Towards a global pension crisis?

Coping with increasing longevity

Proceedings of the I International Conference on Longevity and Pensions
Held in Madrid the 23rd of September 2015

SPONSORED BY Instituto Aviva ORGANIZED BY Afi Escuela de Finanzas

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Nicholas Bar, Clive Bolton, Elisa Chuliá & James Vaupel

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Foreword and Post Scriptum

With some perspective behind, once digested the presentations at the I International Conference on Longevity and Pensions, we are thoroughly convinced of the relevance of the debates held and the necessity to further push this initiative ahead.

When we started planning for this Conference we had several reasons for it. First, at Afi, to mark our Finance School's new academic year 2015-2016, when we had just opened our present premises. Second, jointly with Aviva's Institute for Savings and Pensions, to bring as many people as possible into newer approaches to longevity and pension issues. Third, to mark Afi and Aviva team's prow on longevity and pensions issues before our conventional and less conventional stakeholders. A final, but not least, reason was to mark our joint commitment to continue to provide advanced thinking and education to current and future generations of experts and students.

But the high level contents of the conference, and, above all, the extraordinary feedback we received from speakers and attendants to the conferences showed us that we had hit some target. Perhaps the need for accurate, live, independent and creative discussion and information on pensions, at least in Spain.

Convinced now that this initiative must be continued, as we already announced, not much sure then about its final coming to life, we are happy to present to the general public the proceedings of what we already call the "I International Conference on Longevity and Pensions".

This means thus that the "II International Conference on Longevity and Pensions" will follow suit in October the 3rd this year, and for which the preparations are well underway.

We wish you a most rewarding reading of the contents of this volume.

Mónica Guardado
DG at Afi Finance School

Ignacio Izquierdo
CEO at Aviva Spain

Emilio Ontiveros
Chairman at Afi

A. Opening Interventions

1. Opening words by Ms Mónica Guardado, Managing Director of Afi Finance School

Welcome all to our new Afi Finance School Campus. It is my pleasure to open the first Edition of this International Conference on Longevity and Retirement Solutions. At Afi School of Finance we have a strong commitment to our community of clients, alumni, professors, and friends, who are our collaborators who help us to bring new responses to current and future challenges.

We are very pleased with the initiative of Professor José A Herce together with our School, and with the support and strong collaboration received from our sponsor Instituto Aviva, who has made this amazing conference possible.

At Afi School of Finance, it is part of our DNA, to teach and inform on future dilemmas while trying to shed light on possible responses to these dilemmas. Our curriculum comprises a long list of courses on sophisticated and applied finance and economics. We have recently included specific curriculum on Data Science and Big Data that helps financiers and insurance companies deal with the enormous amount of data that they generate every day.

As part of our search for new ideas and solutions to the problems that we envision, in our area of expertise of Insurance and Pensions, we launch today's International conference with the goal of opening the door for debate and reflection on Longevity and Retirement Solutions. We at Afi School of Finance commit to continue to work every year in order to bring this opportunity to all of you.

I want to thank all the speakers that have travelled from afar in order to help shed some light on these issues.

I hope you enjoy and participate in today's first International Conference on Longevity and Retirement Solutions, I wish you all an amazing day.

2. Opening words by Prof Emilio Ontiveros, President of Afi Finance School

Muchas gracias Mónica, buenos días, sólo dos palabras, en primer lugar para agradecer su presencia y para dar la bienvenida a nuestra casa a todos los asistentes. La Escuela de Finanzas es el pulmón que alimenta los trabajos del conjunto de AFI. En esta casa, recién estrenadas sus nuevas instalaciones, trabajan un centenar de personas que a la sazón son también profesores, alimentadores de la oferta docente que tiene nuestra Escuela de Finanzas.

Entre sus propósitos, desde hace algún tiempo, pero más intensamente en sus planes de actuación para los próximos años, está precisamente prestar atención a tendencias de gran alcance y al protagonismo de sectores básicos en nuestra economía, en nuestro sistema financiero, en el sector de los seguros. Y entre las tendencias que subyacen en las transformaciones económicas y financieras, qué duda cabe de que la relevancia del tema de la evolución demográfica y sus consecuencias, su impacto sobre las pensiones, y no sólo sobre el sistema público de pensiones, constituye un elemento fundamental para nosotros.

Otra de las líneas que inspira el comportamiento, las actuaciones de nuestra Escuela son alianzas con socios, con instituciones de referencia, como lo es Aviva España, desde luego institución con la que venimos trabajando desde hace algún tiempo en distintos ámbitos de difusión de las finanzas, de alfabetización financiera y, cómo no, de anticipación de lo que pueden ser las implicaciones de esa tendencia a la que me refería, que es la evolución demográfica.

Yo quiero a agradecerle a nuestro buen amigo Ignacio Izquierdo, CEO de Aviva España, el apoyo que nos ha brindado. Esta jornada no hubiera sido posible sin su protagonismo, sin su iniciativa. Y como ha señalado también Mónica Guardado, quiero agradecer también a José Antonio Herce, Director asociado de Afi, su iniciativa. Desde antes incluso de incorporarse a AFI, José Antonio ha tenido entre sus principales obsesiones analíticas y académicas la sostenibilidad del sistema de pensiones y la evolución demográfica.

Yo creo que hay razones para dotar de relevancia a un encuentro como este, todos ustedes tienen ya un sesgo de partida al acudir a esta jornada y, por lo tanto, entienden mejor que yo lo que son los fundamentos, las razones de nuestra preocupación.

Estamos viviendo más años que nunca antes, estamos viviendo bastante más a partir de los 65 años y, por lo tanto, de muchas maneras, buena parte de los planteamientos que se tenían en la definición de los sistemas públicos de pensiones, se han alterado de forma significativa. En la mayoría de los países desarrollados desde luego, en Europa y desde luego en España.

En segundo lugar, acabamos de superar, estamos en trance de dejar atrás de forma definitiva, una profunda recesión, una crisis económica de alcance que ha tenido como denominador común en la mayoría de las economías una fuerte erosión en su crecimiento potencial, el aumento de la tasa de desempleo, la reducción de la capacidad de maniobra de las finanzas públicas e incluso la instalación, en un escenario de bajo, o muy bajo, crecimiento durante los próximos años.

Y también, un entorno financiero que compromete la actividad de operadores financieros distintos, como pueden ser compañías de seguros y como pueden ser los propios fondos, los propios delegados en los que confiamos para que nos gestionen nuestra riqueza financiera, sobre todo los de aquellos que ya tenemos una edad relevante en este punto.

Yo creo que estos son retos muy importantes, desde luego son retos que interesan en AFI, en donde hay un equipo muy cualificado de colegas que están trabajando precisamente en cuáles son las consecuencias de estas transformaciones, no solamente en términos de comportamiento del consumidor, no solamente en términos de salud, no solamente en términos de preferencias como usuarios financieros, sino también el impacto sobre los propios mercados financieros, el impacto sobre los sistemas financieros, del envejecimiento de la población.

En países como el nuestro, es muy difícil conciliar esa necesidad de disponer de instrumentos financieros susceptibles de inversión por parte de las compañías de seguros, de los fondos de pensiones, con un grado de bancarización tan intenso como el que tiene nuestro sistema. Por eso, de alguna forma, junto a la liberación y la relajación de restricciones antes comentadas, la propia transformación del sistema financiero en la dirección de dotar de un mayor protagonismo a los mercados de capitales, a la financiación directa frente a lo que es la tradicional bancarización, va a ser uno de los elementos que va a condicionar esa transición y uno de los elementos a los que analíticamente hay que prestarle atención.

Poco más, termino saludando, agradeciendo por supuesto, a quienes han tenido la capacidad para convocar un panel de ponentes como los que hoy están aquí y eso nos remite necesariamente otra vez al apoyo y empuje de Ignacio Izquierdo y a la perseverancia de José Antonio Herce y de los colaboradores de la Escuela de Finanzas, y también del equipo del área de seguros de AFI

Esta Conferencia Internacional sobre Longevidad y Pensiones sirve para marcar, por así decirlo, en el inicio del curso, esa señal clara de compromiso de la Escuela y de AFI con el análisis de esas tendencias básicas, la evolución demográfica, la longevidad en última instancia, y sus consecuencias no sólo sobre el sistema o los sistemas de pensiones, sino también con el análisis de tendencias de más largo alcance como es la transformación de nuestro sistema financiero.

3. Opening words by Mr. Ignacio Izquierdo, CEO of Aviva España

Good morning to all you, first of all I would like to thank our speakers for their presence in this Conference this morning.

Quiero agradecer sinceramente a AFI la oportunidad de que Aviva España colabore en una iniciativa como esta, desde el momento en que AFI, Emilio Ontiveros y José Antonio Herce y nos propusieron participar en una conferencia de este tipo desde luego que quisimos estar apoyando la iniciativa.

Aviva es una gran compañía de seguros a nivel mundial como todos ustedes saben y en ella estamos convencidos de que la sociedad se enfrenta a un reto importantísimo en las próximas décadas, aunque este reto no es un problema de corto plazo, sí es un problema serio y de gran alcance en el muy largo plazo.

La excelente noticia es que cada vez vivimos más y mejor, cualquier día, como comentaba antes con los amigos periodistas, inventan algo o se descubre algún medicamento, algún avance médico que haga que demos otro salto de diez, quince o veinte años en nuestra esperanza de vida. Esto puede pasar, y puede pasar en cualquier momento, causando una enorme disrupción en los esquemas contables, financieros y operativos de toda la industria de los seguros y las pensiones.

Vivir más de cien años y vivir con calidad, es algo que va a suceder casi con toda seguridad y, a la vez que es una excelente noticia, pero marca unos retos importantísimos para las sociedades, no solo la española.

Esta conferencia ha reunido un plantel de expertos de nivel internacional y ellos les confirmarán, si es que fuese necesario, que el envejecimiento es un fenómeno al que debe enfrentarse cualquier sociedad, especialmente las sociedades desarrolladas, especialmente aquellas en las que más se ha desarrollado el Estado de Bienestar. No es necesario cuestionarlo, ni dar toques alarmistas sobre su futuro, pero incluso aunque no quisiéramos ver problemas detrás del fenómeno del envejecimiento, deberíamos afrontar con decisión y con creatividad las implicaciones buscando posibles soluciones.

El Instituto Aviva de Ahorro y Pensiones se crea en el año 2011, como un foro de investigación, análisis y debate, es un foro donde pretendemos, desde Aviva, que obviamente es un grupo asegurador, impulsar la actividad del Instituto sin caer en el afán del mercado.

El Instituto desea fomentar la sensibilización, la educación, la investigación alrededor de estos temas tan importantes. Y, desde la industria propiamente dicha, pues queremos poner nuestro granito de arena como uno de los agentes que puede colaborar en esas soluciones, contribuyendo a que los ciudadanos cada vez sean más sensibles, más conscientes de todo esto, y dispongan de mejores servicios y productos de cara a su jubilación.

En Aviva España estamos pues muy satisfechos patrocinando esta conferencia internacional, y continuaremos haciéndolo tanto desde el Instituto como desde la propia compañía, y colaborando con el conjunto del sector, veo aquí a Pilar González de Frutos, Presidenta de UNESPA, y a su equipo, para aportar ese granito de arena a los ciudadanos, para abordar con las mejores garantías técnicas y analíticas soluciones a esta tendencia que es incontestable, y a la que la demografía nos lleva ineludiblemente, y frente a la cual, por lo tanto, hay que adoptar soluciones.

Estas soluciones, cada vez vienen más de los individuos. Sin necesidad de poner en cuestión la sostenibilidad del sistema público de pensiones, que no lo está a corto plazo, sí ha de admitirse que se trata de una cuestión respecto a la que cada vez se está trasladando más responsabilidad a los ciudadanos, que tienen que tomar más decisiones. Pero no se puede trasladar cada vez más responsabilidad a los ciudadanos sin ayudarles con herramientas, con información, con educación para que tomen lo mejor posible esas decisiones que les incumben crecientemente. Nosotros, la industria de las pensiones, junto a muchos otros actores institucionales, seguiremos contribuyendo modestamente pero firmemente a dichas soluciones.

De nuevo, AFI, muchísimas gracias, muchas gracias Emilio. Es un placer estar con todos ustedes y, por mi parte, nada más. Buenos días de nuevo y espero que disfruten mucho de la jornada. Muchas gracias.

4. Opening words by Prof José Antonio Herce, Associate director at Afi and Conference Director

Muy buenos días a todos, muchas gracias Mónica, Emilio, Ignacio por apoyar la celebración de esta jornada desde el principio que se os planteó y ayudarme a hacerla realidad. Gracias también por vuestro apoyo esta misma mañana con vuestra presencia y vuestras palabras. Gracias muy especiales a nuestros distinguidos ponentes. Gracias a todos y todas por su presencia y sean muy bienvenidos a esta Conferencia Internacional sobre Longevidad y Pensiones.

We decided to organize this Conference on the growing evidence that countries all over the world, in the face of increasing longevity everywhere, are struggling to update, reform or adapt their pension systems, either public or private, pay-as-you-go or funded ones.

This evidence, more than anecdotal one, led us to wonder on whether a "global pension crisis" exists or not. To explore this question and try to address an answer to it from different perspectives, we gathered this impressive panel of experts, scholars and industry practitioners that doubted not even one second in accepting our invitation. So, again very special thanks for being here.

The different perspectives I mentioned before had to be truly different, and not only in the academic front, We wanted demographics and economics to be part of this mixed approach, but we also wanted sociology, political science and market perspectives to be into the mix. I truly believe that we have succeeded in gathering the persons that will do the job.

B. Keynote Speeches

5. Global trends in, and implications of, increasing longevity

James W. Vaupel

Almost everyone is interested in longevity and the fact that we are living longer and longer. Today I will summarize the trends and discuss some implications.

Like many scientific ideas, longevity was considered by Aristotle –in an essay in 350 B.C. He compared life to a fire that was burning down. The fire could be put out prematurely by throwing sand or water on it –that was analogous to death from an epidemic or in war. Or the fire could die down naturally -that was analogous to old-age mortality. As Leonard Hayflick expressed it "there is one and only one cause of death at older ages, and that is old age. And nothing can be done about old age." This concept of a fixed frontier of survival was the dominant idea about longevity from 350 B.C. until recently –and it is still widely held today.

A second concept about longevity is... yes, there is a fixed frontier of survival, unless you know the secret of longevity. Many secrets have been proposed –a fountain of youth, sex with young virgins, blood transfusions from children, vitamins A, B, C, D, E, F, G... Luigi Carnaro, a Venetian nobleman, published his secret in 1540 in a book titled "The Art of Living Long", when he said he was 56 years old. The secret was severe dietary restriction. Carnaro recommended eating an egg a day, a scrap of bread and a small glass of wine. His book was, after the Bible, the best-selling book in Europe for three centuries. It is still widely sold today and many researchers are studying caloric limitation as the secret of longevity. In 1557 when a new edition of Carnaro's book was published, he claimed to be 80, although if he was 56 in 1540 he could only be 73. And in 1565, shortly before his death, he claimed to be 95 –but could only be 81. Carnaro did not live exceptionally long, but eating an egg a day it must have seemed very long.

In general, if someone in the past claimed to be 95 or someone today claims to be 105, then you have to check a birth certificate or some comparable evidence. We've done so for thousands of cases. Most centenarians, especially those who claim to know the secret of longevity, are liars.

