Why the "average age of retirement" is a misleading measure of labor supply

Richard Johnson

Both Murray Gendell, in a recent *Monthly Labor Review* article, and Sveinbjörn Blöndal and Stefano Scarpetta, in a working paper for the Organization for Economic Cooperation and Development (OECD), construct "average ages of retirement" as functions of age-specific labor force participation rates and the age structure of the population.[1] The formula Blöndal and Scarpetta use to construct their "average retirement age" has the unfortunate property that, under simple assumptions, if the curve of participation rate versus age slopes down linearly between ages 45 and 70 (that is, labor force participation rate = ($m \times$ age) + c), then the average age of retirement is always the midpoint 57.5, for any m or c, unless m = 0, in which case the average age of retirement is undefined. Thus, quoting the average age of retirement produced by this formula may not convey any information about m or c, parameters affecting the size of the labor supply. If, by contrast, the curve of labor force participation rate versus age schedule is everywhere nonlinear, we can construct examples in which labor force participation rates rise at all ages, but the average age of retirement falls. This property of the "average-retirement-age" function has been noticed by Cordelia Reimers and Gendell, who each conclude that the surprising behavior of the average age of retirement makes it a statistic of independent interest.[2] The analysis that follows leads to the conclusion that if the average age of retirement is constructed with either Blöndal and Scarpetta's formula or any essentially similar formula, then quoting it as a summary statistic of the labor supply may be misleading, because it might be thought to convey information that it does not in fact convey. The labor force participation rate of the total population is then a preferable statistic for summarizing labor supply behavior.

The next section of this article defines the average age of retirement and examines its behavior. In the case of two-piece linear age-versus-participation-rate curves, it is shown that the average age of retirement is always the age halfway along the downward-sloping segment of the curve. If participation rates are examined not cross-sectionally at one point in time, but within cohorts over time, again cases can be constructed in which the average age of retirement is fixed regardless of the rate of decline of participation rates within cohorts. In the case of nonlinear age-versus-participation-rate curves, examples are constructed wherein the average age of retirement falls while labor force participation rates rise at all ages or, alternatively, fall at all ages. The examples are empirically relevant, showing that the average age of retirement for men as well as for women in the United States fell between 1960 and 2000, while labor force participation rates for men fell at all ages and those for women rose at all ages. Therefore, it is often not clear what the statement "the average age of retirement has fallen" implies about changes in the labor supply.

Accordingly, one must be careful in quoting the average age of retirement to summarize labor supply behavior. In cases where the average age is by definition 57.5, the associated function transforms labor force participation rates in such a way as to discard all the information they contain. Thus, quoting instead the labor force participation rate of the total population would transmit that information.

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The "average age of retirement"

Reimers quotes the formula[3]

$$\bar{X}_R = \sum_{x=35}^{\infty}\left(x+\frac{1}{2}\right)\left(PR_{x+1}-PR_x\right)P_{x+1} \Big/ \sum_{x=35}^{\infty}\left(PR_{x+1}-PR_x\right)P_{x+1}$$

where $\bar{X}_R$ is the average age of retirement, x is age in years, PR_x is the labor force participation rate at age x, and P_{x+1} is the number of people aged x + 1.[4] Blöndal and Scarpetta use a similar formula devised by Denis Latulippe:[5]

$$\bar{X}_R = \frac{23.35\left(PR_{45,49}-PR_{40,44}\right)P_{40,44} + \sum_{x=45,50\ldots}^{60}\left(PR_{x+5,x+9}-PR_{x,x+4}\right)\left(x+5\right)P_{x,x+4}}{0.5\left(PR_{45,49}-PR_{40,44}\right)P_{40,44} + \sum_{x=45,50\ldots}^{60}\left(PR_{x+5,x+9}-PR_{x,x+4}\right)P_{x,x+4}}$$

Here, the subscript $x,x+4$ refers to the population or the labor force participation rate of people aged between x and x + 5. Both Gendell alone and Gendell and Siegel quote average ages of retirement that are constructed by using a different formula.[6] However, because none of Gendell's works cited herein offers a full explanation of this formula,[7] only the properties of

Latulippe's formula can be examined.

