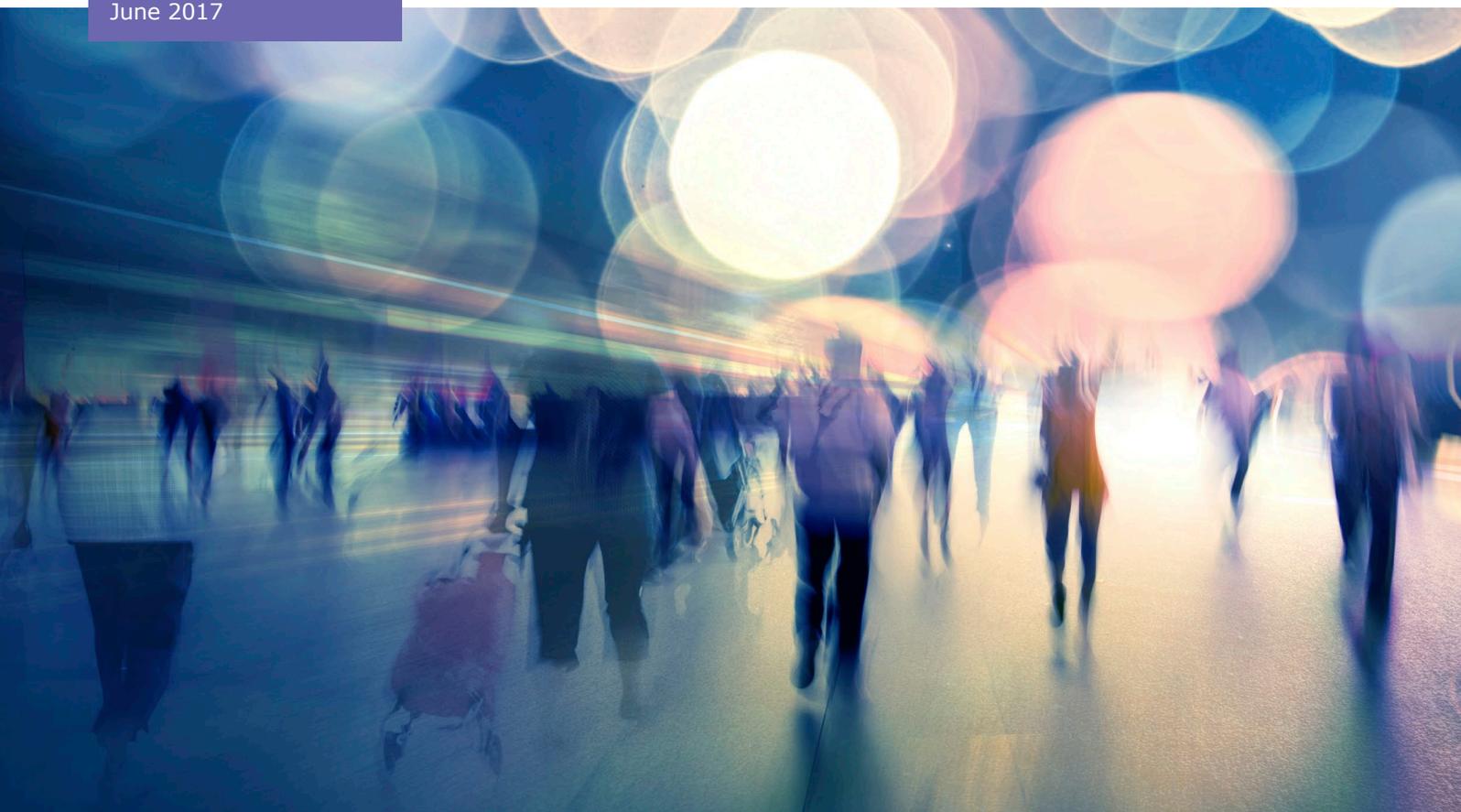


Discussion Paper

No. 06
June 2017

Population Europe

THE NETWORK OF EUROPE'S LEADING
DEMOGRAPHIC RESEARCH CENTRES



Green Book Ageing Society

How “new ageing” will change our lives

Edited by James W. Vaupel and Andreas Edel

Population Europe Discussion Paper Series

Editor of the series: Ann Zimmermann

Number 1:

Perspectives of Policy-relevant Population Studies (Authors: Tommy Bengtsson et al.), 2012.

Number 2:

Demographic Change on the Political Agenda of the European Commission (Author: Ann Zimmermann), 2015.

Number 3:

EU Civil Society and Demographic Change (Author: Ann Zimmermann), 2015.

Number 4:

Social Vulnerability as an Analytical Perspective (Author: Ann Zimmermann), 2017.

Number 5:

Family Diversity and its Challenges for Policy Makers in Europe (Authors: Daniela Vono de Vilhena und Livia Sz. Oláh), 2017.

Number 6:

Greenbook Ageing Society (Editors: James W. Vaupel und Andreas Edel), 2017.

Green Book Ageing Society

How “new ageing” will change our lives

James W. Vaupel and Andreas Edel (Eds.)

Imprint:

Editors: James W. Vaupel and Andreas Edel, Max Planck Institute for Demographic Research, Rostock

Acknowledgements:

The editors would like to thank the German Insurance Association (Gesamtverband der Deutschen Versicherungswirtschaft e. V.), Wilhelmstraße 43 / 43 G, 10117 Berlin, that financially supported the publication in context of the initiative "7 years longer" (www.7jahrelaenger.de).



ISSN: 2512-6172

Editor in charge: Andreas Edel (V.i.S.d.P.)

Editorial Team: Miriam Hills, Emily Lines

Technical Coordination: Aimie Bouju, Emily Lines, Amparo Necker

Layout: The Brettinghams GmbH, Berlin

Address: Max Planck Institute for Demographic Research / Population Europe Secretariat, Markgrafenstraße 37, 10117 Berlin, Germany

Phone: +49 30 2061 383 30

Email: office@population-europe.eu

Web: www.population-europe.eu

Contributions bearing the name of specific individuals do not necessarily reflect the opinion of the publisher or the editorial staff. The reproduction of articles, excerpts and graphics is only allowed for non-commercial purposes. Please provide us with a specimen copy.

© 2017 Max Planck Society for the Advancement of Sciences on behalf of the collaborative network "Population Europe."

› TABLE OF CONTENTS

INTRODUCTION - James W. Vaupel and Andreas Edel	1
DEMOGRAPHIC REVOLUTIONS. HOW DOES AN AGEING POPULATION CHANGE SOCIETIES? - Josef Ehmer	4
HOW MANY HEALTHY YEARS OF LIFE ARE WE GAINING? - Roland Rau	9
STAYING SMART WHILE GROWING OLDER. HOW DO COGNITIVE ABILITIES DEVELOP AT ADULT AGES? - Ursula M. Staudinger	13
FASTER, HIGHER, STRONGER. HOW PRODUCTIVE ARE OLDER PEOPLE? - Christian Hunkler	18
WHICH SEX IS REALLY STRONGER? WHY DO MEN AND WOMEN AGE DIFFERENTLY? - Anna Okసుzyan	22
HOW MUCH MONEY IS TRANSFERRED BETWEEN GENERATIONS? - Fanny Annemarie Kluge	27
HOW WILL AGEING AFFECT SOCIAL COHESION? - Harald Wilkoszewski	31
BETTER THAN EXPECTED? THE ECONOMIC POTENTIALS OF AN AGEING SOCIETY - Tobias Vogt	35
MIND CHANGE - HOW CAN WE CONVINCe WORKERS AND EMPLOYERS OF LONGER WORKING LIVES? - Elke Loichinger	38
WORK 4.0. WHAT CAN TECHNOLOGICAL PROGRESS TELL US ABOUT THE FUTURE OF WORK? - Wenke Apt	42
WINDING PATHS. WHAT CAN FAMILIES PROVIDE IN AN AGEING SOCIETY? - Martin Kohli	47
CONCLUSION - James W. Vaupel and Andreas Edel	52
Authors	55

Introduction

James W. Vaupel and Andreas Edel

**Max Planck Institute for Demographic Research,
Rostock**

The issue of the ageing of society has been at the very top of the political agenda for a number of decades. In European nations and in Brussels, in regional authorities and in city governments, in companies, in works councils and in staff councils, in labour unions, in churches, in welfare and civil society organisations – in all of these contexts, the potential consequences of demographic change are being discussed, and new solutions are being considered. The convening of the third Demographic Summit of the German Federal Government in March 2017, in which Chancellor Angela Merkel personally took part, along with a number of federal ministers¹, is a clear sign of how important this issue has become in German politics and society.

Warnings that Germany is on track to experience a collapse of its pension and health care systems due to the gradual ageing and shrinking of its population have mostly given way to an objective debate about the effects of ageing. The discussion has become so matter of fact that some observers appear to believe that the topic of ageing has already been dealt with, even though the challenges that were initially flagged have not changed, and the effects of this demographic change are now being felt for the first time.

The last remaining large birth cohort of the so-called baby boomers in Germany are now in their early fifties, and will reach retirement age in coming decades. Although birth rates in Germany have recently been increasing, they remain well below the replacement rate of 2.1 children per woman. While this demographic measure has been criticised, it is impossible to ignore the mathematical reality that the ageing of society can no longer be prevented by an increase in the birth rate. Even if the birth rate was to unexpectedly shoot up in coming years, these larger generations would not enter the labour market for another 20 years – and at that point they would have to devote large shares of their taxes, fees and insurance premiums to financially supporting a society in which more than one-third of the population are already retired. Net immigration

from foreign countries will do little to stop the decline in the working-age population, especially since there are growing calls in the public debate in Germany that support the exclusion of immigrants. These developments could make permanent settlement in Germany a less attractive option for many potential immigrants, including those who are highly qualified. At the same time, life expectancy is rising, and the number of very old people is increasing. Up to now, there is no indication that life expectancy will not continue to rise in the future, or that a biological limit to the length of human life is likely to be reached. Thus, the age structure of the population will continue to shift towards older ages. This ageing of the population raises the question not only of whether the pension and social systems are financially sustainable over the longer term, but of how the burden of paying for these systems will be distributed fairly across the generations.

In general, it appears that the trend is to call for more flexibility: Given that people are living longer, and that a portion of those additional years are spent in good health, it makes sense to revisit the assumption that working life should end at a fixed age. Recently, politicians have been discussing the idea of changing the pension age so that it adjusts dynamically in line with increases in life expectancy.² The classic division of the life course into three periods of education, work and retirement is now being called into question: As technical innovations are occurring at an increasingly rapid pace, and as individuals are expected to enter the labour force with ever-higher qualification levels, it may be necessary to have multiple educational phases throughout the life course, and the possibility to change careers. In light of the general decline in the share of the population who are fit for employment, companies must do more now than ever before to encourage their older employees to continue working as long as possible. In teams of mixed ages, older workers can pass on their experience-based practical and institutional knowledge to their younger colleagues, even as the company's workforce is continuously refreshed by the arrival of new waves of younger people able to offer a "fresh wind." In contrast, teams of workers of the same age can benefit from such a dynamic for only a brief period of time before all the members start to get older collectively.

Flexibility also means that there has to be a new division of child care responsibilities between parents,

and improvements in institutional child care. This mix of care services will make it easier for people to combine employment and child care, and, in the future, easier to balance work and elder care. The life course may even take on new forms, with people spending longer periods working part-time or taking breaks to care for children or elderly parents, or to earn new qualifications. By working longer, people can make up for their reduced pension contributions earlier in life.

Even in the health care system, individuals are under heavy pressure to adjust their behaviour: In recent years, more personal responsibility is demanded, e.g. in regard to leading a health-conscious lifestyle, taking preventive measures and contributing more to the cost of their care through co-payments and insurance premiums. This is also happening in the realm of retirement planning: Whereas in the past people could depend on getting a defined pension from their employer or from institutionalised pension insurance funds, today many people are hoping to secure a higher income in old age by purchasing additional insurance coverage or by investing in stocks or other financial assets, such as real estate.

As these systems of solidarity are restructured, the extent to which individuals can handle these continuously increasing levels of responsibility remains to be seen. For example, not everybody is healthy enough or has enough socio-economic security to be able to make big life changes, especially in old age. At the same time, many employment situations are no longer permanent, or could even be classified as precarious. This means that lower earners who may already be struggling to cope with the rising cost of living – especially in urban centres with high housing costs – have nothing left over to save for their own retirement needs. While estimates of the share of the population who are at risk of living in poverty in old age vary, it is now beyond question that levels of inequality have been increasing for decades. And despite its high level of development, Germany has been falling behind in providing its citizens with equal access to education. Especially since the chances of being healthy and active in higher ages worsen with a low level of education.

Nevertheless, even if this demographic shift can no longer be avoided, it represents a challenge for our society, and not a fate to which we are condemned. The increase in life expectancy and the fact that

ever more people can live fulfilling lives well into old age are achievements that open new doors for individuals. Given its strong economy, the conditions for providing such opportunities are surely much better in Germany than in other European countries. But this assumes that we are prepared to make adjustments, such as rethinking traditional career paths and conventional gender roles, and even reconsidering the relationship between personal responsibility and social solidarity.

It is even possible that a fundamental social process is associated with demographic change. In past centuries the main goals were to free the individual from societal and governmental controls, and from economic constraints and social discrimination; in the future, more emphasis may be placed on striking the right balance between showing solidarity and taking personal responsibility. Thus, the individual will be encouraged to make his or her own decisions about his or her future and to take more responsibility for him- or herself, but will also receive support if unable to handle these responsibilities for a period of time, or even permanently. In any case, it is clear that we are on the verge of experiencing the effects of demographic change, as the last baby boomer generations approach retirement age.

In preparing this Green Book, the German Insurance Association, together with Population Europe, a network of more than 30 leading demographic research institutions across Europe, has sought out to kick off a discussion about the opportunities and the limits that come with rising life expectancy. This Green Book covers a wide spectrum of topics, bringing together perspectives from leading experts in various scientific disciplines, ranging from demography, sociology, psychology and epidemiology, to economics, politics and history. In their short contributions, the authors present evidence that sheds light on these fundamental questions. It is clear that the topics discussed here do not provide a complete picture of the diversity of demographic change, which includes an even wider range of questions, for example, related to family and migration policies. The contributions by these experts should encourage readers to think about how we can deal with the phenomenon of increasing life expectancy and promote an exchange of ideas about one of the most important issues for the future of our society. Because in the end, only one thing is certain: Demographic change.

Footnotes

[1] Speech of German Chancellor Dr Angela Merkel at the chancellor's demography summit "Zusammenhalt stärken – Verantwortung übernehmen" on 16th March 2017 in Berlin. Available online: <https://www.bundesregierung.de/Content/DE/Bulletin/2017/03/28-2-bkin-demografie Gipfel.html>.

[2] Ex. *Frankfurter Allgemeine Zeitung*, 21 April 2016, <http://www.faz.net/aktuell/wirtschaft/was-wird-aus-der-rente/wolfgang-schaeuble-fordert-hoeheres-renteneintrittsalter-14190625.html> or *Die Welt*, 5 November 2016, https://www.welt.de/newsticker/dpa_nt/infoline_nt/brenn-punkte_nt/article159281223/Union-fuer-hoeheres-Rententalter.html.

Demographic Revolutions

How does an ageing population change societies?

Josef Ehmer

University of Vienna

Recommendations

✓ A primary mission should be to loosen the conventional three-part division of the life course into the phases of education, employment and retirement. The opening up of these categories will allow for a more equal distribution across age groups and genders of learning, working, family and household tasks, and free time/leisure.

✓ The chronological age of humans is a socially constructed instrument of measurement and regulation that has become questionable. While we cannot get rid of chronological age, for example for administrative reasons, we should make age limits as flexible as possible to allow individuals to expand the range of their abilities and interests.

✓ The culturally and institutionally established age boundaries in our society have to be renegotiated. The idea that people start a phase of life known as "old age" at age 60 or 65 has become anachronistic. This assumption is an obstacle to understanding demographic change that makes it difficult for societal institutions and for people's mentalities to adjust to the dynamics of this development.

✓ Migration and spatial mobility have been and remain important elements of human life, and of social and economic development. But they offer no guarantee that the populations of highly developed countries will continue to grow, or will at least remain stable. Germany has to anticipate and prepare for a decline in its population, and for the accompanying changes in its age, social and regional structures.

✓ The term "over-ageing" is misleading, and should be avoided. There is no "normal" or "ideal" age structure that could serve as a benchmark. Throughout history, the age structure has fluctuated and changed.

› Demographic revolutions?

If we take a bird's-eye view of the development of the world's population over the last two centuries, it would be no exaggeration to say that a demographic revolution has occurred. Around 1800, there were barely one billion people on the planet. By 1950, when today's 65-70-year-olds were born, the earth's population was around 2.5 billion. In the decades that followed, a historically unique and previously almost unimaginable surge in population numbers occurred. The world's population had grown to more than six billion by the turn of the century, and is currently around 7.5 billion. The two main demographic components of this growth were also revolutionary: Mortality decline and increase in life expectancy first and then conscious family planning and limitation of family size. While the world's population will continue to increase in the 21st century, it is highly likely that growth levels will slow down by the middle of the century. All of the current forecasts indicate that in the second half of the century, population numbers will stabilise, and the global population will start to gradually decrease. This trend towards population stabilisation and decline will lead to a shift in age structures, which combined with an on-going trend toward increasing life spans, is referred to as global "demographic ageing".

This world historical process has unfolded, and is still occurring, at different times and at varying speeds in different regions of the world. As early as in the 19th century, Germany saw its population grow at a very high rate, and this growth continued in the 20th century, albeit at a slower pace. But since the 1970s, the German population has been increasing through migration only. But migration is not a one-way street. Germany has benefited from the fact that in most years, more people entered than left the country. Between 1991 and 2014 alone, 23 million people arrived in Germany, while 17 million people emigrated. But in the future, even large migration gains will only serve to slow down population decline, and will not be able to prevent it completely.

The demographic ageing of the German population started as early as the period between the two world wars. The process happened in two phases. In the first phase, a decline in births led to a shift in the age structure away from children and adolescents and toward adult ages, and thus to a strengthening of the middle generations. The second phase, which

has been occurring in recent decades, has been dominated by a shift away from middle ages and towards older ages. This trend has lately been accelerating, and is expected to further accelerate due to the decline in the population. While there have been old and very old people throughout history, this age group has been in the minority. Today, more than a quarter of the German population are aged 60 or older, and are thus, based on traditional criteria, considered "old." The share of older people in the population is growing rapidly, which is also a historically unique and novel situation.

› Mortality transition

The mortality transition has directly affected the life of each and every person. The more than 1,000-year-old verse, "In the midst of life / We are in death," which was sung by monks in the middle ages, and was popularised in the Protestant hymn book published by Martin Luther in 1524, has lost its relevance, at least during times of peace. The near disappearance of infant and child mortality and the stabilisation of adult life have led to death being delayed to old ages. And whereas it was widely believed until the 1980s that the human life span had a natural limit of around 85 years, it has recently been shown that even this limit can be stretched. Life expectancy continues to climb, and it is increasing especially fast in the higher age groups. These trends have led to a discussion about whether the natural limit to human life is actually 100, 110, or even 120 years; or whether there is any natural limit at all. It has since been shown that having a long life and good health are closely connected. While concerns had been raised that the increase in life expectancy would lead to an expansion of the number of years people spend in poor health and dependency, it is now clear that people are living more years in good health and with a high quality of life.

These trends indicate that while there are still inequalities in morbidity and mortality rates linked to socio-economic status and lifestyle factors, the life chances of individuals have converged to a very large extent. The postponement of death to higher ages has resulted in a stabilisation of family life and more durability in relationships between the generations, which constitutes a counter tendency to the greater instability in couple relationships and marriages. When Gustav Schwab wrote the poem,

"Great-Grandmother, Grandmother, Mother, and Child," in 1828, it was still relatively rare in the 19th century for the members of all of these generations to be alive simultaneously; today, however, it is normal. Yet even today, the chances of living a long and happy life can be drastically reduced by wars, natural or environmental disasters, or economic or political crises.

› The demographic dividend

The change in mortality had and continues to have a positive influence on economic development. First, as death is postponed to higher ages, people are able to maintain their human capital – i.e., the knowledge, the skills and the attitudes that people acquire over their life course through socialisation and education – for longer periods of time. Second, the growth in the population led to a higher and increasing number of workers and consumers, which stimulated economic growth, especially in regions of the world in which sufficient levels of capital, education and infrastructure were available. Third, the shifts that occur as a result of the first phase of population ageing, in which there are fewer children, but many more adults, can generate a "demographic dividend" in a society, as the share of the population who are of working age increases. In Germany, the share of the population aged 15-60 was consistently between 61% and 65% from the 1920s until the end of the 20th century. While this dividend is nearing its end, a "second demographic dividend" might be generated if the real retirement age increases and workers, in anticipation of still having a longer retirement phase, acquire more assets, thereby increasing their economies' and capital stock.