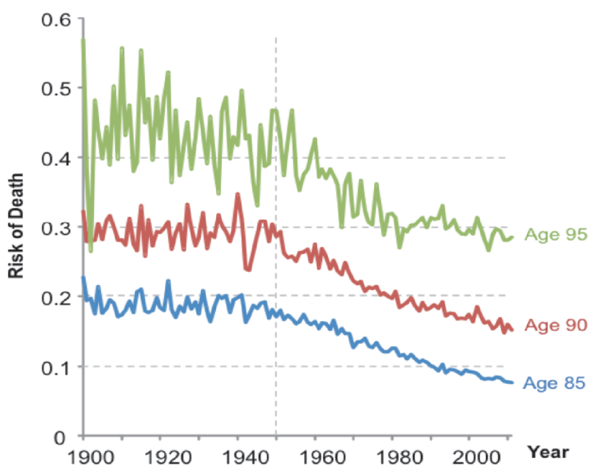
Thirty-five years ago I published a third hypothesis about the frontier of survival. I speculated that the frontier of survival was advancing, people were living longer and longer, but we didn't know this because we had no reliable data on any population after age 85. If you need reliable demographic data, where do you go? Stockholm: the Swedes have gathered the world's earliest and most reliable data on mortality by age. So in the late 1980s I journeyed to Stockholm and met Hans Lundström at Statistics Sweden. He showed me the detailed records in the basement, including the records of survival past age 85. I asked him to computerize these data and he worked on weekends and evenings for more than two years to do so. He sent me the results and finally evidence was available on death rates at age 85 and older.

The next slide shows the results from 1900 to today for 85-year-old Swedish women. There was little progress before 1950: Aristotle was more or less right until then. But afterwards there were dramatic improvements. The risk of death was cut from about 20% to under 10%. There was similar progress at age 90 and at age 95.

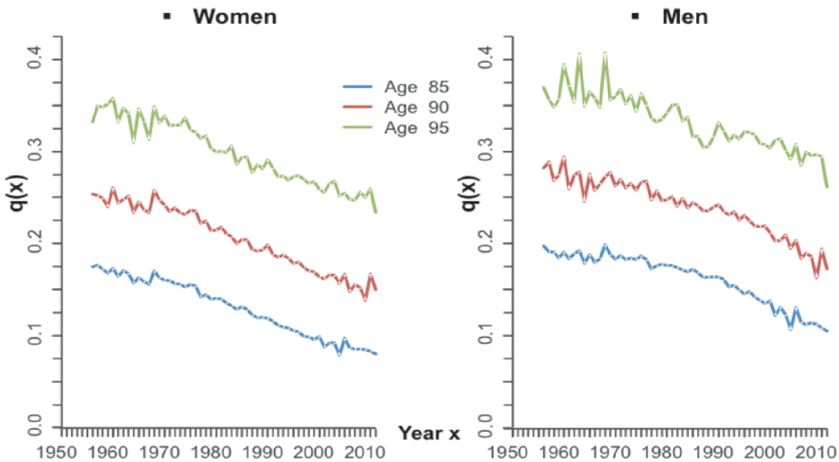
This finding has now been replicated for many countries. Here's the picture for German women and men.

These reductions in old-age mortality have produced an explosion in the number of centenarians.

Mortality at ages 85, 90 and 95 for Swedish females

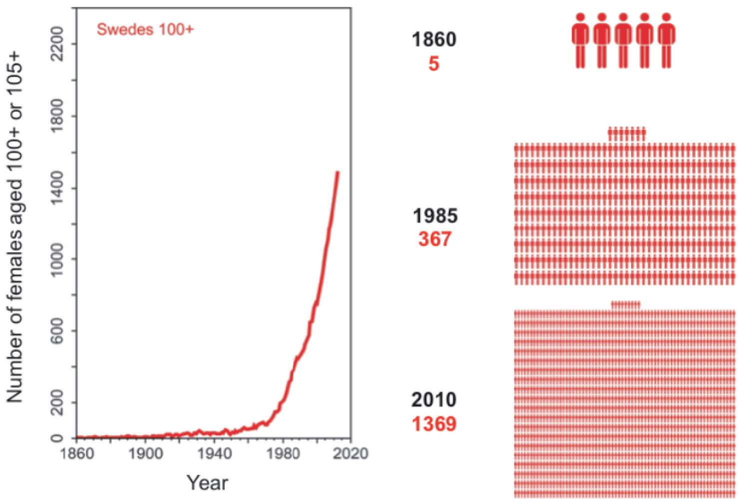


The decline in chances of death in Germany at ages 85, 90 and 95



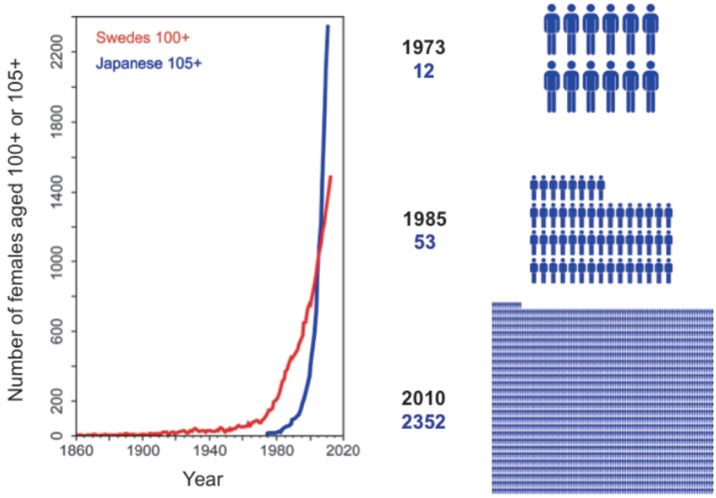
Here's the astonishing increase in the number of Swedish women who are 100 old or more. There were 5 Swedish female centenarians in 1860 and more than a thousand in 2010.

The explosion of centenarians



Now consider an even more astonishing increase: the explosion in the number of Japanese women age 105 or more. There were 12 in 1973, and there are more than 2300 today.

The explosion of centenarians



The improvements in survival at older ages are not due to a slowing down of the aging process—the improvements are due to a postponement of aging to older ages.

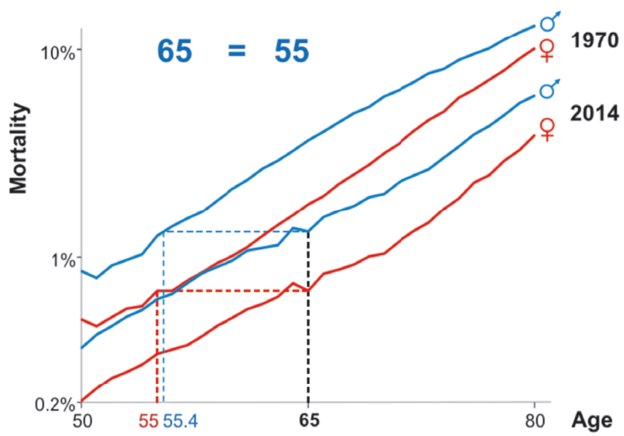
Current age and age of equivalent mortality 50 years ago

Age	Equivalent Age 50 Years Ago							
	Female				**Male**			
	France	Swe den	USA	Japan	France	Swed en	USA	Japan
50	42	40	44	23	44	43	44	39
60	49	52	53	43	51	53	51	50
70	59	62	63	53	59	62	60	57
80	71	72	74	67	71	73	73	70
90	83	85	85	79	84	87	85	81

The table above compares people of some age currently (70 year olds, say) with people 5 decades ago who suffered the same risk of death. You can see for French males that 70 years olds today are as healthy as 59 years olds were half a century ago. The same is true for French females and approximately the case at other ages and for other countries. There has been a delay of about a decade in old age.

Let me further illustrate this for Germany. Here is how the risk of death rose with age in 1970 for German women and for men. Today the risks look like this for women and for men. The risk of death today at age 65 for women is a bit less than 1%. Here is the same risk in 1970. 55-year-old German women in 1970 suffered the same risk of death that 65-year-old German women do today. And here is the corresponding equivalence for German men. Again, measured by the chance of death, a 65-year-old today has the same health that a 55-year-old had in 1970: **65 is the new 55.**

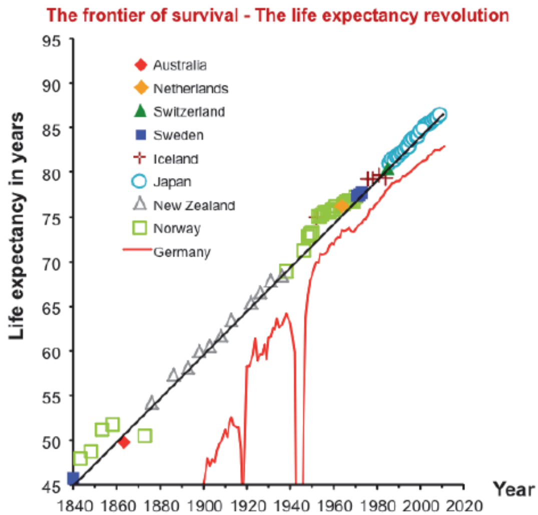
The postponement of senescence in Germany 1970-2014



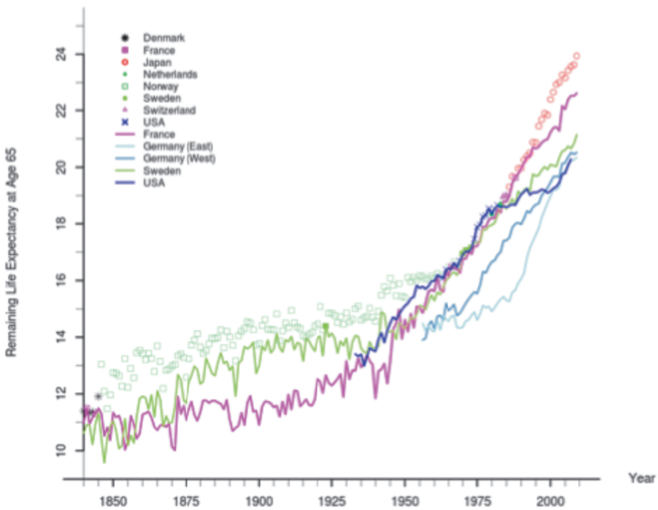
The advancing frontier of survival is part of a larger life-expectancy revolution. In 1840 Swedish women enjoyed the world's longest life expectancy: 46 years. Over time the world record steadily increased, with different countries taking the lead. For the last three decades, Japan has been the record holder. Last year in Japan, life expectancy for women was more than 87 years. So from 46 in 1840 to 87 today, best-practice life expectancy has almost doubled—rising at a remarkably steady pace: two and a half years per decade, 3 months per year... **6 hours per day!** You don't have to deduct the six hours of this meeting from your life expectancy, it's free!

Different countries followed more erratic trajectories than the straight-line increase. Below's the history of life expectancy for women in Germany since 1900. In 1900 life expectancy was less than it was in Sweden 60 years earlier. Germany started to catch up, but then WWI and the Spanish flu killed millions. Despite the turmoil of the interwar years, Germany resumed its rapid progress—until the disaster of WWII. But again Germany caught up and after 1960 life expectancy in Germany has risen at the same pace as in the best-practice countries, albeit at a level 2 to 4 years lower.

The life expectancy revolution



The life expectancy revolution



Data Source: Calculations based on Human Mortality Database
from Roland Rau and James Vaupel (unpublished)

Remaining life expectancy at age 65 is also increasing as shown in the graph above. Progress started to accelerate around 1970. Today remaining life expectancy at age 65 is increasing almost as rapidly as life expectancy at birth—not 6 hours a day but depending on the country 4 or 5 hours per day.

Life expectancy over time is increasing 6 hours per day, 3 months per year. Life expectancy for people born in successive years is increasing 4 months per year—because as a baby gets older and older, the person benefits from the progress being made over time. By projecting this 4-month-per-year progress into the future, we can estimate the age that at least 50% of Germans born in 2000, 2005 and 2010 will attain: 100, 101, 103. That is, most children alive in Germany today will, if past progress continues, celebrate their 100th birthdays.

Oldest Age at which at least 50% of a Birth Cohort is Still Alive

Christensen, Doblhammer, Rau & Vaupel, *Lancet* 2009, extended

Year of Birth:	2000	2005	2010
France	102	104	105
Germany	100	101	103
Great Britain	102	103	105
Japan	105	107	108
Sweden	101	102	104

Data are ages in years. Baseline data were obtained from Human Mortality Database and refer to the total population of the respective countries

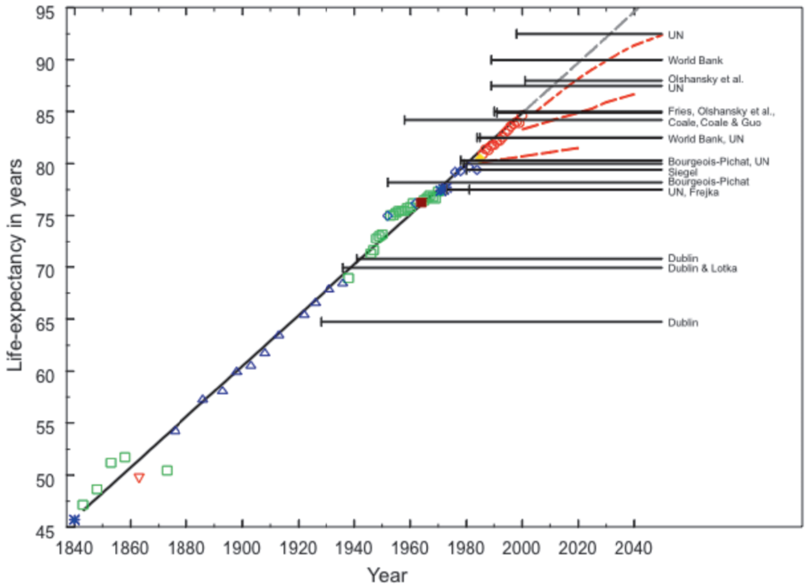
The Japanese, if past progress continues, will live even longer and Sweden will rank between Germany and Japan. Very long lives are not the distant privilege of remote future generations: Very long lives are the likely destiny of children alive today.

Mortality forecasts based on expert judgment have been less accurate than extrapolation. This graph below illustrates this. The straight diagonal line captures the life expectancy trend observed since 1840. The horizontal lines denote limits to life expectancy proposed by various actuaries and demographers. The end of each horizontal line indicates the year of publication. You can see the predicted limits to life expectancy have been broken over and over again.

The future will be different from the past. In next decade or two, progress against cancer and dementia and in developing genotype-specific therapies will give way to progress in regenerating and eventually rejuvenating tissues and organs accompanied by progress in replacing deleterious genes, and aided by nanotechnologies (nanobots). Perhaps in a de-

The Sorry Saga of Looming Limits to Life Expectancy

Oeppen and Vaupel, *Science* 2002



cade or two, probably later, progress in slowing the rate of aging (as opposed to further postponing aging).

Since 1840, future progress in extending life expectancy has been different from past progress. The country with the longest life expectancy has shifted from Sweden to Japan. The causes of death against which progress has been made have shifted from infectious diseases to chronic diseases and the ages at which mortality has been reduced have shifted from childhood to old age

The table below shows the shift in the ages at which mortality progress is being made. Before 1900 almost all the increase in life expectancy was due to reductions in death rates before age 50. Since 1990 most of the advance of life expectancy is attributable to mortality improvements after age 65.

Because since 1840 future progress in extending life expectancy has been different from past progress, and because experts understand the past but have difficulty foreseeing future advances, the best strategy for forecasting the future of mortality is to extrapolate past trends, which incorporate all the unforeseen advances and shocks in the past.

