

DISCUSSION PAPER SERIES

DP16140

The 15-Hour Week: Keynes's Prediction Revisited

Nicholas Crafts

ECONOMIC HISTORY

CEPR

The 15-Hour Week: Keynes's Prediction Revisited

Nicholas Crafts

Discussion Paper DP16140

Published 12 May 2021

Submitted 11 May 2021

Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programmes:

- Economic History

Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Nicholas Crafts

The 15-Hour Week: Keynes's Prediction Revisited

Abstract

In 1930 Keynes opined that by 2030 people would work only 15 hours per week. As such, this prediction will not be realised. However, expected lifetime hours of leisure and non-market work in the UK rose by 60 per cent between 1931 and 2011, considerably more than Keynes would have expected. This reflects increases in life expectancy at older ages and much longer expected periods of retirement. Leisure in retirement contributes to high life satisfaction for the elderly but building up savings to pay for it is a barrier to working only 15 hours per week.

JEL Classification: J22, J26, N34

Keywords: leisure, Life Expectancy, retirement, Work

Nicholas Crafts - n.crafts@warwick.ac.uk
University of Warwick and CEPR

Acknowledgements

An earlier version of this paper was presented to a workshop at the University of Groningen where participants made helpful comments. I am also grateful to Paul Johnson and Leandro Prados de la Escosura for useful suggestions and to Richard Disney and Daniel Sgroi for expert advice. The usual disclaimer applies.

The 15-Hour Week: Keynes's Prediction Revisited

Nicholas Crafts

University of Sussex and CAGE, University of Warwick

May 2021

Abstract

In 1930 Keynes opined that by 2030 people would work only 15 hours per week. As such, this prediction will not be realised. However, expected lifetime hours of leisure and non-market work in the UK rose by 60 per cent between 1931 and 2011, considerably more than Keynes would have expected. This reflects increases in life expectancy at older ages and much longer expected periods of retirement. Leisure in retirement contributes to high life satisfaction for the elderly but building up savings to pay for it is a barrier to working only 15 hours per week.

Keywords: Leisure; Life Expectancy; Retirement; Work

JEL Classification: J22; J26; N34

Acknowledgements: an earlier version of this paper was presented to a workshop at the University of Groningen where participants made helpful comments. I am also grateful to Paul Johnson and Leandro Prados de la Escosura for useful suggestions and to Richard Disney and Daniel SgROI for their expert advice. The usual disclaimer applies.

Introduction

In 1930, Keynes published a short essay called “Economic possibilities for our grandchildren”. It is famous (notorious?) for its prediction that a hundred years hence people would work for only 15 hours per week. Although this was originally conceived as an after-dinner talk for schoolboys and then as a public lecture rather than as a serious piece of scholarly research, it has a high profile. This was underlined by a collection of 14 papers commenting on the essay mostly written by distinguished economists including 4 Nobel Prize winners (Pecchi and Puga 2008).

In his own words, this is what Keynes said: “I would predict that the standard of life in progressive countries a hundred years hence will be between 4 and 8 times as high as it is today” (2008: 21). At that point, “everybody will need to do some work if he is to be contented ... a 15-hour week may put off the problem for a great while. For 3 hours a day is quite enough to satisfy the old Adam in most of us!” (2008: 23). Keynes was foreseeing a future where consumption needs could be met with very little or no work but where most men would not want to give up work completely.¹ There is a back-of-the-envelope flavour to this prediction but, even so, it has been much discussed.

The general reaction among economists is nicely captured by Pecchi and Puga: “How could it be that a man of Keynes’s intelligence, with a deep understanding of economics and society, could be so right in predicting a future of economic growth and improving living standards and so wrong in understanding the future trends of labor and leisure, consumption and saving?” (2008: 3). The economists in their volume discuss several plausible hypotheses to explain the failure of work hours to fall as Keynes predicted. These include that for work-leisure choices substitution effects were bigger and income effects smaller than Keynes (implicitly) assumed, that new goods created new consumer wants, and that preferences have changed in response to advertising, and that consumer expenditures keep increasing to keep up with or outdo fellow citizens.²

The data reported in Table 1 are typical of those that have been used to compare outcomes with Keynes’s predictions and to suggest that he was right about growth but wrong about leisure. The UK has experienced lower growth than most other advanced economies since 1931 but, nevertheless, real GDP per person in 2011 was a little over 5 times the 1931 level, i.e., already within the 4 to 8 times band so on that measure Keynes’s prediction about economic growth was well on track. Although average hours of market work per year fell by almost a third between 1931 and 2011, in that year they were still a long way above Keynes’s prediction of 780 hours and had decreased by less than 5 per cent in the previous 20 years.