› Ageing as an achievement and as a challenge

The two main components of ageing, the postponement of mortality and the increase in life expectancy, are among the greatest achievements in the history of humanity. Together with the transition to birth control and family planning, these advancements have enabled individuals, their family members and members of their social networks to lead lives with more security and predictability than has ever before been possible. But can a blessing also be a curse? Of course. Population ageing does not have direct

effects on the economy or politics, or on the living arrangements or lifestyles of individuals. Instead, it is mediated through institutions, norms and mentalities. In response to ageing, adjustments will be needed in many areas. But whether such adjustments are planned for, designed and realised – and, if so, in which direction, at what speed and in what manner – does not depend on the ageing process itself. Rather, changes are needed in institutions and attitudes, not just in regard to old age, but to the whole life course. We will address two main issues in the following: The distribution of work over the life course and our mental images of old age.

› The tripartite division of the life course

The demographic change of the last two hundred years was part of a broader modernisation process that started in Western Europe in the 18th century, and gradually spread across the globe. One element of this process was the so-called “institutionalisation of the life course” through the breakdown of the life course into three phases: Education, employment and retirement. Childhood and old age were thereby separated – or liberated – from participation in gainful employment. At the same time both these life phases became chronologically standardised. Whereas in previous historic periods calendar age mainly had a symbolic function, it was turned into an important regulatory instrument. Older people, who had been expected to work for as long as their strength and employers permitted in the 19th century, were then expected to exit the labour force on a socio-politically defined date. The dynamics of demographic change, with its continually increasing life expectancy, stand in opposition to the fixed life course kept in place by the rigid calendar.

Moreover, the chronological order of the entry into and the exit out of the labour force has undergone considerable changes over the course of the 20th century. As the educational system expanded to provide universal access to secondary school, and later to higher education, people were spending longer periods of time in education. The entrance into a permanent position has shifted into the third decade of life for an increasing number of young people. A similar process – albeit in the opposite direction – was occurring at older ages. Over the course of the 20th century, the pension age continued to decline;

and the secular trend toward early retirement has only recently started to be reversed. Nonetheless, the duration of the retirement phase continues to increase, as the life expectancy of older people has been rising faster than their labour force participation levels. As modern societies have become increasingly oriented, in addition to work, toward leisure, workers have to come to look forward to enjoying a long phase of free time later in life.

› Can education, work and free time occur in parallel?

In short: The longer we live, and the healthier and more able-bodied we remain over the whole life course and into old age, the later we enter the labour force, and the earlier we leave it. At the same time, the demands placed on people in their middle years of life have increased considerably. For women and men, despite continuing gender differences, professional and familial duties and responsibilities overlap during the “rush hour” of life. In the humanities and social sciences, this breakdown of the life course into three phases has long been criticised. Wouldn't it make more sense to enable and to encourage people to continue to acquire new skills and knowledge well into old age, rather than restricting formal education mainly to their early years? Wouldn't it be better if the enormous gains in spare time that our prosperous societies allocate to older people were spread more equally over the life course, so that middle-aged people could also enjoy longer phases of leisure? In short, isn't it high time that we responded to the changes brought about by demographic change by redistributing education, work and free time over the life course?

› The final life phases

This would, of course, mean that older people would have to work longer. The establishment of a final life phase during which the individual is financially secure and yet freed from the need to work remains, however, one of the great achievements – and on-going responsibilities – of our society. As the population ages, the numbers of old people, and especially of oldest-old people, are growing rapidly. In Germany in 1950, around 1% of the population were older than 80. By 2010, this share had risen to 5.3%, or around 4.3 million people. The oldest

age groups are growing the fastest: The number of “centenarians,” or people aged 100 or older, rose from around 150 in 1960 to around 14,000 by 2012, or nearly one hundred-fold – a development that can truly be described as revolutionary. While we can assume that a large share of older people will continue to enjoy life, and that the human psyche is adaptable and capable of developing up to the oldest ages, it is nonetheless the case that the numbers of older people who depend on health and social services, and who rely on helpers to provide them with care or shield them from loneliness, are increasing. Thus, more than ever before, it is essential that we base our assessment of people’s value not on their economic productivity alone, but that we take steps to ensure that our oldest fellow citizens are able to continue to participate in society, and to have a life – and a death – that is dignified and satisfying.

› Images of old age and discourses on ageing

Thus, demographic change is forcing us to reflect critically upon the entrenched cultural stereotypes about older people that our society has perpetuated for many centuries. Discourses on age and ageing have been and continue to be ambivalent, including both positive and negative assessments by observers of ageing and by older people themselves. But it is worth noting that many of those who praise the dignity and maturity of old age also expect older people to be willing to make sacrifices, to accept a marginal role in society and to withdraw from public life. The supposedly positive image of the “young old” that was created in the 1970s of “seniors” who are fit and active did not include the expectation that older people would stay involved in all areas of society, and especially in professional or political life. Negative images and stereotypes of ageing furthered and legitimised this marginalisation. While having the option to withdraw from active life may meet the needs of some older people, a normative requirement that they do so limits the opportunities for engagement of all. As our society continues to age, the expectation that older people should retreat from public life and economic activities will be less justifiable than at any other point in our history.

Questionable cultural assessments of ageing affect not only the experiences of individuals, but the age-

ing society as a whole. Especially between the two world wars, the shift in the age structure was interpreted by Friedrich Burgdörfer, one of the leading statisticians of the Weimar Republic and the Third Reich, as a threatening sign of the “senescence of the German people,” which would result in a crippling of the “youthful daring and vim and vigour” of German society, and in its “infiltration” by foreign elements. These kinds of apocalyptic predictions had nothing to do with demographic realities. Such ideas spread across Europe during a period when the populations of Europe were still relatively young, and when the numbers of working-aged people were exceptionally high. These dramatic discourses about “the ageing of society” were not rooted in real concerns about demographic change, but rather in a social-Darwinist and racist zeitgeist. Even today, it is essential that we pay close attention to whether and how the discourse on ageing is being instrumentalised – and possibly abused.

› Summary

The ageing of the population is not an isolated phenomenon; rather, it is an element of demographic change, which is in turn part of the development of society as a whole. Ageing is both a product of societal change, and a contributor to that change. Above all, ageing creates pressure to adjust our social institutions, as well as our perceptions of age and ageing. Both these dimensions are closely linked. If we want to become willing to change our culturally entrenched and institutionally rigid life course patterns, we require a realistic picture of human ageing, coupled with an awareness of its historic variability. Adjustment to demographic change will not take place automatically. A considerable willingness to make changes and to experiment will be needed if we want to ensure that our ageing societies preserve and expand their current prosperity, and provide good lives for all of their citizens.

Further Reading

- Ehmer, J. (2013): *Bevölkerungsgeschichte und historische Demographie 1800-2010*. Enzyklopädie deutscher Geschichte, 71 (2nd Edition), Munich: De Gruyter.
- Ehmer, J. & Höffe, O. (Eds.) (2009): *Bilder des Alterns im Wandel*. Historische, interkulturelle, theoretische und aktuelle Perspektiven. Halle (Saale)/Stuttgart: Deutsche Akademie der Naturforscher Leopoldina e.V. Available online:

https://www.leopoldina.org/uploads/tx_leopublication/NAL363_Bd_1_001-244_Online.pdf.

- Göckenjan, G. (2000): Das Alter würdigen. Altersbilder und Bedeutungswandel des Alters. Frankfurt/Main: Suhrkamp Verlag.

- Kocka, J. & Staudinger, U. M. (Eds.) (2009): Gewonnene Jahre. Empfehlungen der Akademiengruppe Altern in Deutschland. Halle (Saale)/Stuttgart: Deutsche Akademie der Naturforscher Leopoldina e.V. Available online: https://www.leopoldina.org/uploads/tx_leopublication/2009_NatEmpf_Altern_in_D-DE.pdf.

- Münz, R. & Reiterer, A. F. (2007): Wie schnell wächst die Zahl der Menschen? Weltbevölkerung und weltweite Migration. Frankfurt/Main: S. Fischer Verlag.

How Many Healthy Years of Life Are We Gaining?

Roland Rau

Max Planck Institute for Demographic Research,
Rostock

Recommendations

✓ An intensification of epidemiological, demographic and social science research into why in some countries or in portions of the populations of some countries life expectancy is higher than it is in Germany. Can these differences be attributed to lifestyle factors like diet, smoking or obesity, or possibly the health care system?

✓ An intensification of medical research aimed at developing new approaches to preventing and treating chronic illnesses, and especially for the most common causes of death, such as cardiovascular diseases and cancer.

✓ An intensification of open-ended basic research into the causes of ageing.

› Introduction

When following the news these days, it is easy to get the impression that people's living conditions are continuously worsening. Without a doubt, tragic events are occurring in places like Syria. But over the past 150 years, we have seen that people, and especially people in Europe, have benefited from an ever-longer life expectancy. The following article provides a brief overview of these positive developments, with a special focus on improvements in health in Germany over the past ten years. This period of study was chosen in part because of data availability considerations; and in part because it took around 15 years after German reunification before one could speak of a common development in mortality in Germany as a whole.

› The development of life expectancy

Before we can look at developments in healthy years of life, we first have to examine the development of

life expectancy – as ultimately, it is the increase in life expectancy that makes the increase in healthy years of life possible.

Several scientific publications from around the turn of the millennium, like the 2002 article by James Oeppen and James Vaupel in *Science*, showed that life expectancy has been increasing at a steady pace in many countries around the world. If we look at trends in the highest points in life expectancy measured worldwide, we see that life expectancy rose from around 45 years for women in Sweden in 1841 to more than 86 years for women in Japan today. On average, this so-called "record life expectancy" has increased with astonishing regularity by around three months per calendar year, or nearly by 2.5 years per decade, or almost six hours per day.

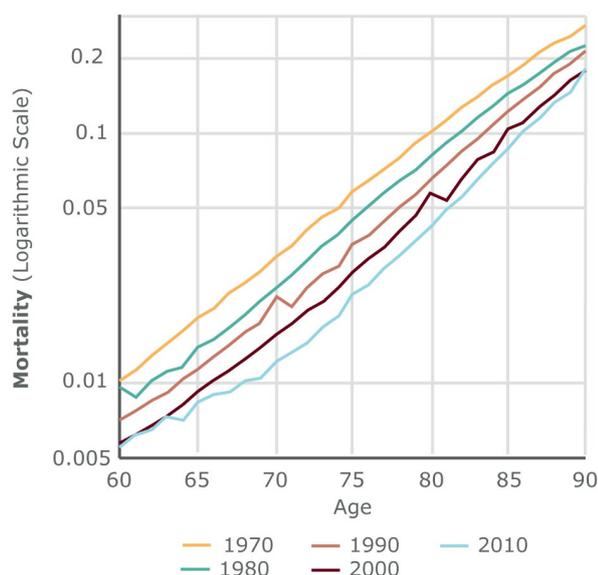
This linear increase in life expectancy could be observed not only when looking at a cross-section of the various record holders, but also when we look at individual countries, albeit at a lower level. Thus, it is hardly surprising that in many countries, life expectancy has doubled. For example, in Germany, the current life expectancy of men and women combined is slightly higher than 80 years. In the life table of the German Reich for 1871-1881, the life expectancy of both men and women was still under 40 years.

Between the years 2003 and 2013 alone, life expectancy increased by around two years. This positive development could be observed not just in Germany or in other countries with a high standard of living. Looking at data from the United Nations, we can see that life expectancy levels rose over this period in all countries of the world (with the sole exception of Syria). On average, these improvements occurred even more rapidly in other countries than in Germany. Even in Greece, which has been experiencing an economic crisis for a number of years, life expectancy has been increasing steadily.

Over time, particular age groups have contributed more than others to this linear increase in life expectancy. Until the middle of the 20th century, life expectancy increased mainly as a result of improvements in the survival probabilities of infants and children. But with the passage of time, the role of child mortality in life expectancy statistics declined. In countries like Germany, the bulk of the increase in life expectancy was attributable to reductions in

mortality among older age groups. Around 55% of the nearly two years of life gained per year (and nearly 70% among women) was due to declines in mortality among people aged 65 and older. Thus, the remaining life expectancy at age 65 rose over the past ten years, between 1.2 and 1.3 years.

Fig. 1: Mortality rates of women in (West) Germany from 1970 and 2010



Source: The author's own calculations based on data from the Human Mortality Database.

Mortality increases exponentially with age. If we look at mortality on a logarithmic scale, it appears to move in a straight line. Figure 1 shows the change in the age-specific mortality pattern between 1970 and 2010. As an example, data for West German women are used. It is interesting to note that the general pattern hardly changed over time – it simply moved to the right. Thus, we see no signs of a so-called “slowing down of the ageing process,” which would have resulted in a flattening out of the increase in mortality with age. But is such a slowing down of the ageing process even desirable? If we assume that a certain mortality level is closely associated with a certain health status, then a slowing down of the ageing process would mean that people would spend more years in worse health. But instead we observe a shift to the right, or a trend that demographers call a “postponement” of mortality. The mortality level that was observed among 60-year-old West German women in 1970 could be observed among their 68-year-old counterparts in 2010. A similar postponement of eight years occurred at age 70. This postponement effect was slightly less pronounced at

age 80, at around six years. While men are known to have higher mortality levels than women, the numbers of years of the postponement of mortality at higher ages are comparable among men and women (not shown in Figure 1).

› The development of healthy life years

But have the numbers of healthy years of life also increased over the past ten years? After all, it is sometimes said, what good is it to live longer if you spend most of that extra time in sickness and ill health?

It is difficult to conduct quantitative analyses of healthy years of life. Research on mortality is not hindered by problems of definition, as it is easier to distinguish life from death than it is to differentiate a healthy state from an unhealthy state. The data needed to conduct such analyses must be collected using surveys, which can lead to additional problems. Even if we had a) a clear definition of health, b) a representative sample, and c) a sample that was large enough to minimise random fluctuations, d) there is still the possibility of false answers.

In Table 1, we present estimates of remaining years of life based on the so-called “Sullivan method” and data from the EU-SILC household survey, which for Germany alone includes yearly responses from 8,250 households and 14,500 individuals aged 16 and older. To illustrate the problem of the use of different definitions, three definitions of health are used here. The first two refer to responses to the question that calls for a self-assessment of health using a five-point scale (“very good,” “good,” “average,” (2005), “mediocre,” (2013), “bad,” “very bad”). The first two responses were placed into the category of “good health,” while the last two responses were excluded from the category of “the absence of bad health.” Alternatively, a person could be classified as healthy if she reported having no long-term limitations in her ability to perform activities of daily living. Out of the large number of estimated indicators, Table 1 shows the remaining years of life for men and women at ages 25, 55 and 65 for each category of health.

Tab. 1: Remaining years of life by health status for men and women in Germany in 2005 and in 2013

Number of years of life remaining...	Women			Men		
	2005	2013	+/-	2005	2013	+/-
... in good health						
from age 25	29.9	34.0	4.1	29.1	34.0	4.9
55	9.2	12.4	3.2	8.8	11.7	2.9
65	4.9	7.7	2.8	5.2	7.5	2.3
... in absence of bad health						
from age 25	50.1	52.2	2.1	46.5	49.1	2.6
55	22.7	24.9	2.2	20.1	22.1	2.0
65	15.0	17.1	2.1	13.4	15.2	1.8
... without long-term restrictions						
from age 25	32.1	34.4	2.3	31.8	34.4	2.6
55	10.6	12.0	1.4	10.5	11.6	1.1
65	6.0	7.2	1.2	6.4	7.0	0.6

Source: The author's own calculations based on data from the EU-SILC and from the Human Mortality Database.

When we look at this table, two points are particularly striking: 1) The sign in the "+/-" column is consistently a plus, regardless of which health indicator is chosen. This means that over the eight years of the period studied, the number of healthy years of life increased for men and women of all age groups. It is therefore clear that the years of life gained were not spent exclusively in illness. 2) Except among 65-year-old men and for the last definition of health, the number of healthy years of life grew more than life expectancy over the study period. Thus, the share of the remaining years of life that were spent in good health grew.

› Implications for the individual

While research has shown that the expected life spans of people are becoming increasingly similar through reductions in mortality at earlier stages of life, large differences between individuals remain. So what can an individual do to increase his or her chances of having a life that is as long and healthy as possible? If we want to sum up the research findings into one piece of advice, it would be to do what your mother always told you to do: "Don't smoke, don't drink too much, exercise and eat right!" In addition, numerous studies have found that people with higher levels of education have lower mortality. Thus, education seems to have a key function for a long life.

› Implications for society

The considerable progress that has been made in increasing life expectancy since the 1970s is mainly attributable to improvements in cardiovascular mortality, not just in Germany, but in all Western countries. These effects have been so large that some researchers speak of a "cardiovascular revolution." But while members of the public have become more knowledgeable about the risk factors for cardiovascular diseases, there are two main reasons why mortality from this cause of death has decreased so dramatically. First, the treatment of acute problems has greatly improved. Medical interventions like pacemakers, bypass operations and stents – which would have been unthinkable, or were in the early stages of development 50 or 60 years ago – are now common. In addition, medications like beta blockers are being prescribed to treat and prevent high blood pressure and related conditions. Data from the Robert Koch Institute show that mortality from circulatory diseases has been more than halved since the 1980s. Yet despite these advancements, five out of the ten leading causes of death in Germany fall into this category. Thus, it appears that there is still room to further reduce mortality from circulatory diseases. Besides death from circulatory conditions like heart attacks and strokes, the second most common category of causes of death is made up of various types of cancer. While some progress in preventing and treating cancer has been made over the past 40 years, the advancements in the area of cancer lag far behind those in the area of circulatory diseases. We can assume that intensive medical research is needed to achieve a breakthrough in cancer treatment.

Moreover, if we want to ensure that life expectancy continues to rise, and that the years of life gained are spent in good health, we should not ignore other diseases that contribute to mortality, albeit to a lesser extent, such as neurodegenerative diseases like Alzheimer's or infectious diseases like multi-drug resistant pathogens (e.g., MRSA and MSSA).

Annotations

Methods:

- The contributions of various age groups to the gains in life expectancy were calculated using the "Arriaga method," which is explained on page 65 in Preston, S.H., Heuveline, P.

& Guillot, M. (2001): *Demography. Measuring and Modeling Population Processes*, Blackwell Publishing.

- The "Sullivan method" for calculating healthy life expectancy can be understood by looking, for example, at page 87 in Egidi, V. & Frova, L. (2006): *Relationship between Morbidity and Mortality by Cause*. In: G. Caselli, J. Vallin & G. Wunsch (Eds.): *Demography. Analysis and Synthesis*. Volume 2, Academic Press.

Data:

- Life tables, data on (remaining) life expectancy and additional mortality data can be found in the Human Mortality Database at www.mortality.org.

- Data on historic life expectancy levels in Germany can be found in the Human Life-Table Database at <http://www.lifetable.de>.

- The development of cause-specific mortality in Germany is explained very well in "Gesundheitsberichterstattung des Bundes" at www.gbe-bund.de.

- The data on the development of life expectancy worldwide were drawn from the "2015 Revision of World Population Forecasts" of the United Nations, at <https://esa.un.org/unpd/wpp/>.

- The health data come from the EU-SILC household survey, which are available from the Eurostat database at <http://ec.europa.eu/eurostat/data/database> (Table htl_silc_01, Category "Population" for Activity and employment status).

References and literature for further reading:

- The precise reference for the article from Oeppen und Vaupel is: Oeppen, J. & Vaupel, J.W. (2002): *Broken Limits to Life Expectancy*. *Science* 296: 1029-1031.

- The development of Greek and German life expectancy has, for example, been outlined in Rau, R. & Bohk-Ewald, C. (2015): *Steadily Upward: Life Expectancy in Greece Defies Crisis*. *Population Insights* 1: 1.

- For evidence that the contributions to the rise in record life expectancy of older age groups has been increasing, see, for example, Table 2 on page 1199 in Christensen, K., Doblhammer, G., Rau, R. & Vaupel, J.W. (2009): *Ageing Populations: The Challenges Ahead*. *The Lancet* 374: 1196-1208.

- The postponement of mortality to older age groups has been shown not just for Germany, but for other countries as well. In Rau, R. & Vaupel, J. W. (2014): *The Changing Demographic Context of Ageing*. In: Kirkwood, T. B. L. & Cooper, C. L.: *Wellbeing: A Complete Reference Guide, Wellbeing in Later Life*. John Wiley & Sons 2: 9-29, findings comparable to those shown in Figure 1 are presented for France.

- A general overview of more recent (bio-)demographic research results, including on the postponement of mortality,

can be found in Vaupel, J. W. (2010): *Biodemography of Human Ageing*. *Nature* 464: 536-542.

