

A theory of change model was used in this impact evaluation. Stakeholder consultation was conducted through phone calls and informal interviews regarding the impact of the stochastic models. Desk research was conducted to provide supporting information about impact.

Stakeholder testimonials appear in this report as primary research. Written discussion about findings is based on the reports and information found online during secondary research.

10. Appendix 2 – List of PPI publications incorporating the use of the models

10.1 Reports and briefing notes

Available here: <https://www.pensionspolicyinstitute.org.uk/research/research-reports/>

2019

Supporting later life

- Feed into individual modelling of illustrative vignettes

Pension charging structures and beyond; an outcomes-focused analysis

- Feed into DC fund growths

The DC Future Book: 2019 Edition

- Feed into the Aggregate Model

Increasing Savings in Automatic Enrolment: Analysis Sponsored by Which?

- Feed into individual modelling of illustrative vignettes

2018

The DC Future Book: 2018 Edition

- Feed into the Aggregate Model

Evolving retirement outcomes

- Modelling of different retirement approaches

How would removal of the State Pension triple lock affect adequacy?

- Interaction of inflations in costing / projecting the state pension

Automatic enrolment in the gig economy: modelling for Zurich

- Feed into individual modelling of illustrative vignettes

Investment market volatility: analysis commissioned by TUC

- Interaction of inflations and returns in DC outcomes

Briefing note 109: How will the evolving retirement landscape impact tax and benefits?

- Feed into individual modelling of illustrative vignettes

Briefing note 105: The impact of the introduction of automatic enrolment on future generations

- Feed into individual modelling of illustrative vignettes

2017

The impact of DC asset pooling: International evidence

- Feed into individual modelling of illustrative vignettes

The DC Future Book: 2017 Edition

- Feed into the Aggregate Model

Consumer engagement: the role of policy through the life course

- Feed into individual modelling of illustrative vignettes

2016

The DC Future Book: 2016 Edition

- Feed into the Aggregate Model

Value for money in DC workplace pensions

- Modelling the impact of volatility management in DC pension saving

10.2 Casper Project

Output published here: <https://www.pensionspolicyinstitute.org.uk/research/casper/>

July 2018 - Care and State Pension Reform: The interaction of inflation indices

- Interaction of inflations in projecting incomes and means testing benefit thresholds

10.3 Reports (from 2018 and 2019) that mention the Economic Scenario Generator directly:

<https://www.pensionspolicyinstitute.org.uk/media/3227/20190711-understanding-the-gender-pensions-gap.pdf> (p.44)

<https://www.pensionspolicyinstitute.org.uk/media/1262/20180731-casper-interaction-of-inflation-indices.pdf> (p.12)

<https://www.gov.uk/government/publications/automatic-enrolment-review-2017-maintaining-the-momentum>

11. Appendix 3 – Organisations who attended PPI events

Aberdeen Standard Investments
AXA Investment Managers
Cardano Group (including Cardano, NOW: Pensions and Lincoln Pensions)
Department for Work and Pensions
Legal and General Investment Managers
MFS Investment Management
NEST
Phoenix Group
Scottish Widows
Smart Pension
The People's Pension
Wealth at work Ltd
Aviva
Columbia Threadneedle Investments
Just
The Pensions Regulator
Age UK
AON
ABI
Lane Clark Peacock
M&G Prudential
PLSA
Quilter
Royal London
Shell
Chartered Insurance Institute
USS
Which?
Pendragon
Natixis
Newton Investment Managers
Standard Life
Centre for Ageing Better
Government Actuary's Department
HMT
Capita
LV=
LifeSight
Intelligent Pensions
Atlas Master Trust
Cartwright Group Ltd
River & Mercantile Solutions
Reddington

Buck Consultants
Barnett Waddingham
FCA
Vanguard
TPAS
Money & Pensions Service
Siemens PLC
Institute of Faculty and Actuaries
The Investment Association
ILC UK
The Law Debenture Pension Trust Corporation PLC

12. Appendix 4

12.1 Supporting later life

Supporting later life

The Pensions Policy Institute (PPI) has recently published the second of its ‘Supporting Later Life’ reports.