Another way to express Keynes’s prediction is as an expected increase in the amount of leisure (and/or non-market work). Allowing a conventional 8 hours per day for sleep, there are 112 waking hours available per week. The work week averaged 46.5 hours (2417/52) in 1931, so this left 65.5 hours for leisure and non-market work. A work week of 15 hours would leave 97 hours per week, so Keynes’s was predicting an increase of 48.1 per cent $(97-65.5)/65.5$ in leisure/non-market work time. This is more than double the actual increase between 1931 and 2011 which was 22.7 per cent $(80.4 - 65.5)/65.5$ according to Table 1.

However, this only takes account of time use during a person’s working years and does not include later life. This is an important omission in the context of increases in life expectancy and length of

¹ The discussion in Keynes’s paper is clearly about the future of men’s rather than women’s work.

² An increase in wage rates raises both income and the opportunity cost of leisure. Its effect on labour supply is ambiguous and depends on the relative size of the two effects. The last three arguments might be interpreted as reasons for the substitution and income effects being different from what Keynes imagined.

retirement since 1931 (Tables 2 and 3), as this paper shows. I calculate that over his lifetime a 20-year old male in 2011 could expect 276522 hours of leisure or non-market work compared with 172675 for his 1931 counterpart, an increase of 60.1 per cent (Table 4). On reasonable assumptions, this is more than Keynes would have predicted, as the paper also demonstrates. The main reason for his ‘underprediction’ is that, contrary to the expectation of 1930s’ experts, life expectancy at older ages has increased considerably since the 1960s.

A life-cycle perspective is also useful for understanding why, although total lifetime leisure and non-market work has risen by more than Keynes would have predicted, average hours of market work for those in employment have fallen by less than he suggested. Consumption during a longer expected period of retirement needs to be financed by the accumulation of assets during working life and this is likely to have been underwritten by continuing to undertake a substantial amount of market work pre-retirement.

Estimating Expected Length of Retirement (ELRP)

The method used to obtain estimates of the length of retirement is basically the same as that proposed by Lee (2001). Retirement duration is estimated for male workers at age 20 by calculating a weighted average of life expectancy at each age of retirement. The weight assigned to life expectancy at age x , e_x , is the probability of retiring at age x . In turn, this is the product of the following probabilities: the probability of remaining alive to age x (S_x), the probability of remaining in the labour force until age x conditional on surviving to age x (T_x), and the probability of retiring at age x conditional on remaining in the labour force at age x (γ_x). Among the men who would retire between age x and age $x + 1$ ($S_x T_x \gamma_x$), the proportion of those who die is given by the mortality rate within the age interval (${}_1q_x$). If the likelihood of retirement does not vary within the age interval, half of these men would die before they leave the labour force. Therefore the probability of retirement between age x and $x + 1$ is $S_x T_x \gamma_x [1 - (0.5 \times {}_1q_x)]$. If a man retires between age x and $x + 1$, his expected length of retirement is $(e_x + e_{x+1})/2$. Assuming for simplicity that the earliest age at retirement is 50, this gives the expected length of retirement at age 20 as follows:

$$ELRP = \rho^{20-50} \sum_{x=50-89} S_x T_x \gamma_x [1 - (0.5 \times {}_1q_x)] [(e_x + e_{x+1})/2]$$

where ρ^{20-50} is the probability at age 20 of surviving until age 50.