As Jonathan Swift observed, everyone wants to live long but no one wants to be old. As life expectancy rises, what is happening to health at older ages. To understand this it is helpful to distinguish **three** states of health—healthy, unhealthy and dead. It was fea-

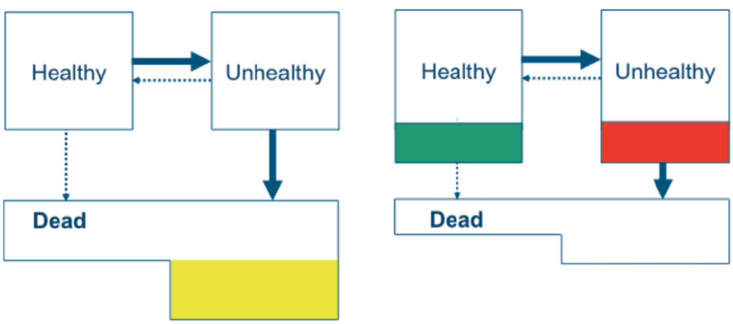
Age-Specific Contributions to the Increase of Record Life Expectancy among Women 1850 to 2009 in %

Age group	1850-1901	1901-1925	1925-1950	1950-1975	1975-1990	1990-2009
0	14	32	15	21	10	4
1-14	55	8	16	12	4	2
15-49	25	38	39	20	7	4
50-64	3	13	19	17	20	11
65-79	2	8	11	24	41	37
80+	0	1	0	6	17	41
Total	100	100	100	100	100	100

Data source: Calculations based on Human Mortality Database by Roland Rau and James Vaupel (unpublished)

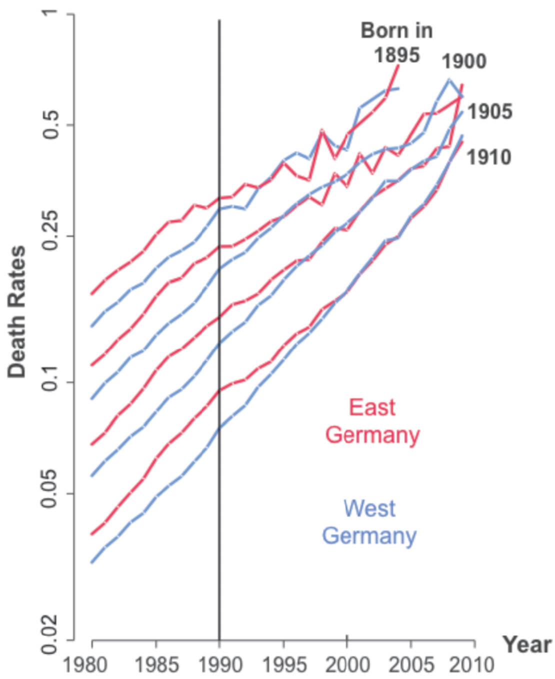
red that rescuing people from death would increase the number of unhealthy people. The progress that has saved lives has, however, also resulted in more people staying healthy. So there are more people in the healthy box—and, because of saving lives, also more people in the unhealthy box. The balance has remained about the same. More people are taking medicine to reduce blood pressure, more people have pacemakers, and so on—these people are better off, alive rather than dead, but they are ill in some sense. If "healthy" and "unhealthy" are determined by a person's ability to live independently, to manage the activities of daily living, then as life expectancy has increased, the span of healthy life has also increased at about the same pace. In particular, as we live longer, the onset of cognitive impairment and dementia is being postponed to older ages. This changing pattern is illustrated in the diagramme below.

Will we live longer healthy



Before 1990 people in East Germany suffered higher death rates than people in West Germany. Here are the death rates for people born in 1900, who reached age 90 in 1990. After Unification, death rates still rose with age in East Germany but the East German disadvantage rapidly disappeared. The same was true for older people born before 1900 or afterwards. This quasi-experimental evidence demonstrates that even very old people can benefit from improved conditions.

It's never too late



Conditions for older people in Eastern Germany improved in two ways. They had more money. In July 1990 retired people in Eastern Germany started to receive pensions that were worth on average 20 times (20 times!) the pensions that they had been getting until then. And they got better medical care because in East Germany children and workers had priority over retired people. What was more important in improving survival for older East Germans—money or medicine? Because the pension increase happened everywhere in East Germany in July 1990 but the West German health-care system gradually spread, first to East Berlin, then to cities with University hospitals, such as Dresden, Leipzig and Rostock, and then to other places, it is possible to disentangle the effects of money vs. medicine. The answer—both were about equally important.

The life expectancy revolution in Germany: Why?

Money?

Medicine?

But what did 85-year-old Frau Schmidt do with 20 times more money? She bought a fur coat and took a vacation on Majorca—but what else? She gave a lot of money to her children and grandchildren, who then took good care of her. For older people, the care and concern of younger people can be crucially important.

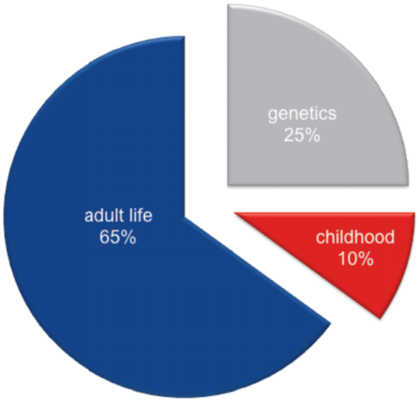
If you would like to live a long time, the best thing to do is to be born a girl, recently—and in a country with long life expectancy. Prevailing levels of prosperity and medical knowledge determine the average length of life. But some people live longer than average and others live shorter. What determines this variation?

Oliver Wendell Holmes asserted that if you wanted to live long, you should choose two long-lived parents. But genetic factors actually play only a modest role in determining who lives longer than average. At least in the Nordic countries, where excellent twin registries permit analysis of how important genetic factors are, about a quarter of the variation in how long adults live can be attributed to genetic variation among people.

No variant of any specific human gene has been found so far that accounts for more than a fraction of 1% of lifespan variation. It appears that hundreds of genes, interacting with each other in complicated ways, influence lifespan. Your father's lifespan was or will be only modestly influenced by his genes and similarly your mother's lifespan—and you only share half your genes with your father and with your mother. Considering this, it is not surprising that knowledge of the lifespan of a person's father and mother only reduces the uncertainty about the person's lifespan by about 4%.

Events that occur early in life—in utero and in childhood—are statistically significant in explaining late life health and survival but the overall impact of childhood conditions is relatively small—only a tenth or even less of the variation in how long adults live is due to

Determinants of individual longevity



variation in conditions from conception to maturity. Most of the evidence for this comes, again, from studies of Nordic twins. Twins share a uterus, grow up in the same socio-economic environment, have the same parents, and often suffer the same diseases. Their shared childhood experiences, however, account for less than 10% of the variation in how long they live.

Hence, about two-thirds of explanation of why some people live longer than others comes from differences in their adult lives. The entire course of adult life is important but evidence that "it is never too late" suggests that what is happening now is particularly decisive. Let me adumbrate a few of the factors that available evidence supports:

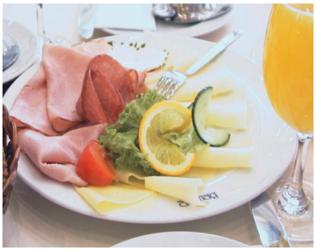
• Clean air turns out to be more important than most people realize. And living close to a good hospital can also be crucial, especially if you have a relative or friend who keeps an eye on you and gets you to the hospital in time.

• When it is cold, stay warm. Getting chilled increases the chance of a bad cold and also the chance of heart attack tomorrow.

• Get a good night's sleep. Many people don't realize how important this is for health.

• Eat a balanced, varied diet. Astonishingly little is known about the optimal diet, despite a lot of research and all the claims and hype. But it seems reasonable to eat a sensible mix of foods.

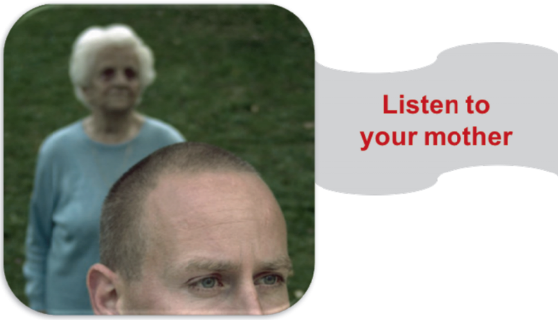
• Get exercise all your life and watch your weight. Get married and have children and grandchildren. Stay active in life and maintain a social network.



• It is easier to live shorter than average than to live longer. Consumption of some alcohol appears to be salubrious but excessive drinking, especially binge drinking and drunk driving, is very unhealthy. Smoking is the biggest risk. In most countries people who smoke all their lives live about a decade less than people who never smoke.

So what's the bottom line: If you want to live long, listen to your mother!



Let me now turn to a very different but equally interesting topic: how much do we work? We are surviving to older ages but our working lives have not been lengthening, indeed, over past decades, we have tended to retire earlier. More and more people are retired instead of working—and retired people are living longer. This reduces the average amount of work we contribute.

Country	Hours worked per week per capita		
	2012	2025	Change
Germany	**13.20**	**12.25**	**-7%**
France	11.69	10.94	-6%
Italy	12.65	11.96	-5%
UK	15.04	14.28	-5%
USA	16.05	15.34	-4%

Source: Vaupel (2015)

So, taking this into account, how much do Germans work? Specifically, how many hours do Germans work on average per week per person? Wow! Just over 13 hours per week! We all know that Germans work very hard, but many Germans don't work. So on average 13 hours per week. If current labor-force participation rates in Germany stay the same until 2025 (and aren't changed upward or downward) then Germans will work on average 12 and a quarter hours per week in 2025. This will be a change of -7%, which can be compared to an increase in unemployment of 7 percentage points.

The French work even less, as do the Italians. The British and the Americans work more. But in all cases, work comprises an amazingly small portion of our lives. There is enormous potential for the redistribution of work. If more people worked, the people who work could work less. This would be very beneficial to younger people trying to combine careers with families.

Let me illustrate this with some simple arithmetic using highly-reliable data from Denmark. Last year Danes worked, actually worked at their work places, 3.8 billion hours. 5.6 million people live in Denmark. Dividing 3.8 billion by 52 weeks per year and then dividing by 5.6 million yields just over 13 hours/week/capita, a figure close to the figure for Germany. How is this possible? Well, only 2.6 million Danes worked at all, 47% of the population. Those who worked, worked 28 hours/week/worker.

How is that possible? The usual workweek in Denmark is 37 hours/week. But Danes take long vacations, celebrate almost as many holidays as Spaniards do, and sometimes get sick. This reduces the effective work week to 31-32 hours. And some people, a minority, work part time, leading to the 28 hours/week/worker. If 5% more of the Danish population worked, increasing the percentage of workers from 47% to 52%, then the effective work week of 28 hours per worker could be cut to 25 hours per worker. The official work week could be cut to 33 hours per week. This would greatly help younger people who are trying to combine careers with children. It would increase low birth rates.

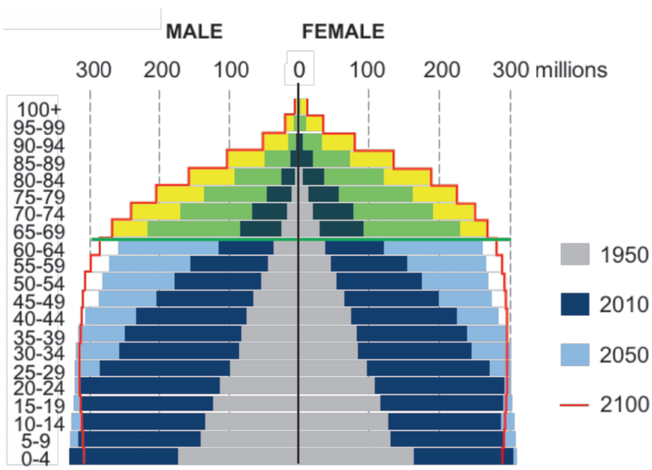
And work is good for older people who are able to work. Some people in their 60s cannot work anymore, but most can, and, if they did, perhaps only part-time, they would help society and they would also help themselves. People who work tend to be healthier and to feel better about themselves because they are contributing to society and reducing the burden on younger people.

The 20th century was the century of the redistribution of income and wealth. I predict that the 21st century will be a century of the redistribution of work and leisure. More people will work, to older ages, but they will work fewer hours per week.

The following graph shows how the population pyramid for the world has changed since 1950 and how it is likely to change from now to the end of this century. You can see that there will be very large increases in the number of people above age 65 (colored in successive pyramids).

World population

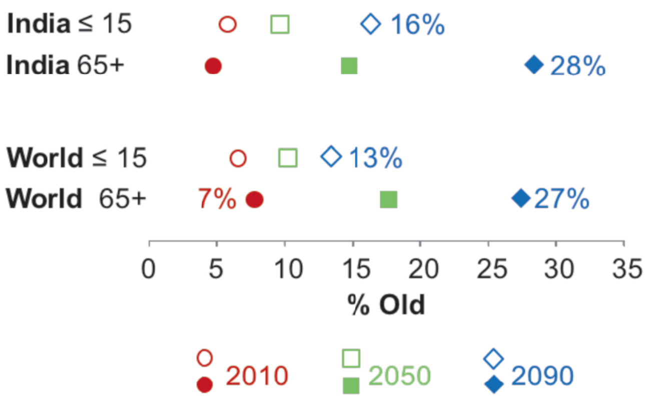
By five year age group, in millions



Source: UN

The percentage of people who are "old" depends on how "old" is defined. If old is defined as 65+, then there will very large increases in the percentages for the world and for particular countries, such as India. But if old is defined as the age when remaining life expectancy falls to 15 years, then the increases will be much more modest.

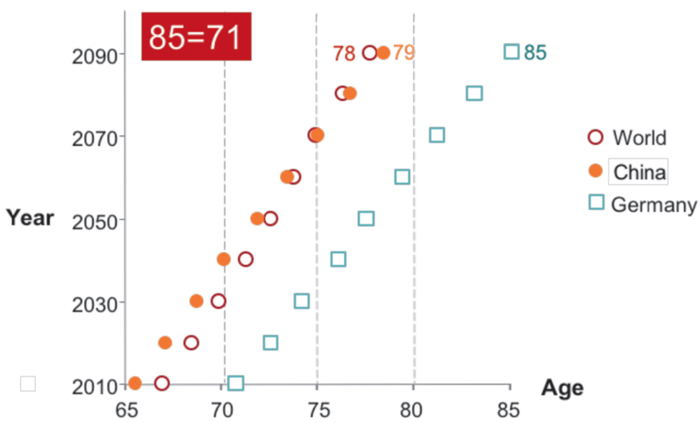
% Old when old means:
65 + vs. ≤ 15 years of remaining life expectancy



Data provided by S. Scherbov and W. Sanderson

The age when remaining life expectancy falls to 15 years is likely to rise substantially over the course of the 21st century. In the graph below you can see the trends for the world, China and Germany. For Germany, age 85 will be the new 71 by the end of the century.

Age when life expectancy = 15



Data provided by S. Scherbov and W. Sanderson

So, here are the demographic prospects for the 21st century:

• We will live longer and longer; most children alive today will live well into the 22nd century.

• We will live healthier at all ages. Disability will be postponed to later ages.

• We will work more years of our lives but fewer hours per year, fewer hours per week.

