

The Dependency Ratio

What Is It, Why Is It Increasing, and What Are the Implications?

Introduction

The dependency ratio, which is the ratio of the number of persons aged under 18 or over 64 to the number aged between 18 and 64, is projected to increase dramatically in almost all advanced economies and many developing countries over the coming 50 years.¹ This is something to celebrate. The increase in the dependency ratio is in part the result of increases in longevity. Increases in longevity are associated with reductions in the prevalence of chronic disease, and we would all surely prefer long and healthy lives to short lives marred by ill health.² It is also the result of reductions in fertility. When discussing fertility rates, we sometimes forget that, not so long ago, our primary concern was the threat posed to humanity by exponential population growth.

But should the increase in the dependency ratio also be a matter for concern? Will we become impoverished because the output of each worker has to be shared with a growing number of dependants? I consider that the dependency ratio receives too much attention relative to two statistics that are much better measures of the burden of dependency—the labour force participation rate, expressed as a percentage of the total population, and the percentage of the total population that is capable of work. The good news is that, unlike the dependency ratio, these latter ratios are susceptible to economic, health, and social policy interventions.³

It is important to view the “problem” in context. Economic forecasts, discussed later, indicate that per capita income will continue to rise over the next 50 years even in those countries, such as Germany and Japan, that will experience the greatest increase in the dependency ratio. It may simply not rise as fast as it would have done in the absence of population ageing.

It is also important to recognise that most people value leisure, or at the very least, they value not having to work. Any assessment of the costs and benefits of an increase in the dependency ratio must take account of the value of the additional years of leisure that people will enjoy at the end of their lives as a result of increased longevity. Should it be a matter of public concern if older workers choose not to increase their age of retirement even as longevity increases, so that people spend an ever greater proportion of their life either at leisure or free to pursue other activities? In a market economy, the decision whether to participate in the labour market is usually left to the household, so why should individuals' retirement decisions be viewed any differently from other labour market participation decisions?

The concerns mainly relate to the impact of increases in the dependency ratio on the finances of pay-as-you-go (PAYG) pension programs, such as the Social Security program in the United States. In a purely PAYG pension, contributions are not invested but are instead used to pay current benefits.⁴ If the ratio of beneficiaries to contributors increases, then, as a matter of arithmetic, one must either increase contributions or reduce benefits. The benefit reduction need not take the form of a straightforward reduction in monthly pensions but might alternatively take the form of an increase in the age at which the pension comes into payment. Both these changes have the same effect of reducing the expected present value of the individual's entitlement. Whatever the other merits of Social Security individual accounts, they are not a "quick fix" to this particular policy dilemma.⁵

Why not just accept the demographic facts and increase the Social Security tax? Strong evidence suggests that PAYG pensions, in common with many other transfer programs, particularly at the high-income replacement rates provided in some European countries, incorporate economically harmful disincentives to continued labour force participation among older workers. They drive a wedge between the net financial reward workers get from going to work and the value of their labour to employers, and thus to society. As a result, workers supply less labour than is socially optimal. The longer that workers would be willing to work in the absence of this disincentive, the greater are its costs. Similar disincentives are also found in many types of pensions provided by employers.

We might wish to reduce these disincentives to labour force participation so that workers choose to retire at older ages. There is strong evidence that increases in longevity are associated with improvements in the health of older workers, so that workers are now better able than ever to continue working beyond the ages at which they customarily retire. The problem lies in the fact that increasing the age of early retirement, probably the most effective policy intervention, might adversely affect vulnerable groups—for example, those unable to work by reason of poor health or lack of education and skills.

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By Anthony Webb, Ph.D.

A Definition of the Dependency Ratio

The dependency ratio is usually defined as the ratio of the number of persons aged under 18 or over 64 to the number of persons between these ages. The overall dependency ratio can be subdivided into the youth and the aged dependency ratios. So, for example, Ethiopia, with a high fertility rate and short life expectancy, had a youth dependency ratio of 0.9 and an aged dependency ratio of 0.1 in 2002, whereas the comparable figures for Japan, a country in which fertility is below replacement rate and which enjoys exceptional longevity, were 0.2 and 0.3.

Where Is It Heading?