Both period and cohort estimates of ELRP are reported in Table 3. Period estimates are based on the assumption that a 20-year old man estimates his retirement duration based on current mortality and retirement rates remaining unchanged in future. Cohort estimates are based on the mortality and retirement rates that obtained as the 20-year old passes through his life and are equivalent to an assumption of perfect foresight of future life expectancy and labour force participation probabilities. Except for those cohorts reaching the age of 20 a long time ago estimates are partly based on future projections. Since, over time, life expectancy has been increasing and, at least until recently, fewer people have been working late in life, in general, the period estimates of ELRP may be considered as a lower bound and the cohort estimates as an upper bound. The gap between the two has varied in the past and has described an inverted-U shape since 1881.

The data used to estimate ELRP were as follows. Life expectancies and survival rates prior to 1951 were taken from Case et al. (1962) who compiled the evidence of early English life tables which were

constructed using information collected by the Registrar General. From 1951, life tables published by the Office for National Statistics (2018) were used. These include projections through to 2068 such that cohort estimates for a 20-year old are available up to 2011. Labour force participation rates from 1881 to 1981 are taken from Johnson (1994) who derived them from the Population Census.³ Later years use tabulations from the Labour Force Survey and projections of future participation rates through to 2065 in Office for Budget Responsibility (2015).

Table 3 reports estimates for ELRP that reflect a large increase between 1881 and 2001. During those years the period estimate rose by 14.61 years and the cohort estimate by 13.86 years. In the years since Keynes published his essay, from 1931 to 2011, the period and the cohort estimates gained 11.71 and 8.04 years, respectively.

The main reason for longer expected retirement is increased longevity. The period estimates for life expectancy at age 20 were 40.0 years in 1881, 47.1 years in 1931 and 59.4 years in 2011 and at age 65 were 10.3, 11.4 and 18.3, respectively. When Keynes wrote a 20-year old had a 70.4 per cent chance of surviving to age 65, which became the conventional age at which men retired, whereas by 2011 this had risen to 87.1 per cent. ELRP is estimated as 5.36 years using 2011 participation rates and 1881 mortality or 7.58 years using 1931 mortality and 2011 participation rates. Thus, 11.01 out of the 14.61 and 8.79 out of the 11.71 years increases in ELRP between 1881 and 2011 and between 1931 and 2011, respectively, resulted from improved life expectancy.

Estimating Expected Lifetime Hours of Market Work and of Non-Market Work or Leisure

Having made estimates of ELRP and using estimates of annual hours worked (AHW) from Table 1, it is possible to divide expected lifetime hours at age 20 into expected hours of market work and of non-market work or leisure. The estimates assume that the average year comprises 8766 hours of which 2922 are allocated to sleep.⁴ Total lifetime hours are 5844 multiplied by life expectancy at age 20 (e_{20}). Then

$$\text{Expected Hours of Market Work} = (e_{20} - \text{ELRP}) \times \text{AHW}$$

$$\text{Expected Hours of Non-Market Work \& Leisure} = (5844 \times e_{20}) - (e_{20} - \text{ELRP}) \times \text{AHW}$$

The limitation of this formula is that it does not capture phased moves into retirement where workers initially scale down their hours before retiring completely. However, since only a small proportion of lifetime expected market work hours are post-65 and there were shorter hours at these ages both in 1931 and in 2011, any bias in comparisons of expected lifetime leisure/non-market work between these two years is likely to be very small. The evidence available for 1931 is for workers in London and shows average weekly hours for those who worked at ages 65, 70 and 74 were 41.4, 35.0 and 31.1, respectively (Baines and Johnson 1997), and on average in England and Wales 5.1 per cent of lifetime hours were after the age of 65. For the UK in 2011 men who worked at the ages of 65-69 and 70-74

³ The census was not taken in 1941 for which year Johnson interpolated his estimates.

⁴ This allows for a leap year every fourth year.

averaged 30 hours and 20 hours per week, respectively (Chandler and Tetlow 2014), and 3.4 per cent of lifetime hours were post-65.