<https://www.financialreporter.co.uk/specialist-lending/supporting-later-life.html>

‘People in 70s/80s vulnerable to decisions leading to financial deprivation’ – PPI

People in their 70s and 80s are vulnerable to making decisions that lead to financial deprivation if they do not seek support, said the Pensions Policy Institute (PPI).

<https://moneyage.co.uk/People-in-70s-80s-vulnerable-to-decisions-leading-to-financial-deprivation-PPI.php>

People above 65 less likely to receive advice

People that have already entered retirement are less likely to seek advice than those aged under 65, despite decisions in later life being more difficult to navigate due to the pension freedoms, warned a report.

<https://www.ftadviser.com/pensions/2019/10/23/people-above-65-less-likely-to-receive-advice/>

12.2 Pension charging structures and beyond

Contribution levels have ‘most significant’ impact on pension outcomes – PPI

Pension contribution levels commonly have the “most significant” impact on retirement outcomes, said the Pension Policy Institute (PPI).

<https://www.pensionsage.com/pa/Contribution-levels-have-most-significant-impact-on-pension-outcomes-PPI.php>

Low fees not the most important factor for pension savers, new report argues

The most important factor identified by the PPI report was the contribution levels of members.

<https://www.moneyobserver.com/news/low-fees-not-most-important-factor-pension-savers-new-report-argues>

Low fees not always good value for pension savers – report

Low charges are no guarantee for getting good value when saving for a pension, according to a new analysis by the Pensions Policy Institute (PPI).

<https://www.ft.com/content/67f0c744-d544-11e9-8367-807ebd53ab77>

12.3 Increasing savings in automatic enrolment: Analysis sponsored by Which?

Give new mothers' pension pots a £2,000 top-up says Which?

New mothers should be given a £2,000 pension top-up to address the gender gap as part of reforms to workplace pensions, according to Which?

<https://www.professionaladviser.com/news/3076688/-mothers-pension-pots-gbp2>

Call to end the 'motherhood penalty' grows louder

Recently, Which? and the Pensions Policy Institute joined the call to address the growing problem of pensions gender inequality.

<https://www.ftadviser.com/pensions/2019/06/04/call-to-end-the-motherhood-penalty-grows-louder/>

Government should top up mums' pensions

A new report recommends that women who take time off work after having children should receive a pension top up following the birth of their first baby. Which? and the Pensions Policy Institute found that mothers who take a career break or work reduced hours to raise a family could be £15,000 worse off compared to those women who work full-time. Furthermore, it was found that they would save £46,000 less than the average full-time employed man. The report suggested that mothers should be given a £2,000 contribution to bridge the gap.

<https://www.wales247.co.uk/government-should-top-up-mums-pensions/>

Mothers 'should be given £2,000 pension top-up for having to take time off work to have children'

Women face a 'motherhood pension penalty' that the Government should remedy, according to consumer watchdog Which?

<https://inews.co.uk/news/pension-penalty-government-give-mothers-2000-top-up-which-501076>

Women caring for children £45,000 worse off in pension savings

Which? calls for lump sum top up to parents' pension pots.

<https://www.which.co.uk/news/2019/10/women-caring-for-children-45000-worse-off-in-pension-savings/>

Removing the ‘motherhood penalty’ from pensions

With motherhood damaging women’s retirement prospects, what long-term policy changes are needed to improve women’s lot – and how can they plan ahead in the meantime?

<https://www.moneymarketing.co.uk/analysis/removing-motherhood-penalty-pensions/>

Alice Honeywill: Will a bonus for new mothers sufficiently address the gender pensions gap?

I read with interest the June 2019 report that consumer association Which? published in collaboration with the Pension Policy Institute (PPI) entitled [Top up the pots: Achieving adequate retirement incomes with automatic-enrolment](#).

<https://employeebenefits.co.uk/alice-honeywill-bonus-pension-gap/>