Countries are at widely different stages of the “demographic transition” from high fertility and mortality rates to low fertility and mortality rates. During the demographic transition, mortality rates typically fall first, followed by fertility rates. Ethiopia is an example of a country at the beginning of the demographic transition. It has an extremely high dependency ratio, but the dependants are almost exclusively children. During the transition, the dependency ratio typically falls to extremely low levels and then increases. Table 1 shows United Nations data on actual and projected old-age dependency ratios for G7 countries.⁶

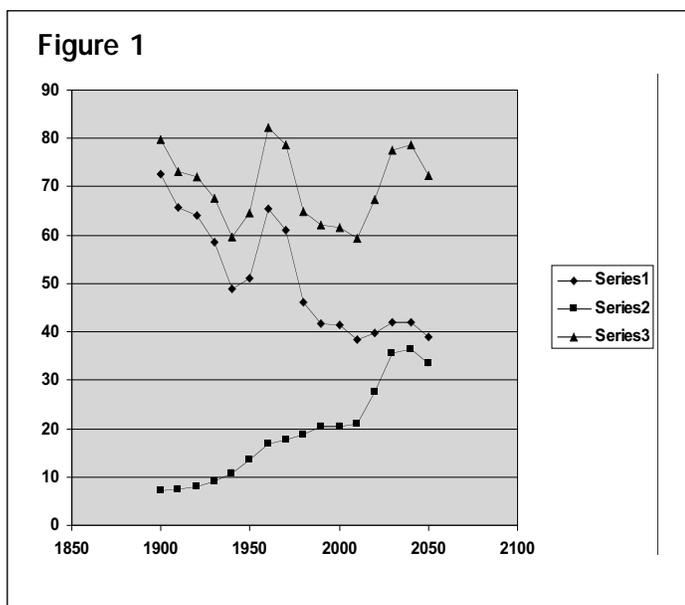
Countries with very low fertility rates (Germany, Italy, and Japan) tend to have the highest projected dependency ratios, and countries with the largest declines in fertility (the fertility rates in Italy and Japan more than halved over the period 1950–2000) tend to have the greatest increases. But, due to increasing longevity, there would still have been substantial increases in dependency ratios even if fertility rates had not declined.

Table 1 Old-Age Dependency Ratios

G7 Countries	2000	2025	2050
Italy	0.267	0.406	0.681
Japan	0.252	0.49	0.713
Germany	0.241	0.39	0.547
France	0.245	0.362	0.467
United Kingdom	0.244	0.328	0.392
United States	0.186	0.293	0.349

The extremely high ratio projected for Japan reflects that country’s exceptional longevity and low birth rate. However, even in 2050, the Japanese total dependency ratio will still only be approximately equal to that of Ethiopia today, albeit very different in composition. On average, persons over 65 consume far more medical care (but also far less education) than those under 18, so if the two countries have similar patterns of labour force participation, the Japanese may well be facing a greater effective burden. But the Japanese, with one of the world’s highest per capita incomes, will be much better placed than the Ethiopians to support their dependants.

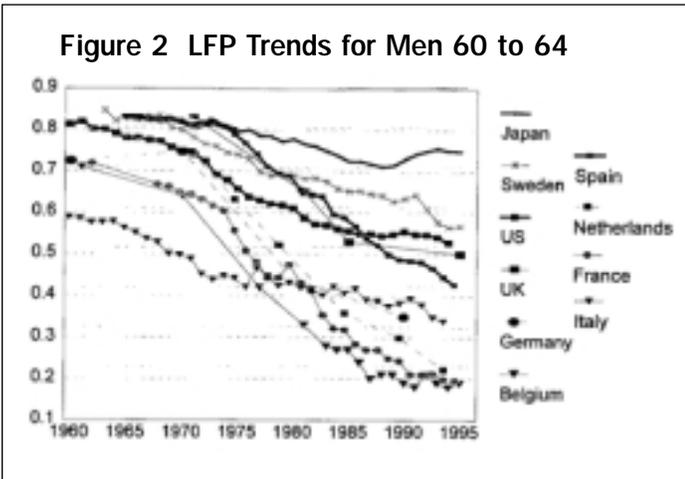
Figure 1 plots the total aged and youth dependency ratios in the United States for the period 1900–2050.⁷ The aged dependency ratio increases fivefold between 1900 and 2040, before declining marginally with the death of the baby boom cohort. The youth dependency ratio almost halves, with an upturn in the postwar years caused by the birth of the boomers. Importantly, the total dependency ratio is lower in 2050 than in 1900.



Why the Dependency Ratio Doesn't Really Measure Dependency

If we wish to measure the number of dependants who must be supported by each participant in the labour force, then the relevant statistic is the ratio of labour force participants to nonparticipants. The dependency ratio is actually rather a poor proxy for this statistic. Many persons aged 18 to 64 either choose not to participate in paid employment or are unable to do so due to disability, participation in education and training, family responsibilities, or lack of skills and employment opportunities.