- The research evidence that life spans are becoming increasingly similar, which was mentioned only briefly here, can be found in articles such as Colchero, F., et al. (2016): *The Emergence of Longevous Populations*. *Proceedings of the National Academy of Sciences* 113: E7681-E7690.

- A description of the "cardiovascular revolution" can, for example, be found in Meslé, F. & Vallin, J. (2006): *The Health Transition: Trends and Prospects*. In: G. Caselli, J. Vallin & G. Wunsch (Eds.): *Demography. Analysis and Synthesis*. Volume 2. Academic Press.

- Projections of the future prevalence of dementia-related diseases in Germany can, for example, be found in Ziegler, U. & Doblhammer, G. (2010): *Projections of the Number of People with Dementia in Germany 2002 through 2047*. In: G. Doblhammer & R. Scholz (Eds.): *Ageing, Care Need and Quality of Life: The Perspective of Care Givers and People in Need of Care*, Wiesbaden: VS Verlag für Sozialwissenschaften.

Staying Smart While Growing Older

How do cognitive abilities develop at adult ages?

Ursula M. Staudinger

Robert N. Butler Columbia Aging Center,
Columbia University, New York

Recommendations

✓ A roundtable on work and work processes in the 21st century made up of employers, employees, and government officials is needed to ensure that people will be able to continue to work productively as working life is extended. Properly organised, work can help people retain their cognitive capacities well into old age.

✓ Lifelong learning must be made affordable and accessible for everyone. Therefore, a financing model and better quality control of training course and work schedules that have enough flexibility to incorporate training are necessary. No one's educational trajectory should have to end after he or she completes the first phase of education.

✓ Walking should once again become a normal component of daily life. Movement should be integrated into the work day, and should be supported by the way living environments are structured in the city and in the country.

✓ In addition to work, leisure-time activities, like civic engagement, are very important for supporting the cognitive capacities over the life course. To encourage people to become more involved in their communities, barriers to entry should be lowered and the competences needed to participate in volunteering should be conveyed.

Source: Academy Group "Ageing in Germany" (2009): *Gewonnene Jahre*. Stuttgart: Wissenschaftliche Verlagsgesellschaft. Translation: Academy Task Force (2010) "More Years, More Life."

According to demographic projections, 40% of the German population will be over the age of 60 by 2050. This is a historical first, and like so often novelty also creates a new uncertainty. Whether this new

age structure is seen exclusively as a problem, as it is often framed in the media, or as an opportunity, will depend on the behaviour of individuals, and to a much greater extent on the design of institutions, the workplace and the physical environment. One of the main strategies that can be used to manage demographic change is to increase the number and the productivity of workers because an important part of the labour market reserve in Germany is still those over the age of 55. But how willing, healthy and productive are people in this age group? Psychological studies of lifespan development that have examined the competency profiles of older people and the plasticity of human development into old age, have provided a clear and positive answer to this question.¹

› Cognitive ageing is multifaceted

Changes to intellectual abilities and cognitive processes with age depend on complex interactions between biologically determined deficits and culturally transmitted strengths.² Therefore, the "ageing of intelligence" is not a standardised process, but is a process that plays out very differently among individuals and abilities. While some people remain sharp and insightful well into old age, others experience a strong deterioration in their cognitive functions as they grow older. The same goes for different abilities: For example, after the age of 25 or 30, deterioration is generally observed in the *cognitive mechanics*, which is, for instance, the speed with which people can perform certain tasks or the working memory capability. These changes at the behavioural level are associated with neuronal changes in the brain (the loss of synaptic connections, fewer transmitters and a low number of neurons). Not all of these changes are exclusively biological in nature, but rather also consequences of one's lifestyle (diet, physical fitness).

By contrast, the *pragmatics of intelligence*, which is a type of thinking that draws upon knowledge and experience, shows stability and even under certain circumstances, can improve with age.³ The knowledge and experiences people accrue over time can help them counterbalance or compensate for the deterioration in cognitive mechanics. For example, a study of professional expertise showed that increased experience in a job help people develop strategies to compensate for having slower reaction times or a

less efficient memory. In the area of life experience and in dealing with difficult life problems, it has been shown that between the ages of 25 and 75, despite declining achievements in cognitive abilities, there is no sign of a deterioration in people's ability to judge difficult and existential problems of life. This finding has been proven in several studies. It is important to note, however, that there is also no evidence that, on average, people perform better with age on tasks that require wisdom. Just getting older does not necessarily make people wiser.

› Plasticity: The malleability of cognitive ageing

In addition to these current trends in ageing being observed, it is important to keep in mind that cognitive performance can be greatly increased through training. The plasticity of cognitive capability has been confirmed in numerous training studies of intelligence tests and of memory functioning.⁴ Longitudinal data has been used to show that the degree to which performance can be improved (a standard deviation of 1/2 to one) is equivalent to the decline in performance between the ages of 60 and 80. This does not mean, however, that such interventions can lead to a reversal in the decline in cognitive mechanics that has already taken place. Rather, they can help people develop strategies (pragmatics) that allow them to compensate for, or at least reduce the effects of, the deterioration in the mechanics. This also means that the extent to which these gains in performance can be transferred to other tasks for which the person has not been trained is rather limited and a better performance without applying the learned strategy is missing. These interventions are different from interventions that increase a person's physical fitness and also significantly increase cognitive capacity. It has been shown that increases in physical endurance can lead to a reactivation of parts of the brain that have been subject to deterioration with age.⁵ Thus, improvements in cognitive abilities that are associated with higher levels of physical fitness have more generalised effects, and are not dependent on the application of learned strategies. The plasticity of cognitive ageing is also reflected in the marked decline in the probability of developing Alzheimer's disease that has been observed throughout the industrialised world over the past ten to 20 years.⁶

Therefore, the chronological-statistical ageing of the population is not the best way to determine how productive people are likely to be. What a given calendar-based age means – in terms of health, mental and physical performance and motivation – changes with historical change and cultural development. A study has shown, for instance, that in 2040, the population of Great Britain will be much older than today from a demographic perspective, but if the improvements in cognitive abilities from generation to generation that have been observed in recent decades continue, the population will be younger than it is currently in terms of cognitive processing abilities due to plasticity.⁷

There is also research showing that workers up to age 70 can profit from job-specific training provided in the workplace. Moreover, we know that people with cognitively demanding occupations have higher levels of cognitive performance at older ages compared to a control group.⁸ Recently, it was shown that people who do relatively simple jobs can still retain their cognitive abilities through regular changes in their work activities.⁹ In addition, there is evidence that even people who are suffering from dementia can benefit from training where more time is spent presenting the material.¹⁰ Yet another study has demonstrated that people with dementia can improve their cognitive performance if they are allowed to draw upon their existing knowledge.¹¹

Interestingly, there is another form of cognitive "training" that is likely to have long-term effects, but that yet receives too little attention: A negative stereotype of ageing can have very negative effects on the self-assessments and self-worth of older people, which can have consequences for their cognitive abilities.¹² Conversely, the activation of positive stereotypes about ageing (e.g., that older people are "wise") can have positive effects on cognitive performance.¹³

These findings demonstrate that there is still room to improve the creative application and combination of methods that have been developed through the study of age-related changes.

› What consequences do these findings have for society today, and in the future?

The ageing process of today is not the same as the ageing process of tomorrow: The malleability of the ageing process suggests that ageing in the future will happen differently than the ageing process we are currently observing. When it comes to today's older birth cohorts, they have strengths that an ageing society could benefit from (experience), but currently does not fully take advantage of, largely because after people retire they are given too few institutionalised opportunities to continue to contribute through civic engagement or employment. Older adults' cognitive weaknesses could be attenuated through appropriate measures. However, what is important are "training measures" that are integrated into daily life, and are applied over the longer term and have high ecological validity. For example, people could be presented with once and again changing cognitive challenges in their everyday life at work or in retirement. Older people of the future are likely to have higher levels of general education and to be in better health than the current generation of older people, they should be able to take on more cognitively demanding tasks at work than what is currently the case.

For the individual, demographic change and the findings of lifespan developmental psychology have a number of implications: 1) Long-held assumptions about the life course and ageing should be adjusted. 2) The phase of education before starting work should be complemented with shorter phases of education interjected at various points over the course of the working life. 3) As the working life becomes longer, the individual should be prepared to and be given opportunities to perform a range of professional activities (albeit presumably in line with the individual's qualification levels and place in the hierarchy). 4) The individual should be empowered to take more responsibility for his or her own health, retirement income, participation in civil society for and during a life that is likely to be relatively long.

There are also a number of implications for companies: 1) Continuously investing in the qualifications and skills of all of their employees (regardless of age) pays off. 2) The best way to manage diversity is for companies to take into account the strengths and weaknesses of employees of various age groups. 3) A good strategy is hiring older workers. 4) Employers

should provide workers with regular changes in their work tasks without having to move to another occupational group.

Finally, there are implications for society: 1) Efforts should be made to overcome the one-sided negative views of ageing. 2) The temporal organisation and division of the life course into three parts – education, work and private life – should be relaxed, and linkages across these areas should be created. 3) The transition to a new temporal structuring of the life course should be supported for each individual and for companies through the dismantling of regulations that stand in the way, and through temporary legal incentives to move away from traditional patterns of behaviour. 4) The intergenerational contract should be updated, without calling its achievements into question. To do so, the appropriate policies will be needed in the areas of work, employment and health. 5) Opportunities to participate in civil society as well as the labour market should be institutionally embedded and should become the new normal.

A longer life calls for a new order. If we mix together phases of education, work and private life, and allow these phases to alternate, then we could make it easier for people to have longer and more productive working lives. In order to make this successful and acceptable for individuals, we would also have to alter the structure of work biographies and the work environment. Education is not just necessary when someone wants to receive a higher salary. Today, the applied knowledge needed to perform just about every type of job is changing rapidly. Thus, there is a need for continuous learning in the workplace that companies should be willing to support and implement.¹⁴

Education will become a requirement for continuing career paths and for the maintenance of one's working ability until the age of retirement is reached. But rapid changes are happening outside of professional life as well. Therefore, lifelong learning is a requirement for social participation, for participation in democracy and engagement in civil society. In short: People who learn more live longer and stay healthier! Education helps people make good use of the additional years of life they are gaining. Continuing to learn is much easier than stopping to learn when leaving school or university and then restarting it later in one's work life.¹⁵ While it is possible to kick-start this process even at a later age, it is more diffi-

cult to do so than it is to maintain a habit of learning throughout one's life.

From the perspective of companies, already the growing decline in the number of (young) qualified workers makes it crucial for them to hold on to their experienced employees as long as possible and to keep them as productive as possible. Companies can enable employees to work longer, or at least until retirement age, by allowing them to move at the right time to a less physically demanding or cognitively exhausting job, and they can generally pay attention to mixing tasks, which help employees remain employable. This type of work organisation and personnel development is promoted, for example, through "job rotation", which means individuals move between different jobs within a work day or a work week. It could also include the opportunity for lateral careers, meaning the possibility of development without moving up or down in the company hierarchy, but taking on new tasks at the same hierarchical level. The chance to move laterally can increase job satisfaction levels, and can help individuals retain their ability to work up to retirement age and beyond.

The sustainable management of human capital involves skill and health management, and correspondingly adapted work organisation.¹⁶ So far, relatively few companies have committed to making such changes. Collective agreements can be used to pressure employers to move in this direction. If employees are permitted to change their mix of job responsibilities at the right point in their working life, they may be able to avoid the physical and mental wear and tear that can otherwise occur, and will thus be able to remain employed longer. Job-specific optimal years of tenure based on occupational health norms should be developed and timely further qualification should be guaranteed. This opens a new interpretation of the protective function that trade unions, professional organisations and health insurances can play with regard to enabling longer work lives that are productive and satisfactory. It is not much any longer about protecting workers from work, but rather making sure that they have access to work that protects their health, productivity and satisfaction.

It is difficult to motivate individuals to invest in longer lives. Planning for the long term can be risky for an individual, as life expectancy is a statistical measure that is not calculated for each individual. For that

reason, social actors, like the state or negotiators in collective wage agreements, should take the longer-term perspective by providing workers with incentives to plan for the future. Enrolling in continuing education could be made more attractive to the individual by the state or through collective bargaining agreements by, for example, providing conditional guarantees for educational credits or subsidised educational savings accounts. When individuals who have completed their initial phase of education take time out to go back to school, they should continue to receive pension credits, even if their pension level is reduced over the short term. Because such investments in human capital may be expected to boost productivity, it is likely that they will not only pay for themselves, but will generate surpluses.

It is worth noting that women have long had interruptions in their professional biographies, as they often take time off from work or simultaneously care for family members. Because they live longer on average, women tend to have more time left to live for work even after caring for children or elderly relatives. Therefore, also from the perspective of employers, it is worthwhile to invest in training women to re-enter the workforce. The opportunity to work longer or to return to work after taking a break could also be an attractive option for men or for individuals who have been unemployed. For both men and women, further education measures should aim to be connected with a job and not conducted provisionally. For example, a certain share of parental leave benefits could be made dependent on participating in educational programmes. By improving the compatibility of work and family, it is possible to prevent skill loss due to longer absences from the labour market.

› Summary

A society of longer lives is no reason to fear that we will become a society of people suffering from dementia. The astonishing plasticity of cognitive ageing creates many new opportunities at the individual and societal levels to productively structure longer lives. But we must take advantage of these opportunities.

Footnotes

[1] Staudinger, U. M. & Kessler, E.-M. (2012): Produktives Leben im Alter. In: W. Schneider & U. Lindenberger (Eds.): Entwicklungspsychologie (7. ed.). Weinheim: Beltz, pp. 733-746.

- [2] Baltes, P. B., Lindenberger, U. & Staudinger, U. M. (2006): Life-span Theory in Developmental Psychology. In: R. M. Lerner (Ed.): Handbook of Child Psychology (6. ed.). New York: Wiley, pp. 1029-1143.
- [3] Staudinger, U. M. (2015): Images of Aging: Outside and Inside Perspectives. *Annual Review of Gerontology and Geriatrics* 35(1): 187-210.
- [4] Hertzog, C., Kramer, A. F., Wilson, R. S. & Lindenberger, U. (2008): Enrichment Effects on Adult Cognitive Development: Can the Functional Capacity of Older Adults be Preserved and Enhanced? *Psychological Science in the Public Interest* 9(1): 1-65.
- [5] Voelcker-Rehage, C., Godde, B. & Staudinger, U. M. (2011): Cardiovascular and Coordination Training Differentially Improve Cognitive Performance and Neural Processing in Older Adults. *Frontiers in Human Neuroscience* 5(26): 1-12.
- [6] Wu, Y.-T., et al. (2016): Dementia in Western Europe: Epidemiological Evidence and Implications for Policy Making. *The Lancet Neurology* 15(1): 116-124.
- [7] Skirbekk, V., Stonawski, M., Bonsang, E. & Staudinger, U. M. (2013): The Flynn Effect and Population Aging. *Intelligence* 41(3): 169-177.
- [8] Wentura, D. & Rothermund, K. (2005): Altersstereotype und Altersbilder. In: S. M. Filipp & U. M. Staudinger (Eds.): *Entwicklungspsychologie des mittleren und höheren Erwachsenenalters*. Göttingen: Hogrefe, pp. 626-654.
- [9] Kessler, E.-M. & Staudinger, U. M. (2007): Intergenerational Potential: Effects of Social Interaction Between Older Adults and Adolescents. *Psychology and Aging* 22(4): 690-704.
- [10] Oltmanns, J. & Staudinger, U. M. (2017): Mental Stimulation and Cognitive Aging – A Systematic Review of in Vivo Evidence. Submitted Manuscript.
- [11] Oltmanns, J., Godde, B., Winneke, A., Richter, G., Niemann, C., et al. (2017): Don't Lose Your Brain at Work – The Role of Recurrent Novelty at Work in Cognitive and Brain Aging. *Frontiers in Psychology* 8(117): 1-16.
- [12] Kopelman, M. D. (1985): Rates of Forgetting in Alzheimer-type Dementia and Korsakoff's Syndrome. *Neuropsychologia* 23: 623-638.
- [13] Lipinska, B., Bäckman, L. & Herlitz, A. (1992): When Greta Garbo is Easier to Remember Than Stefan Edberg: Influences of Prior Knowledge on Recognition Memory in Alzheimer's Disease. *Psychology and Aging* 7: 214-220.
- [14] Staudinger, U. M. & Bowen, C. E. (2011): A Systemic Approach to Aging in the Work Context. Ein Systemischer Ansatz zum Altern im Arbeitskontext. *Zeitschrift für ArbeitsmarktForschung* 44(4): 295-306.
- [15] Staudinger, U. M. & Baumert, J. (2007): Bildung und Lernen jenseits der 50: Plastizität und Realität. In: P. Gruss (Ed.): *Die Zukunft des Alterns. Die Antwort der Wissenschaft*. Munich: C. H. Beck, pp. 240-257.
- [16] Oltmanns, J., Richter, G., Godde, B. & Staudinger, U. M. (2016): Healthy Aging at Work. In: M. Wiencke, M. Cacace & S. Fischer (Eds.): *Promoting Health at Work*. Heidelberg / New York: Springer, pp. 69-84.

Faster, Higher, Stronger How productive are older people?

Christian Hunkler

*Max Planck Institute for Social Law and Social Policy,
Munich*

Recommendations

✓ Because they have more professional and life experience, older workers can in principle compensate for declines in their physical and cognitive capabilities. Thus, for the majority of the population, demographic change and the longer working life are not a threat, or even a major challenge. This point should be made more frequently in public debates.

✓ The extent to which experience can be productively applied depends on the work context. Policy makers, employers and social actors should find creative ways to adapt working environments accordingly, and to make it easier for individuals to move to other work contexts.

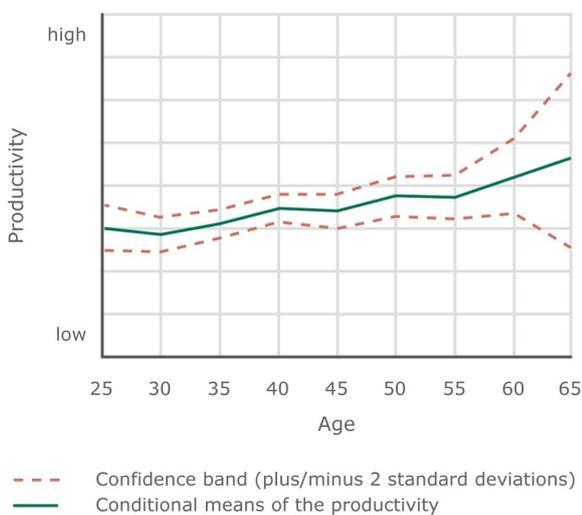
In the public debate on the productivity of older people, it is often assumed that productivity declines with age. Because the labour force participation rates of 55- to 64-year-olds are relatively low, it is frequently asserted that already many people up to the age of 64 are no longer able to keep up with the demands on workers to be “faster, higher, stronger.” Thus, it can be difficult for people today to imagine how working life could be extended. Yet it is often ignored that as recently as the early 1970s, around 80% of people in this age group were working, and this share only fell below 60% by the middle of the 1990s because of structural problems in the labour market. Since the implementation of reforms of “Agenda 2010”, the labour market participation rates of older people are again nearly at the same levels as those of the total working-age population (these figures refer to OECD data on men aged 55-64). Similarly, the assumption that productivity declines with age was used to argue for early retirement regulations and it can be assumed that individual decisions by employers and employees were also influenced by this assumption. However, there is no theoretical or empirical reason to assume that

productivity actually decreases from a certain age. Generally, a person’s productivity can be defined as a function of the application of his or her physical and cognitive abilities and his or her experience in a given context. Individuals tend to reach the maximum levels of their physiological and cognitive abilities relatively early in life; roughly between ages 20 and 30, depending on the indicator. Thereafter, these levels tend to decline. In contrast, an individual’s total professional experiences in particular and his or her general life experiences increase with age. The extent to which physiological and cognitive abilities are relevant for productivity is thus mainly dependent upon the extent to which a given work context allows the individual to apply his or her total experiences in a productive manner. It is, of course, the case that after a certain age, a person’s physical and cognitive abilities will have declined to such a degree that his or her productivity will indeed have decreased. Yet given the clear increases in healthy life years, the age at which productivity declines is an empirical question and is dependent on the work context.