Table 4 reports a major change in the expected proportions of a worker's lifetime spent in work and leisure/non-market work. Whereas in 1881, with then current mortality and labour force participation rates 49.0 per cent of expected waking hours would be spent in market work by 2011 that had fallen to 20.3 per cent. The expected hours of leisure/non-market work more than doubled over the same period from around 119000 to around 277000. According to the estimates in Table 4, a 20-year old male in 2011 could expect 276522 lifetime hours of leisure or non-market work compared with 172675 for his counterpart in 1931, an increase of 60.1 per cent.

As noted above, there is an issue regarding hours of work for older men but this does not make much difference. Using the evidence on hours of work for workers after the age of 65 in Baines and Johnson (1997) and Chandler and Tetlow (2014) together with participation rates from Johnson (1994) and OBR (2015), the adjusted estimates would be 173905 expected hours of leisure or non-market work in 1931 compared with 277167 in 2011. The increase over the period would be 59.4 per cent rather than 60.1 per cent if no adjustment is made.

The increase in lifetime hours of expected leisure and non-market work hours has some interesting features. First, a relatively large part of this increase, 68433 hours or 65.9 per cent of the total, accrues during retirement, i.e., towards the end of life when health may be deteriorating. The increase in expected leisure or non-market work time pre-retirement is only 24.3 per cent compared with 60.1 per cent overall (Table 5). Second, almost half of the 35414 rise in expected pre-retirement leisure/non-market work hours is in the form of vacation time which rose from an average of 2.2 weeks per year in 1931 to 5.8 weeks in 2011 (Ward et al. 2018) so that 15.4 per cent of these hours were on vacation in 2011 compared with 7.2 per cent in 1931. A rising share of leisure time being taken as vacations is perhaps not surprising when the very high valence rating of 'vacation' is recognised.⁵

A Lifetime Equivalent of Keynes's Prediction

Keynes did not discuss the future of work over the whole life cycle nor did he ever predict what life expectancy or retirement behaviour might be a hundred years after he wrote. It is possible, however, to make some informed guesses at what he might have assumed and thus to make an estimate of lifetime expected hours of leisure and non-market work in 2030 from a 1930 Keynesian perspective.

The demographic future was a high-profile issue in the 1930s in the context of worries that the future was one of a declining population. The best-known and much-publicized predictions were made by Charles (1935). She offered 3 variants of which her estimate b) which took account of increases in future life expectancy is the most appropriate. Her views were typical of the time; she foresaw steady decreases in mortality below the age of 70 for the next 30 years, at which point a minimum level would

⁵ In other words, 'vacation' is a word that strongly connotes 'happiness'; for details of the measurement of the valence of words on which this observation is based using the Affective Norms for English Words (ANEW) dataset, see Hills et al. (2019). In their sample of 13915 words, 'vacation' scored 8.63/9 and ranked 1st.

have been reached, but she expected mortality over the age of 70 to remain at the 1935 level. In 1965 the maximum life expectancy at birth of 68.3 years would have been attained. This is very close to the 68.1 years in the life table for 1961 (Table 1). I will assume for my lifetime equivalent of Keynes's prediction that the life table for 1961 still obtains in 2030; in other words, in common with informed opinion of the 1930s, Keynes is assumed not to have foreseen the further increase in life expectancy to 79.0 years in 2011.

By 1930, the concept of occupational pensions which would become widespread after World War II had arrived for the lucky few. These schemes typically had a normal retirement age and by the 1930s this was generally 65 years for men. This was also established as the state pension age in 1928 and, as Hannah put it, "The age of 65 as the pension age for men had long been considered ideal" (1986: 128). By the 1950s, it was possible for middle-class men to retire completely at 65 and enjoy a comfortable retirement which most chose to do. However, in 1930 the most generous occupational pension scheme, from which civil servants benefited, had a retirement age of 60 so perhaps this would be expected to be the norm in 2030. I will assume for my lifetime equivalent of Keynes's prediction that age-specific labour force participation rates were as in 1931 up to 65 with AHW = 780 after which age no-one works but I also calculate a variant in which no-one works past 60.