Some simplifying assumptions will reveal the essential properties of this formula. First, assume that $PR_{40,44} = PR_{45,49}$. Then the leftmost terms in the numerator and denominator are zero, and the formula is nearly identical to Reimers' formula. Also, assume that the number of people in each age group, $P_{x,x+4}$, is k, the same across all age groups. Then the numerator and denominator of Latulippe's formula have the common factor k, which cancels out. Finally, assume that participation rates in the age groups 45–49 through 65–69 decline linearly with age, so that $PR_{x,x+4} = mx + c$, where $m < 0$. Now Latulippe's formula reads

$$\bar{X}_r = \frac{\sum_{x=45,50,...}^{x=60} \left(PR_{x,x+4} - PR_{x+5,x+9}\right)\left(x+5\right)}{\sum_{x=45,50,...}^{x=65} \left(PR_{x,x+4} - PR_{x+5,x+9}\right)} = \frac{5m\left(50+55+60+65\right)}{\left(5m+5m+5m+5m\right)} = 57.5$$

Here, c drops out because the formula examines changes in participation rates, and m drops out because it is a factor in both the numerator and denominator. This "average-age-of-retirement" function has thrown away the information contained in m and c. Blöndal and Scarpetta use the participation rate for people aged 65 and older where Latulippe's formula calls for the participation rate of people aged 65 to 69. Under Blöndal and Scarpetta's approach, if we assume that the participation rate at age 65 or older follows the downward trend from age 45–49 on, again we would have the result that the average age of retirement is 57.5 regardless of m and c.

Thus far, the analysis has been cross sectional and has employed only participation rates observed in the same year. Gendell, instead, uses a cohort-based approach, comparing, for example, $PR_{45,49\,(1990)}$ with $PR_{40,44\,(1985)}$ to find the average age of retirement between 1985 and 1990. If this approach is used in Latulippe's formula with the same assumptions as before, but with the stipulation that $PR_{x+5,x+9(1990)} = PR_{x,x+4(1985)} - c$, then the average age of retirement is 57.5 whenever c is different from zero, regardless of the participation rates in 1985, and is undefined when c equals zero. Thus, the average age of retirement could also be fixed, regardless of any decline in the labor force participation rate within cohorts over time.

Table 1. Examples of the average age of retirement

Age	Labor participation rate (percent)			
	Population	A	B	C
40–44	100	10	90	5
45–49	100	10	90	5
50–54	100	10	50	5
55–59	100	10	30	0
60–64	100	0	10	0
65 and older	100	0	0	0
Average age of retirement, from Latulippe's formula	...	60	55	55

Table 2. Labor participation rates and average ages of retirement

Age	Labor participation rate (percent)			
	Men		Women	
	1960	2000	1960	2000
40–44	95.4	92.1	45.3	78.7
45–49	94.5	90.1	47.4	79.1
50–54	92.0	86.8	45.9	74.1
55–59	87.7	77.1	49.7	61.2
60–64	77.8	54.8	29.4	40.1
65 and older	30.6	17.5	10.4	9.4
Average age of retirement, from Latulippe's formula	66.0	63.6	64.7	62.4
Labor participation rate of population 16 years and older	80.4	74.7	35.7	60.2

SOURCES: U.S. Census of 1960; Current Population Survey for 2000.

Now consider the behavior of the average age of retirement when participation rates decline nonlinearly with age. Table 1 shows three fictional populations, each with 100 people in each age bracket defined in the first column. Population A has a higher average age of retirement than population B, according to Latulippe's formula, while B has higher participation rates at all ages. Reimers shows that her formula can give the same result.[8] Population C has the same average age of retirement as B, but lower participation rates than either A or B. Hence, in this example, knowing that the average age of retirement had fallen from 60 to 55 would tell us nothing about movements in labor force participation rates.