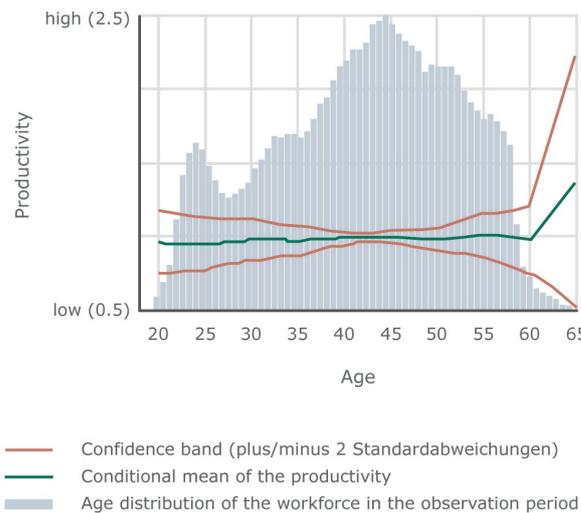
From a methodological perspective, the question of at what age productivity declines is far from trivial. To answer this question, several selection problems must be considered, suitable measures for productivity must be found and the effects of ageing must be differentiated from cohort effects. Previous studies have, for example, used individual wages to measure productivity. However, wages can only be observed for people who are in paid employment, so the labour force participation of the individuals who are being examined could lead us to make false assumptions about the relationship between age and productivity (selection problem 1). Second, wages can only be observed in the work contexts in which people are actually employed, but these work contexts could be influenced by individual and, above all, by employer assumptions about differences in productivity by age (selection problem 2). Third, because productivity is determined by the cooperation of teams or groups in all but a small number of occupations, applying measures of individual productivity in such contexts would provide us with little information. Yet another problem that can arise when using wages to measure productivity is that people may be paid under collective bargaining agreements or employment contracts that base compensation levels not on productivity, but on age or seniority. A further problem of empirical research is the separation of age and cohort effects. Cohort effects can, for example, occur when

differences in productivity are only relevant because older workers are not “digital natives;” i.e., they did not grow up with computers, mobile phones or similar devices. This means the lower productivity levels observed are not related to their age, but rather to the specific historic circumstances in which they were raised. Before we can identify associations between productivity and age that are both generalisable and meaningful, we have to differentiate cohort effects from the “real” effects of age. So-called “panel data,” in which the same individuals are followed over time, can be especially useful in such cases.

Given the methodological problems that can arise when estimating the relationship between age and productivity, and the overall challenges associated with measuring productivity, it is not yet possible to give a reliable estimate of the relationship between age and productivity that is based on a broad base of evidence generated by empirical studies. Instead, the results of two case studies of the relationship between productivity and age will be presented. These studies make it possible to overcome most of these methodological and estimation problems through the use of so-called process-generated “big data.”



Study 1: Age-productivity profile of a truck assembly plant. Source: Börsch-Supan/Weiss 2016 (Figure 1 shows an inversion of the original sum of the error weights).



Study 2: Age-productivity profile of a financial services provider. Source: Börsch-Supan/Hunkler/Weiss 2016, Figure 2.

The first case study examines productivity among workers in a truck assembly plant by measuring the productivity of both younger and older employees working on an assembly line that runs at a consistent rate by looking at the number of mistakes made and the severity of these mistakes.¹ The second study looks at a financial services provider.² Here, the productivity was measured as a standardised number of transactions completed by each work team. In both cases, the productivity of whole teams, not of individuals, was measured on a daily basis over a period of more than two years. The questions raised above could be answered through the large number of observations made. The first study was based on nearly 1.7 million observations of nearly 3,824 workers in 100 teams; while the second study was based on more than 4.6 million observations of more than 10,000 employees in around 1,500 teams. The number of observations and the measurement of productivity at the team level make it possible to estimate the effect of age through the daily changes in the age composition of the team. These daily changes related to, for example, employees taking vacation or reducing overtime, are not influenced by selective processes. The large amount of data allows to control statistically for cohort effects, so that the estimated age-productivity profiles reflect age effects alone.

Neither case study found any evidence that productivity declined up to age 65. In the truck assembly plant, the productivity was actually found to have increased slightly up to age 65. When

Börsch-Supan and Weiss analysed the number and the severity of the mistakes made per worker, they found that while older workers made more mistakes, they were less likely than younger workers to have made the kinds of mistakes that result in high costs. This finding can be interpreted as showing the relevance of experience, stress resistance or even knowledge of human nature by older workers – which can be particularly important in difficult situations. In general, it appears that experience seems to counterbalance the decline in physical and cognitive abilities in an area in which these abilities are particularly relevant, at least until the age of 65. In the second case study, we again found evidence that experience played a role. Whereas average productivity levels differed little by age among workers aged 20 to 65, we see some interesting differences when looking at different types of work activities. Productivity declined with age when performing easier routine jobs. However, in teams that were engaged in more complex processes, productivity increased with age. This result shows that experience can not only compensate for the decline in physical and cognitive abilities, but it can have a positive effect. However, the extent to which this is the case depends on the work context. The kinds of work experience that can be useful in dealing with complex or difficult cases are not needed for every type of job.

As life expectancy rises, it is likely that we will be spending a portion of the years of life gained in paid employment. The good news is that for most people, this will be a productive time in their lives. People may not become faster or stronger with age – rather somewhat slower and weaker – but they do become more experienced. As far as we can conclude from the two presented case studies, there is no evidence that 55- to 65-year-old workers and employees (at least those in the age cohorts observed in the study) contribute less to the productivity of their teams than their younger colleagues. If we assume that at least up to a certain point, slowly declining physical and cognitive abilities can be compensated for by increasing professional and life experience, then we can also assume that this pattern would not be dramatically different for 66- or 67-year-olds.

The central, individual challenge is to see the lengthening of working life as an opportunity. This makes it necessary to critically examine the career paths and work contexts chosen, with regard to

possibly having a longer working life. Given the types of work people currently do or want to do, is it possible to delay retirement to a higher age? What kind of new skills or technologies do these older workers have to learn in order to stay in their current job, or to move to another one? In which contexts would accumulated experience be most useful? These challenges are not new, of course: Also in “the good old days”, depending on the chosen job, the speed of technological change in the field or the relocation of jobs, these were relevant questions. The main difference is that workers may be affected by such issues for a period that is two to three years longer than in the past.

For social actors, and especially for large and small companies, the systematic analysis of the age structure of the workforce and the development of this structure in the future should already have become standard practice, especially in light of the shortage of skilled workers that employers have long been complaining about. Similar analyses should be conducted of individual abilities and opportunities for development, and for the management of the assignment of workers to optimal work contexts. A “best practice” example directly related to truck assembly is the replacement of conveyor belts with so-called “production islands” in some Audi plants. As individual buyers’ demands for customised colours and fittings increased, the classic conveyor belt approach was no longer able to keep up. Using modular assembly techniques that are implemented with the help of a digital steering system, each car can be assembled efficiently. At the same time, the uniform pace that is necessary in a conveyor belt-based production system is rendered more dynamic. In such a work context, there are ample opportunities to optimise the composition of each team based on individual abilities, while also raising overall productivity levels. In smaller companies demographic change could, however, cause greater problems. First, smaller businesses might find it hard to conduct a systematic analysis of the effects of the coming demographic changes on their workforce. Second, smaller firms have less flexibility than larger firms in moving workers around within the organisation.

Annotations

[1] Börsch-Supan, A. & Weiss, M. (2016): Productivity and Age: Evidence from Work Teams at the Assembly Line. *Journal of the Economics of Ageing* 7: 30-42.

[2] Börsch-Supan, A., Hunkler, C. & Weiss, M. (2016): Big Data at Work: Age and Labor Productivity in the Service Sector. Unveröffentlichtes Manuskript: Munich Center for the Economics of Aging at the Max Planck Institute for Social Law and Social Policy.

Further Reading

- Börsch-Supan, A. (2012): Wie gut können wir die Folgen des demografischen Wandels abschätzen? Was ist sicher? Wozu brauchen wir bessere Daten? AStA Wirtschafts- und Sozialstatistisches Archiv 6: 65-82.

Which Sex is Really Stronger?

Why do men and women age differently?

Anna Oksuzyan

*Max Planck Institute for Demographic Research,
Rostock*

Recommendations

✓ Men and women should have the same chances in education and to participate in the labour market, both in the younger years and throughout the whole working life.

✓ Informational campaigns about a healthier lifestyle should be gender-specific.

✓ We should develop gender-specific strategies in order to better detect chronic diseases.

› Are men or women physically stronger?

On average, men are physically stronger than women at all ages and across all continents.¹ It is remarkable that handgrip strength – a measure used to assess upper arm muscle strength – of an 80-year-old Danish man is similar to that of a 45-year-old Danish woman. Interestingly, men not only outperform women on handgrip strength tests, but the grip strength levels of men decline more rapidly with age than those of women, which may indicate that women age more slowly than men, at least in regards to this specific indicator of physical strength.

In addition, men report having fewer difficulties than women in carrying out the so-called “activities of daily living.” These are the activities that a person needs to be able to perform to meet his or her own basic needs, such as bathing, dressing, moving around the house, and walking up and down one flight of stairs, and also the activities that allow an individual to live independently in a community context, such as shopping, managing money and using the telephone.

The distribution of gender roles should be taken into account when evaluating gender differences in the

ability to perform certain daily activities, especially in the older cohorts; among the older generations tasks like cooking or shopping are more likely to be done by women, while tasks like managing money are more likely to be done by men. However, research evidence from five European countries that differ considerably in terms of the distribution of gender roles has suggested that the differences by gender in levels of ability to perform tasks like preparing meals, shopping and housework are similar across Finland, Italy, the Netherlands, Spain and Sweden.²

› Are men or women mentally stronger?

Women are more likely than men to suffer from depression, and are more prone to experience symptoms such as appetite disturbance and sleep disorders. In contrast, men are more likely to commit suicide.

› Does “stronger” also mean “smarter”?

Gender differences in cognitive abilities continue to play a big role in the scientific, medical and political discourses. Generally, men have advantages in mathematical and visuospatial abilities (i.e., abilities that help individuals find their way or recognise faces). Women tend to be better at remembering events and in using and understanding language (verbal ability). However, it should be emphasised that there are no, or rather negligible, gender differences in general intelligence, at least in developed countries in which men and women have similar educational opportunities. Although research has suggested that cognitive decline occurs at similar rates in men and women, Alzheimer’s disease is more prevalent and more severe among women than among men, but the underlying mechanisms for this gender difference are not yet fully understood.

› Do men or women get sick more often?

Empirical evidence has shown that women have more physician-certified absences from work than men.³ In countries with universal access to health care services, such as the Scandinavian countries,

men are more reluctant to visit or postpone seeing general practitioners, but have higher hospitalisation rates than women. These patterns may be different in countries that do not provide equal access to health care services. In those countries, men tend to have higher socio-economic status and wages than women, and therefore, may have greater access to health care services.

Women and men also tend to have different health concerns and health care needs. Women often develop chronic conditions that are not lethal, but that are likely to become disabling over time, such as osteoporosis, cataracts, knee and hip problems, migraines or autoimmune diseases. Men, by contrast, are more likely than women to suffer from acute conditions that are associated with high mortality rates, such as angina pectoris, heart failure and stroke.⁴ This sex-specific distribution of chronic conditions is also observed “under the skin”, i.e., at the level of biological markers of health. For example, men have a higher prevalence than women of electrocardiographic abnormalities reflecting serious, life-threatening, pathophysiological changes in the heart; whereas women suffer more from being overweight and obese, which do not pose immediate health risks, but that are linked to functional limitations.

At all ages, men have a higher incidence of all cancers excluding sex-specific forms, but gender differences in other chronic conditions may change as individuals age. For example, compared to men, women tend to develop cardiovascular diseases about ten years later and have a lower lifetime risk of developing cardiovascular diseases. Thus, when seeking to answer the question of whether men or women get sick more often, it is important to consider not just the prevalence of a particular disease, but also the age-related changes in this condition.

› All things considered, are men or women healthier?

Women generally rate their overall health lower than men of the same age. Because of the traditional distribution of gender roles, women tend to have more responsibility for the health of the family and they may be more knowledgeable than men about signs of diseases.⁵ It is also commonly assumed that men are more stoic and are more reluctant to discuss their health problems than their female counterparts.

Women, by contrast, are said to be more likely than men to report signs of illness, particularly psychosomatic symptoms of stress and malaise, such as sleep problems, difficulties with concentration, headaches, or back pain; and to be more prone than men to seek medical advice promptly when health problems arise.

If unhealthy men are more reluctant than unhealthy women to participate in or report their symptoms accurately in surveys, some of the observed gender differences in health may be attributable to sex-specific survey participation patterns. Research in Denmark has shown that women who were hospitalised or used medication prior to being surveyed have been slightly overrepresented in surveys, which may have resulted in the overestimation of health problems among the female population.

However, this selection bias is likely to explain only a small part of the observed gender differences in health, and the size of this selection bias may differ in countries with higher levels of gender inequality than in Denmark. Interestingly, no differences in the accuracy of the reporting of medication use in surveys has been found between men and women.

It is important to keep in mind that the way survey participants answer to the questions about subjective health can be culturally influenced. For example, in a ranking of ten European countries, Denmark and Sweden were rated as having the healthiest populations, whereas Germany was in eighth place, just ahead of Spain and Italy.⁶ However, when differences in reporting styles were taken into account, Germany moved up to the middle of ranking, and Denmark fell to sixth place.

Among older people, who tend to adhere to more traditional gender stereotypes, women may over-report and men may under-report health problems. But less is known about gender differences in reporting styles among younger generations who tend to follow more egalitarian gender role norms, for example fathers taking on more responsibility for household and childrearing tasks, or women who are more often employed.

There is also a lack of adequate research on the issue of whether gender differences in health are confounded by the inclusion of populations in care institutions, who generally have worse health than

their community-dwelling peers.

› Who lives longer?

The issue of gender differences in health is clearly complex, and much of this complexity can be attributed to variations in definitions of health and to age-related changes in the incidence rates of many chronic conditions. However, research has consistently shown that women have a greater life expectancy than men: In almost every country in the world, women can expect to live longer than men.⁷ This difference was observed as far back as the 1750s in Sweden and in other developed countries. Across the developed countries for which reliable vital statistics are available, the difference in life expectancy between men and women in 2014 was largest in the Russian Federation (11.22 years), and was smallest in Sweden (3.70 years). There is growing evidence that the female advantage in healthy life expectancy (i.e., expected years of life spent in good health) is smaller than the gender gap in life expectancy in most European countries. These findings suggest that women may live longer despite having more disabilities and chronic conditions than men.

› What are the explanations for the gender differences in health and survival?

The pervasive gender inequalities in health and survival have intrigued researchers for decades. Currently, most scientists who have looked at this issue agree that the gap has biological underpinnings modulated by social and behavioural conditions.

The most prominent biological explanations for the female survival advantage are hormonal and genetic. Studies show that oestrogen has positive effects on lipoprotein profiles by decreasing “bad” cholesterol levels (total cholesterol and LDL cholesterol levels) and increasing “good” cholesterol levels (HDL cholesterol), and that it has a range of anti-inflammatory and vaso-protective effects. The evidence regarding the effects of testosterone on men’s health has been mixed. Although some studies have reported negative associations between testosterone levels and mortality related to all causes, cardiovascular diseases and cancer it is still

unclear whether these associations are causal, or whether testosterone is an important biomarker of overall male health.

Hormones also affect processes in our immune system: Progesterone and testosterone have immunosuppressive effects, whereas oestrogens have immune-enhancing effects. The incidences of many bacterial, viral, parasitic and fungal infectious diseases have been found to be substantially higher, and some infectious diseases have been shown to be more severe in men. Autoimmune diseases are more common and immune responses to vaccinations are often stronger in women than in men. These findings have led researchers to conclude that low levels of immune-competence among men contribute to gender differences in mortality and health.⁸

A number of experts have suggested that fundamental sex differences in genetics contribute to the female survival advantage. As a result of mammalian evolution, the human organism has more than 1,000 genes on the X chromosome that are involved in various physiological processes, but fewer than 100 genes on the Y chromosome.⁹ The sex-determining chromosomes can carry genetic mutations that cause a number of life-threatening diseases, such as haemophilia. If a woman carries an abnormal gene on one of her X chromosomes, the normal gene on her second X chromosome can be used, and the disease can be avoided. But since men only have one X-chromosome, the defective gene leads to the disease.

Furthermore, gender differences in lifestyle behaviour appear to be associated with differences in cardiovascular diseases, lung cancer, chronic obstructive pulmonary diseases, liver cirrhosis and accident fatalities between men and women. It is well known that men have a riskier lifestyle than women, for example, in relation to the consumption of tobacco, alcohol, psychoactive substance use, eating unhealthy food and driving less safely. Women tend to report eating more vegetables and fruits, and fewer high-fat food products than men. According to the German Health Interview and Examination Survey for Adults 2008-2011, about 50% of women and 34% of men aged 18-79 years have never smoked. In recent generations in developed countries, the gender gap in smoking and alcohol consumption appears to have decreased, or even reversed – men consume less tobacco while women

reach for cigarettes more often.

These trends can be partially explained by the expansion of equal rights between women and men in Western societies. These developments suggest that there is an urgent need to include women in the target populations for healthy living campaigns.

There are, however, behavioural areas in which men perform better than women, including physical activity. In a survey across 20 countries, young men were more likely than young women to report high levels of physical activity.¹⁰ While men tend to be more active at adult ages, women appear to be less likely than men to reduce their levels of physical activity as they age. Given that regular physical activity contributes to the prevention of many chronic diseases, the maintenance of mental wellbeing and improved survival among people of all ages, physical activity together with a healthy diet is the most important health measure to positively influence a population's health.

› Conclusions

The research evidence presented here clearly shows that gender differences in health vary in their directions and magnitudes. Thus, the question of whether men or women are the "stronger" sex cannot be easily answered. This is hardly surprising given that health is a multidimensional concept, and "is a complete state of physical, mental and social wellbeing, not merely the absence of disease."¹¹ We need to further investigate whether the individual determinants of health – e.g., smoking or being overweight – have the same meaning for men's and for women's health and survival. Behavioural differences in treatment-seeking behaviour and compliance with the use of prescribed medication are also likely to contribute to this gender gap. If further research suggests that the higher hospitalisation and mortality levels among men are partially due to delays in seeking treatment, then the factors that affect the tendency to seek medical help should be carefully studied. Men should also be encouraged to behave more responsibly when they notice the first signs of becoming ill.

It is also important that we better understand why and how men and women age differently. If women undergo a more rapid transition from "healthy" to "unhealthy" states and are less likely to recover than

men, then future research should focus on identifying the factors that contribute to these health transitions, and on designing strategies to prevent the deterioration of health.

Since most previous studies that examined gender gaps in health and mortality have focused on disentangling the effects of the individual biological or behavioural factors that contribute to these gaps, there is a need for more integrative models that account for the interactions of these individual factors.

All of this research can help policy makers create tailor-made strategies to improve the health and quality of life of men and women. Ultimately, this reduces the costs of the health care system in an ageing society.

Annotations

- [1] Bohannon, R. W., et al. (2006): Reference Values for Adult Grip Strength Measured with a Jamar Dynamometer: A Descriptive Meta-Analysis. *Physiotherapy* 92(1): 11-15.
- [2] Nikula, S., et al. (2003): Are IADLs Comparable Across Countries? Sociodemographic Associates of Harmonized IADL Measures. *Aging Clinical and Experimental Research* 15(6): 451-459.
- [3] Mastekaasa, A. & Olsen, K. M. (1998): Gender, Absenteeism, and Job Characteristics. *Work and Occupations* 25(2): 195-228.
- [4] Gold, C. H., et al. (2002). Gender and Health: A Study of Older Unlike-Sex Twins. *Journal of Gerontology, Series B, Psychological Sciences and Social Science* 57(3): 168-176.
- [5] Idler, E. L. (2003). Gender Differences in Self-rated Health, in Mortality, and in the Relationship Between the Two. *Gerontologist* 43(3): 372-375.
- [6] Juerges, H. (2007): True Health vs Response Styles: Exploring Cross-Country Differences in Self-Reported Health. *Health Economics* 16(2): 163-178.
- [7] Barford, A., et al. (2006): Life Expectancy: Women Now on Top Everywhere. *BMJ* 332(7545): 808.
- [8] Owens, I. P. F. (2002): Ecology and Evolution: Sex Differences in Mortality Rate. *Science* 297(5589): 2008-2009.
- [9] Migeon, B. R. (2007): Why Females are Mosaics, X-Chromosome Inactivation, and Sex Differences in Disease. *Gender Medicine* 4(2): 97-105.
- [10] Bauman, A., et al. (2009): The International Prevalence Study on Physical Activity: Results From 20 Countries. *International Journal of Behavioral Nutrition and Physical Activity* 6(1): 6-21.
- [11] WHO (1948): World Health Organization. WHO Definition of Health. Available online: <http://www.who.int/>

<about/definition/en/print.html>.

Further Reading

- Benyamini, Y., Leventhal, E. A. & Leventhal, H. (2000): Gender Differences in Processing Information for Making Self-Assessments of Health. *Psychosomatic Medicine* 62(3): 354-364.
- Colom, R., et al. (2000): Negligible Sex Differences in General Intelligence. *Intelligence* 28(1): 57-68.

How Much Money is Transferred Between Generations?