If a lifetime equivalent of Keynes's prediction is based on the life table of 1961 and full retirement at age 65 for those still in work, then expected lifetime hours of leisure or non-market work for a 20-year old man are 260280 and expected hours of market work are 39673. If the calculation is reworked with full retirement at 60, then leisure or non-market work increases to 264290 hours. The increase in lifetime leisure or non-market work compared with 1931 is 50.7 and 53.1 per cent, respectively. In either case, this is appreciably below the 60.1 per cent increase that accrued between 1931 and 2011. So, contrary to conventional wisdom, it seems that actual increases in the expected time available for leisure and non-market work have exceeded anything Keynes might have predicted.

This conclusion may not be persuasive, however, if leisure or non-market work time during retirement years is regarded as less valuable than that enjoyed earlier in life. This may be the view of Skidelsky and Skidelsky when they say "it must surely be wrong to concentrate so much leisure in the last years of a person's life {when} capacity for enjoying it may well have diminished" (2013: 25). The calculations reported in Table 5 show that if, for example, expected leisure or non-market work in retirement is regarded as only half as valuable, then the increase between 1931 and 2011 is lower than the lifetime equivalent of Keynes's prediction where everyone retires at 65 and about the same as in the variant where everyone retires at 60.

Historically, for some men retirement was not through choice and entailed a life of poverty. In the early 21st century, however, this would seem a very pessimistic interpretation of the average experience. Noting a greater capacity to finance retirement and much better pension arrangements, Hannah argued that "Voluntary retirement is ... a luxury good whose incidence would be expected to grow" (1986: 124). Costa (1998) pointed to the lower price of recreational goods and their increased variety as reasons why retirement became a lot more enjoyable in the later 20th century.

Other economic and social historians have emphasized that many elderly people at this point had the option of a fairly comfortable retirement, that living standards in old age had improved markedly

compared with the mid-20th century, both in absolute terms and relative to those in employment, and that older people often described themselves as active, involved and happy (Johnson 1989; Thane 2000). This last observation is consistent with the evidence of a large volume of happiness studies which report relatively high levels of subjective well-being in later life. In 2011-15, UK responses to the survey question 'Overall, how satisfied are you with your life nowadays?' on a scale of 0-10 averaged 7.8 at 65, 7.85 at 70 and 7.7 at 85 – higher than at any age between 20 and 65 (Blanchflower and Oswald, 2019).⁶

I conclude that Keynes was right to predict a large increase in leisure or non-market work time but failed to see that much of this would be enjoyed in retirement. Keynes did not put his prediction in terms of lifetime experience but if he had done so he would surely have under- rather than over-predicted the expected increase for a 20-year old man in 2011 compared with his predecessor of 1930. The change in life expectancy since the 1930s would be a very nice surprise.

A Life-Cycle View

It is helpful to analyse decisions about how much to work in the context of a life-cycle framework in which their intertemporal aspect is recognised. A stylized example taught to economics students would see a phase of borrowing when young, accumulating assets while middle-aged and dissaving during retirement. It might be expected that there is consumption smoothing over time and the central prediction is that optimization will be achieved by equating the marginal utility of consumption over time. The accumulation of assets pre-retirement, which reflects both work effort and savings behaviour, matters for living standards during retirement.

The much greater accumulation of assets by the average person at the end compared with the beginning of the 20th century underpins the notion of being able to finance an enjoyable retirement, as Hannah (1986) noted. These assets often included occupational pension and housing wealth as well as an entitlement to a state pension. A recent study found households adopting a three-pronged asset accumulation strategy based on homeownership, pensions and savings to provide financial security as welfare benefits have become less generous (Hillig 2019). The number of persons in receipt of payment of an occupational pension, which were typically based on defined benefit schemes, rose from 0.2 million in 1936 to 9.2 million in 2011 (Hannah 1986; ONS 2019). The percentage of dwellings which were owner-occupied rose from 23.4 in 1918 to 34.1 in 1939 and 65.0 in 2011, having peaked at 69.8 per cent in 2001 (Holmans 2005; DCLG 2013). In 2011, house ownership was normal for the 'traditional working class' as well as the middle classes and the elite (Savage et al. 2013).