So, to end mi talk, will there be a global pension crisis? NO, IF (but only if) a greater proportion of people work, including working at higher ages, for example until "life expectancy − X", with, say, X = 15. This reform will be so difficult in many countries that there will be many pension crises around the world. But a proper answer to this question should be of course not, but only if we are smart enough. Thank you.

6. Can we insure against longevity? The UK Retirement Income Market: The Old World and the New

Clive Bolton

6.1. Introduction

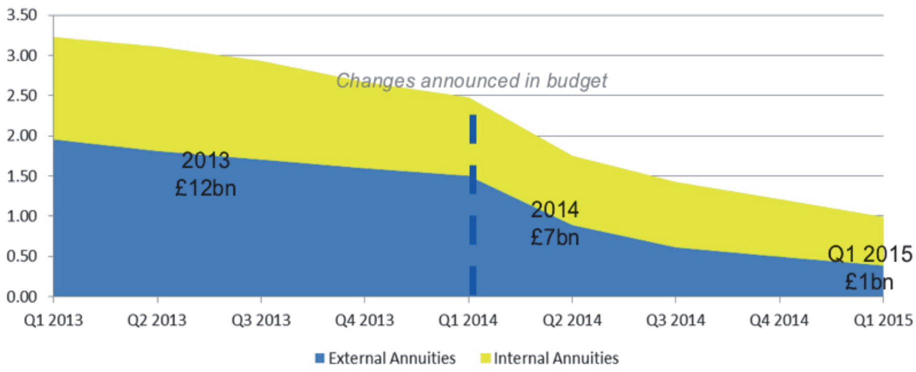
This paper explores the UK pension regulation changes in 2014 & 2015 and the impact it is having on the way individuals retire and on the pension industry. Specifically it covers: (i) The changing landscape of the UK retirement market, (ii) initial consumer attitudes to the changes and their varying confidence to make good decisions, (iii) the emergence of different customer segments in terms of approach and engagement, (iv) the switch from annuities to self-administered investment products, (v) the impact on product design and the emergence of blended retirement income solutions and (vi) the importance of health as a financial asset to allow working lives to be extended

6.2. The New Age of Pension Freedoms

On 19th March 2014 the UK Chancellor of the Exchequer announced the biggest change in pensions legislation for nearly 100 years. He famously stated that no one would ever have to buy an annuity, giving all defined contribution pension savers the freedom to choose what they do with their money from age 55. There were two stages to the implementation; the first with immediate effect dramatically increased the triviality limits which allowed individuals to cash in small pension funds and the second, which came into effect on 6th April 2015, removed the limits altogether. As a result, by Q1 2015 the level of annuities sold reduced to approx. 30% of the level seen in Q1 2013. However this should be put into the context of a consistent year on year reduction of annuities sales over several years as consumers adapted to the persistent low yield environment.

Previously, most people bought an annuity (guaranteed income product) with their pension savings; only those with higher value pensions had the option to consider draw-

Total Individual Annuity Market (£bn PVNBP)



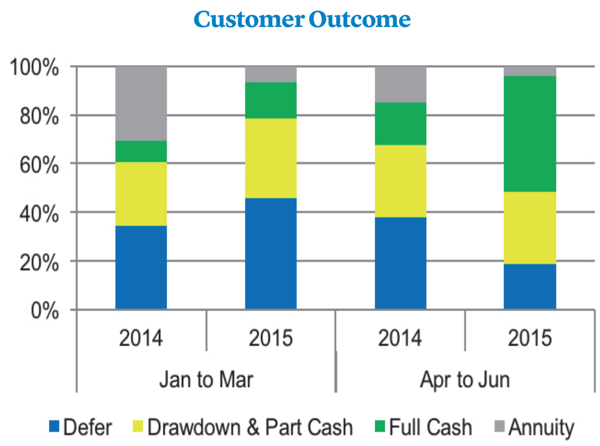
down (due to minimum purchase price and income limits). Only those with very low pensions savings were able to take their benefits in cash without suffering a penal tax charge (55%). Pensions did not traditionally work well from an estate planning perspective as any fund passed on after death would also be subject to tax in excess of 55%.

The changes made through pensions freedoms lowered the age at which retirees could access their pension savings from 60 to 55 years old. Most radically, the rules allowed pension savers to cash in pension policies of any size (subject to lifetime allowance limits) on payment of income tax at the retirees marginal rate. In addition, the limits around drawdown were removed allowing savers with all pot sizes to access their cash flexibly. The changes also brought amendments to tax rules making pensions easier and more favourable to pass on to beneficiaries after death.

Like other insurers, Aviva radically changed their pension customer services operations to respond to customer questions and requests to cash in their pension policies. Call volumes were up over 150% in 2015 compared with 2014. Many customers had been waiting to access cash both those aged 55-59 who would not have been eligible previously, and those who had pension values above the previous limits. In addition some customers who could have accessed their pensions pre-changes also waited seemingly prompted by the media coverage of changes happening in the industry but unaware of details of the rules.

There were four principle choices that a customer could make:

Defer	Defer the decision to a later date
Drawdown and Part Cash	Take some cash out of the fund and put the remainder in a self-administered investment platform to draw down in subsequent years
Full Cash	Take all the fund as cash
Annuity	Buy an annuity



Over 65% of transactions were customers wanting to take full or part-cash from their pension. In the first 6 months Aviva paid out approximately £0.5bn to around 30,000 customers with an average fund value of £17,000. Although these numbers are large they represent a small proportion of the total customers eligible showing that most prefer to keep their savings for later life. Demand for cash remains high but is dropping off sharply though we are yet to see what the new 'normal' looks like in the pensions freedoms world. It may take several years for the environment to stabilise and a long-term view to emerge.

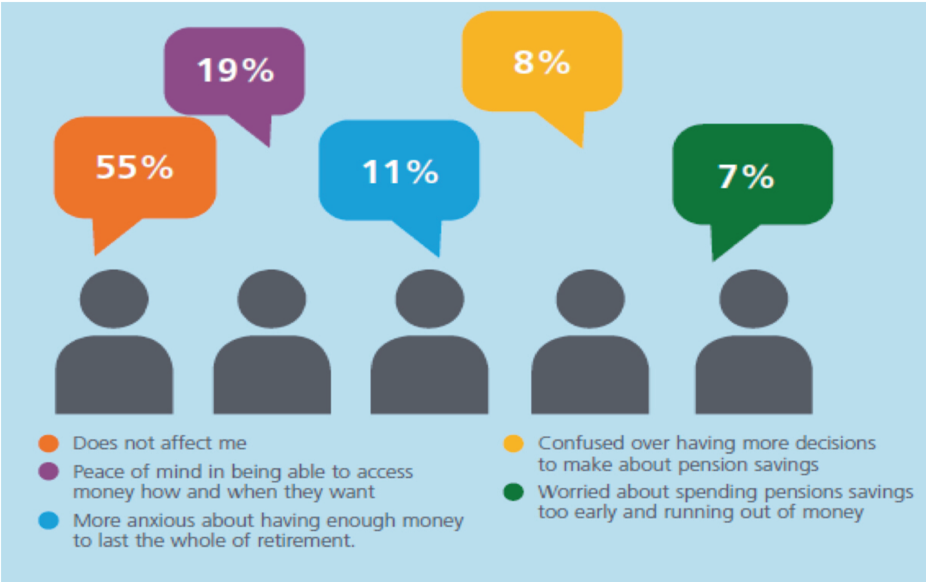
6.3. Retiree Attitudes to the Changes

These changes widened the choices available to retirees creating a potentially complex situation for many people. Aviva's research paints an understandable picture of how customers are feeling – a worryingly high proportion believing they will be unaffected, and others being cautiously concerned about what the new regime brings.

Aviva responded using our retirement expertise to develop clear and engaging educational material and online tools to support customers to make good decisions. This included our interactive tool "My Retirement Planner" which helps customers to compare the different solutions available and give an understanding of how life expectancy can affect these choices. To supplement this, we further broadened our ability to support customers by offering access to financial advice through an external advice partner. We continue to develop these solutions and services to support customers going through the retirement journey.

Pension freedoms create two specific customer segments. Firstly it opens the investment market to a new breed of investor – those who would traditionally have bought an annuity now have to familiarise themselves with the concept of investments. Many of these customers will want to engage directly rather than using the services of a financial adviser.

How are customers feeling?



Título del esquema

The 'new breed' investor	The 'persistently passive'
• New to the investment market • £50k - £100k • Traditionally bought an annuity • Doesn't relate to concept of an IFA • Aware of new retirement choices • Wants to engage but doesn't know how	• No engagement with pension • No understanding of value of pension saving or investments • Keeps concept of retirement at arms length • High level of mistrust of financial services industry. Tars all with same brush

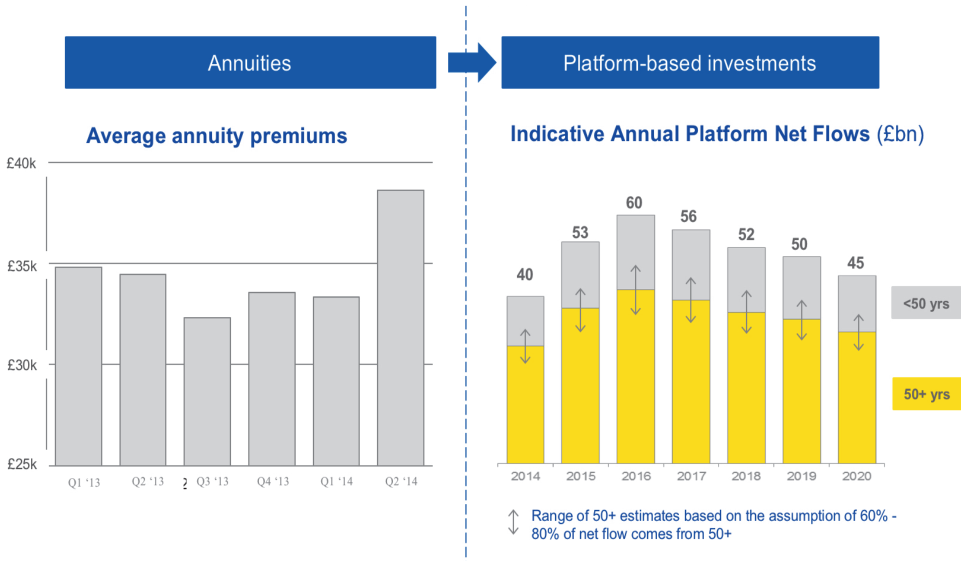
This is not just about the products and solutions; education and support is equally important to support this new type of customer through their retirement and decision-making journey.

Secondly there will remain a group of customers who have yet to engage with their pension or retirement decisions. These create a different challenge in how we can provide support to those who are mis-trusting and uncertain of the financial services industry. It is clear that these more passive customers will need to take far greater control of their finances and investments in the new world and propositions will need to evolve to support them.

6.4. Shift to Self-Administered Investments

As referenced above, the demand for annuities dropped following the announcement of the changes. The average annuity premium has increased because small policies are now more likely to be cashed instead and the larger, adviser led, annuity purchases are the least affected. However, whilst annuity premiums have begun to recover, customer demand has switched towards platform-based investment products which support customers' desire to access their money flexibly as they move through retirement.

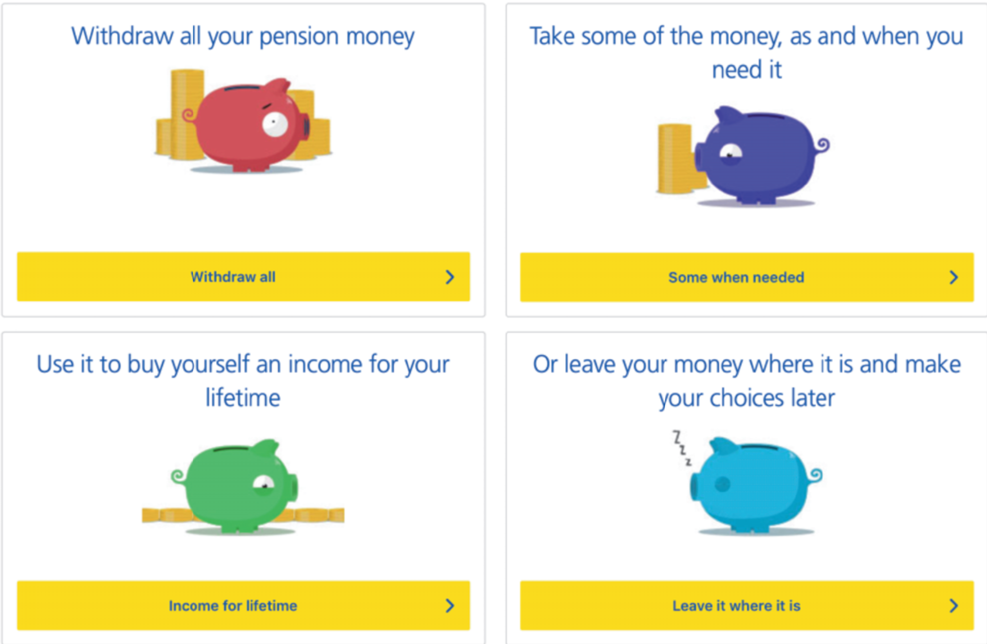
A snapshot of the changing retirement market



Source: ABI

Source: Marakon analysis

To enhance the range of solutions available to retiring customers in the new world, Aviva launched its consumer savings platform, an online, direct to customer pension and savings proposition offering the full range of freedoms. It is built in a simple style for people not used to dealing with their own finances in this way as shown by the screenshot below.



If you do decide to take an income from your pension, this needn't remain the same throughout your retirement. You can vary the amount you take from time to time. The remainder of your fund would stay invested.

Aviva also developed its annuity product to take account of the new regulations, offering features fit for the new regime (such as longer guarantee periods and value protection) where annuity still has an important part to play, albeit it is no longer the 'standard' option.

6.5. Impact on Product Design

The 'next generation' of retirement offerings are expected to focus on optimising the blend of existing solutions rather than a new "silver-bullet" product. Although there is an obvious attraction to products that offer annuity type investment guarantees but with equity type returns market forces are very good at normalising the cost of these guarantees with the prevailing risk free returns removing any advantage. Retirees also need to consider longevity risk; many under-estimate their life expectancy and the effect this will have on their choices.

Delaying annuity purchase to later in life or by purchasing guarantees in advance could mitigate these risks.

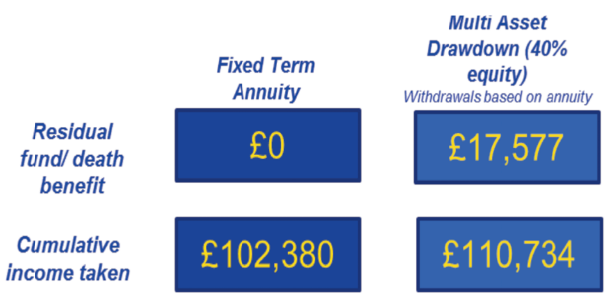
Pension freedoms and increased flexibility in rules allows the potential for new products. Aviva worked with Moody's Analytics to analyse how existing products would perform under different scenarios and what would be the potential benefit to customers of new products/solutions. The focus of the analysis was on total return for different products, at different points in time and with investment scenarios. These are based on a 65 year old individual with a retirement fund of £100k a life expectancy of 90 (the life expectancy for a healthy 65 year old male). The four specific product questions considered were:

1) Would consecutive temporary annuities give a better outcome than income drawdown?