Fanny Annemarie Kluge

*Max Planck Institute for Demographic Research,
Rostock*

Recommendations

✓ Individual life phases, such as education, employment and retirement, should be reconsidered in light of increases in life expectancy.

✓ The costs of an ageing population should be distributed over many shoulders.

In the context of demographic change, the cost associated with an ageing society has become one of the most frequently discussed topics in politics and society. The negative consequences of ageing are mainly a result of the pay-as-you-go social security systems in Western industrialised countries. Germany engages in a particularly large redistribution of resources between the generations through public expenditures for education, pensions, health care, nursing care, unemployment benefits and social welfare benefits. As the population ages and declines in size, these transfers are being carefully examined, and the sustainability of public finances must also be secured in the future.

Germany is one of the countries with the oldest population worldwide and is a forerunner of demographic change. Over the past 20 years, the median age in Germany – the age at which exactly half the population is older and half is younger – has risen eight years, and is now at 46.2 years. Since the birth rate has been well under the replacement rate of 2.1 children per woman since the 1970s, the subsequent generations will be numerically much smaller and older than the preceding generations. This trend will become even more pronounced in the future. In the coming decades, the over-80 age group is projected to rise substantially. Estimates that half of the girls born today could end up reaching the age of 100 is a success at the individual level. On average, people are reaching ever higher ages in increasingly good health.

In an ageing population, how individuals arrange their economic life courses takes on a special significance. It is important for people to fill their longer lives in a meaningful and sustainable manner. Interestingly, despite the expansion of healthy life years, the retirement age has fallen and the average number of years spent in education has increased in recent decades. Whereas in the 1980s and the 1990s workers retired at an average age of 62 with a life expectancy of around 75 years, today workers retire at an average age of 64 with a life expectancy of more than 80 years. In the past individuals spent on average 12 years, or 15% of their lifetime, in retirement; currently individuals are spending on average 17 years, or 21% of their lifetime, in retirement. These trends have led to a continuously increasing redistribution of income toward dependent age groups, as children, young adults, and older people are generally unable to finance their consumption through their labour income alone. Thus, improvements in health and life expectancy in the past go along with an expansion of public benefits.

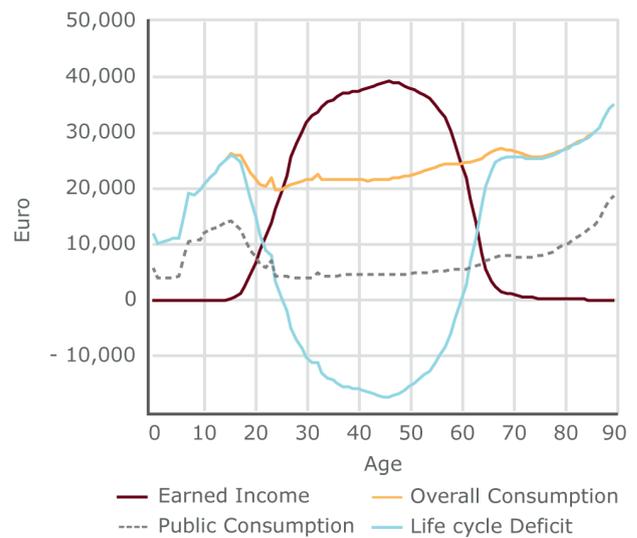
To assess the financial consequences of demographic change, we need an age profile of consumption, income, as well as public and private revenues and expenditures to quantify current transfers between the generations, and to make approximate forecasts for the future. The so-called "National Transfer Accounts" (NTA) are a relatively new method to integrate the variable "age" into the national accounts (for a more detailed overview, see www.ntaccounts.org). Data for around 50 countries worldwide are available for comparative analyses. The purpose of the NTAs is to provide a per capita age profile for all of the relevant economic variables. Using this method, we can gain information about the use of public or private services by specific age groups. For the calculations presented here, we used the 2013 Income and Expenditure Survey. The national accounts are used to validate the age profiles and to adjust them to the macroeconomic indicators. The advantage of this approach is that it shows both public and private cash flows between the generations.

If we use this method to create a profile of the individual economic life course of a typical German in 2013 (see figure), we can see that the average per capita labour market income rises steadily from age 18 onward, and reaches its highest point between ages 40 and 50. At age 65, the individual is drawing hardly any income from self-employment or from

dependent employment. At the same time, the level of consumption varies with age. Public consumption expenditures increase between the ages of six and 20 due to spending on education, and again among the 65+ age groups due to spending on health. The total consumption amount includes the amounts spent on private consumption. These figures steadily rise until age 18, and then remain relatively stable over the life course. The “life cycle deficit” reflects the difference between labour income and consumption in each age group. A positive value means that the individuals in this age group do not have enough labour income to cover their total consumption, while a negative value indicates a surplus of labour income. In Germany, the ages at which labour income is higher than public and private consumption are between ages 26 and 60 only, or 34 years out of a life expectancy today that exceeds 80 years. By comparison, young Austrians start producing a surplus at age 21, and older Swedes are productive until age 63.

Given that the dependent age groups are heavily funded by public benefits provided by the pay-as-you-go social welfare system in Germany, the transfers of the state are considered here: Two-thirds of the expenditures on the 65+-year-olds are covered by public transfers. 44% of the consumption of young people (under age 25) is covered by public transfers for education, social benefits and health benefits. While these levels appear to be relatively high in international comparisons, they are similar to the levels observed for the Scandinavian welfare states. In 2013, almost 200 billion euros were transferred to the younger age groups through the public sector. For the 65+-year-olds, these transfers came to 430 billion euros. The remaining consumption of younger people was financed exclusively through private transfers (mostly from parents, and to a smaller extent from grandparents). The net payments made from private sources to young people in 2013 came to 315 billion euros. In addition to public transfers, older people also rely on their savings. Unlike public transfers, private monetary transfers from younger people to older people were relatively rare. Thus, in Germany, transfers flow mainly from the working-age population to all of the other age groups.

Fig. 1: Labour income, consumption, and life cycle deficit by age, Germany 2013



Source: The author’s own calculations based on the Income and Expenditure Survey 2013 and national accounts for 2013.

The age profile of public revenues illustrates one of the main problems of the ageing of the German population: Taxes and social welfare contributions are primarily generated from the working-age population. Yet this population is shrinking and in the future, substantial amounts of revenues will be missing. In 2013, public net transfers from 30- to 50-year-olds to the younger and the older age groups amounted to more than 400 billion euros. Additionally, these 30- to 50-year-olds are paying for their children and looking after their own age. Due to the changes in the age structure, the individual challenges have increased, especially for those in the working-age population.

Yet we can also see that because of the federal structure in Germany, demographic change has very different consequences at the federal, state and municipal levels, and for those contributing to social insurance. Not all regional authorities are equally affected by demographic change. Given their cost structures, states and municipalities can expect reduced expenditures in the future. This is largely because regional authorities will have to devote most of their resources to funding education and social welfare benefits (housing and income support). These expenditures could be reduced for future smaller and older cohorts. In contrast, the federal government and some branches of social insurance will be responsible for covering the costs associated

with the ageing of the population, including public pension payments and increasing health and nursing care costs.

What are the implications of these findings on the individual economic life course for demographic change at the societal level? In the past, 60+-year-olds, and especially 80+-year-olds, were in the minority. A strong foundation of people of working ages allowed for high per capita transfers for pensions and health. In the future, the number of middle-aged taxpayers will shrink relative to the number of benefit recipients. If we take the age profile of public expenditures for 2013 and multiply it by the age structure in various years, we can clearly see the influence of demography. Whereas in 1990 25% of public transfers were redistributed to people under age 25, today just 18% are targeted to younger people, and by 2030 this share will have declined another three percentage points. Meanwhile, the share of transfers that go to 65+-year-olds has risen from 32% in 1990 to 42% today; and assuming age structure cost profiles remain constant, this share will increase to 52% by 2030.

However, between 2003 and 2013 the net transfers to the elderly did change. Through additional taxes on pensions, a higher value-added tax or changes in health insurance contributions, the age at which labour income no longer covers the cost of consumption could rise from 57 to 60. Between 2003 and 2013, the period during which labour income exceeded consumption was extended by five years; an important step given the ageing of society. There are also reasons to believe that health care expenditures will not increase to infinitely high levels. Findings suggest that older people age healthier, which means that in the future, older people may spend their additional years of life expectancy in relatively good health, and will not only be sick and need nursing care.¹ It thus appears that most of the health expenditures will be concentrated in the last years of life shortly before death.²

The results of the "National Transfer Accounts" programme provide us with an important insight: As life expectancy continues to expand, we have to try to reduce net public transfers to dependent age groups and lengthen the phases of the individual life course during which labour income exceeds consumption. For every year that young people enter the labour market earlier and that older people stay in the

labour market, they earn an income and pay taxes, which could in turn be used to support others. At the same time, the number of net transfer recipients is declining. However, the length of working life should not be expanded at any price. The time spent in education should not necessarily be shortened, as having a higher level of education is associated with increased productivity, which could pay off in the long run.

Although the period during which a surplus was produced was expanded between 2003 and 2013, the general life cycle results seem to be astonishingly constant, especially when they are viewed in relation to the labour income of a 30- to 49-year-old main breadwinner in a given year. But there is also considerable room to adjust these figures. If each net payer remained a net payer just one year longer, we would already see positive effects, as even small changes can have large effects at the population level. There are promising approaches to determine the age of retirement in an ageing population, which range from working life accounts and linking the age of retirement to remaining life expectancy.³ In light of the fact that the years of life gained can be spent in good health, new opportunities are presented. However, it must be emphasised that the idea of lifelong learning will have an important role in the future.⁴ Furthermore, not all occupations are suited for an expansion of working life.

Another possible approach is to generate more public revenues from income sources that are not dependent on age. For example, consumption taxes could be raised, as has been done in the Scandinavian countries. In Sweden, people produce a surplus past the age of 60. Moreover, the activation of women and migrants would have positive effects on the labour force potential, as it would change the economic ratio of those who depend on transfers to those who contribute transfers. However, demographic change should be considered differently. If more women enter the labour market, then there will be a lack of caregivers in the family, for example, since women currently care for dependent, older family members while also caring for their children simultaneously.

Demographic processes have a profound impact on our society. This influence will increase in the future as the baby boom generation reaches retirement age. Of course, the interventions suggested in this article will not solve all of the problems associated

with demographic change. Nevertheless, we should begin to shape the future. The burden of providing our ageing population with an adequate quality of life should be shared across many shoulders, and regardless of age.

The good news is that demographic change is less like a sudden storm than a gradually evolving shift in the climate. The demographic developments over the coming decade are (with the exception of migration movements) highly predictable. The children who will start school in six years have already been born, the labour force potential or the number of potential nursing home residents can be forecasted using a range of scenarios. If we find common answers to the most pressing questions, then we can shape the change.

Annotations

[1] Doblhammer, G. & Kreft, D. (2011): Länger leben, länger leiden? Trends in der Lebenserwartung und Gesundheit. Bundesgesundheitsblatt, pp. 907-914.

[2] Breyer, F. & Felder, S. (2006): Life Expectancy and Health Care Expenditures in the 21st Century: A New Calculation for Germany Using the Costs of Dying. Health Policy 75(2): 178-186.

[3] Fenge, R. & Peglow, F. (2014): The Impact of Demographic Developments on the German Statutory Pension System. Working Paper with Francois Peglow (MPI Rostock), 2014.

[4] Vaupel, J. & Hofäcker, D. (2009): Das lange Leben lernen. Zeitschrift für Erziehungswissenschaft 12(3): 383-407.

How Will Ageing Affect Social Cohesion?

Harald Wilkoszewski

WZB Berlin Social Science Center

Recommendations

✓ The discussion about what intergenerational justice can and should mean has so far been relatively superficial, and should be addressed in greater depth by political leaders and society.

✓ In discussing this issue, three main points should be taken into account: 1) differences in attitudes between younger and older people; 2) the overall societal role of new family forms; 3) the capabilities and potentials of all age groups.

✓ To create opportunities for discussions for the different generations, political education must be developed for all age groups.

› Overview

For some time now, population ageing in Germany, together with the need to reform the sustainable financing of the social security system, have prompted a discussion about the question of how social cohesion between the generations can be safeguarded and further developed in the future. In laser-like fashion, the various developments and events of recent years have put these structures in Germany and in its European neighbours to the test. On the one hand, there are the classic lines of conflict, or the so-called cleavages, between, for example, the poor and the rich.¹ On the other hand, there have been crises at the level of the EU, such as the Euro crisis (2008) or, more recently, the Brexit vote (2016), that have instigated and exposed very large differences in individual countries, and that threaten the cohesion of social groups. For example, a Eurofound study has shown that as a result of the financial crisis, the levels of trust citizens have in both national and European institutions have declined sharply.² The very close vote in the referendum on whether the United Kingdom should leave the EU shows that the British society is divided on a question that is of great

importance not just for that country, but for Europe as a whole.

As several observers have noted, it is of great importance that this division is heavily dependent on age and the ageing of the population.³ 1) Regarding the Brexit decision, the preferences of younger and older British people differ sharply: While the majority of older people voted to leave the EU, the majority of younger people voted to stay in the EU. A scientific survey showed that the younger generations in particular had very negative and emotional reactions to the loss of the referendum. 2) A second important way in which age played a role in the Brexit decision was the claim made by those on the losing side of the vote that the consequences of Brexit would be especially severe for the younger generations, whose future opportunities – such as working in Europe or engaging in other transnational activities – would be curtailed. 3) There were large differences in the political participation levels of the various age groups, as voter turnout in the referendum increased greatly with age: While 64% of the population in the 18-24 age group voted, 90% of the population in the 65+ age group went to the polls. This leads to the question that is of fundamental importance, namely, are the younger generations sufficiently involved in the decision-making processes that will greatly affect their future; and, if so, how?

These three observations are anything but specific to the Brexit vote. Rather, they touch upon issues that are of central importance to every society, such as, for example, intergenerational justice and political participation.⁴ However, the Brexit vote revealed with a degree of clarity never seen before the demographic dimension of social cohesion.

The question of whether older and younger people differ in their socio-political preferences, and how these preferences might affect intergenerational justice and the distribution of resources, first received considerable attention in social science discussions in 1984, when Samuel H. Preston introduced his hypothesis that the U.S. was experiencing a generational conflict based on distribution politics at the expense of younger generations.⁵ Since then, this topic has gone through different levels of awareness, and has been controversially researched and debated in Germany and Europe. Several studies⁶ have found lower levels of conflict between age groups, or they have argued that there are few signs that demographic change

and the accompanying shifts in the age structure of the population will result in a deterioration of social cohesion between young and old. However, other studies based on data from Germany⁷, Switzerland⁸ and across Europe⁹ found that there were clear differences in socio-political preferences by age group. In addition, the discussion resulting from the British EU referendum was not the first event to reveal that the potential fault lines between younger and older people could become more relevant in the future. Already in the context of the 2008 financial crisis, the European Commission issued a report in which they noted that the consequences of the crisis could exacerbate the existing differences between the age groups¹⁰, and they reinforced their commitment to working toward intergenerational justice within the EU.

› Challenges

What challenges can we identify in light of the findings outlined above? Research on differences in attitudes between younger and older people in Germany have shown that there are indeed differences, even if they are not open conflicts between the generations. Nonetheless, it would be wrong to conclude from these results that the topic does not need to be brought into the political planning process. As the Brexit vote in the United Kingdom showed, differences between age groups can quickly turn into virulent arguments over who is to blame. In Switzerland, age is the most important factor in referendums on political issues related to distribution. Since the German political system does not permit nationwide referendums and the decision process is heavily focused on consensus, possible differences in attitudes within the German society cannot be expressed as clearly.

Moreover, based on our current knowledge, there is little reason to expect that population ageing will slow down in the future. As in all developed countries, life expectancy in Germany is increasing with a remarkable degree of regularity at around three months per year. There are no indications that this trend is weakening. The demographic restructuring of the German population to an ageing society indicates that the relative influence of younger people at the voting booth will continue to decline. The extent to which demography and the levels of political power held by different generations can influence

events has already been shown by a study of voter turnout in the Brexit referendum. The study noted that news reports during the two days after the vote indicated that the majority of young people were in favour of remaining in the EU, but smaller shares of younger people took advantage of their right to vote (a phenomenon that is observed in many countries, including Germany). Ergo: Young people should blame themselves for their political loss. However, more precise calculations¹¹ showed that even if 100% of the younger people who were qualified to vote had participated, the more numerous, older, pro-Brexit British would have ensured that the outcome of the referendum was the same. If we transfer the Brexit scenario to other countries like Germany, we can see that because of their demographic weight, older voters will ultimately be the decisive factor when it comes down to it.

Another factor worth considering is that because the economy in Germany has been extraordinarily strong in recent years, political questions about the distribution of resources have lost their dramatic effect. The discussion about, for example, the sustainability of pensions or the financing of additional benefits for the elderly was much more contentious ten years ago than it is currently. If the economic situation worsens, then the tone could become much sharper. We should prepare for this possibility.

To prepare properly, we have to ask the right questions. With regard to the issue of ageing and social cohesion, the following are the two main aspects:

First – What does intergenerational justice mean in an ageing society?

Life expectancy reaching levels of 80, 90, or even 100 years, is dramatically contrasted by a slowly increasing age of retirement. 40 years spent in retirement makes no sense from the perspective of the individual or society. This problem is becoming more significant as it is not just Germany, but also other countries in Europe, where it is difficult to make the retirement age more flexible and to create the conditions needed to ensure that individuals can work for longer periods of time. This failure can be attributed to a tendency to avoid the fundamental conversation that needs to take place about the rights and responsibilities of the various generations in relation not just to pensions, but to social benefits in general. While the “demographic strategy” of the German

federal government focuses attention on the relationship between the young and the old, it does not include concrete statements about how the claims of the various age groups can be addressed socio-politically to ensure that each generation will be given the chance to participate in society, fairly and with dignity. However, a societal consensus about how to achieve this goal will be needed, as the socio-political expectations of the various demographic groups continue to differ. An assessment of political reforms that are being proposed under the heading of intergenerational justice should also be part of this discussion. However, the so-called “debt ceiling,” for example, which is designed to prevent public debt from becoming a financial burden on future generations, can also cause necessary investments in infrastructure and education to be delayed or avoided altogether. Moreover, to consolidate their budgets, a number of federal states have used up all or most of the reserves that were supposed to cover their rising pension liabilities. Given the unequal participation levels of the age groups, organising and moderating a discussion about these issues is likely to be very challenging.

Second – What type of family stability should the social welfare state support?

Population ageing is only one element of demographic change that Germany is experiencing. Family structures are also affected: The shares of the population who have no children of their own or who are not married are growing. The family – which is often seen as the “nucleus” of a society – is an important factor when it comes to social cohesion, but the familial cohesion is changing. Nevertheless, many social policy makers continue to cling to the ideal model of the traditional family. After all, it is easier for the state to control and organise traditional family arrangements. The state tends to privilege the traditional family because it fits reliably within the institutional and temporal frameworks by assuming duties that are considered important to social stability. If two people accept responsibility for each other, they are better able to help each other in difficult financial, health or social situations. This arrangement lightens the burdens on the public purse, and strengthens the community. Given these likely changes, the key question is which forms of “family,” in addition to the traditional form, the state will support legally and financially. Wouldn’t intensive parenting of children by godparents help to ease

the burden faced by a single parent family and not the state? Wouldn’t a stable partnership between two widowed or divorced seniors who continue to maintain their own households, but who otherwise support each other as if they were married, be just as important for a society as a classic union between a man and a woman with a marriage certificate? The fundamental discussion about what modern forms of family stability look like, and which forms the state can support, is urgently needed, but has yet to take place.

› Possible courses of action

For social and political actors who want to address these two central issues, several courses of action are worth considering. The following describes two possible approaches for responding to the first question, which already has some initial best practice experiences.

More political education to create more space for discussion and participation across the generations

To improve awareness of the socio-political expectations and needs of other groups, the generations should have more opportunities to engage in discussions of these issues. A political approach to education designed for all age groups is needed. Using this approach, the public should be educated about the effects of population ageing, and discussions about intergenerational justice should be organised and moderated. Ideally, this would also lead to higher levels of political participation by underrepresented, i.e. young, groups. An experiment with such an approach was conducted under the scientific direction of the *Akademie für Politische Bildung* at the closing session of the 2013 Year of Science, and again in 2016 in Bavaria. The political simulation, “Parliament of the Generations” (www.parlament-der-generationen.de), was designed to both provide more information about political negotiation processes between the generations, and to serve as a political education programme aimed at promoting dialogue between the age groups. For the parliaments, a group of up to 200 participants were chosen who were as representative as possible of the broader population. Over two days, the participants took on the roles of parliamentarians who were discussing political reforms related to issues of distribution. Such events are relatively resource-intensive, but the

learning effects justify the effort. It would therefore be desirable for such educational opportunities to be offered on a systematic basis. At the very least, topics such as ageing, intergenerational justice and social policy should be standard components of political education programmes.

