

What is the value of retail annuities?

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Introduction

The first cohorts reliant on defined contribution pensions are now entering retirement, leading to a new challenge: how to balance current needs against the risk of outliving one's assets? Annuities, offering guaranteed lifetime income, are a leading solution to this problem.¹ However, take-up of annuities is low, with their expected cost cited as a main explanation. This *brief*, based on a recent paper, explores the value of lifetime income products.² It looks first at “money's worth”—the ratio of expected lifetime benefits to cost—and then at “wealth equivalence”—a measure that takes into account the insurance value of annuities. It also explores how both money's worth and equivalent wealth vary by socioeconomic status (SES).

The discussion proceeds as follows. The first section describes the data and methods used in the analysis. The second section shows the money's worth and wealth equivalence of each of the three lifetime income products for the full population. The third section provides the money's worth and wealth equivalence of immediate annuities for the different SES groups. The final section concludes that money's worth and wealth equivalence have remained stable over time, with deferred annuities offering the best value of the three products despite having the highest expected cost. At the same time, large gaps in money's worth by education and race translate into moderate (and sometimes opposite sign) gaps in insurance value, likely because groups with lower life expectancy also have more uncertain longevity.

¹ This analysis focuses on retail annuities, rather than annuities offered within tax-advantaged plans such as 401(k)s or 403(b)s.

² Wettstein et al. (2020).

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How money's worth and wealth equivalence are calculated

This section briefly explains how the analysis approaches calculating money's worth and wealth equivalence for the full population. It then outlines how mortality for the different SES groups is estimated for use in calculating money's worth and wealth equivalence for each group.³

Calculating money's worth

The money's worth of an annuity is the ratio of the expected present value (EPV) of payouts from the annuity to its premium (generally quoted per \$100,000). A ratio of 1 indicates that consumers would expect to receive every dollar of premium back over their lifetime. Typically, money's worth for insurance products such as annuities is less than 1 since commercial products are less than actuarially fair.⁴

The expected value, or money's worth, of commercial annuities in the United States has not been explored in two decades.⁵ Over this period, rising life expectancies and falling interest rates would be expected to increase the value of annuities. Furthermore, new lifetime income products have become available that have never been analyzed, such as indexed annuities (which increase their payouts over time) and deferred annuities (which commence paying out many years after purchase).⁶ The analysis, therefore, calculates money's worth for three types of annuities: nominal immediate annuities;

immediate annuities with a fixed 3 percent annual escalation; and deferred annuities bought at age 65 and commencing payments at age 85.

The EPV depends on three profiles of future inputs: annuity payouts every year per \$100,000 premium; interest rates; and survival probabilities. Average payouts for men and women are gathered for each type of annuity from Annuity Shopper archives for annuities purchased at age 65.⁷ Interest rates are calculated based on the term structure of U.S. Treasury bonds, with a risk premium added corresponding to the difference in yields between Treasuries and BAA corporate bonds. Finally, survival probabilities are taken directly from the Social Security Administration estimates (for the full population); or estimated based on death counts from the *National Vital Statistics System* (NVSS) coupled with population estimates from the *American Community Survey* (ACS, for the gender/race/education tercile demographic groups).

As noted, long-term increases in life expectancy and declines in interest rates would increase the expected value of an annuity, all else equal. However, the trend in annual annuity payouts per \$100,000 premium is also a crucial input to the calculation. As shown in Figure 1, payouts for both men and women have declined since 2001, which means the trend in money's worth is ambiguous.⁸

³ For more detail on the methods see the full paper.

⁴ Such actuarial unfairness results from some combination of adverse selection (where those who buy annuities live longer than the population average); insurer overhead costs (such as management and administration, advertising, etc.); the opportunity costs insurers bear for holding capital reserves in case of adverse outcomes; and insurer profits.