For example, in the United States, the average worker retires not at age 65, but at 62, sometimes by choice, sometimes as a result of ill health or to serve as caregiver.



As shown by Figure 2, there are significant variations between countries in the labour force participation rates of older workers. There have also been significant declines in participation rates in most countries over the last 35 years.⁸ The lack of correlation, whether over time or across countries, between the dependency ratio and labour force participation rates means that the dependency ratio is likely to give a misleading picture of the relative burdens faced by different countries or changes in the burden over time.

But even if the dependency ratio is a poor measure of the proportion of the population that is actually participating in the labour force, maybe it is a better approximation to the proportion of the population that is capable of working. Could we not say as an approximation that the number of those aged over 64 who are capable of work roughly balances the number of younger persons facing some work-limiting disability? The problem with this use of the dependency ratio is that there is ample evidence that increased longevity is associated with a reduction in the rate of disability among older persons. To the extent that increases in the dependency ratio are the result of increased longevity, they will be associated with reductions in the rate of work-limiting disability among the population.

Will We All Be Impoverished If Labour Force Participation Rates Among Older Persons Don't Increase?

In the worst-case scenario, labour force participation rates among older workers won't increase much, if at all, from current levels. Consider the case of Germany, a country with extreme population ageing. Under quite pessimistic assumptions about labour force participation rates—no convergence between men and women, between the former Eastern and Western Lander, or between immigrants and Germans; no increase in the retirement age; and only a 3 percent decline in the unemployment rate—approximately one-half of productivity growth over the period 2000–2050 is required to compensate for population ageing.⁹ It still implies an increase in per capita consumption over that period, albeit at lower rates than those to which Germans have been accustomed.¹⁰ The Japanese government projects economic growth averaging 0.3 percent a year from 2010 to 2050. But Japan also projects a population decline of 0.5 percent a year, implying a modest 0.8 percent annual average increase in per capita income.¹¹

In the United States, the payment of scheduled Social Security benefits could be financed by an increase in the Social Security tax from its present 12.4 percent to 17.8 percent by 2038, and 19.4 percent by 2075.¹² This tax increase would impose both direct and indirect costs. The direct cost is, fairly obviously, the reduction in the take-home pay of the working population. But, to the extent that the tax is perceived as a tax and not as a purchase of valuable future benefits, it also imposes an indirect cost because it reduces labour supply.¹³ However, these costs need to be placed in context. The Social Security Administration assumes a rate of real wage growth of 1.4 percent a year over the period to 2075, so the additional tax in 2075 will be met out of salaries that will be almost three times as great as those enjoyed today.¹⁴ The real question is not whether the present system is affordable, but whether reform can deliver the features that are valued with fewer economic distortions.

Why Should the Labour Force Participation Rate Be a Matter of Public Concern?

In a market economy, it is generally left to households to decide how much labour to supply. Increased longevity enables households to enjoy greater lifetime consumption, if they choose to increase their retirement age in line with the increase in life expectancy. Or they may choose the same lifetime consumption but more lifetime leisure, if they choose not to increase their age of retirement, or something in between. Whether or not they choose to increase consumption, they are better off as a result of the increase in longevity.¹⁵

So why should the ages at which individuals choose to retire be any more the concern of governments and policymakers than the choices that households make over other labour supply decisions?

The answer lies in the fact that, at older ages, Social Security contains powerful and potentially economically damaging disincentives to labour force participation. It acts as a tax on labour supply, so that individuals choose not to work even when the value to society of their output is greater than the disutility to the worker of going to work. There are probably fewer disincentives at younger ages, except for married women, who sometimes may obtain little benefit from their Social Security contributions and whose labour supply has been shown by academic research

to be often more responsive than that of men to changes in the after-tax wage.¹⁶ Defined benefit (DB) pension plans contain similar incentives that research has shown contribute to early retirement.