Create transparency about the potential of various age groups

To engage in a knowledgeable discussion about intergenerational justice, we need to have as much information as possible about the potentials and capabilities of the different age groups. While we have plenty of information from “generational accounting” about the balance of contributions made by the generations, and about how transfers flow between the generations (see the contribution by Kluge in this publication), measuring the capabilities of older and younger people is much more difficult. In 2012, the European Commission started an “Active Ageing Index,”¹² in response to the financial crisis and to fears that it could have negative effects on social cohesion. The index shows how older people living in the 28 EU member states can realise their potential in terms of work, social and cultural participation, and independent living. The index also measures the extent to which the social environment enables older people to live an “active life.” A ranking tells us how well each country is performing in general, and in specific categories. In 2014, Germany was ninth out of 28, but it did particularly poor in the category of “social participation” (24th place). Sweden is the overall frontrunner of the index, and occupies first place in almost all of the categories. These kinds of relative benchmarks cannot, of course, fully reflect reality, but they can serve as a useful indication of the need for reform. However, to provide the kind of comprehensive information that is needed to conduct broader public discussions of intergenerational justice, the index has to cover more than just the older generation – the index has to also include the younger generations.

Annotations

- [1] Tamaru, T., et al. (2016): Socio-Economic Segregation in European Capital Cities. (n.p.): Routledge.
- [2] Eurofound (2013): Political Trust and Civic Engagement During the Crisis. Luxembourg: Publications Office of the European Union.
- [3] Kermani, N. (2016): Auf Kosten unserer Kinder. Frank-

furter Allgemeine Zeitung, 29.06.2016; Georgi, O., & Steppat, T. (2016): Die Alten wählten den Brexit – Die Analyse. Frankfurter Allgemeine Zeitung, 24.06.2016; Wilkoszewski, H. (2016): That (Demographic) Ship has Sailed. Population & Policy Bites. [Weblog], 05 Jul. 2016. Available online: <http://www.population-europe.eu/statement/demographic-ship-has-sailed>.

[4] Bertelsmann Stiftung & Eurofound (2015): Gesellschaftlicher Zusammenhalt und Wohlbefinden in der EU. Gütersloh and Dublin.

[5] Preston, S.H. (1984): Children and the Elderly. Divergent Paths for America’s Dependents. *Demography* 21(4): 435–457.

[6] Naumann, E., et al. (2015): Die Alterung der Gesellschaft und der Generationenkonflikt in Europa. *Zeitschrift für Soziologie* 44(6): 426–446; Busemeyer, M., et al. (2009): Attitudes Towards Redistributive Spending in an Era of Demographic Ageing. *Journal of European Social Policy* 19(3): 195–212.

[7] Wilkoszewski, H. (2011): Germany’s Social Policy Challenge. London School of Economics and Political Science.

[8] Bonoli, G. & Häusermann, S. (2009): Who Wants What from the Welfare State? *European Societies* 11(2): 211–232.

[9] Wilkoszewski, H. & Muth, E. (2009): Demographic Change and the Acceptance of Population-related Policies: A Comparison of 13 European Countries. MPIDR Working Paper.

[10] European Commission (2009): 2009 Ageing Report. *European Economy*, No. 2.

[11] Wilkoszewski, H., Loichinger, E. & Dick, P. I. (2016): Turning the Tables – Policy and Politics in an Age of Ageing. Population & Policy Bites. [Weblog], 18 Oct. 2016. Available online: <http://www.population-europe.eu/statement/turning-tables-policy-and-politics-age-ageing>.

[12] UNECE: Active Ageing Index Home. Available online: <http://www1.unece.org/stat/platform/display/AAI>.

Better than Expected? The economic potentials of an ageing society

Tobias Vogt

*Max Planck Institute for Demographic Research,
Rostock*

Recommendations

- ✓ The economic potential of older populations should be positively highlighted and actively developed.
- ✓ Options for and knowledge about private old-age provisions designed to cover longer periods of retirement should be improved.
- ✓ Innovative technologies and digitalisation offer economic growth opportunities in elderly care.

The picture of the future of a society growing older is often painted in dark, gloomy colours. The relative increase in age groups of a specific age, typically starting at the statutory retirement age, could pose dangers for the sustainability of our public finances and our economic prosperity. Some fears are certainly not to be dismissed, since in its current form, our social system will be under great pressure. Nevertheless, the ageing of society should not be evaluated merely from the standpoint of costs, as it also provides opportunities. On the one hand, it could offer opportunities that could be seen as unintended positive consequences of ageing. On the other hand, social and political decision-makers should aim at strengthening potentials of the ageing society so that the fears of the public attributed to demographic change can be eased. At the same time, we should not forget that despite the tendency to characterise population ageing as a looming challenge, we have been in the middle of this trend for some time now.

Even without targeted efforts by the relevant decision-makers, changes in a society's population structure provide new economic and development opportunities. These changes do not just refer to the current increase in the number of older people in our society. In the past, the decreasing number of younger age groups has contributed to economic

growth. These positive effects that resulted from changes in the age structure have been called "demographic dividends."¹ An initial demographic dividend can be realised when, for example, a decline in the birth rate leads to a decrease in the share of young people in the population. This results in society having to support fewer young people, and that the child dependency ratio, or the ratio of the number of current workers to the number of future workers, declines. To realise this demographic dividend, investments must be made in education and other forms of care infrastructure. Almost all developed countries have the demographic conditions needed to realise a large initial demographic dividend as birth rates decline. However, in Germany and in other Western countries, the first demographic dividend took place in the 1960s and the 1970s, when the birth rates fell and remained below the replacement rate of 2.1 children per woman.

The onset of ageing, which is now well advanced due to the increase in life expectancy, offers Western societies the opportunity for a second demographic dividend. This realisation is based on the necessity of older people to prepare for their longer lifespans and the need to finance a prolonged retirement. The capital, which is made up of savings and assets, and is economically available, provides economic impulses, for example in the form of investments. While such a dividend is possible in an ageing society, whether it is realised depends on the socio-political framework conditions and the types of policy decisions that are made.² In countries with pay-as-you-go pension systems, individuals tend to save less than they do in countries where they have to make their own provisions for old age. For example, in countries like Sweden and Finland private retirement saving plays a marginal role, and the opportunities for realising a second demographic dividend in these countries is thus very limited. The Germans and the British, by contrast, rely on their accumulated assets to cover their consumption needs in retirement to a much greater extent.³ Since the last pension reforms in Germany, the trend toward making individual preparations for retirement clearly increased. Whereas in 2003, 73% of German households had made no additional preparations for retirement, by 2013 this share had declined to 39%.⁴ This development points to a second adjustment mechanism that should not be ignored when seeking to realise a demographic dividend: People of working age have to be aware of the need to prepare for retirement, and need a cer-

tain degree of “financial literacy”, i.e. an understanding about managing financial services. Then again, they need to have sufficient financial resources to be able to build up savings and assets over a longer time period.

The accumulation and access to private financial assets by older Germans is not only decisive for a possible demographic dividend, but it highlights the roles of older people as consumers and as bequeathers. Between 1993 and 2013, the share of total consumption attributable to people aged 60 and older rose from 23.6% to 31.3%. In terms of importance as private consumers, this age group caught up to the 30-50 age group. This relative increase in private consumption did not occur just among people around the age of entry into retirement; rather, consumption increased to the same extent among older age groups. The importance of people aged 70+ has increased considerably in the last 20 years. Their share of total private consumption rose from 11.6% to 17.8%. By comparison, younger age groups lost importance over this period. The share of consumption attributable to people under age 30 declined from 28% in 1993 to 21.9% in 2013, even though total private consumption increased by 47% over this period, amounting to 1.26 billion euros.

The consumer spending of older people does not just reflect the cost of living. The demand for health-related products and services is growing. The types of products and services older people are purchasing go beyond more intensive personal nursing services, but rather offers the potential for innovation-driven growth. For example, information and communication technologies are playing central roles in health care provision, health monitoring, the delivery of medical services, as well as in the provision of services that help older people remain mobile and lead an independent life. As the oldest country in the world, Japan leads the way in the development and the distribution of innovative technologies for age-related growth incentives.⁵ In Germany, economic growth is also expected in the area of e-health. For example, health consultations (interactions between physicians and patients) supported by digital technologies and sensors, or the monitoring of patients or their surroundings.⁶ These innovations are not limited to older consumers in Germany, but they offer, for example, possibilities for growth in other European or globally older markets.

Despite the rise in life expectancy and the increase in consumption among the older population, the younger generations can benefit from these trends through the transfer of assets from older to younger family members. Estimates of the amounts of wealth that are inherited each year vary greatly depending on the calculation methods used, from 64 billion to 300 billion. Inherited assets are also increasing annually.⁷ Since fertility has been low for decades, these inheritances are being divided among increasingly smaller numbers of children. These assets are inherited later, often at an age when their own grandchildren have already been born.⁸ This trend does not necessarily lead to greater economic growth. However, this development shows that even ageing societies have opportunities that can be taken advantage of through sound policy making. For example, these funds can be used to support the younger generations during phases when they need more financial support, such as when they are in school or are raising children. In addition, the taxation of inherited estates can allow for the redistribution of these funds outside of the family.

Since older people can stimulate the economy as both savers and consumers, it is clear that we should view demographic change as an opportunity, not as an obstacle. This applies especially to the productivity of older people. Just based on the legal and actual age of retirement, people aged 60-65 are already classified as “old.” But given the annual increases in life expectancy, including during retirement ages, this statistical indicator should not be used to assess a person’s capabilities – especially since older people do not seem to become less productive, but also contribute to the creation of value.⁹ It also appears that the increases in average educational levels and in health will enable people to use the years of life they have gained productively.

The positive effects of a longer productive phase of life can be observed by looking at the effects on public finances, for which the most pronounced reform efforts are anticipated. The finances of the federal and state government are not equally affected by the ageing of society, as the expenditures of the German states are mainly spent on the declining younger age groups; whereas the expenditures of the federal government, which consists mainly of federal subsidies for social insurance, are more involved in ageing. But the simple assumption that the productive phase of life can be extended by five years has

substantial implications for both the federal and the state governments.

For Brandenburg and Bavaria, which in the future will be among the oldest and youngest states, the extension of the productive phase of life will lead to significant increases in their projected revenues. In both Brandenburg and Bavaria, based on current levels, tax revenues in 2030 are projected to increase by 107%. In terms of spending, it may be possible to shift the largest expenditures to an ever-increasing ages. If the productive phase can be extended, pension payments can start later. Based on this modified expenditure profile, the expenditures in 2030 can be expected to decrease to 96% in Brandenburg and to 97% in Bavaria relative to today. Over the entire study period, Bavaria and the rapidly ageing Brandenburg would be able to cover their expenses. In comparison to the state level, such a development would have an even greater impact at the federal level: The extension of productive life would cause expenditures to decline from 340 billion today to 310 billion in 2030, and revenues to increase over the same period from 330 billion to 350 billion. These figures include the revenues and the expenditures of the federal government, as well as the federal subsidies for social insurance for pensions and health, and do not include the potential revenues and expenditures of the social insurance providers.

The economic opportunities described here give us reason to be confident that many of the fears associated with this ageing process do not necessarily have to happen. However, some of the negative effects of ageing on economic growth cannot be completely avoided, though their severity can be lessened. Thus, despite these positive developments, it should not be assumed that the demographic future will not have its challenges for societal decision-makers. Not just social, but also economic policy reform efforts will be needed in order for these opportunities to be realised. Most importantly, it is essential that we see the increase in life expectancy not as a societal problem, but as an individual achievement. Our additional years of life will require us to adjust our working life and the financing of our retirement. Given the extensive adjustments to the trajectory of ageing that were made through reforms efforts between 2003 and 2013, this does not seem to be an impossible task.

Annotations

- [1] Bloom, D., Canning, D. & Sevilla, J. (2003): The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change. Rand Cooperation.
- [2] Mason, A. & Lee, R. (2006): Reform and Support Systems for the Elderly in Developing Countries: Capturing the Second Demographic Dividend. *Genus* 62(2): 11-35.
- [3] Sambt, J. & Prskawetz, A. (2014): Economic Support Ratios and the Demographic Dividend in Europe. *Demographic Research* 30: 963-1010.
- [4] Börsch-Supan, A., Bucher-Koenen, T., Coppola, M. & Lamla, B. (2015): Savings in Times of Demographic Change: Lessons from the German Experience. *Journal of Economic Surveys* 29(4): 807-829.
- [5] Kohlbacher, F. & Herstatt, C. (2011): The Silver Market Phenomenon. Marketing and Innovation in the Aging Society. Berlin / Heidelberg: Springer.
- [6] Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e. V. & Fraunhofer-Institut für System- und Innovationsforschung ISI (2012): Gesamtwirtschaftliche Potenziale intelligenter Netze in Deutschland.
- [7] Bönke, T., Corneo, G. & Westermeier, C. (2015): Erbschaft und Eigenleistung im Vermögen der Deutschen: Eine Verteilungsanalyse. Discussion Paper, School of Business & Economics. *Economics*, No. 2015/10.
- [8] Kluge, F., Zagheni, E., Loichinger, E. & Vogt, T. (2014): The Advantages of Demographic Change after the Wave: Fewer and Older, but Healthier, Greener, and More Productive? *PLOS ONE* 9(9): e108501.
- [9] Börsch-Supan, A., Düzgün, I. & Weiss, M. (2009): Alter und Produktivität – eine neue Sichtweise. *Nova Acta Leopoldina* 102(366): 53-62.

Mind Change

How can we convince workers and employers of longer working lives?

Elke Loichinger

Chulalongkorn University, Bangkok; International Institute for Applied Systems Analysis, Laxenburg

Recommendations

✓ A longer working life should be accompanied by supportive measures during the entire working life – keyword life course perspective. It is not enough to only provide support for older workers.

✓ Education and continuing education already play a very important role in the ability to work. Their importance will increase in the future.

✓ Depending on the job and occupational group, individual approaches will have to be found for enabling people to have a long working life. There is no “one-size-fits-all” solution.

› Overview of the topic

One issue that is often mentioned in discussions about the ageing of society and the long-term sustainability of the social welfare state is increasing the statutory retirement age. This policy measure refers to one of three fundamental adjustment mechanisms that are part of the debate about reforms of the pension system, the other two being lowering pension benefits and increasing pension contributions. The key consideration is that the continuously rising life expectancy should not be converted on a one-to-one basis into a longer period of receiving pension benefits, but rather that a balance should be found between a longer working life and a longer period of receiving pension benefits. In Germany, life expectancy is rising at an average rate of more than 2.5 years per decade, and a central question is how we can create an environment in which people can spend a portion of these additional years of life economically active. This can only be achieved if both employers and employees are willing to do their part, and are supported by appropriate government policies.

Another aspect of ageing that suggests that people should work longer is the projected decline in the

size of the labour force due to the lower birth rates in Germany. Especially in sectors for which some experts are predicting a lack of skilled workers, longer periods spent in the labour market could help to ease this development.

› Individual challenges

Longer working lives will only be realised if both the supply of labour (employee) and the demand for labour (employer) complement each other. It is by now well known that people find it more difficult to get a job as they grow older, which suggests that there is a discrepancy between supply and demand. Depending on the type of job, it may be more or less challenging to create an age-appropriate work environment and thereby support continued employment of older employees. Many companies in Europe, including Germany, are still choosing to pay for the early retirement of older employees rather than to provide these employees with the support they would need to remain with the company. Even though there are many positive examples, a rethinking of how to treat older employees is urgently needed.

When discussing later entry into retirement, it is important to take into account the different situations of men and women. In particular, we should keep in mind that the share of workers who are women has been increasing steadily, which has led to both an absolute and a proportional increase in female employment at higher ages. The work biographies of men and women differ in many respects: For example, the extent of part-time work and breaks due to taking care of children or other family members. These different patterns are associated with differences in the employability at higher ages. Not just the different situation of men and women calls for special consideration, but also the employability of individuals based on, for example, educational level or occupational group. Their potential differs in regard to the possibilities for a longer working life: Workers differ in terms of their qualifications, are exposed to differently demanding activities and face a very different demand for labour. More generally, whether older employees are able to continue to work depends to a great deal on their qualifications and health status. Both of these factors present challenges that call for the cooperation of workers and employers. Preventive measures in the workplace to protect the health of employees

are becoming increasingly important, as are lifelong learning and continuing education. New technologies are being implemented at shorter and shorter intervals (digitalisation), and it will be even more important in the future to be prepared for changing working conditions and requirements.

The fact that people in Germany are not only living longer, but are spending more years of life in good health, seems to suggest that there should be nothing against extending the working life. However, the relationship between increasing life expectancy and the rise in the number of healthy years of life is not a natural occurrence, but is instead the result of past developments that led to an increase in living standards and better health. Active measures to support good health are needed if this trend is to continue into the future. In this context, it is important to note that the highly touted average life expectancy is just that: An average. Behind this number there are clear differences between groups of people, for example, between individuals with different levels of education and income, or who belong to different occupational groups. Men with low levels of education (ISCED 1-2) have a life expectancy that is nearly four years below that of men with high levels of education (ISCED 5-6).¹ The fact that even the probability of reaching retirement age varies by level of education, occupational group and income should not be ignored when considering the extension of working life.

› The possibilities for action by social actors

The compatibility of family duties and responsibilities with paid employment plays a large role in women's decisions about whether and to what extent they participate in the labour market. Supportive measures that make it possible to combine family and work, and to shift the emphasis from one to the other at different points in the life course, can be advanced by both lawmakers and employers. In this context, however, it is important to keep in mind that whether an individual is able to work longer depends in large part on the person's employment history in middle age. This applies to both men and women. The traditional life course, in which periods of education, work and retirement follow each other according to a strict order, is frequently interrupted. The reasons for these breaks may include child care, family care,

unemployment, education or sickness.

In light of these realities, it is essential that we take the entire life course into account, and not just the phase around the time of retirement, when considering how to enable people to work until higher ages. From an institutional perspective, these interruptions of working life have only been occasionally recognised, and then to a limited extent. The demographic necessity of longer work biographies provides opportunities – for both the state and for social stakeholders – to adjust the social and legal frameworks to these changed and still changing life courses. It would be desirable, for example, to establish a model that compensates for breaks in younger and middle ages through prolonged employment in old age. This could be done by offering flexible work options, working life accounts, lifelong formal and/or informal education, or more flexibility in the retirement age.²

The decision when an individual retires depends on a number of factors. While this decision is primarily financial, a large number of studies in Europe have shown that many other occupational, social and personal factors influence this decision, such as health status, workplace characteristics and family status. A detailed study that was recently conducted in Sweden compared the characteristics of people who left the labour market at age 65 or younger, and those who continued to work after age 65.³ It turns out that four-fifths of the first group said they were looking forward to finally being able to pursue many other meaningful and interesting projects. 40% cited health reasons, and a somewhat smaller share mentioned unfavourable workplace conditions, above all stress, as reasons for leaving the workplace. Only a small percentage of the respondents who had already left the workplace said they would be willing to return, and then only on a part-time basis. By contrast, the great majority of those who continued to work after age 65 said the main reason they decided to stay in the labour market was because they had a strong connection to their work, and found it enriching and stimulating. At the same time, more than half of these respondents said they continued to work because they had observed the positive effects of working longer on others, and for financial reasons. In addition, individuals who had higher levels of education were less likely to leave the labour market early.

Less detailed studies conducted in Germany paint

a similar picture.⁴ In Germany, an individual's level of education appears to be an important factor in whether he or she decides to exit the labour market or continue to work. At the macro level, this means that people with tertiary education are much more likely to remain in the labour market than people with secondary education, which has important implications for the current debate: A gradual change which is already taking place and will continue in the next decades is the sustained education expansion. As future generations of young and middle-aged adults will have higher educational qualifications than their predecessors, we can expect that educational attainment levels of the "new older employees" will differ markedly from those of today's older workers. At the same time, a higher education level is accompanied by a later exit from the labour market. If current trends persist, then retirement will be automatically delayed because of an increase in the numbers of people with post-secondary education. It is likely that this increase will not be sufficient to compensate for the rise in life expectancy. Still, changes in the educational structure of future generations of older people should be considered since they have direct effects on, for example, potential continuing education and work productivity.