The temporary annuity provides a fixed income for a short period (normally 5 to 10 years) with a guaranteed residual lump sum at the end of the period which can then be reinvested. We explored the scenario where a 5-year temporary annuity is purchased and then re-invested in the same product every 5 years. The total income provided was then compared to an income Drawdown product where the income taken was equal to that which could be provided by a conventional annuity at age 65.

Results: In a median investment performance scenario the temporary annuities underperformed the income drawdown product giving 8% less income and £17k less on death. It also didn't provide any significant downside protection under poorer investment scenarios; a major factor being the correlation of equity and fixed interest reinvestment risks.

Return to average life expectancy (91) – Male aged 65 – £100k fund, median performance scenario



Conclusion: Given that both products offer similar levels of flexibility the conclusion was that there is little benefit of type of product for a customer. The end result was that Aviva stopped selling this product in April 2015.

2) **Would adding longevity protection to income drawdown benefit customers?**

We also considered how an income drawdown proposition could be enhanced to provide protection against a customer living longer than expected – the major disadvantage of an income drawdown solution compared to a conventional annuity. We therefore compared:

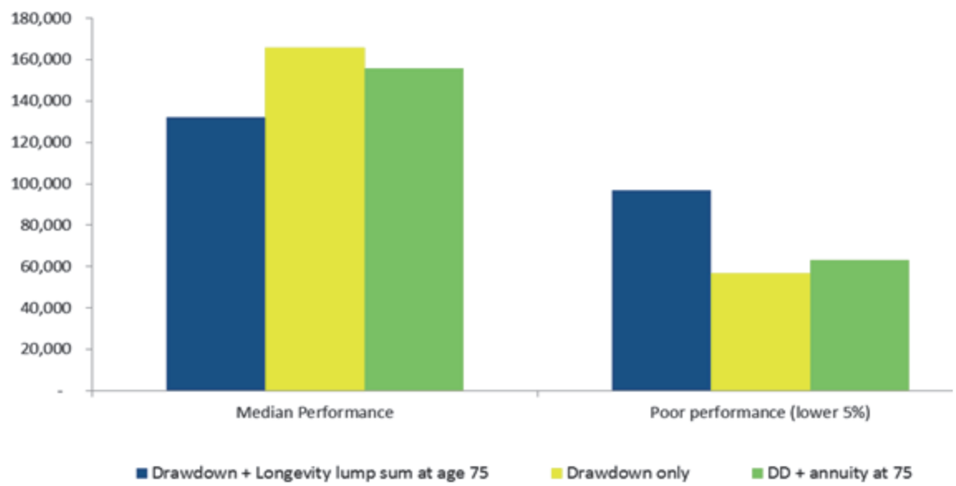
- The return to a customer who only used an income drawdown product,

- The return to a customer who used an income drawdown product up to age 75 and then purchased an individual annuity,

- The return to a customer who used an income drawdown product but also purchased longevity protection which provided a lump sum at age 75 which was then used to purchase an individual annuity

Results: Under a median investment return scenario, only using an income drawdown performed better as the customer was not spending some of their fund on longevity protection or locking into fixed income returns. However, where investment returns were poor the provision of the longevity protection lump sum at age 75 provided a boost to the customer's pension fund and income and provided some downside protection as well as longevity protection.

Total fund returned to Average Life Expectancy (Male aged 65 – £100k fund)

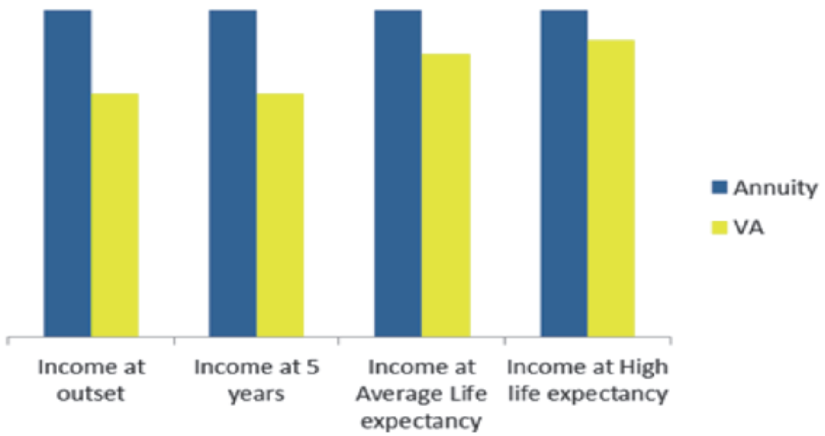


Conclusion: Longevity insurance could be a useful component when building retirement income solutions. However, it is unlikely to be a stand-alone product because of the specialist nature and the requirement to integrate with the other components.

3) Can a single product generate income and provide investment guarantees?

As part of the analytics work we also considered whether a single product could provide high levels of income as well as giving customers sufficient guarantees over the income they receive. In particular, we looked at how a variable annuity product compared with an individual annuity.

Income levels under annuity and VA on Median Performance (Male aged 65 – £100k fund)



Results: The lower starting income provided by a variable annuity and the high charges for the guarantees mean that, even under a median investment performance scenario, the individual annuity performed better even if a customer exceeds their normal life expectancy. A variable annuity needs to outperform risk free rates materially to cover charges and increase income. However, this increases the need for higher equity exposure which in turn increases the cost of guarantees.

Conclusion: The high cost of guarantees tend to negate any investment advantage variable annuities may have in current market conditions. Therefore they are not a universal answer for retirees. This view has been borne out by their lack of popularity in this new market.

4) Could a blend of different retirement income products produce a better outcome?

The alternative to a single product is to use a blend of solutions to provide guarantees as well as exposure to equities. We looked at how a combination of individual annuity and income drawdown products compare against single solutions.

Total fund returned to Average Life Expectancy (Male aged 65 – £100k fund)

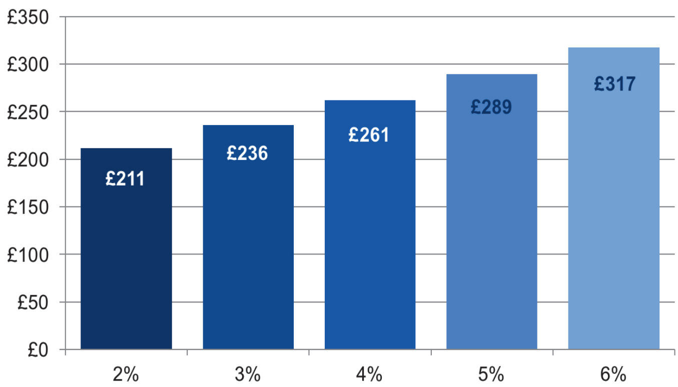
Results: In a median investment scenario a blend of individual annuity and income drawdown products (split 40% individual annuities 60% drawdown) performed better than the stand alone products. Furthermore, under a poor investment scenario only an individual annuity performed better than the blend.

Conclusion: This demonstrated that a blend of traditional products can provide a high level of protection against downside risk as well as giving the customer exposure to good market performance and flexibility. However, there is further work required to optimise the blends to match customer needs as the scenarios used in the analysis above ignored many factors such as tax, one off expenditure and inheritance.

6.6. The Importance of Extending Working Lives

When considering saving for the future we are used to focusing on the average yield over the accumulation period. However in the decumulation phase during retirement, as the graph shows, the yield is much less important. For instance if a constant 5%pa yield was achieved over 25 years (assumed in this example to be the individual's life expectancy) the monthly income would only be £28pm (10.7%) higher than for a 4% yield. This is primarily because we have assumed for this level of wealth the whole fund will be used and so the main component of each monthly payment is the return of the original fund rather than the interest earned.

The new breed investor
65 year old with saving £50k
Monthly income over 25 yrs at different yields



Alternatively, this individual could work 2 years longer until 67 and save, say, half the difference between the UK state pension they would have received had they retired (£115.95pw, approx £6,029pa) and the UK average wage (approx £26,500pa). Working and saving for those extra years would increase the additional monthly income from £261 to £368 an increase of £107 (34.6%).

This demonstrates the powerful effect of retiring later and indeed a significant number of individuals say this is what they are going to do; some expressing it as an intention to "never retire". The reality is that most people do stop working often when illness or lack of fitness forces retirement on them. This highlights that good health is perhaps the most important financial asset we have.

6.7. Summary

UK has seen a massive shift in the options at retirement. These have been implemented at great speed but we have not seen a significant "dash for cash". Most individuals that have withdrawn their pension had relatively small funds (ie under £30k) that would not have provided a substantial income if spread over their remaining lifetime. Although in the early stages of development some themes are emerging:

• Individuals will have to take far greater control of their finances and investments. Although they have more freedom they do not have any more money and research suggests that many are not yet familiar with what has changed. This goes beyond aspects such as investment choices but also how to minimise unexpected tax bills and the best way to pass wealth to future generations.

• It will take several years for the new environment to stabilise and a long term view to emerge. The infrastructure has been put in place for individuals to access their pension funds in a more flexible way but the use of these flexibilities has a long way to go before they are mature.

• In the UK there is likely to be further significant regulatory changes. There are ongoing reviews of pension tax relief, pension product exit charges, establishment of a secondary annuity market and the accessibility of regulated advice.

• Those who will use a significant proportion of their capital in retirement are not well served. Most of the investment research and advice protocols concentrate on either the accumulation phase or wealthy individuals who continue to accumulate (or use a modest amount of capital) during retirement. Until recently those expecting to consume all their wealth during retirement have usually bought an annuity thus have not required investment strategies to help them make their money last.

• There are some product gaps and some redundancy. Temporary annuities with guaranteed maturity amounts do not seem to fit in the new world, longevity insurance may be valuable as part of a solution and a portfolio of income products look more beneficial than complex variable annuity products.

• The infrastructure to tailor solutions is not yet mature. Although a blend of products could provide tailored solutions for retirees there is significant work required to operationalise this proposition in the areas of product, investment and advice. However, there is a substantial opportunity for organisations that crack this problem.

7. Are we heading towards a global pension crisis?

Nicholas Barr

Good morning everybody. It's a great pleasure to be back in Madrid. I apologise that I'm not speaking in Spanish but it would not be a kind thing to you for me to try to do that.

Before I start on my slides I want to lob a rather large rock into the pool. This is following on from what Clive Bolton was saying. And I want to make it clear that what I'm going to say is an attack on the British Government, not an attack on the industry.

The UK pensions authorities say that people don't have to buy an annuity and there is no constraint on drawdown. And I just want to point out that a lot of people, myself included, think that that is a seriously bad policy, because it's based on what economists call first best economics. It assumes that people are rational and well-informed and capable of making decisions that maximise their own long-run welfare.

The reality is that financial literacy is bad. It ought to be improved, it could be improved, but this is in some ways the worst audience of all to understand just how bad financial literacy is. There was an international survey and it asked people three questions. And I'm just going to tell you the first one. It says: you've got a hundred dollars in a bank account and the interest rate is two per cent. After five years, will the account be worth more than 102, less than 102, equal to 102 or don't know? The other two questions were equally easy. Within advanced countries, the US did best. In the US, 35 per cent of respondents got all three questions right. In a lot of other countries like New Zealand, Sweden or Italy, it was 25%. In Russia, it was 2%. So financial literacy is a huge problem.

Now, this is not an elderly professor of economics being condescending. I write books about pensions. Does that mean I could manage a pension portfolio well? No. Does it mean I could choose a good pension fund? No. In Sweden workers have to choose a fund from about 800 alternatives, but workers who don't make a choice go into the default fund. About 98% of new entrants to the labour force in Sweden go into the default fund and about 50% of people in Sweden in total are in the default fund. Originally, once people had chosen a private provider they were not allowed to move back into the default fund, but the political pressure in Sweden to be allowed to move back was so great that it's now permitted.

I was asked to write a report for the Swedish Government on their pension system and the night before I presented the report I was having dinner in Stockholm with two old friends. One, the person who runs the Swedish pension system. The other, the person who was a major figure in designing it. I said to them that if I were a Swedish worker I wouldn't have a clue about choosing a good pension fund, I'd be in the default fund. And they looked at me, and they laughed, and they said we're in the default fund.

So, I just want to make the point that pension reform in Britain, in general, is an object lesson to other countries about how not to do it. We have too many reforms, they are announced without adequate consultation. I think the industry has been handed a horrible problem of trying to implement something as difficult to implement as this. And as I say, this is not an attack on the industry. It's saying the British Government has gone for a policy which, to use a technical term, is barking mad.

So, let me now come straight onto what I want to talk about. Is there a pensions crisis? No, there is a problem. But there's a problem with a solution.

Just to start off with objectives. Pension systems have multiple objectives. For the individual, redistributing from yourself in your middle years to yourself when you're retired, consumption smoothing. Separately, insurance. We've heard a lot about the longevity risk, annuities are one way of doing that. Public policy has additional objectives, like poverty relief, making sure that no one is poor in old age. And a lot of Governments may have other redistributive objectives wider than poverty relief.

Years ago journalists in Britain would ring me up and say: Professor, I want to talk to you about the pensions crisis. And I would say: there isn't a crisis, there's a problem. But there's a problem with a perfectly good solution. People, I would then continue, are living longer, this is wonderful, good news, but it means they should work longer. Then, they would end the conversation as soon as they politely could, because they thought I was a crazy professor who didn't understand political realities.

Now, time has moved on and it is now a fixed subject for political conversation, what retirement age ought to be. So there isn't a crisis. There's a problem. It's a problem with a solution. A solution would have been much easier if Governments a long time ago had started gradually to increase retirement age.

Then, what are the problems? First of all, a key problem is "uninsurable risks". The model of actuarial insurance works well if a bunch of conditions hold: probabilities have to be independent, the probability of the insured event has to be less than one (actually it's got to be quite a lot less than one, you need to know the probability in order to calculate a premium and the insurance company needs to know as much about the riskiness and behaviour of the person buying the insurance as the purchasers do themselves. So that, in the jargon, no adverse selection and no moral hazard occur.

Now, you can insure against individual risk but you can't insure when some of those conditions fail and, in particular, you can insure against individual risk but not against a common shock. In other words, where probabilities are not independent, the actuarial model breaks down.

If everybody starts to live longer that's a common shock. That's a problem for all sellers of annuities. Inflation is another example of a common shock. If any one of you in Madrid experiences 5% inflation this year, you all do. It's not the case that if one of you experiences +5% another experiences -5% let's say. So a common shock is a problem.

And another problem is uncertainty. With risk you know, or have a reasonable idea, of what the probability of an insured event is, so you can price a premium sensibly. With uncertainty you know there's a risk but you don't actually know what it is. There's a large variance around the estimate and as we've heard from Jim Vaupel earlier, the projections of life expectancy of government actuaries have always and everywhere been wrong. So I think longevity is more of an uncertainty than a risk. As I say, this is not an attack on the insurance industry, it's a technical argument about the actuarial mechanism and it is bad policy to use actuarial insurance where the necessary technical conditions don't apply. So that's one problem – uninsurable risk.

The second problem, obviously is demographic change. There is something I call "Pub economics". Pub economics is about something that is obviously right and everybody knows it's right but, actually, it's wrong.

And it's an example of Pub economics to say there's a pensions crisis because of the baby boom. It's not so. The main cause of the crisis is a failure to adapt to long-term trends. A long term trend of rising life expectancy, which we've heard about, a long-term trend of declining fertility and a long-term trend, until recently, of early retirement and those are much more important drivers than two more recent phenomenon, one is the baby boom, the other is the increase in the scale and reach of pension systems since the Second World War.