In the case of DB pensions, once an individual attains the plan's "normal retirement age," the pension reward to additional service, measured as the increase in the expected present value of the pension benefit, may sometimes be negative.¹⁷ Although, in the United States, the Social Security reward for delaying retirement is, on average, approximately actuarially fair in the sense that the expected present value of the pension is unaffected by the individual's choice of retirement age, this is not necessarily true for all workers. Recent research suggests that many impatient individuals may find the reward inadequate and may choose to retire at age 62, the earliest age at which they can currently claim an immediate pension.¹⁸ Apart from being economically inefficient, it also reduces the individual's pension and increases the risk that the individual and any surviving spouse may become impoverished. Other research finds evidence of strong effects on labour supply in other countries, particularly European countries with high Social Security income replacement rates.¹⁹

But tinkering with pension incentives is unlikely to have much of an impact on the behaviour of those who currently choose to retire at 62. What is probably required is an increase in the Social Security early retirement age. The problem with implementing such a reform is that a significant minority of the population is unable to continue work beyond the ages at which they currently retire whether as a result of ill health, lack of skills, lack of employment opportunities, or age discrimination. Countries with inflexible labour markets may also suffer from structural unemployment that may further limit the employment opportunities of older workers. Any such reform would probably need to be accompanied by other measures and, in particular, would need to be coordinated with changes in health care coverage, disability insurance programs, and unemployment benefit programs.

Conclusion

The increase in the dependency ratio is an inevitable consequence of reductions in fertility and in the incidence of premature death, developments that have brought great benefit to humanity. Even under present policies, the economic burden of the increase in the dependency ratio will not be so great as to cause a reduction in living standards—per capita income will simply not increase as it might otherwise have done. The real question is whether we can achieve an even better outcome through measures to facilitate participation in the labour market among those older persons who wish to do so, and to minimise the effects of economically harmful disincentives to work while continuing to provide financial security to those no longer capable of work.

Anthony Webb, Ph.D., is senior research analyst at the ILC-USA.

Afterword

By Charlotte Muller, Ph.D.

The dependency ratio generates unwarranted anxiety and even despair regarding the ability of society to thrive as life expectancy grows. Clearly, we need more sensitive indicators to appraise the meaning of population ageing for societies. The financial burden of the economically inactive is expressed by the proportion of the adult population in the labour force, while the waste of human capital created by exclusion and discrimination to which older persons may be subjected is indicated by the ratio of the actual older labour force to the number who are physically able and want to work.

This issue brief points out that population ageing does not necessarily reduce the associated GDP standard of living. While it may slow down the rate of growth in GDP, even that outcome may be offset by innovations that increase the efficiency of a nation's productive resources. The term "dependency ratio" wrongly assumes a crisis because it fails to account for society's resilience and imagination.

An important recent trend favours eliminating or minimising disincentives to continued paid employment after the customary retirement age of many pension and

tax systems. Economists examine disincentives from the perspective of trade-offs considered by workers approaching retirement. The impact of withdrawing a particular disincentive is uncertain since the context of the retirement decision changes. It will merit close attention to prevent hardships and inequities and to free policy from unwarranted assumptions about older persons' capacities, their economic resources, and their decision-making.

The influence of employers on the continued economic activity of older workers is not always recognised. They can make continued employment more attractive to older workers who are contemplating retirement and also to many who have already left the labour force, to the benefit of both employer and worker. For example, while automated processes are exquisitely powerful aids in the performance of many tasks and allow consumers to save time and satisfy varied preferences, helpful interpersonal contact is often lacking, and industrial reorganisation eliminates many familiar faces and voices. In addition to utilising the experienced older worker to strengthen consumer service and satisfaction, employers can consider how to exploit the potential of the workplace for meeting diverse needs and interests, ranging from exercise to cultural expression and social interactions of workers of all ages, making worker "ageing in place" a reality.

Nations that privatise pensions and dismantle systems of social security—arguing that this is necessary because of the dependency ratio—are in danger of seriously weakening the protection against poverty and humiliation in old age. The rising educational and health levels in older age groups suggest that creating opportunities for fuller use of their productive potential is a realistic goal. Future historians will be puzzled by these actions because of the fiscal and human damage such actions foretell.

Charlotte Muller, Ph.D., is professor emerita of economics at the Graduate Centre of the City University of New York. She is senior economist, International Longevity Center and Alliance for Health & the Future.

Notes

1. Labour statistics usually calculate the dependency ratio using the population above a certain minimum age as the denominator. Economics literature usually refers to this measure as the “elderly dependency ratio.”

2. There is also persuasive evidence that health and longevity contribute to economic growth. See Webb, *Do Health and Longevity Create Wealth?* ILC Working Paper (New York: ILC-USA, 2004).