In terms of productivity, it is important to note that older workers are not necessarily less productive than younger workers, but they do have different abilities and competences, with their main strengths being the professional knowledge and experiences they have accumulated over the years. The more these facts are known, the less age discrimination there will be when deciding whether to keep older workers on or to hire them as employees. Growing numbers of companies are recognising that when older employees leave, they take valuable human capital with them. For this reason, many German companies have teams mixed by age, and mentoring systems in which older workers support and pass on their knowledge to their younger colleagues. In mixed-age teams, the abilities of workers of different ages can be optimally used and combined. This could encourage workers to remain with the company longer. Obviously, the extent to which such measures can be applied will vary depending a range of factors, including company size. However, companies can take steps to create the necessary conditions. For example, it is important for employers to think about how workers can be encouraged to remain with the

company well before they are nearing retirement age. Strategies such as providing employees with "mid-career reviews" (MCR) can help them plan for a longer working life.⁵

In terms of lifelong learning, Germany still has weaknesses, which are reflected in the fact that the shares of adults, and particularly people aged 40 and over, who take part in further education programmes are relatively low compared to other European countries. Especially in light of the rising statutory retirement age and the expectation of longer working lives, investing in continuing education of older adults is increasingly cost-effective for employers and employees. What is crucial is that employees will need to have some confidence that they will be able to get a job even after age 50, and employers will have to be able to expect that their employees will remain on the job until higher ages. Among the questions that arise in this context is how these investments in the education of older workers will be paid for. Will the costs be covered by workers, by employers or by public funds?

Another important point in the debate about how to create incentives to work longer is related to pension system reforms. The number of years an individual contributes already plays a large role in the size of statutory pension insurance benefits. It would, for example, be possible to change the calculation of pension payments so that more weight is given to the number of years a person contributes, and less weight is given to the person's age at retirement. Such proposals have been repeatedly put forward. A more far-reaching proposal would be to completely do away with a fixed statutory age at which an individual is qualified to receive pension benefits, and to replace it with a system of precise actuarial calculations of an individual's pension benefits that is based primarily on his or her life expectancy at the time of entry into retirement, and is only loosely based on a minimum age. This policy is tied to the expectation that longer working biographies will become possible through, among other things, less age discrimination in the labour market: There would no longer be a set age at which employees are expected to leave the labour market.

The question of whether such solutions could be implemented in Germany remains open. Political analyses are needed to estimate more precisely what the chances are that such reforms would have the

desired effects.

Finally, it should be mentioned that what is good for the private sector is good for the public sector, too. We can assume that it will be easier for the general population to accept longer work biographies if federal and state employers take similar measures to prolong working lives.

Annotations

[1] Luy, M., Wegner-Siegmundt, C., Wiedemann, A. & Spijker, J. (2015): Life Expectancy by Education, Income and Occupation in Germany: Estimations Using the Longitudinal Survival Method. *Comparative Population Studies* 40(4): 399-436.

[2] Anxo, D., Boulin, J.-Y., Fagan, C., Cebrián, I., Keuzenkamp, S., et al. (2006): *Working Time Options Over the Life Course: New Work Patterns and Company Strategies*. Dublin: Eurofound.

[3] Anxo, D., Ericson, T., Herbert, A. & Rönmar, M. (2017): *To Stay or not to Stay. That is the Question: Beyond Retirement: Stayers on the Labour Market*. Report. Linnäus University, Sweden.

[4] Micheel, F., Joloff, J. & Wickenheiser, I. (2010): The Impact of Socioeconomic Characteristics on Older Employees' Willingness to Continue Working in Retirement Age. *Comparative Population Studies* 35(4): 869-902.

[5] Eurofound (2016): *Changing Places: Mid-Career Review and Internal Mobility*. Luxembourg: Publications Office of the European Union.

Work 4.0

What can technological progress tell us about the future of work?

Wenke Apt

VDI/VDE-IT, Berlin

Recommendations

Lifelong learning

✓ Opportunities to develop technical knowledge and to become proficient in using modern digital technologies and in understanding inter-disciplinary processes should be made available to all workers. The training needs of workers who are older or have low qualification levels should be given special attention, as their continuing education needs have previously been rather under-represented.

✓ Furthermore, efforts to strengthen occupational continuing education programmes should focus on small and medium-sized companies and their workers.

✓ More attention should be paid to informal learning (e.g. on-the-job learning with the support of assistance and tutoring systems) and the creation of working conditions that promote learning. New approaches for certifying and recognising skills that are acquired informally are therefore also needed.

Transfer of technology into the workplace

✓ With the help of publicly funded research, a wide array of technical assistance and tutoring systems have been developed. However, the level of implementation in companies has so far been low. Information about these systems should be aimed at medium-sized companies in particular.

✓ Additional funding programmes should explicitly address the introduction of modern digital technologies in companies. Among the research areas that should be supported are the development of products, services and business processes; the targeted use of technical innovations to improve the quality of work; and approaches to data privacy and informational self-determination in the digital work environment.

Currently, hardly a day goes by in which we do not see news about the digitalisation of the work environment; and hardly a week goes by in which there are no new studies published or conferences held on this topic. However, digital work is hardly a new phenomenon, but it has been transforming the workplace over many years. In the last 20 years, the spread of information and communication technologies like computers, the internet and mobile phones has led to profound changes in the work environment. New digital applications like cloud computing and the use of mobile devices have facilitated more flexible forms of working. Technical developments that have occurred under the heading of "Industry 4.0" have made it possible for machines to "learn" how to think, and for humans to collaborate with machines, such as with flexible, adaptive robots. In the area of artificial intelligence, researchers are attempting to simulate human cognition and human behaviour using machines.

The technological transformation of the work environment is embedded in broader economic and social processes of change, such as globalisation, the dynamisation of production life cycles, resource scarcity and concerns about sustainability, the shift from an industrial to a knowledge-based society, changes in values, and demographic change. These trends further intensify the changes in the workplace in close interaction with the technical innovations. There are also implications at the societal, organisational and individual level. In particular, the effects of these technological developments on work and employment are being debated, as are the issues of how to design "good" working conditions, and how to deal with the social and economic risks that individuals now face. Political, economic and social stakeholders have thus recognised that "Work 4.0" is the next "major construction site" of digitalisation. For future work arrangements, demographic change will also have a decisive impact. The production factor of manpower will be in increasingly short supply, especially since doubts have been raised about whether Germany will be able to offset the negative effects of demography on the labour force potential by encouraging sufficient labour market-oriented migration.¹ Therefore, the ageing and increasing heterogeneity of the working-age population requires extensive adaptation measures.

Since around the mid-1990s, workplace design for older employees has become a focus for businesses and labour research. Initially, the focus of this research was on occupational health. Over time, focus shifted to the potential of intelligent support systems as “skill amplifiers” for employees. Such assistance systems help employees carry out their work. They include information delivery technologies such as mobile devices, tablets and interactive visualisation systems (e.g., augmented reality, virtual reality and mixed reality using virtual data glasses), as well as other assistive tools that provide workers with cognitive or physical support. The kinds of support range from simply displaying work instructions (e.g., assembly and maintenance instructions, quality information or security information) via IT systems, to the documentation and delivery of knowledge (process knowledge, qualification management, etc.), the adaptation of the working environment to the needs of the individual (e.g., the delivery of context-sensitive information; adjustments of desk height, language and operator interface), to human-machine collaborations and electronically supported learning in the workplace. Among the core capabilities of state-of-the-art assistance systems are context awareness, reactive behaviour, attention control and situation interpretation. Examples of applications that are under development include assistance systems that can provide adaptive and individualised support through the use of sensors that can capture the context and the specific level of knowledge of workers.

For example, funded by the technology programme “Autonomics for INDUSTRIE 4.0” of the German Federal Ministry for Economic Affairs and Energy (BMWi), the research project APPsist has developed a multimedia assistance system that supports workers in the use of cyber-physical production systems.³ The researchers drew upon methods in the areas of artificial intelligence, virtual reality and game-based motivational learning (“gamification” and “serious games”). The goal of this system is professional training in the workplace. During the work process, the worker receives personalised, didactically appropriate information from the machine, taking into account the respective language, culture and the need for barrier-free usability. Similarly, the autonomic project motionEAP provides context-specific, process-integrated mechanical assistance for production processes. Through the use of cameras and remote

sensors, the employee’s steps are captured and evaluated. If the worker makes assembly mistakes, uses non-ergonomic body or hand positions, or otherwise deviates from the normal work process, the system projects an alert in the worker’s field of vision.

The additional information and recommendations for action provided through these technical systems can improve the quality of products and processes, and can greatly reduce the frequency of errors. An intelligent workplace that adjusts automatically to the component that is being worked on and to the size of the worker can reduce the work strain – especially for older workers – and improve productivity. Accordingly, the German Federal Ministry of Education and Research (BMBF) sponsored a research project called Ergotab, which developed an adaptive work table for the manual assembly of larger components.⁴ The work table includes a kinematic, movable system that allows for height adjustments and the rotation of components. The rotation occurs in response to the work progress. Simultaneously, the worker’s presence at the table is detected by an intuitive control system with a radio transmitter (e.g., through an arm band with an RFID tag). Characteristic values, such as height or arm span, are matched with the dimensions of the piece being built. The optimal work height is adjusted automatically. Moreover, the employee is provided with situation-specific assembly information through a screen. In so doing, age-related declines in capabilities can be compensated for and their premature loss can be prevented.

The ARSuL project, which is also sponsored by the BMBF, takes the increasingly rapid technical innovations and product cycles in the plumbing, heating and air conditioning trades as a reason to develop an augmented reality-based support tool for systems mechanics. The support technology is implemented in the work process through the complex integration of sensors capable of detecting the work context, and a learning management system. This allows highly knowledgeable workers who are older and less physically able to pass on their accumulated system and process knowledge to a younger technician, for example when installing a new system for a customer, through a technical interface. The learning system can be used over mobile devices (e.g., smart phones, tablets and data glasses) and follows the integrated learning approach.⁵ This allows older workers in particular to remain actively employed as knowledge carriers responsible for training and

further education.

Process quality and the reduction of errors are especially relevant for complex and safety-critical occupations in which human failure can have far-reaching consequences. For example, in the BMBF-sponsored MACeLot project, an assistance system for teamwork in the area of air traffic control is being developed. In another project supported by BMBF, KonsensOP, a technical assistance system is being developed for use in an “attentive operating room,” which generates instant recommendations for action regardless of the work flow and the condition of the members of the operating team.⁶ Similarly, the BMBF project SurMe is developing a technology-based training programme for spinal surgery. Using sensors, visualisation and tracking systems, and automatic learning analytics, users receive immediate feedback on their work and learning progress.⁷

The implementation of assistance systems can also make personnel planning easier. The training of new employees can be simplified through the instantaneous delivery of information to the workplace. Intelligent tutoring systems are already able to create user and skills profiles, and their support functions can respond to the concrete support requirements of the users. Learning sequences of varying scopes and levels of complexity can be embedded in the systems, and the lines between support and learning are flexible. As a consequence, the boundaries between working and learning and between productive working and continuing education (“process-immanent continuing education”) become increasingly blurred. This blurring of the lines has implications for work organisation and management, as it becomes less and less clear what continuing education is, where it begins and ends, and who decides if and how it should take place.⁸

The digitally supported, individualised assistance systems not only allow for more rapid training in new work processes; they can facilitate integration and participation in the work environment. Older or immigrant workers can be supported in the work process by these systems based on their individual performance capabilities, and can provide them with the support they need to perform types of work they previously would have struggled with or been unable to do. For example, the BMBF-sponsored project OR-TAS developed a new, portable system (“Orthese”) that is made of body-hugging textiles or lightweight

hard-shelled components that can physically support older workers in particular in performing physically demanding jobs. The integrated sensors simultaneously capture and analyse the wearer’s movements and workload, providing tactile feedback to help the worker maintain ergonomically advantageous body positions. There are, by contrast, relatively few cognition-based approaches that use digital assistance systems to support people with migration backgrounds in learning languages and integrating into the workplace. Exceptions are the BMBF-sponsored project noALIEN, which created an automated system for efficient language training, and DINTA, which provides technically-supported integration of foreign, skilled care workers while taking into consideration an inter-culturally compatible human-technology interaction. As learning the language of the destination country is a basic requirement for successful integration into society and the labour market, the digital association Bitkom has already called for the increased use by asylum seekers of digital teaching and learning tools for language acquisition.

› Challenges in implementing technology

With the help of publicly funded research, a wide array of technical assistance solutions has been developed. However, technical feasibility alone does not determine a tool’s successful transfer into the workplace. In addition to the investment costs, the legal framework, the context-specific user friendliness and ergonomics, as well as the specific company culture and the associated expectations regarding productivity improvements, cost reductions, product and process innovations, and new customer business are factors of implementation. Relatively little is known about the use of modern digital technologies in German companies. According to a representative survey of companies, around half of all companies in Germany use such technologies, or see them as a core component of their business model. However, one-third of the surveyed companies indicated that they have never used these technologies, which suggests that there is a divide between German companies on the path to the digital age. In particular, smaller companies are less likely to use modern digital technologies than larger companies. The non-users apparently see fewer opportunities to apply these technologies to ease the physical burdens of their ageing workforce, realise productivity

gains, or offer new products and services.⁹

Another risk associated with using technical assistance and tutoring systems is the user himself. He must recognise and accept the support as helpful. At the centre of considerations about user acceptance are psychological work and motivational issues, as well as the adequate protection of privacy rights, self-determination and trust in data protection. Since all activities are recorded in a digital work environment, a large pool of data is compiled from which new information can be gleaned, and a detailed profile of the performance levels, behaviours and habits of the workers can be derived. In addition, there are a growing number of applications designed to measure emotional states and “soft” work factors, such as communication behaviour and stress resilience. Established data protection principles could be under pressure, like earmarking, data minimisation, transparency and proportionality, as well as the limited processing of work-related and personal data. In the case of digital assistance systems, it is possible under current law to use the data collected in the workplace to analyse the need for qualifications or for training measures, but not for overall performance monitoring. Furthermore, monitoring by assistance systems must be made to be easily recognisable. The permanent tracking of employees is permitted in exceptional situations only.¹⁰ Thus, the digital world of work poses many new legal challenges.

The digitalisation process changes the qualification and skill levels required of workers. The current evidence suggests that in the future, technologically supported work will be less physically taxing, but more cognitively demanding, varied and complex. Therefore, the requirements for process knowledge, the ability to work across disciplines, and more general capabilities like social skills, creativity and basic digital proficiency are increasing. Thus, all of the skill areas in which humans still have a comparative advantage over machines will be in great demand. This suggests that job profiles will become increasingly similar along the human-machine interface, regardless of occupation and sector. At the same time, the demand will grow for people with vocational training or further training in skilled occupations, and for highly qualified university graduates. Workers have recognised this trend toward higher qualifications: The great majority believes that continuing education will be needed to meet the demand for higher skill levels.¹¹

› Digitalisation and demography

For the work environments of the future, it becomes clear that modern digital technologies are not rendering humans superfluous, but are instead increasingly supporting the work that humans do. Companies and workplaces should therefore be organised in a way that they support lifelong learning and conditions for “good work.” The degree to which workplaces are conducive to learning also depends on the complexity of the tasks, i.e., the extent to which workers are being asked to apply varied, high-level skills in their work, and to which the need and the opportunities to learn arise in response. The complexity of tasks that workers in Germany perform is higher than the European average. This is also reflected in the high levels of complexity of German products and the high educational levels of Germany workers, which is a key success factor in Germany’s competitiveness. The second factor is the extent to which employees are able to shape their own working conditions, and thus their freedom to act at work. The preservation of task complexity and the strengthening of opportunities for participation in the work process are thus – regardless of the technical or demographic changes in the workplace – clear contributions to the future capacity for innovation and competitiveness of companies.¹²

Given the current developmental levels of technical assistance and tutoring systems, we can expect that another ten to 15 years will be needed before these systems mature and become universally available. Thus, the time until about 2030 can be used – parallel to the decline in the working-age population and the integration of immigrants into the labour market – to develop systems of technical support that are designed to enable workers to do their jobs better through digitalisation, rather than to replace them with automation. Given this development paradigm, it should be possible to preserve the complexity of tasks. If there is a clear flattening of demographic trends, by this time, the “enabling paradigm” should be well-established at all places of work. Demographic change calls upon us to shape the digital work environment by making conscious decisions for the benefit of humans, and that make the most of their individual abilities. These innovations will help older workers in particular, allowing them to remain in the workplace longer, but will also help younger workers, who will be able to perform their work in an increasingly efficient environment – and, as the older

people of tomorrow, to profit from the innovations in continuous learning and health promotion that will be implemented over the next 20 years.

L. & Birner, N. (2014): Der iit-Innovationsfähigkeitsindikator. Ein neuer Blick auf die Voraussetzungen von Innovationen. iit perspektive, 16.

Annotations

[1] Fuchs, J., Söhnlein, D. & Weber, B. (2017): Projektion des Erwerbbspersonenpotenzials bis 2060: Arbeitskräfteangebot sinkt auch bei hoher Zuwanderung. IAB-Kurzbericht, 06/2017, Nürnberg.

[2] BMWi (2015): Erschließen der Potenziale der Anwendung von 'Industrie 4.0' im Mittelstand, Studie im Auftrag des Bundesministeriums für Wirtschaft und Energie, agiplan GmbH, Fraunhofer IML und ZENIT GmbH, Mülheim / Ruhr.

[3] BMWi (2017): Förderprogramm „Autonomik für Industrie 4.0 – Projekte“. Available online: http://www.digitale-technologien.de/DT/Navigation/DE/Foerderprogramme/Autonomik_fuer_Industrie/autonomik_fuer_industrie.html.

[4] BMWi (2017): Bekanntmachung "Mit 60+ mitten im Arbeitsleben: Assistierte Arbeitsplätze im demografischen Wandel". Available online: <http://www.technik-zum-menschen-bringen.de/foerderung/bekanntmachungen/mit-60-mitten-im-arbeitsleben>.

[5] BMBF (2017): Bekanntmachung "Erfahrbares Lernen". Available online: <http://www.technik-zum-menschen-bringen.de/foerderung/bekanntmachungen/erfahrbares-lernen>.

[6] BMBF (2017): Bekanntmachung "Sozial- und emotionssensitive Systeme für eine optimierte Mensch-Technik-Interaktion". Available online: <http://www.technik-zum-menschen-bringen.de/foerderung/bekanntmachungen/sozial-und-emotionssensitive-systeme-fuer-eine-optimierte-mensch-technik-interaktion>.

[7] BMBF (2017): Bekanntmachung "Erfahrbares Lernen".

[8] Hartmann, E. (2015): Arbeitsgestaltung für Industrie 4.0: Alte Wahrheiten, neue Herausforderungen. In: A. Botthof & E. A. Hartmann (Eds.): Zukunft der Arbeit in Industrie 4.0. Berlin / Heidelberg: Springer, pp. 9-20.

[9] Arntz, M., Gregory, T., Lehmer, F., Matthes, B. & Zierahn, U. (2016): Arbeitswelt 4.0 – Stand der Digitalisierung in Deutschland: Dienstleister haben die Nase vorn. IAB-Kurzbericht 22/2016, Nürnberg.

[10] Hornung, G. & Hofmann, K. (2015): Datenschutz als Herausforderung der Arbeit in der Industrie 4.0. In: Hirsch-Kreinsen, H., et al. (Eds.): Digitalisierung industrieller Arbeit: Die Vision Industrie 4.0 und ihre sozialen Herausforderungen. Baden-Baden: Nomos Verlagsgesellschaft, pp. 165-182.

[11] Arnold, D., Arntz, M., Gregory, T., Steffes, S. & Zierahn, U. (2016): Herausforderungen der Digitalisierung für die Zukunft der Arbeitswelt. ZEW Policy Brief 16-08, Mannheim.

[12] Hartmann, E. A., von Engelhardt, S., Hering, M., Wangler,

Winding Paths

What can families provide in an ageing society?

Martin Kohli

*European University Institute, Florence;
Bremen International Graduate School
of Social Sciences, Bremen*

Recommendations

✓ Ageing policies should not replace the services provided by families, but should instead support families in delivering these services themselves (help through self-help). Appropriate forms of support include monetary incentives (e.g., financial transfers, tax deductions, pension entitlements), ambulatory services and assistance in hiring family helpers.

✓ Ageing policies should ensure that older people are able to stay as long as possible and as long as they want to in their own homes, even if their family networks are no longer fully able to care for them.

✓ As the length of the working life increases, steps should be taken to ensure the compatibility of paid employment and family care, in both the labour market (e.g., the right to take leave) and social security (e.g., family benefits).

› Overview

What parents do to support their children until they reach the age of adulthood is well known. By contrast, the exchange relationships between the adult generations in a family, and the meaning of these relationships for older adults, have only recently become the subject of systematic investigations. One of the main reasons why these relationships have been neglected is because of the dominance of the ideal picture of the “nuclear family,” consisting of two spouses and their children who have not grown up yet. Referring to the two classic sociological authors from whom this mental picture stems, it can be called the “Durkheim-Parsons orthodoxy.” Newer research has worked on this assumption and has

increasingly rejected it.