The argument is that there would be a problem of paying for pensions even if there hadn't been a baby boom. When Peter Diamond and I were doing our first book, we did some age pyramids, for China, India and the USA, and, I at least, was surprised about the results. The USA had a baby boom, and projection of age distribution in 2050 shows a very large number of older people. China, didn't have a baby boom, but it had, and to some extent, still has, a one child policy that achieves something very similar. India, had neither a baby boom, nor a one child policy and its age pyramid is pretty much the same as the other to. What's driving them all is the same thing -rising life expectancy and declining fertility.

If those are the problems, what are the solutions? When I said the British Government has a long record of bad pension reforms, there is one glorious exception, there was a report for the Pensions Commission in 2005, chaired by Adair Turner, and that was a wonderful example of good analysis and good writing. When people went before the committee to present their proposals, Adair Turner applied what has become known as the "Turner test". And the Turner test says if you've got a problem that is paying for pensions then in pure logic there are four, and only four, solutions.

Solution one: you reduce monthly pensions. Solution two: you keep monthly pensions unchanged but you start paying them from a later date. Solution three: you raise contributions. Solution four: you can grow national output sufficiently rapidly that you have the resources to pay the pensions you've promised.

What Adair Turner said was that any proposal for reform that doesn't involve at least one of those elements is smoke and mirrors, it's illusionary. Of these four solutions, the one I want to focus on is the second one, that is, later retirement.

Mostly of what I want to talk about is later retirement, which we all know about, but secondly, and not nearly sufficiently discussed, more flexible retirement. The starting point is to say, what is the purpose of retirement? Historically, when pensions were first introduced, their purpose was to get rid of doddering old workers on the factory floor and the farmyard. I would be an old worker, I would be doddering around, I would be falling across your machine, I would fail to keep up with the production line. I would be lowering the productivity of younger workers like you. So the purpose of pensions was the same – you're old, you're useless, you're out of here, but we'll pay you a pension. For that kind of world, it made sense that retirement was mandatory and it was complete.

Since then, two things have happened, first of all, people are living longer, healthier lives, which means we can work longer. But secondly, societies have got richer, which means we can afford to give people a period of leisure at the end of their working life, even if they are still capable of working. But that means the purpose of retirement has changed. It's a social institution to give people a period of leisure after working life and that, it turns out, is going to be important when I talk about flexible retirement.

Later retirement thus, seems in order. The gains in life expectancy should be shared in some sensible way between longer working life and longer retirement. When Adair Turner presented the UK reform he went on television and he said to the audience, you will work longer than your parents, but you will also be retired for more years than your parents. And both are true if you share the gains in life expectancy sensibly.

Longer healthy life, plus a constant or declining retirement age creates problems of pension finance. I always tell my students that we all play by the same rules. They have as much right to a personal opinion as I do but they, like me, will be hung out to dry and publically, ritually humiliated for faulty logic.

But I say there is one exception. If you use the expression "the ageing problem", you will fail. There isn't an ageing problem. As we've heard, people are living longer, healthier lives, this is arguably the great welfare triumph of the 20th Century. So the problem is not that people are living too long, it's that they're retiring too soon. And if people are retiring too soon, the solution's obvious, they should retire later. We've heard that most work is today less physical than in the past. I will come back to the lump of labour fallacy that says if you raise retirement age you increase youth unemployment.

So you should share extra life in some sensible way between longer working life and longer retirement. A British man who retired in 1950 had been in school on average for 14 years, he then contributed for 53 years until retiring at the then average retirement age of 67 and a British man aged 67 in 1950 had on average 11 years of life left. A British man who retired about 10 years ago had been in education a bit longer, 16 years, then contributed for about 48 years until the then average retirement age of 63. A British man aged 63 ten years ago had remaining life expectancy of 20 years.

What that says is, that the man that had retired in 1950 had contributed for about 5 years for each year of retirement. The man who retired in 2004 contributed for about 2.5 years for each year of retirement and what this says is there is ample scope for achieving what Adair Turner promised – you work longer but you have more years in retirement than your parents. So there's an overwhelming argument for later retirement. How do you do it? Well some very simple rules, you announce the changes a long time in advance. What you don't do is to say to somebody who is aged 64 and 11 months, sorry you thought you were going to retire next month but actually now you're going to have to work for another 5 years. You give people plenty of advance notice. That's good economics, it's good politics, it's good social policy.

Secondly, the rules should relate to date of birth, not the date of retirement. If you say anyone who retires before the end of 2015 can retire at 65, but otherwise it's going to be 67. Guess what's going to happen, everyone's going to retire this year. So you have to relate it to date of birth.

A third thing is you need to have a formula that increases retirement age that avoids the following problem – you are a week younger than me but you're the wrong side of a border line so I can retire at 65 and you can only retire when you're 67. So you have to have a formula where if you're a week younger than me you may have to work a month more than me but not a year longer than me.

And finally the rules should be explicit. In fact we have been raising women's retirement age in Britain to equal that of men and the rules that the Government have chosen have conformed with all of those which is why it has happened without any great political drama.

Now, flexible retirement. Given the change in the social purpose of pensions, giving people choice about how they move from full time work to completely retired, giving people choice over that, is desirable from every point of view. It would be good policy even if there wasn't a problem for paying for pensions. And the question is, everybody agrees flexible retirement is a great idea, people should be able to move from full time to part time, they should be able to down shift from an intensely responsible 80 hour a week job to something which is less demanding. Everybody agrees it's a good idea but it hasn't happened and the question is why. And the answer is there are a series of impediments that stop it happening and I'm going to talk about those because once you've identified the impediment you can then do something to try to fix it. So you need to say first of all why would older workers not want to work longer and secondly why would employers not want to hire older workers. So let me take them in turn.

Why might an older worker not continue working? One obstacle is well-informed preferences. I've got enough money to retire, I would like to retire, there are other things I want to do, in that case that's great, there's no problem. The second one is attitudes. I might think I'm 65 so I'm officially old, so I'm officially useless, so I can't work anymore. Raising state pension age is an important signal to affect people's attitudes. There is a problem that we are all systematically badly informed about age because when you ask somebody how old is old, we all think of our grandmothers. But as we heard from Jim Vaupel, people are living longer and longer lives. My grandmother was really quite elderly when she was 70 but there are a lot of 70 year olds today who are still playing tennis, who are still active in their careers etc. So there is a problem and one needs to change attitudes.

A third reason why a worker may not work is rigidities in the labour market. The key one is the extent to which the labour market still offers a mainly binary choice. Either you're full time or you're not working at all. The options for part time work are very incomplete.

Another problem is rigidities in pensions design. Again, pensions tend to be binary. In the UK system I can choose whether to take my national insurance pension or I can choose to defer it. I can take it 100% or I can take it 0%. Sweden is the only country I know of that does things sensibly, when you reach their minimum pension age you can choose whether to take 0% of your pension, 100% of your pension, or 25% or 50% or 75% of your pension. And if you go to part time work and take 50% of your pension, you continue to pay pension contributions on your part time earnings so that the pension you get on the 50% you haven't drawn down when you do eventually draw down is larger both because you deferred it and because of the additional contributions.

So Sweden gives people a genuinely flexible choice. I have banged on to the British Government that this would be easy to do and they keep on fobbing me off. But I think there are ways of doing it and another problem with pension design, if you are on a mindless, badly designed, final salary pension, then it's death to part time work. If I work half time and reduce my salary by half, I reduce my pension by half.

So there are labour market issues and pension design issues.

There's also impediments that stop employers hiring older workers. One is age discrimination, which is illegal, and if it's a problem you need to enforce the law. But I was on a small British Government Committee that was advising on this and the first draft we got from our civil servants had age discrimination in every paragraph and I thought this was a cop out. And I asked myself the following question, I am an enlightened employer, I love older workers, why would it be rational for me not to hire them and I came up, I was noisy enough that eventually our Department of Work and Pensions convened a round table of major employers and it turned out my surmises were correct.

First of all, it would not make sense for me to hire part time workers if there is a fixed cost of employment. In the US it's going to cost me 4,000 dollars per worker in medical insurance, so my incentive is to have as few workers as possible and make them work very long hours. Another cost of employment is if insurance rises sharply with age – travel insurance, medical insurance, so you've got cost of employment that is one thing to think about. Then there's legal impediments, if I move to a less demanding job, under what circumstances could my pay fall. There's a lot of labour market legislation which makes that difficult. There are a lot of legal uncertainties. If I want to move to a new contract there is a hassle factor for my employer, who doesn't know what aspects are legal or not. So a solution there might be some template contracts agreed by the employers' association, the Trade Union associations, etc.

There's also an issue of skills of older workers. Pub economics says there's no point in giving an older worker retraining, the pay off period is too short. But with technological advance, the life of skills is getting shorter and shorter so it is a less and less bad proposition to train older workers. On the other hand, if there is an issue there might be a case for some sort of public subsidy for the training of older workers. Then health is another issue, everybody knows older workers are sick and unproductive but as Jim Vaupel says, the evidence doesn't bear that out.

I may not be able to shift pianos as well as younger workers, but I am less likely to fail to turn up on a Monday morning because of a weekend of binge drinking. So the point there is not what the evidence says but making sure that the employers know what the evidence is.

What does all that say about policies? Policies can change attitudes, increasing pension age is important because of the signal it gives, thinking more intelligently about age is also important. You can measure age as years from birth, in which case 70 sounds old, or you can measure the age of a population in terms of remaining expected life. A study found that if you use the second measure, remaining life, then Britain today is about three years younger than we were in 1840. So, just thinking about age purely in chronological terms we're systematically badly informed.

We should set policies to encourage workers to continue working, and employers to facilitate access to training for older workers. Avoid a pension penalty from continuing work. Allowing workers to defer part of their pension but not necessarily all of it. Policies to facilitate employers hiring older workers, enforce laws on age discrimination, avoid fixed costs of employing a worker. If I work half time and get half pay then the costs to my employer should be half of what they would be if I worked full time. Review employment law to reduce transactions costs and legal uncertainties. As I said, sample contracts could be useful in that context. And if health is an issue, if older workers are less healthy, if there's empirical evidence of that, that could be a case for some sort of taxpayer subsidy to help with the employment of older workers.

Now, what about youth unemployment? What's called the "lump of labour fallacy" is another example of pub economics. Politicians everywhere know that if you raise retirement age you make youth unemployment worse. Of course, youth unemployment is a horrible problem and it must be addressed, but it's a mistake to connect it with retirement age. What economic theory says is labour markets adjust. If you raise retirement age, other things being equal, you have more workers, and if you have more workers, other things being equal, wages will rise less rapidly and the labour markets will have jobs for everybody who would like to have a job if labour markets are working well. And the support for that is that if later retirement led to high youth unemployment, countries with later retirement would have more youth unemployment. If you look internationally, what is true is the opposite. Countries with later retirement typically have less youth unemployment and the reason is countries with later retirement typically have labour markets that work better. Youth unemployment is a labour market problem much more than a retirement age problem. So where countries have problems of youth unemployment it doesn't really have nothing to do with retirement age, it's in many ways a horrible problem, but it's a separate one from pension age.

So to wind up, the main cause of the pensions "crisis" is a failure to adapt to long-term trends. If when pensions were invented they hadn't said retirement age is 65 and they'd said retirement age will be linked to life expectancy in some sensible way, we wouldn't really be having this conference today. So the main solutions for pension finance are a combination of lower market pensions, later retirement, higher contributions and output growth. I mean higher output growth is always desirable but the big ticket item for pensions is later retirement and also more flexible retirement.

8. Coping with longevity: social innovation and cultural change

Elisa Chuliá

Good morning. Let me begin with an anecdote which is linked with that very impressive graph that Professor Vaupel showed us about the rise of centenarians in Japan. Three days ago Japan celebrated the "Respect for the Aged Day" (*Keirō no Hi*). This pubic holiday to honor elderly people was established in the early 60s. One of the symbols of these days since its establishment has been the gift the Japanese Government sends to people reaching one hundred years of age. This present has been a silver cup to drink sake, you know, the Japanese drink made from fermented rice. According to a news story I read some weeks ago or perhaps a month ago in the Washington Post, Japan has now so many centenarians that the Government is considering giving up this program. In 1963 when the program was initiated, around 150 centenarians received this sake silver cup. In 2014 the number of registered centenarians, these are not liars, had soared to nearly 30,000 and the cost of the program was already above 2 million dollars.

We can frame this news as a downside of ageing and as a new manifestation of the ageing problem by focusing on the inability of the Japanese state or in general of over-burdened states to satisfy previous commitments, even if these commitments imply relatively modest outlays, which is bad news if we frame the news like that. Or we can frame it as an adaptive response to rising longevity which is great news, not only because it means that during the last half century Japan has managed to extraordinarily increase life expectancy, but also because the Japanese Government is willing to accept or to reconsider past expenditure and try to save money for social purposes which may be more important than the sake silver cup.

Probably all of us, or most of us, will adopt the second perspective. I certainly adopt the second perspective, living longer and healthier, is a great victory of the 20th century and news related to this fact shouldn't be framed as the ageing problem or ageing problems.

But, the fact is that, according to data collected by the Pew Research Centre in 2013, the great majority of Japanese people, 9 out of 10, perceive ageing as a problem. This perception is also held by the majority of people in South Korea, in China, in Germany and in Spain. And if people perceive it as a problem we sociologists have to understand it and to treat it as a problem and if it is not a problem, like Professor Barr has, I think very persuasively, showed in his intervention, we should try to persuade people that this is not a problem. But this effectively, they see it as a problem.

So, what will be the main reasons for this perception? And the motives underyling the perception of old age as a problem were very nicely identified 2000 years ago by Cicero, in his *De Senectute*. He distinguished four reasons why old age appears to be unhappy.

He wrote that it (i) withdraws us from active pursuits, (ii) makes the body weaker, (iii) deprives us of almost all physical pleasures and (iv) it is not far removed from death. Cicero's purpose was to refute or at least to strongly qualify these arguments.

So for example, he argued that old age does not necessarily withdraw people from active pursuits and make their lives less valuable, quite to the contrary; old age offers the opportunity to achieve great things, by means of reflection, force of character and judgement. These are qualities that would flourish in old age. And old age also would allow to exert influence, which Cicero defined as the crowning glory of old age. As regards to the second motive (the weakening of the body), he emphasized the possibility of fighting against old age by living a healthy life, practicing moderate exercise, taking enough food and drink without overloading the body. And he thought this regarding the mind and the soul. He furthermore argued that old age might be a blessing since it frees the bodies from the temptations of pleasure. And lastly he regarded the proximity of death as not particularly troublesome after having lived a virtuous life and especially if one believes in the immortally of souls. So Cicero tried hard to refute this negative view of old age and in fact I think his first two arguments are very strong and I think very modern too and he insisted on the argument that not age, but disposition, attitude or spirit is the problem. He wrote: the blame rests with character, not with age. And he also rightly underlined that people can control, to a considerable extent, the conditions or factors on which the quality of life in old age depends.

Now, even if we agree with Cicero, we have to take into consideration that he did not refer to an important circumstance of old age, which is the need of having adequate resources to live during this last stage of life.

And so we all know that he had not to face this circumstance as he came from a wealthy family and he had a very successful career, including the Consulate. But precisely this circumstance, is what most worries societies with rising longevity. Again, we can refer to data from the Pew Research Centre to check the percentages of people who are "much confident", or "somewhat confident" that they will have an adequate standard of living in old age. For 2013, there are some countries in which confidence is high. In Europe, Germany appears to be the most confident with 60% of people being quite confident, much confident or somewhat confident. In Britain the majority is also confident with 55% but in Spain, France or Italy the group of people who confide in living without economic difficulties shrinks considerably.