3. An individual country, but not all countries simultaneously, can reduce its dependency ratio through immigration. But the immigration would need to be massive and sustained to have a significant effect. Axel-Borsch-Supan (*Labor Market Effects of Population Aging*, National Bureau of Economic Research Working Paper No. 8640, 2001) calculates that Germany would require immigration at the rate of 750,000 a year to 2035 to fully offset the effects of population ageing. Pronatalist policies, even if desirable, appear to have a limited and short-term effect even if one is willing (as in communist Romania) to dramatically curtail reproductive rights.

4. Social Security is primarily PAYG. The value of the trust fund is small in relation to the present value of accrued benefits.

5. Most individuals could undoubtedly obtain a better risk-adjusted return in the financial markets than they will obtain on their Social Security contributions. But those contributions are not invested and are instead used to pay current benefits. Individual accounts may confer benefits in the long run if they increase national saving and therefore gross national product, but proponents need to explain how the immediate revenue shortfall would be financed.

6. The figures are not comparable with those previously noted, where the denominator is the total population, not merely the population over 18.

7. Source: Data from the U.S. Bureau of the Census (January 2000), Washington, DC; U.S. Government Printing Office.

8. Source: Jonathan Gruber and David Wise, *Social Security and Retirement Around the World*, National Bureau of Economic Research Working Paper No. 6134 (1997).

9. Axel Borsh-Supan, *Labor Market Effects of Population Aging*, National Bureau of Economic Research Working Paper No. 8640 (2001).

10. Some of this increase may well be absorbed by increased health spending. But the increased spending is not wholly or mainly the result of population ageing. It is largely the result of new medical technologies that produce tangible benefits in terms of improved health and greater longevity.

11. 2003 Cabinet Office Economic Finance White Paper base case economic growth and medium case population growth scenarios.

12. The President’s Commission to Strengthen Social Security, *Strengthening Social Security and Creating Personal Wealth for All Americans* (2001).

13. Social Security is a tax to the extent that an individual’s contributions exceed the value he places on the benefits purchased by those contributions. Although Social Security offers most households a modest financial return, it offers something unavailable on the financial markets—a government-guaranteed cost-of-living adjusted annuity—that economic theory suggests risk-averse households facing an uncertain life span or the risk of work-limiting disability may well value quite highly.

14. *The 2004 Annual Report of the Board of Trustees of the Federal OASDI Trust Funds*.

15. Health costs obviously complicate the story but are beyond the scope of this issue brief.

16. A household only benefits from a married woman’s contributions to the extent that those contributions yield benefits in excess of the spousal supplement earned by the husband’s contributions.

17. DB pensions may benefit employers if they induce retirement at what is, for the employer, an appropriate age. See Edward P. Lazear, “Retirement from the Labor Force,” in *Handbook of Labor Economics*, Vol. 1, eds. O. Ashenfelter and R. Layard (New York: Elsevier Science Publishers, 1986).

18. Thomas Gustman and Alan Steinmeier, *The Social Security Early Retirement Age in a Structural Model of Retirement and Wealth*, National Bureau of Economic Research Working Paper No. 9183 (2002). Given that the Social Security incentives to delay retirement are, on average, approximately actuarially fair, one might argue that individuals should continue to be free to claim reduced benefit at age 62, since the age of retirement does not affect the long run finances of Social Security. A potential concern might be that some individuals may be acting myopically and that by retiring early they are exposing themselves to the risk of poverty in old age.

19. Jonathan Gruber and David Wise, *Social Security and Retirement Around the World: Micro-Estimation*, National Bureau of Economic Research Working Paper No. 9407 (2002).

The Alliance for Health & the Future

was organized in 2003 to combine research, education, and policy efforts to promote good health and productivity throughout the life course. Operating as a division of the International Longevity Center, the Alliance secretariat is in Paris with additional offices in London and New York. The aim of the Alliance is to advance knowledge and provide training, skills, and systems to help individuals and society realize a healthy future.

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is a not-for-profit, nonpartisan research, education, and policy organization whose mission is to help individuals and societies address longevity and population aging in positive and productive ways, and highlight older people's productivity and contributions to their families and society as a whole.

The organization is part of a multinational research and education consortium, which includes centers in the United States, Japan, Great Britain, France, the Dominican Republic and India. These centers work both autonomously and collaboratively to study how greater life expectancy and increased proportions of older people impact nations around the world.

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INTERNATIONAL
LONGEVITY CENTER–USA

60 East 86th Street
New York, NY 10028

212 288 1468 Tel
212 288 3132 Fax
info@ilcusa.org
www.ilcusa.org

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