Whereas this research focused first on emotional and cognitive exchanges in families; more recently researchers have been investigating material transfers and services with monetary value. Today it is clear that the relationships in modern “multi-generational families” encompass a wide range of solidarity-related services.¹ Family members usually are at the centre of social networks, which is where people find encouragement and support. Even today families need to be seen as parts of wider kinship networks.² The services they provide can be summed up as follows:

1. Family members provide the major share of the care delivered to dependent older people.³ The share of older people who are cared for by public or private services or in nursing homes, rather than by family members, is relatively small by comparison. Among couples, the care of the older person is usually handled by the spouse, followed by the children and their spouses, especially the daughters (-in-law). Even in countries like Italy, where migrant women are often hired to care for older people in the home, the family members are still responsible for organising and supervising this care.⁴

2. Care services may be provided in the other direction, with grandparents looking after their grandchildren. Knowing that the grandparents are available to provide child care is often an important prerequisite for the compatibility of parenthood and work for young parents. Thus, older people play a large role in the demographic reproduction of society.

3. Families provide material support and thus help their weaker members manage in difficult economic situations. However, in contrast to common assumptions, most material transfers flow from older people to younger people. This is especially important given that many young people find it difficult to build up a livelihood due to unemployment or precarious working conditions. Older people may provide material help to family members through financial transfers and gifts, through sharing a home, or finally, through inheritances.

4. Families contribute to emotional wellbeing. There is no one-to-one relationship between the lack of close family members and loneliness, and it is possible to feel lonely in a family, or, conversely, to feel

socially integrated without a family. But to the extent that families reduce loneliness, they can also prevent the negative consequences of loneliness that have been repeatedly shown in research.

5. Families can form a bridge between age groups and generations. Contemporary societies are highly stratified and segregated by age – a result of the historic process of the institutionalisation of the life course as the fixed succession of different life phases that are clearly demarcated by chronological age. Thus, conflicts between age groups and generations are becoming a serious risk. Families form material and emotional relationships that help to reconcile age-related differences and to ensure that the age groups remain in contact with each other.⁵ An example can illustrate how this works. Peter Uhlenberg⁶ analysed responses to a question from the U.S. General Social Survey in which individuals were asked to name five people with whom they had spoken with about important matters in the last six months. The result was clear: None of the respondents under age 30 named a person over the age of 70 who was outside of their family, and vice versa. Thus, close relationships outside of the family are mainly with people of (approximately) the same age, whereas relationships with people of very different ages tend to be limited to within the family.

What families provide varies depending on cultural traditions and the social welfare state.⁷ When European countries are compared, they can be grouped into “regimes” according to the forms of family solidarity that are typically provided. Briefly stated, in the Southern European regime, young adults leave the parental home relatively late, or move back in later with their older parents. The parents therefore support their adult children by co-residing with them. However, financial transfers across households are relatively rare. In Northern Europe, by contrast, adult children seldom live with their parents. The children leave the parental home relatively early, and then often receive direct financial support; although the amounts they are given tend to be lower than the social welfare benefits young adults may otherwise receive. The continental European countries fall somewhere in between these two patterns.

› Challenges

The services provided by the family described above appear to be increasingly under threat. The frequent warnings of a current or coming “crisis of the family” are usually referring to one or more of the following points:

1. The first point are the demographic changes towards people having fewer children and an increase in the time intervals between the generations. As a result, the “supply” of familial caregivers is shrinking. Whether growing longevity is also increasing the demand for care services is a matter of debate. The answer depends on whether a longer life expectancy leads to a longer period of disability, or whether disability is “only” being postponed to a higher age. Older people who are childless are at particular risk.⁸ Childlessness was high among the cohorts born at the beginning of the 20th century (at around 20% in most European countries), then up until the 1940-50 birth cohorts, declined sharply, and has increased again since then.⁹ This means that the share of the older population who are childless is relatively small today, but will rise sharply in the coming years and decades. However, a number of empirical studies have shown that childless older people are in a better position than is often assumed. They tend to compensate for their lack of children by forming more intense relationships with other relatives and with friends and neighbours. These networks generally suffice until the older person needs a high level of care. Moreover, childlessness is not a clear status. Individuals can have biological children, stepchildren, adopted children, foster children, or be completely childless; and individuals can have regular contact with their children or no contact at all (in extreme cases because of the early deaths of their children). Finally, it is important to keep in mind that childless individuals do not just need and receive support; they also provide it in both material and social forms, and through their greater tendency to volunteer.

2. The provision of care by family members is coming under pressure because of the increasing labour market participation of women on the one hand, and increasing life expectancy on the other. In extreme cases, middle-aged working people – especially women – can face a triple burden of responsibilities: In addition to work-related duties, they provide care for parents or parents-in-law and for their own children

and grandchildren (the so-called “sandwich” situation).¹⁰ While it is well-known that younger mothers and parents struggle to reconcile work and child care, the simultaneous pressure of work and family care is a second type of work-family balance that is attracting increasing attention.¹¹

3. It is often assumed that the willingness to support family members has declined as a result of societal individualisation processes. It is claimed that individuals feel less obliged to help their family members, and prefer to instead maximise their own interests. Yet this claim falls short. Individualisation means that people are making choices in line with their own standards. This can – but does not have to – mean that they are pursuing their own interests exclusively. Empirical studies have shown repeatedly that moral standards that extend beyond personal interests are widespread among the younger generations. Individualisation does, however, mean that people place more value on independence and self-determination in their relationships with both their children and their older parents, whose own self-determination is endangered by the need for care.

4. The situation is similar for family conflicts. The family home can be a dangerous place. The majority of interpersonal violence occurs between family members. And as the media and literature repeatedly remind us, beneath the level of physical violence, family relationships can be rife with conflict. However, the empirical research paints a more differentiated picture.¹² Serious conflicts occur, but only in a minority of families. In many respects, the societal individualisation process may have led to a reduction in these conflicts, as parents today have become less likely to try to impose their authority on their children, and more likely to accept and support their children’s independence. Thus, relations within the family are less determined by paternalism and hierarchy. Relationships between young adults and their parents are therefore under less pressure. The same is true for the relationship to older family members when they start to need care. But relationships between the generations in a family are still characterised by ambivalence, as individuals seek to strike a balance between feelings of obligation and their desire for autonomy.

5. The last challenge is social inequality. While the welfare state (for the most part) has a redistributive effect, and has thereby reduced levels of inequality in terms of material resources and living standards,

the opposite seems to be the case for intergenerational transfers in families. Indeed, transfers *inter vivos* and, to an even greater extent, inheritances, are highly unequal. The effects of these transfers depend, however, on the context in which they occur.¹³ This includes how transfers and inheritances are taxed, and their demographic parameters. If wealth is divided among a large number of children, wealth inequality is reduced overall. If affluent parents support their less affluent adult children, this leads to a decline in inequality between the age groups and the generations.

› Possible courses of action

What are the actions that political and social actors might take to address these – quite differentiated – challenges? The most important principle is that family contributions should not be replaced with services provided by the state, the market, or civil society; but that families should be supported in providing these services themselves (help through self-help). This general principle is now widely known, but its realisation through concrete policy instruments is not always easy. In the problematic area of care, the instruments include monetary support (e.g., financial transfers, tax deductions, pension contributions), as well as services that can lighten the workload of family members. These instruments can also include relief through the employment of family care providers (e.g., migrant women). The integration of these instruments can strengthen the ability of families to care for their older members (“integrated care”). Efforts should also be made to ensure a “continuum of care”¹⁴ by providing a systematic perspective on the various components of care that allow older disabled people to remain in their home environment.¹⁵ At the same time, the quality of the home care needs to be assured.

1. The demographic challenge of a shortage of family members to provide support is the toughest test of this principle. To a large extent, this shortage can be compensated for through other relationships; but if an individual’s kin network and other social networks are too weak, the welfare state and civil society will have to fill the gap. The care insurance provides a good foundation of support, although the services it covers may not be fully sufficient. It is therefore important to ensure that individuals have the benefit entitlements and the access to ambulatory services they need to remain in their own homes for as long

as possible, even without support from close family members.

2. How middle-aged people balance higher levels of labour market participation with the need to provide care to older family members is now recognised as a second type of work-family compatibility problem (after the difficulties faced by young parents).¹⁶ That this problem manifests itself differently among women – who make up the majority of care givers – than among men is well-known. Moreover, the compatibility issue has to be differentiated based on the class affiliations of the care givers, especially with respect to the resources they have to provide care, and the financial sacrifices they may be forced to make. The double burden of family care and work can have negative consequences for other areas of the care giver's life, and for the quality of the care itself. To make it easier to balance responsibilities – like for young parents – policies are needed to ensure labour market and social security protections. A proposal to introduce a new form of family allowance creates an interesting connection between these gender and class problems, as it suggests compensating a couple for a portion of the earnings lost if both partners reduce their working hours to spend time on care giving.

3. A consequence of societal individualisation is that the demand for self-determination grows. Family solidarity is no longer self-evident, but is instead a matter of free choice. This means, for example, that the autonomy of both the care giver and the care recipient should be supported. Ambulatory care can help care givers manage the care burden better and maintain their own lifestyle.

4. Family solidarity should not be idealised. It is characterised by ambivalence, and can occasionally lead to conflicts. In extreme cases family members have to be protected from exploitation and violence.

5. The social inequality that is associated with family support becomes a particular problem when there are large financial transfers. The inequality impact of these transfers can be lessened through redistribution in the form of inheritance and gift taxes. These taxes should be structured so that direct descendants are allowed to keep relatively large tax-free amounts; but very large assets should be subject to more inheritance tax than is now the case. Currently, the disproportionately privileged treatment of company

assets means that inheritance taxes seldom arise. The unpopularity of inheritance taxes may be attributed to the general lack of awareness of the considerable levels of wealth that are already tax-exempt. The acceptance of these taxes could be further enhanced if the revenues were tied to specific purposes, such as the financing of care and assistance for families.

Annotations

- [1] Szydlik, M. (2016): *Sharing Lives: Adult Children and Parents*. Abingdon: Routledge.
- [2] Heady, P. & Kohli, M. (Eds.) (2010): *Family, Kinship and State in Contemporary Europe*. Vol. 3: *Perspectives on Theory and Policy*. Frankfurt/M: Campus.
- [3] OECD Health Project (2005): *Long-Term Care for Older People*. Paris: OECD.
- [4] Bettio, F., Simonazzi, A., & Villa, P. (2006): Change in Care Regimes and Female Migration: The 'Care Drain' in the Mediterranean. *Journal of European Social Policy* 16(3): 271-285.
- [5] Kohli, M. (2015): Cleavages in Aging Societies: Generation, Age, or Class? In: B. Marin (Eds.): *The Future of Welfare in a Global Europe*. Farnham: Ashgate, pp. 327-351.
- [6] Uhlenberg, P. (2009): Children in an Aging Society. *Journal of Gerontology. Social Sciences* 64B(4): 489-96.
- [7] Albertini, M. & Kohli, M. (2013): The Generational Contract in the Family: An Analysis of Transfer Regimes in Europe. *European Sociological Review* 29(4): 828-40.
- [8] Albertini, M. & Kohli, M. (2017): Childlessness and Intergenerational Transfers in Later Life. In: M. Kreyenfeld & D. Konietzka (Eds.): *Childlessness in Europe: Contexts, Causes, and Consequences*. SpringerOpen, pp. 351-868.
- [9] Sobotka, T. (2017): Childlessness in Europe: Reconstructing Long-Term Trends Among Women Born in 1900-1972. In: M. Kreyenfeld & D. Konietzka (Eds.): *Childlessness in Europe: Contexts, Causes, and Consequences*. SpringerOpen, pp. 17-53.
- [10] Künemund, H. (2006): Changing Welfare States and the "Sandwich Generation" – Increasing Burden for the Next Generation? *International Journal of Ageing and Later Life* 1: 11-30.
- [11] Keck, W. (2012): *Die Vereinbarkeit von häuslicher Pflege und Beruf*. Bern: Huber.
- [12] Szydlik, M. (2016): *Sharing Lives: Adult Children and Parents*. Abingdon: Routledge.
- [13] Kohli, M. & Künemund, H. (2009): Verschärfen oder verringern Erbschaften die soziale Ungleichheit? In: S. Nissen & G. Vobruba (Eds.): *Die Ökonomie der Gesellschaft*. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 95-107.

- [14] OECD Health Project (2005): Long-term Care for Older People. Paris: OECD.
- [15] Lamura, G., et al. (2006): Erfahrungen von pflegenden Angehörigen älterer Menschen in Europa bei der Inanspruchnahme von Unterstützungsleistungen: ausgewählte Ergebnisse des Projektes EUROFAMCARE. Zeitschrift für Gerontologie und Geriatrie 39: 429-442.
- [16] Keck, W. (2012): Die Vereinbarkeit von häuslicher Pflege und Beruf. Bern: Huber.

Conclusion

James W. Vaupel and Andreas Edel

**Max Planck Institute for Demographic Research,
Rostock**

The articles in this Green Book show that Germany is in the midst of demographic change – however, it is not stuck, but continues to move through this change. How can we achieve higher levels of health and financial security in old age, regardless of our gender or socio-economic status in our younger years? How can we ensure that resources are distributed fairly across the generations, and that families receive the support they need to handle their responsibilities? How can we reorganise our working lives and make our workplaces better suited for older people? In short: How can we shape demographic change so that we create an optimal situation for individuals and their living environments? Potential responses to these questions have been discussed here, and the current trends in research have been presented.

But is it possible that these demographic developments have already outpaced us? Recently, there has been a debate in the research community about whether there might be a “biological limit” to life expectancy.¹ So far, however, according to today’s research, there is no clear evidence to support such an assumption. Since the middle of the 19th century, lifespans have been steadily increasing, initially due to improvements in hygiene, especially in infancy; success in tackling epidemics and preventing diseases; medical improvements in the handling of diseases; progress in health education; the construction of water, energy and other forms of infrastructure essential to good health, especially in densely populated areas; the provision of social welfare benefits; and the improvement of individual development chances through new education opportunities. And it appears that technological innovations will enable people to live even longer than they do today by making work and daily life easier, providing a healthier living environment, increase safety at work and in traffic, or leading to new breakthroughs in medicine. Thus, we should start getting used to the idea that a leading factor of demographic change, namely high life expectancy, will continue to increase. If, in planning at the individual and at the societal level, we continue to rely on old-age pension and health care systems based on our current level

of life expectancy, we may struggle to catch up as healthy life expectancy continues to rise.

We can also assume that for the foreseeable future, the second factor in the ageing of the population – namely, the low birth rate – is unlikely to reach the high level that was reached in the mid-1960s. Given that birth rates have been relatively low among most of the cohorts born in recent decades, the number of children born is also unlikely to rise rapidly because the number of potential parents in the next generations has decreased. Thus, it seems that the only way to substantially increase birth rates is through immigration, which would boost the number of potential parents. Traditional concepts about what a family should look like are also changing: While most societies continue to view a married or a cohabiting couple with children as the ideal family, new forms of cohabitation are forming, such as “patchwork” families, single households and long-distance relationships with and without children. Today, couples who want to have children can use reproductive technologies to delay starting a family until they have reached their desired level of personal and professional stability, have fewer children or even remain childless if they so choose. Since these developments seem to be increasing, it is likely that, on average, smaller families will continue to be the norm, especially when, in the future, we should make more substantial progress to better balance career and family.

The third factor, immigration, has undergone a massive shift in the recent past and Germany, which before the outbreak of the civil wars in the Arab world had relatively low levels of immigration, has had a jump in population growth. Therefore, it is not hard to predict that in coming years, more pressure will be experienced from immigrants coming from other crisis regions of the world. Mobility is also likely to rise within Europe, and Germany is in a good position to benefit from the restrictions on immigration that are being imposed by the United Kingdom and the United States. But in the medium-term, even these relatively high levels of immigration won’t come close to compensating for the effects of the ageing of the population. While efforts to prepare these recent arrivals to enter the German labour market may not pay off immediately, especially if they are young, we should take steps now to offer immigrants the education and training they need to succeed. However, it would be problematic if the Western industrialised countries tried to drain these troubled regions of the

workers they need to rebuild. Therefore, it would be counterproductive to recruit all of the highly educated individuals from developing countries in order to compensate for our ageing society.

To counteract this looming, massive decline in the labour force due to population ageing – especially when the baby boomer generation retires – it would be sensible to better incorporate those groups that have not been fully included in the labour market: The great potential of well-educated women who have struggled to find their way back into the labour market after taking a break to have children, and who have suffered from major career setbacks or the pressure to accept work that is well below their abilities; older workers who have been forced into retirement, but who still feel fit and active enough to either return to their previous occupation or to find some new role in the labour market; or, well-educated immigrants whose qualifications are not recognised in Germany, or, even worse, who may even be barred from working while living in a group home. Furthermore, the existing potential labour force could be better exploited by increasing productivity per capita, particularly by raising the educational standards individuals achieve prior to entering the workforce, offering opportunities for further education over the life course, and further mechanising workplaces. Finally, it is important to think about the burdens families are shouldering: While they may have fewer children to take care of than in the past, they still face substantial challenges, like mounting pressure to ensure that the next generation has the higher qualifications they need to succeed, and to provide care for ageing family members.

It is, however, becoming apparent that in the era of demographic change, society will deal with these issues in less dogmatic and more flexible ways than in the past. Calls to lift fixed retirement limits, to legally facilitate opportunities for retirees to have additional employment opportunities; to improve child care services and to create telecommuting or part-time work options for individuals with family care responsibilities; to ensure that people are given good information about individual retirement planning; and to provide opportunities for continuous learning are already a part of the standard public discussions surrounding demographic change. It is about being ready and willing to take the steps necessary to ensure that people who have been given additional years of life have the opportunity to use them

productively, and for private and public employers to show more understanding for the challenges younger workers face in caring for children and older family members – and therefore substantially lower the costs for society. We may have to fundamentally rethink what a career path should look like and allow people to earn the qualifications they need to take on higher-level positions later in life, when their children are older and their family care responsibilities are lighter. These are just a few of the ideas that could be discussed in a debate that will surely intensify in the decades to come.

When we look at the ageing of society, one thing is clear: At the end of the day, the opportunities far exceed the challenges – if only we take advantage of them.

Annotations

[1] Geddes, L. (2016): Human Age Limit Claim Sparks Debate. Analysis Suggests People Will Never Live Much Beyond 115 but Some Scientists Say That it's too Soon to Assume a Fixed Shelf-life. Nature News, Nature Publishing Group. Available online: <http://www.nature.com/news/human-age-limit-claim-sparks-debate-1.20750>.

Authors

Dr Wenke Apt



Senior Consultant in the Department "Demographic Change and Future Studies", VDI/VDE-IT, Berlin
wenke.apt@vdivde-it.de

Dr Andreas Edel



Executive Secretary of Population Europe, Berlin / Max Planck Institute for Demographic Research, Rostock
edel@demogr.mpg.de

© Lina Grün

Prof. Dr em. Josef Ehmer



Professor for Economics and Social History, University of Vienna
josef.ehmer@univie.ac.at

Dr Christian Hunkler



Senior Researcher, Head of "Macro Implications of Demographic Change", Max Planck Institute for Social Law and Social Policy, Munich
Hunkler@mea.mpisoc.mpg.de

© Körber-Stiftung / David Ausserhofer

Dr Fanny Annemarie Kluge



Research Scientist in the Laboratory of "Survival and Longevity", Max Planck Institute for Demographic Research, Rostock
kluge@demogr.mpg.de

Prof. Dr em. Martin Kohli



Professor of Sociology at the European University Institute (EUI), Florence, and at the Bremen International Graduate School of Social Sciences (BIGSSS)
martin.kohli@eui.eu

Dr Elke Loichinger



Lecturer at the Chulalongkorn University, Bangkok, and Research Scholar at the International Institute for Applied Systems Analysis (IIASA), Laxenburg
elke.l@chula.ac.th

Dr Anna Oksuzyan



Head of the Independent Research Group "Gender Gaps in Health and Survival", Max Planck Institute for Demographic Research, Rostock
oksuzyan@demogr.mpg.de

Prof. Dr Roland Rau



Max Planck Fellow, Research Group "Mathematical and Actuarial Demography", Max Planck Institute for Demographic Research, Rostock
rau@demogr.mpg.de

© Frederik Peters

Prof. Dr Ursula M. Staudinger



Professor of Psychology and Director of the Robert N. Butler Columbia Aging Center, Columbia University, New York
umstaudinger@columbia.edu

Prof. Dr James W. Vaupel



Founding Director and Head of the Laboratories "Survival and Longevity" and "Evolutionary Biodemography", Max Planck Institute for Demographic Research, Rostock
jvw@demogr.mpg.de

© Fotostudio Hagedorn, Rostock

Dr Tobias Vogt



Guest Researcher in the Laboratory "Survival and Longevity", Max Planck Institute for Demographic Research, Rostock
vogt@demogr.mpg.de

Dr Harald Wilkoszewski



Head of the Information and Communication Department, WZB Berlin Social Science Center
harald.wilkoszewski@wzb.eu