In the Pew Research Centre report, we find data according to which the degree of confidence is linked with personal economic situation which is very intuitive. But, for example, in Spain and France people who are acknowledging a good personal economic situation lack the confidence in an adequate standard of living in old age who represent nearby half the population, 48% in Spain and 52% in France and in Italy even more, about two thirds (67%). Hence, the prospect of inadequate means in old age is what most worries the population and the positive correlation of this lack of confidence and the perception of old age as a problem is quite evident although there are some deviant cases like, for example, China, where people feel old age is a problem but they are confident that they will adequately live in old age.

Let me now focus on the Spanish case. I want to briefly summarize what we know from surveys. Spanish people perceive ageing as a problem and more or less intensively they fear that they will not have an adequate standard of living in old age. And I now ask two questions, are these concerns or these worries justified, and second, is social culture consistent with these concerns? My answer to the first question is yes the concerns are not unrealistic, and to the second question I answer no, or, trying to be more optimistic, I would say not yet. The existing social attitudes seem to be quite incoherent with these concerns. So regarding the first question, Spanish pension policies and politics have, in my view, absolutely failed to foster confidence in the abilities of the state to pay future pensions. As probably most of you know, the flagship of these policies and politics has been since the mid-90s the so-called "Pacto de Toledo", supported by all political parties as well as by trade unions, and employers organizations, which states the will to maintain the social security pension system as the core contributory pension system and introduce parametric reforms oriented towards rationalization of the system and its reinforcement of actuarial basis while improving protection.

Although the pact was also adopted to avoid political conflict and the electoral use of pensions or pension politics, channeling political discussions on pensions into parliamentary debates on the sustainability of social security has been with ups and downs on the public agenda since then. Consequently, during the last two decades people have heard and read frequent information about the regular increase in the number of pensions (between 1995 when the pact was signed and 2015 there has been a 32% increase in pensions, most of them concentrated on old age retirement pensions). There has also been an increase in the average benefit in that period of 133% taking into account nominal values; and people have also read and heard about the dependency ratios and also on the escalating burden of social security expenditure.

Spaniards have also heard about the repeated warnings, throughout all these 20 years, of the European institutions or international organizations and experts about the financial risks implicit in this evolution. Warnings that remained virtually unattended as long as the economy grew and workers' affiliation to the social security sky-rocketed from approximately 12.5 million at the beginning of 1997 to more than 19 million, ten years later in 2007.

All Spanish governments during these 20 years, be they social-democratic or conservative, have claimed that pensions are guaranteed for the present and the future, that pensions are not in risk. But if you take the test, as I have done, and ask a class of Spanish students in their twenties, if they have confidence in getting a public pension when they retire probably less than twenty per cent will raise their hand to say yes, and curiously enough if you further ask how are pensions in Spain organized or financed or how pensions are calculated even approximately, the proportion of hands raised is even lower. So there is a big problem, like Professor Barr told us, in financial literacy in Spain, even among university students. So far the bottom line.

Spanish pension policy makers have not been able to encourage trust in future pensions throughout the first fifteen years, since the approval of the *Pacto de Toledo*, but the last three years have seen significant reforms, particularly the deferral of the statutory pension age (in 2011, active since 2013), and the introduction (in 2013) of a new annual indexation formula (active since 2014) and the implementation of a generational sustainability factor (which will enter into force as of 2019).

I think we can say that (May) 2010 has represented a turning point in Spanish pension politics, since external pressure forced decision makers first to announce reforms and then to design and implement them. Unfortunately as far as I know we do not have information on the impact of these measures on public opinion as regards to increased trust in social security systems. Possibly these measures are perceived more as further cuts in pension benefits than as suitable adaptations to longevity and pension evolution.

Recent news about the current social security deficit, which in 2015 may be 1 percentage point of GDP higher or even more than presumed by the government, and the repeated disposition by the Spanish Government of the social security reserve fund, which has reduced, since 2012, more than half its reserves, do certainly not contribute to smoothing these population worries.

Well we have to say also that these population worries are furthermore compounded by the prospect that families, which are a very strong pillar of the Spanish welfare system, particularly as regards to informal care provision, may not really be available and able to compensate for declining social projection. In fact Spanish families have changed a lot during the last decades. They have shrunk in size and also pretty much altered their structure. For instance, the average household size has been steadily decreasing. In 2006 it amounted to 2.76, in 2015 it is 2.5, so an average of 2.5 persons live in each Spanish household now and this is about 2 persons less than in the 70s. Likewise households with one person younger than 65 have also considerably increased, from 11.6% to 13.9% in 2013 and today nearly 25% of all households are one person households in Spain. By contrast, the marriage rate of the Spanish population, immigrants excluded, has year by year declined from 9.3 to 6.6 per thousand. This last figure is for 2013 while the percentage of births to single mothers has soared from 28% in 2006 to 41% in 2014. So this is really an impressive figure for sociologists. In 2014, last year, 41% of all children were born to single mothers. So given these very apparent family changes provoked by low fertility or childlessness, partner instability and to some extent also the deinstitutionalization of marriage, many people not only think that when they get older they will suffer some economic strain but also that they will be more on their own, that they will not be able to rely on their younger relatives who, additionally, may work and live far away from their elderly kin.

These concerns should lead to individual decisions and actions but in my opinion this translation from concerns into consistent behavior is to some extent blocked by widely held opinions in society. So instead of drawing the conclusion that individuals have to take more responsibility for their financial future in old age, a significant proportion of the Spanish population maintains a very strong welfare statist culture. According to the already mentioned Pew Research Centre survey of 2013, more than half of the Spanish population think that it is the state that should hold the greatest responsibility for the elderly. Furthermore, along with national surveys, conducted by the Centre for Sociological Research, between two thirds and three quarters of the population consider that the state devotes too few resources to pensions, health or long term care. Interestingly, this opinion seems to be gaining ground. If you compare the 2013 and 2014 data, you will see that the percentage of people thinking that the state allocates too few resources, and indirectly demanding higher resources, has increased for all those welfare categories. And it is not only older citizens, who think that the state is mean or stingy, but even students think so, those students who don't believe that they will get a pension.

And what is also remarkable, and in my view inconsistent with this indirect demand for higher social spending, is that nearly 7 out of 10 citizens think that Spaniards pay too much taxes. The proportion of students who hold this opinion is smaller but it is only because a higher percentage of young people does not answer to this question.

Although people understand that the welfare state in general, and the pension system in particular, is under financial pressure, they cling to the opinion that the state is mostly responsible for the citizens welfare. Actually it can be said that in Spain the welfare state faces no ideological or political challenges. There is no serious debate on free riding, on moral hazard or even on unfair distribution of benefits.

And let me refer in this regard to a personal experience. A few days ago I wrote a short note on the inequity in the fact that widows, in Spain, get a life benefit from social security regardless of their age and working situation.

Take, for example, the case of a forty-year-old, working, high-skilled and well-paid widow that gets a pension which might be higher than the one got by an eighty-year-old widow who has no other income and possibly suffers or has dependency problems. I think this inequity should seem to everybody quite obvious. Well, I'm about publishing a short note discussing this and similar cases and I have to confess that nonetheless I am afraid of arousing some critical reactions, not from those young widows but from different opinion leaders who probably will interpret my observation as an attack against the welfare state.

And, unfortunately, in Spain, if you question the rationality of benefits, even on the grounds of inter-generational fairness, and still more on the grounds of financial sustainability, you risk being considered as a person who lacks solidarity, and at worse, as an advocate of big financial institutions, or the insurance industry. So this is certainly not a positive environment for reform, not even for a rational discussion about the consequences and implications of increasing longevity from an economic, social and individual perspective.

And that's why I think that political and social resistance is at least as symbolic as technical problems or rigidities when it comes to reform the welfare state.

In a paper on the advantages of vouchers and welfare virtual accounts published in 2002, Edwin Morley Fletcher stated that the traditional welfare state had placed us upon a path where it is difficult to turn back. And in fact the welfare state and pension systems everywhere are very much path-dependent from an institutional point of view but also from a cultural point of view.

Therefore, I think that radical social policy innovations are very unlikely, not only in Spain but also in other European countries, even under conditions of economic recession that put more pressure on policymakers.

For policy innovations to be imaginable the European institutions would have to take the lead and impose a common regulatory social security framework and this is not likely – particularly I believe this would be a definite step in the direction of a united European Union and if not taken this can be counterproductive for the European Union in the long term. But in the likely absence of aggressive action on the part of the European Union institutions, national policy change will very probably remain modest.

I have tended to believe that parametric reforms, even if capable of slowing down the growth of pension expenditure, would not bring the cultural shift or the change of minds or attitudes required to perceive surviving beyond 65 no longer as a contingency but as a regularity. The change required to understand that expansion of life time lies not only on the extension of life, but also on the redistribution of time devoted to work, family, and leisure through the life cycle. It also lies on the cultural shift that is required to take individual decisions consistent with these perceptions and understanding about longevity. Important decisions that are to be taken timely. Certain decisions cannot be deferred for too long. For example, the decision to plan savings for retirement cannot be unlimitedly deferred or the decision to have children or to adopt healthy life habits. I think if people would really be aware of this fact, old age would be less problematic for them or it would even be non-problematic at all.

But though I keep thinking that this cultural shift is not in sight yet, at least in Spain, I have to admit that certain types of individual decisions required in this context of increasing longevity may already be taking place. In fact, there are signs of slowly changing behavior of elderly workers in the labor market that are worth to be commented on.

If we take a look at the average age of effective retirement, we see that, after falling in most countries between the 1970s and the end of the past century, it has begun to slowly increase. Spain is a case in point. In the 1970s, male effective retirement age was nearly 70 and even higher among women, although very few women worked by then, for the most part they were single women with long work careers. The gradual maturity of the pension system went hand in hand with the reduction of the effective retirement age but with the beginning of the new century, the effective retirement age started to grow and in 2012 it was higher than in Germany. And I think that new data will probably confirm this process as legal retirement age is now increasing year by year up to the 67 years.

Data from the Labor Force Survey confirm the trend towards increasing participation rates at higher ages since the onset of the new century. A trend which has been reversed by the crisis, and in the case of women, the increase of employment at higher ages is very noteworthy and we see that the crisis has been less harmful for them. In fact it has virtually not affected them.

If we distinguish employment by level of education, we see that employment rates of women with university studies are not that different from those of men, in fact they are catching up and, as might be expected, men and women with university studies have significant higher employment rates than men and women with lower education. So education is not only good for amusing yourself, until the end of your life, but also for finding a job at a later ages. As it might be expected, men and women with university studies, as I have said, have significant higher employment rates than men or women with low education and the good news is that in the coming age cohorts, the level of people with higher secondary education and with university studies is really increasing very significantly.

To the extent that the proportion of people with tertiary education and higher secondary education in subsequent age cohorts is increasing and the proportion of people with pre-primary and primary education is practically fading away, one can reasonably expect that in the next decades further increases in employment rates are going to be seen among the elderly population, which is very good news for the people and for the pension system.

One good question is, will the Spanish labor market be able to provide enough jobs to cover the supply of elderly workers. I think here the key is what Professors Vaupel and Barr told us, redistribution of work through the life cycle. I would say that probably yes, the Spanish labor market will be able to provide these jobs if work gets redistributed that way.

As you all know, there are important changes underway in the labor markets. Some experts are saying that old labor markets are fading away because of the extensive use of technology and the consequential replacement of jobs with machines as well as because of the upsurge of “uncertain work” with the undermining of the employment contract as a basic institution, blurred with the very notion of employers. I think that the great revolution in the labor market is the redistribution of work through life-time. I think this will be the most significant change, in the next decades.

For the most qualified people, the ones who have skills and practice life-long learning, there will be appropriate jobs, allowing for flexible arrangements and given that human capital will increase very dramatically among older workers, as will be the case in Spain, the probability that these people find and maintain jobs that require high skills may also grow.

As for the less qualified, elderly workers, this may be more problematic, but one strategy could be to redirect these workers towards care giving tasks which are very labor intensive and may not be very much affected by technological change. As we already know that we will have to confront a huge demand of care services and personal services.

We often read and hear that there are going to be too many people in need of long term care and not enough people to look after them. But I do not agree with this. I think we will have enough people to look after those under long term care if older workers are working longer, for example. In fact there will be enough people to look after people in need of care if these caregivers are reasonably paid for these jobs, either in cash or in time. Payment in time units is already taking place in more than 300 time-banks spread over Spain, and for the most part these institutions have been created in the last five years by local communities and by social NGOs, following this idea introduced by Edgar Kahn in the late 80s in the United States.

Regrettably there are very few data about the membership and the operations of these time banks which, by the way, are also gaining ground in other ageing societies like Japan and Italy as a market oriented way to productively use the excess time enjoyed by the senior members of society. But the data we have suggests that these time banks are being widely used specifically by unemployed or partially employed over 60s.

So let me now conclude by saying some final remarks summing up the points I have developed in my intervention.

First the rise in longevity is too often framed in terms of the ageing problem and, I agree with what has been said here, this is an ideological and unsound expression lacking analytical quality. Even if this perspective is understandable since many people reasonably fear that old age will bring economically tough times, this fear should be effectively countered through information and persuasion about the need for social and individual adaptation to increasing longevity.

People should be more aware of the benefits of longevity, of the fact that longevity offers the opportunity of having more time for doing enjoyable things, for doing what people most value in life, it could be joining relatives, meeting with friends, gaining new experiences, learning and so on.

In general, this is my second point, European governments and socio-political actors, trapped in the dynamics of electoral politics, have not helped citizens to understand the magnitude of the demographic change and its social and economic implications. They have, in my view, hampered the needed cultural shift despite a lack of confidence in the future of pensions, the welfare state remains strong in many countries. In Spain this has happened absolutely and this encumbers appropriate policy change in a sort of vicious circle.

And finally, nevertheless changes in the labor market and employment behavior, suggest that older workers are already responding to increasing longevity through later retirement decisions and longer working lives. The appropriate supply of jobs for workers in their final work stage may be a challenge, particularly for low-skilled workers, but given the expected massive demand in care services during the next decades, governments could perhaps facilitate access of these elderly albeit healthy workers to extra years of work and also facilitate, and further promote, local initiatives to develop social innovations that can contribute to satisfying the increasing demand for personal care for the oldest people.

So I finish now my intervention by showing you a sketch I like very much. This is a sketch by Goya made when he was 80. It portrays an old man coming from the darkness into the light. Below this figure the painter wrote "*aún aprendo*" – I'm still learning. Thank you very much.

C. Wraping Up

9. The role of institutions, the market and innovation in avoiding a global pension crisis

José A. Herce. Now it's time for a wrap-up, final track in this Conference. Many crucial ideas, insights, facts and processes have been put on top of the table this morning and I would like to classify them into "challenges" and "solutions".

As for the challenges, there is increasing longevity itself that, first of all, calls upon individuals to live up to this reality and its implications by, for instance, in the first lieu, rearranging their working lives. An obvious challenge for individuals and society.

In the institutional field, if public pensions are to survive, however their form, Social Security should have to be reinvented. It was invented more than 100 years ago and has served society so well during so many decades but it's not functioning well today plagued by sustainability and sufficiency problems, because of longer lives in a context of virtually unchanged retirement formulas.

There is an obvious way to obtain sustainability in a pay-as-you-go pensions system: just distribute whatever you get every month as social contributions among existing pensioners and that's it. Sustainability by default, you may call it. But then you may have two unhappy surprises: benefits fluctuate wildly and may not be sufficient. The thing is that you cannot ensure sustainability, stability and sufficiency within the current arrangements in pensions systems and given this context of increasing longevity. So, the challenge of reinventing Social Security.