A life-cycle model with consumption smoothing predicts that an expectation of a longer period of retirement implies that individuals will aim to enter retirement with a larger stock of assets. This implies that an increase in ELRP will encourage working more and/or saving a higher fraction of income pre-retirement. Increases in life expectancy in the second half of the 20th century tended to mean longer retirement for many men given the norm or even the contractual obligation to retire at 65.⁷

⁶ 'Retirement' is also quite a happy word according to its valence. It scores 6.6 and ranks in the top 11 per cent of words.

⁷ A survey in 1994 found that 53 per cent of men had an upper limit on their retirement age and more than three quarters of men had an expected retirement age of 65 (Meadows 2003).

Life expectancy for men at 65 rose from 11.4 years in 1931 to 18.3 years in 2011. Other things equal, this implies that to maintain a given level of consumption the amount of assets required at retirement period was 1.6 times larger in 2011. If this is to be achieved by accumulation of housing wealth, there is a strong incentive to move up the housing ladder rapidly by working more (Banks et al. 2017; Bottazzi et al. 2010) For those with occupational pensions, longer life post-65 acts as a disincentive in defined contribution or career-average defined benefit schemes to reduce working hours prior to retirement.⁸ For those schemes where the defined benefit is based on final salary, it raises the cost in terms of foregone earnings and pension payments of a reduction in work hours.⁹

Overall, it seems plausible that increases in life expectancy and the associated lengthening of the retirement period have meant not only much increased time spent in non-market work or leisure in later life but also have acted to discourage dramatic reductions in market work hours in youth and middle age. This provides a further important reason, not previously stressed in the literature, why Keynes's 15-hour week prediction was incorrect.

Conclusions

It is generally agreed that Keynes's bold prediction of a 15-hour week by 2030 will not be realised. If this is taken to be 780 hours per year of market work, this compares with 1641 hours in 2011. Between 1931 and 2011, annual hours of work fell by about a third whereas Keynes predict a fall of two thirds by 2030. An alternative way to frame Keynes's prediction is in terms of an increase of 48 per cent in time available for leisure or non-market work per week. Not surprisingly, this also seems wide of the mark since up to 2011 the actual increase was a little under 23 per cent.

If, however, the increase in expected leisure and non-market work time is considered on a lifetime basis, a very different picture is revealed. For a 20-year old man expected years of retirement have increased from 4.66 years in 1931 to 16.37 years in 2011 mainly as a result of improved life expectancy. The implication is that expected lifetime hours of leisure/non-market work rose by 60.1 per cent between 1931 and 2011.

Keynes did not make a prediction on a lifetime basis but if he had it would surely have assumed that life expectancy, especially for the elderly, would have risen by much less actually was the case. Using conventional 1930s' demographers' assumptions plus a 15-hour week and universal retirement at 65, his prediction for the increase in expected lifetime leisure/non-market work hours would have been about 50 per cent rather than the 60 per cent that transpired. Viewed from this perspective, contrary to conventional wisdom, the outcome has exceeded Keynes's expectations.

⁸ The damage done by reducing work hours for part of a career is illustrated by the high impact of reduced hours and career breaks for women who have children. In their early 60s women in the UK have median private pension wealth which is about one third of that of the median for men and 47 per cent of the difference is attributable to interruptions to full-time work (Jeetwa 2019).

⁹ For example, for someone in a 2/3 final salary scheme whose full time-earnings are y , the total cost of going half time at age 55 is $5y + (0.33y \times 11.4) = 8.76y$ if life expectancy at 65 is 11.4 years as in 1931 but $5y + (0.33y \times 18.3) = 11.04y$ if life expectancy at 65 is 18.3 years as in 2011. Obviously, with no pension entitlement the cost of going half time is only $5y$.

Much of the additional leisure/non-market work that a 20-year old man can now expect will accrue in retirement. This should not be considered 'low value'. The evidence suggests that on average persons aged 65 and over have a high level of life satisfaction nowadays. Enjoying a comfortable retirement is facilitated by accumulating assets earlier in life and this has mitigated against larger reductions in annual hours of market work.