Next, table 2 applies Latulippe's formula for the average age of retirement to actual U.S. data for 1960 and 2000. Calculating the average age of retirement requires both the participation rates shown and age breakdowns of the population. The average retirement age for men fell by 2.4 years from 1960 to 2000. During the same period, the labor force participation rate of men aged 16 and older dropped by 7 percent. The average retirement age for women fell by an amount similar to that of men, 2.3 years. However, the labor force participation rate of U.S. women aged 16 and older rose by almost 70 percent between 1960 and 2000. Women's participation rates were higher in 2000 than in 1960 at ages 60–64, 65–69, and 70–74, although they were lower at ages 75 and older. Thus, there are empirical cases, particularly involving women, in which participation rates rise at all ages, but the average age of retirement falls. In their table II.1, Blöndal and Scarpetta show that the average retirement age for women fell in all OECD countries between 1950 and 1995.[9] Table 2 shows that it is not possible to infer from this fact anything about the movement of women's labor force participation rates or the overall change in the labor supply of women.

Because the function used by Blöndal and Scarpetta to transform labor force participation rates into the average age of retirement has unfortunate properties, the average age of retirement may not be a useful statistic as a summary of labor supply data. In those cases where the average age of retirement is fixed regardless of movements in the curve of age versus labor force participation rate, the statistic indeed conveys no information. Further, the statement "the average age of retirement has fallen" may be interpreted as implying that the overall rate of labor supply has fallen, which might, but need not be, the case. Other formulas, of course, behave differently, but if they are based on Blöndal and Scarpetta's formula, they, too, may have undesirable properties. The participation rate of the total population gives a better sense of the size of the labor force and is thus preferable to the average age of retirement as a summary statistic. □

Notes

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[1] Murray Gendell, "Retirement age declines again in 1990s," *Monthly Labor Review*, October 2001, pp. 12–21; Sveinbjörn Blöndal and Stefano Scarpetta, *The Retirement Decision in* OECD *Countries*, OECD Aging Working Paper 1.4 (Geneva, Organization for Economic Cooperation and Development, 1998). The latter paper is on the Internet at www.oecd.org/subject/ageing/awp1_4e.pdf.

[2] Cordelia Reimers, "Is the Average Age at Retirement Changing?" *Journal of the American Statistical Association*, September 1976, pp. 552–57; Gendell, "Retirement age declines."

[3] Reimers, "Is the Average Age at Retirement Changing?" p. 553.

[4] Reimers describes age 35 as "the peak of labor-force participation," although she gives no argument as to why the formula should truncate the labor supply at that age.

[5] Blöndal and Scarpetta, *Retirement Decision*, p. 54; Denis Latulippe, *Effective Retirement Age and Duration of Retirement in the Industrial Countries between 1950–1990* (Geneva, International Labor Organization, 1996). The truncation of the age distribution at 40 years is arbitrary, but seems calculated to ensure that the factor $PR_{1,2} - PR_{3,4}$ is positive. Gendell and Jacob S. Siegel report that, in calculating the average age of retirement, when they found such a term to be negative, they set it to zero. (See Murray Gendell and Jacob S. Siegel, "Trends in retirement age by sex, 1950–2005," *Monthly Labor Review*, July 1992, pp. 22–29.)

[6] Murray Gendell, "Trends in Retirement Age in Four Countries, 1965–95," *Monthly Labor Review*, November 1998, pp. 20–30, and "Retirement age declines"; Gendell and Siegel, "Trends in retirement age by sex."

[7] Gendell's formula for the average age of retirement uses the "Karup-King third difference method for osculatory interpolation." All three of Gendell's works referred to in the current article cite a textbook as the source of this formula, but exactly how Gendell applies the formula is not explained.

[8] Reimers, "Is the Average Age at Retirement Changing?"

[9] Blöndal and Scarpetta, *Retirement Decision*. Similarly, Gendell and Siegel find that the average retirement age of women has fallen steadily in the United States since 1950, despite rising labor force participation rates for women. (See Gendell and Siegel, "Trends in retirement age by sex.")