In the market field, the pensions industry is firstly challenged by the need to introduce more competition and more innovation in providing effective and efficient retirement solutions for people fitted to any particular situation.

So, please, intervene as you like on these challenges, the floor is yours.

Clive Bolton. I'll go first if you like, since you mentioned the challenge of innovation. One of the key missing components is actually, we're talking about the problems of others and not actually engaging people about their own problem. We will each live our own old age and it doesn't matter whether I persuade you to buy a pension or not you will still live it. And I will live mine. And in some of our psychological research we uncovered that if we ask the question "can you imagine your life in ten years' time?" about half the people had no compelling sense of what their life would be like in ten years' time. And you can ask that to any age. You're basically saying: do you understand what your next life stage will be like? We talk very blandly I think about financial education but in actual fact you're talking to people who don't even understand the language of what they will be themselves. In Aviva we talk about "you meeting you in ten years' time" and until you can do that, there's nothing that I can sell you or services I can provide that you will be interested in buying. And sometimes I think we step over that aspect because a lot of our solutions that we then come to talk about, assume that you and I know it's the same problem, and this is not so, and therefore I think one of the jobs we have to do is to help people have a rich understanding of what their life will be like in retirement or at the various stages of their lifetimes. And actually use that motivation to draw them in rather than us, in a wordy sense, trying to "shove" them into that in the same way as we say you should not drink, you should go to the dentist and all those other things that the state tells people that we should do.

James Vaupel. Let me follow up on that because I think that's exactly right. In addition to helping people optimize better in their old lives this is actually necessary for reform of the social security system. The problem I think is not that the heads of governments are ignorant. I have met a number of them, not so many, but in Sweden, Denmark, Germany, and Poland, and I've talked to them and they understand the problem. Chancellor Merkel understands the problem perfectly well. It's just that the people don't understand the problem. And what do politicians do? Politicians are just brokers for the people and they can't do something if the people are not willing to do it. We thus need better education so that people understand what's going on better. There was a town meeting in the last election campaign in Germany where a number of random people were asked to talk with one of the political candidates for chancellor and they questioned him about why does the age of pension have to go up? And he said well if half of our children are going to live to one hundred years, everyone can understand that the age of retirement has to go up. And he got acceptance from the group about this. So better education is essential and people have to understand why they have to work longer and why retirement should be delayed and be more flexible. But the other aspect of this I think is important. My guess is that people don't want to just work long, they'd like to have some compensation and that's why I think a redistribution of work where older people work more but younger people work less, might be politically more acceptable. And if younger people worked less that would also help with fertility, it would help with happiness more generally. And because we work so little actually over the course of our lives, we could redistribute work so that older people work more and younger people work less but there's a lot of education that has to be done before this would be accepted by the public.

Nicholas Barr. I'm going to play devil's advocate again. You all know that you shouldn't be eating too much, that binge drinking is bad, that exercise is good, that obesity will have ill health factors. Should we know about health, yes, can we, yes, does that make you into medical doctors, no, could it ever make you into medical doctors, no. That is why neither you nor I can go into the pharmacy and buy any pharmaceutical drugs that we like because governments rightly know that we don't have the technical expertise to make those choices for ourselves. In contrast, with food, we go into the supermarket and by and large make our own purchases.

I'm going to argue that pensions are much more like healthcare than they are like food. It is an unbelievably complicated problem. I mean Clive Bolton has indicated we don't know who we're going to be in ten years' time, even in ten years' time, so to ask a 25-year-old to think of what they're going to be like at 75 is just impossible. I couldn't do it, none of us could. So I think that the role of government, irrespective of whether pensions are financed on a pay as you go basis or through some sort of saving arrangement, is to say to people here's what you're going to do and what you're going to do should be something that makes sense for a typical person. If anything it should err on the side of being a little bit on the small side because people always have the option of saving more for old age if they want to. But the default ought to be not a model of "choice and competition", but a model of "here's what you do", and, as a corollary to that, the model of choice and competition I think is the wrong model when it is the individual worker who is making the choice.

There are ways of organizing savings that we can come back to, if people are interested, whereby private financial firms make the investment decisions because they're the ones who should be doing it but where they're competing for the attention, not of us, the workers, but of the people in charge of running the pension systems. So choice and competition are important, but assuming that it's the individual worker, it seems to me, to be miss-specifying the problem.

Prof. Chuliá. I fully agree with the comments that have been made. I only want to say that, from my point of view, this cultural shift is the crucial point. Education is absolutely important to provoke this shift and political leads will have to help to promote this cultural shift, even if it is difficult. It's no longer acceptable that political parties arrange, or sign a conservative agreement that in the end means the system has to remain stable. I think that probably the most difficult thing is to understand that the problem is not the ageing of society but the ageing of the welfare state. This is the problem in my view. And people have to understand this ageing problem of the welfare state, not of society.

It's not easy because we need a good narrative. We have to say for example here in Spain when people in my age for example, around 50, say "I have the right to get a pension when I'm 65 or perhaps 67 at worst." You have to say OK you have studied for much longer time than your parents and much more than your grandparents. So you have to understand that you will have to work a little bit longer in order to have the right to this pension given that, moreover, you are going to live longer. But many people don't like to think in these terms and I see that these are not only people with low education but sometimes also people with higher education. I read some time ago an interesting article, I think it was in the International Herald Tribune, about adapting to longevity and the writer, I don't remember the name, he proposed a multi-level campaign in order to provoke this shift in the minds and in thinking and perhaps we should think about this type of campaign. In Spain it would be definitely necessary.

Nicholas Barr. I just wanted to follow on from that. The world is changing, whether we like it or not, in ways that we can to some extent predict and in ways we can't. If the welfare state doesn't change it will explode, so the welfare state has to change and there has to be sensible discussion about how the welfare state ought to change in the face of changing reality. The difficulty is that some people talk about change as a near liberal plot to destroy the whole thing and others talk about change because they want to see the institution flourish but recognize that it needs to change. And the great challenge is how to have a sensible debate about how the welfare state should adapt to changing realities without instantly being accused of having a political hidden agenda to destroy the whole thing, and that is a challenge for Spain but I think it's a challenge for much more widely across the OECD.

José A. Herce. Thank you very much for your contributions on this "challenges" part. Solutions now. Again, policy, market and social-individual solutions are needed to face the above challenges. And my first question on the policy field is, how best to mix public and private schemes? We've been talking about blended retirement products, let's talk about blended pensions systems and let me elaborate on what Elisa Chuliá commented before on my work with other colleagues. Consider this blended product: a term annuity until, say, you're 75 and afterwards a life annuity. Or, coming to blended systems, a compulsory fully funded system just selling drawdowns from the age of retirement you choose until this "oldest old age" at which a reinvented Social Security system offering life annuities would replace the fully funded system.

We know that we can't insure properly against longevity. I remember having read Professor Barr long ago saying that the best longevity insurance ever invented is... Social Security. But historical social security systems today are just broken. They cannot stand up to their promises. So we should reinvent social security, insuring people against longevity after that longest long age I mentioned before, say 75. Or, as Professor Barr said also before, after "Life expectancy – X" (X being, say, 10 or 12). And, before that age, we have a compulsory fully funded term drawdown, not a life annuity. Term annuities are much cheaper, more efficient, to serve to these retirement purposes, than life annuities. And the life annuity offered by Social Security to its old-age pensioners has every reason to be more efficient than any life annuity you could buy in the market.

Concerning the market field, I'd like to ask you, do we have enough products to convert our savings into retirement income? That's not evident. We have houses and other assets, we have four to five times GDP, in every country, in form of financial and non-financial accumulated savings. Why don't we use these savings for retirement? We shouldn't have any difficulty in having economic troubles at retirement age if we have, as a country, five times the GDP in form of bricks and mortar or other assets, or should we? If it's not our children, we don't have children any more, it'll be our nephews who will get the bricks. That's ridiculous, investing in their education during ages, just to leave them bricks and mortar when we die is nonsense. Let's use our assets to provide for our retirement more rationally and efficiently.

And, in the social-individual field, you've been talking about more personal involvement in retirement. It's clear that this means more effort, more work, more savings through the life cycle as longevity increases. But is there anything else beyond that, what exactly means "personal involvement" in your own retirement? Of course, learning about pensions, but any else? Is it an issue about individuals versus the State or the market?

So, let's devote the remaining time to these issues.

Clive Bolton. I agree with that. And I'm speaking specifically about the people who are coming up to retirement now, so what you can't say to that group is save more, they might save more but you won't substantially change and they're the ones that are first going to be hit by this problem. So they are going to consume all their wealth in their own lifetime pretty much. So I think property wealth must come into play. In the UK one of our fastest growing markets are equity release products which allow people to effectively borrow from their own home without moving from their own home. Increasingly they will look like bank accounts so you can pay and draw out because people's fortunes aren't always the same. And also I think as we went through in terms of different product theories. There is no fantastic product that will make 50 pounds per month into a million pounds. Thank you for asking but we haven't got it. And if I did have it I wouldn't keep it a secret, I would sell it by the bucket loads. So we have to do with what we've got. But I think though actually, making the products fit together much more obviously to people in terms of outcomes rather than actually understanding the technicality of each product, is the way forward. That would require, in the UK at least, advice to be more universally available. And finally, things like debt because a lot of people coming into that age group have debt to pay down as well as expenditure to pay for and finally, increasingly, health, in particular in your 60s, will be your most important financial asset. In my little example, if the yield was not very different but actually somebody delayed their retirement age by two years, and spent say the extra amount they would give over their eventual retirement income, into their retirement fund, that would give them 100 extra pounds a month which is much more substantial. And actually people don't stop work when they say for health reasons because they get something nasty like cancer, they get it because their back is too painful or they're too tired to get out of bed or their knee joints are hurting a little bit more than they want to to actually go through that. They're there much more common reasons that people leave the employment market.

José A. Herce. Thank you. That's big thinking. I quote, "health is your most important financial asset at 65". You need someone from the industry to tell you this. That's important. We very often do not consider these other intangible assets available at retirement.

James Vaupel. One of the things I learned today, that I was very impressed about today, is the evidence of the effort being devoted to developing new kinds of products to help older people in this new environment. I think this is really admirable and very important and so I start to think about myself. I'm 70 years old and I'm still accumulating wealth. And I don't have any drawing down plan and I haven't thought about any of these things. And I'm a professor, I'm interested in pensions and I haven't thought about any of these issues systematically. So there has to be a lot more education, including people like me and there have to be more products that are offered that people like me can consider. Instead of leaving all my wealth to my ungrateful children, maybe I should spend some of this wealth before I die. But the other aspect of this is that it seems to me to be very important that not only do we help older people enjoy a productive, enjoy a solid life with a financial basis but there has to be some social solidarity between older people and younger people and if an older person continues to work that reduces taxes on younger people and it also will enable younger people to work less, because there's a certain amount of work that has to get done. If older people do more then younger people can do less and such social solidarity is very important and older people should realize that it's not just a question of maximizing your expenditures when you're old, but also being part of society and helping out with younger people, so that's the other side of the coin that I think is very important.

José A. Herce. That's great. Professor Vaupel, you're still learning!

James Vaupel. I'm still learning and I'm still working! At 70!

Nicholas Barr. I was going to say I like the Goya drawing, there's a similar quote from a play by George Bernard Shaw who said "the future lies with the learners" which I've always liked as somebody who tries to carry on learning.

A few responses now. First of all, as Clive Bolton has said, if you introduce the most perfect system of mandatory fully funded individual accounts, it's not going to make any difference at all for quite a long time. It takes 40 years for systems like that to mature so it may or may not be desirable, but whatever it does it is not a short term solution and should not be thought of as that. Second point, I'll come back to a point I made earlier, a key question which is not asked enough is how should risks be shared. The future is an uncertain business, the question is, should pensioners face all the risk? No. Should workers face all the risk and guarantee the pensions come what may, almost certainly not. There is a question of how risks should be shared. The Canadian province of new Brunswick has a pension plan that was jointly agreed by the employers, trade unions and the government which says here's a pension you're going to get, but if things go bad and contribution incomes fall, here is the way pensions will adjust and the idea is to say we cannot protect pensioners from all risks, but good design says older people can accommodate risk less well than younger people. Implication, you can't and shouldn't protect pensioners from all risks, but you should expose them to less risk than workers. So that is a key question to think about.

In terms of solutions, most of the talk today has been about individual Defined Contribution accounts. In the face of declining fertility, part of the solution has to be more saving. That saving can be administered through choice and competition individual accounts, but it can be organised in many other ways. Just to give you one example of something that stays within the paradigm of individual accounts, the US Thrift Savings Plan says workers don't want to make choices, workers shouldn't be required to make choices, this is the plan for US Federal civil servants. If I'm a US federal civil servant, I am automatically enrolled in the Thrift Savings Plan. I can choose a fund from five simple funds. If I make no choice, I go into the default fund. The administration is all centralised because there are economies of scale. The investment decisions are outsourced to the private sector who bid for it, but any private firm in order to qualify has to run an identical portfolio for their private clients to insulate from political interference. So this is a model of individual saving but with the choices the individual has to make are only those which he or she feels comfortable making and all the technical stuff is decided by the people who organise the fund and the investment decisions in the private sector. And that seems to me to be a sensible division of labour, rather than mindless adherence to the sort of choice and competition model that works so well for smartphones.

Elisa Chuliá. I don't think I can contribute much more to what has been said but I would like perhaps to underline once more the education factor, and not only education, to have more choice, because as Professor Vaupel has told us, even if you are very well-informed, you can't take some decisions without advice. So we need financial education and the adequate information in order to look for good advice. And we need also truly simple information which may be very effective. For example, the message by Clive Bolton: health is the most important financial asset when you are 65.

Well, having myself children between 14 and 18, I think people should learn this message very early and take the corresponding decisions in line with it. If they would know this they would believe it because it can be supported by empirical evidence. I think the transmission of this kind of messages could be so important in terms of changing minds and individual responsibilities that I believe it is worth trying to convey this message and messages like this that may be framed in such a way to the population.

José A. Herce. So, thank you very much indeed to all of you. Thanks to our audience. Now, our sponsor Instituto Aviva de Ahorro y Pensiones and AFI Finance School invite you cordially to have a standing lunch downstairs. Again, thank you very much for coming and let's now have some food for joy after having had so much food for thought.

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YES, would a skeptic answer to this question. For it seems that all countries have either sustainability, sufficiency or coverage troubles in their pension systems. Be these public or private, pay-as-you-go based or fully funded.

These troubles being lack of resources, too little savings, contribution gaps or insufficient eligibility records. Here and there, no matter whether developing or advanced nations all countries seem to have one or another problem with pensions.

To further complicate matters, reading the contributions to this conference one learns, increasing longevity is making current delicate equilibriums in pension systems tumble. It seems that the increase in longevity, that has been linear in the past 150 years, will continue to be so unbounded. Against this strong force, current funding arrangements everywhere are doomed to collapse.

NO, say the contributors to this conference unanimously. No, provided societies are smart enough to react or, simply, to adapt to this unstoppable trend of increasing longevity. And not precisely by invoking more children into the scene or thinking in untapped resources. In a way, untapped resources do not exist. Sure? There is one resource that we are actually giving away with: the extra years of life.

YES, they say, use this resource, make people arrange their working lives more flexibly through a longer lifespan. Of course, put more R&D efforts into financial and insurance solutions for retirement in this context, but above all use the human resource more wisely. And you will avoid a global pension crisis. But do it now!

Read, read...

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