References

- Baines, D. and P. Johnson (1997) "The labour-force participation and economic well-being of older men in London, 1929-31." London School of Economics Working Paper No. 37.
- Banks, J., R. Blundell, Z. Oldfield and J.P. Smith (2017) "House price volatility and the housing ladder," in D.A. Wise (ed.) *Insights in the Economics of Aging*. Chicago: University of Chicago Press: 87-119.
- Blanchflower, D. and A. Oswald (2019) "Do modern humans suffer a psychological loss in midlife? Two approaches (with and without controls) in seven data sets," in M. Rojas (ed.) *The Economics of Happiness: How the Easterlin Paradox Transformed our Understanding of Well-Being and Progress*. Switzerland: Springer Nature: 439-453.
- Bottazzi, R., H. Low and M. Wakefield (2010) "Why do homeowners work longer hours?" Institute for Fiscal Studies Working Paper No. 10/07.
- Case, R. A. M., C. Coghill, J. L. Harley, and J. T. Pearson (1962) *The Chester Beatty Research Institute Serial Abridged Life Tables, England and Wales 1841-1960*. London: Institute of Cancer Research.
- Chandler, D. and G. Tetlow "Employment of older people in England, 2012-13." Institute of Fiscal Studies Briefing Note BN 193.
- Charles, E. (1935) "The effect of present trends in fertility and mortality upon the future population of England and Wales and upon its age composition." London and Cambridge Economic Service Special Memorandum No. 40.
- Costa, D.L. (1998) *The Evolution of Retirement: an American Economic History, 1880-1990*. Chicago: University of Chicago Press.
- Department for Communities and Local Government (2013) *English Housing Survey*.
- Hannah, L. (1986) *Inventing Retirement*. Cambridge: Cambridge University Press.
- Hillig, A. (2019) "Everyday financialization: the case of UK households." *Environment and Planning A* 51(7): 1460-1478.
- Hills, T.T., E. Proto, D. Sgroi and C.I. Senesinhe (2019) "Historical analysis of subjective wellbeing using millions of digitized books." *Nature Human Behaviour*, October 15.
- Holmans, A.E. (2005) *Historical Statistics of Housing in Britain*. Cambridge: Cambridge Centre for Housing.
- Jeetwa, C. (2019) *Understanding the Gender Pensions Gap*. London: Pensions Policy Institute.
- Johnson, P. (1989) "The structured dependency of the elderly: a critical note," in M. Jefferys (ed.) *Growing Old in the Twentieth Century*. London: Routledge: 63-73.
- Johnson, P. (1994) "The employment and retirement of older men in England and Wales, 1881-1981." *Economic History Review* 47(1): 106-28.

- Keynes, J.M. (2008) (1930) "Economic possibilities for our grandchildren," in L. Pecchi and G. Piga (eds.) *Revisiting Keynes: Economic Possibilities for our Grandchildren*. Cambridge, MA.: MIT Press: 17-26.
- Lee. C. (2001) "The expected length of male retirement in the United States, 1850-1990." *Journal of Population Economics* 14(4): 641-650.
- Meadows, P. (2003) "Retirement ages in the UK: a review of the literature." Department of Trade and Industry Employment Relations Research Series No. 18.
- Office for Budget Responsibility (2015) *Fiscal Sustainability Report: Supplementary Tables*.
- Office for National Statistics (2015) *How Has Life Expectancy Changed Over Time?*
- Office for National Statistics (2018) *Life Tables Principal Projection, UK*.
- Office for National Statistics (2020) *Occupational Pension Schemes Survey: UK 2019*.
- Pecchi, L. and G. Piga (2008) "*Economic Possibilities for our Grandchildren: a twenty-first century perspective*," in L. Pecchi and G. Piga (eds.), *Revisiting Keynes: Economic Possibilities for our Grandchildren*. Cambridge, MA.: MIT Press: 1-16.
- Savage, M., F. Devine, N. Cunningham, M. Taylor, Y. Li, J. Hjellbrekke, B. Le Roux, S. Friedman and A. Miles (2013) "A new model of social class? Findings from the BBC's Great British class survey experiment." *Sociology* 47(2): 219-250.
- Thane, P. (2000) *Old Age in English History: Past Experiences, Present Issues*. Oxford: Oxford University Press.
- Thomas, R. and N. Dimsdale (2017) "A millennium of UK data." Bank of England OBRA Dataset. <http://www.bankofengland.co.uk/research/Pages/onebank/threecenturies.aspx>
- Ward, A., M.B.Zinni and P. Marianna (2018) *International productivity gaps: are labour input measures compatible?* OECD Statistics Working Paper No. 208/12.

Table 1. Average Hours of Work, Real GDP per Person and Real Consumption Expenditure per Person

	<i>Hours/Year</i>	<i>Real GDP/Person</i>	<i>Real Consumption Expenditure/Person</i>
1881	2994	76.8	75.7
1891	2982	81.4	81.2
1901	2950	91.3	90.6
1911	2926	98.0	91.8
1921	2405	91.8	88.1
1931	2417	100.0	100.0
1941	2432	138.2	95.8
1951	2193	142.6	118.7
1961	2067	187.5	150.0
1971	1830	246.5	187.1
1981	1749	292.6	226.9
1991	1720	376.5	316.6
2001	1696	475.8	429.8
2011	1641	515.0	468.1

Source: Thomas and Dimsdale (2017), Tables A12, column F, A21, columns A and V, and A54, column AW.

Notes: real GDP and real consumption expenditure are 5-year averages. Hours per year take account of part-time work, holidays, stoppages, and sickness.

Table 2. Male Life Expectancy at Birth (years)

1881	43.7
1891	44.1
1901	48.5
1911	51.5
1921	55.6
1931	58.7
1951	66.4
1961	68.1
1971	69.0
1981	71.0
1991	73.4
2001	76.0
2011	79.0

Source: ONS (2015)

Note: these are period estimates

Table 3. Expected Years of Retirement at Age 20 (years)

	<i>Period Estimate</i>	<i>Cohort Estimate</i>
1881	1.76	4.02
1891	2.44	5.19
1901	2.84	5.82
1911	3.17	5.76
1921	3.96	6.73
1931	4.66	9.84
1941	5.72	12.08
1951	5.88	14.68
1961	6.71	16.73
1971	8.28	17.31
1981	10.33	17.60
1991	13.10	17.61
2001	15.07	18.12
2011	16.37	17.88

Sources: Derived using mortality estimates taken from cohort and period life tables in Case et al. (1962) and in ONS (2018) together with labour force participation rates based on Johnson (1994) and OBR (2015).

Table 4. Expected Lifetime Hours of Market Work and Non-Market Work/Leisure for Men Aged 20.

	<i>Market Work Hours (%)</i>	<i>Non-Market Work & Leisure Hours (%)</i>
1881	114491 (49.0)	119269 (51.0)
1891	114688 (48.0)	124332 (52.0)
1901	116997 (47.1)	131373 (52.9)
1911	119176 (46.5)	137376 (53.3)
1921	101347 (37.6)	168061 (62.4)
1931	102577 (37.3)	172675 (62.7)
1941	105014 (36.7)	180758 (63.3)
1951	94343 (33.0)	191429 (67.0)
1961	90101 (30.7)	203852 (69.3)
1971	78544 (26.3)	220669 (73.7)
1981	73406 (24.0)	232235 (76.0)
1991	70692 (22.3)	246033 (77.7)
2001	70265 (21.3)	259921 (78.7)
2011	70612 (20.3)	276522 (79.7)

Source: derived using data for Tables 1 and 3.

Note: these are period estimates. Sleep is allocated 8 hours per day.

Table 5. Expected Lifetime Hours of Non-Market Work/Leisure for Men Aged 20 vs. Keynes-type Predictions.

	<i>Pre- Retirement</i>	<i>Post-Retirement</i>	<i>Total</i>	<i>Total: 0.5 weight for Post- Retirement</i>
1931	145442	27233	172675	159058
2011	180856	95666	276522	228639
Keynes (1)	218613	41667	260280	239447
Keynes (2)	192584	71706	264290	228437

Source: own calculations, see the text.

Note: Keynes (1) assumes universal retirement at 65; Keynes (2) assumes universal retirement at 60.