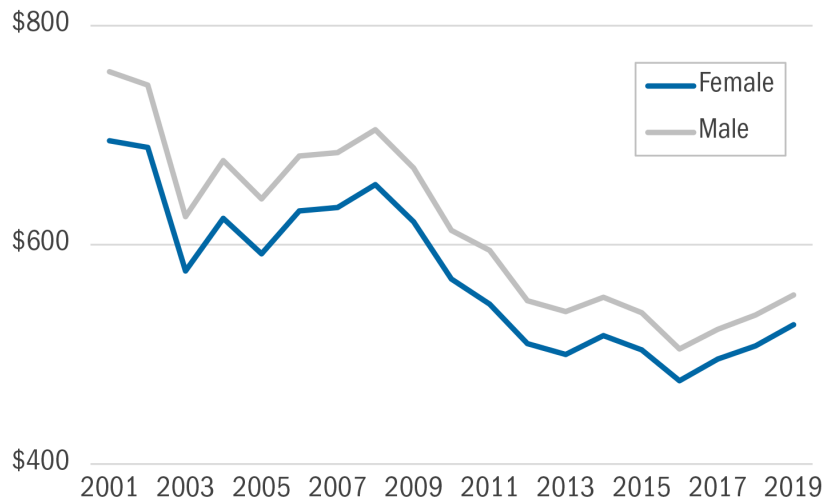
⁵ Mitchell et al. (1999) analyze immediate annuities up to 1995. Some work has been done since exploring various aspects of the money's worth of annuities, but generally assuming actuarial fairness at the population level (for example, Brown 2002). Money's worth of annuities in other countries has been analyzed (for example, in Mitchell, Piggott and Takayama 2011).

⁶ Gong and Webb (2010) analyze Advanced Life Deferred Annuities with survivor benefits. However, they do not consider single life annuities, and they use institutional, not retail prices in their calculations because such commercial products were not widely available at the time.

⁷ The data include about a dozen insurers every year. For immediate annuities, quotes are available for 1986-2019; for indexed annuities for 2007-2019; and for deferred annuities 2013-2019.

⁸ The trends for indexed and deferred annuities are also declining for the years where data is available.

Figure 1. Average annual immediate annuity payment for \$100,000 premium at age 65, for males and females, 2001-2019



Source: Annuity Shoppers archive files for the month of July each year, average of firms' quotes.

Calculating wealth equivalence

Moreover, money's worth is only a partial measure of the value of an annuity because it neglects the insurance that the product provides against outliving one's assets. The analysis, therefore, follows up the calculation of money's worth with a calculation of wealth equivalence: the share of starting wealth an individual would require to be as well off with annuitization as they would be without access to the annuity. The smaller the necessary share of wealth, the better the product.

The analysis assumes individuals have a specific period utility function and reach age 65 with \$100,000 of financial assets. Lifetime utility is simply the discounted sum of period utilities.⁹ The individual consumes the

optimal amount of assets each period in the absence of any annuity. Then, the same calculation is performed with the annuity; if lifetime utility is higher (lower), starting wealth is reduced (increased) in an iterative process until lifetime utility is equivalent with and without the annuity.¹⁰

Estimating mortality by socioeconomic status

Calculating money's worth and wealth equivalence for specific population segments requires estimating each group's expected survival probabilities from age 65 onward. The first step is to define the groups themselves. In the current analysis, the focus is on non-Hispanic Black and white men and women.¹¹ Each of those groups is then divided into three equal-size education groups by

⁹ The utility function assumed is a constant relative risk aversion function common to the literature. This function implies that the share of assets devoted to insurance does not depend on the level of starting assets. The risk aversion parameter chosen is 2, as in Mitchell et al. (1999) for comparability. An individual discount rate of 0.03 is also assumed, consistent with Mitchell et al.

¹⁰ The share of starting wealth devoted to each annuity product is also assumed. For immediate annuities, both indexed and nominal, this share is 100 percent, which would be the optimal share in this model (Yaari 1965). For deferred annuities 100 percent is not optimal; the analysis assumes 20 percent annuitization, similar to the optimal amount found in recent literature (15 percent in Horneff et al. 2020).

¹¹ Hispanics display very different patterns of mortality with education, and so are excluded from the analysis.

cohort.¹² Finally, death rates are estimated for each age-gender-race-education tercile using mortality data from the NVSS and population data from the ACS.¹³

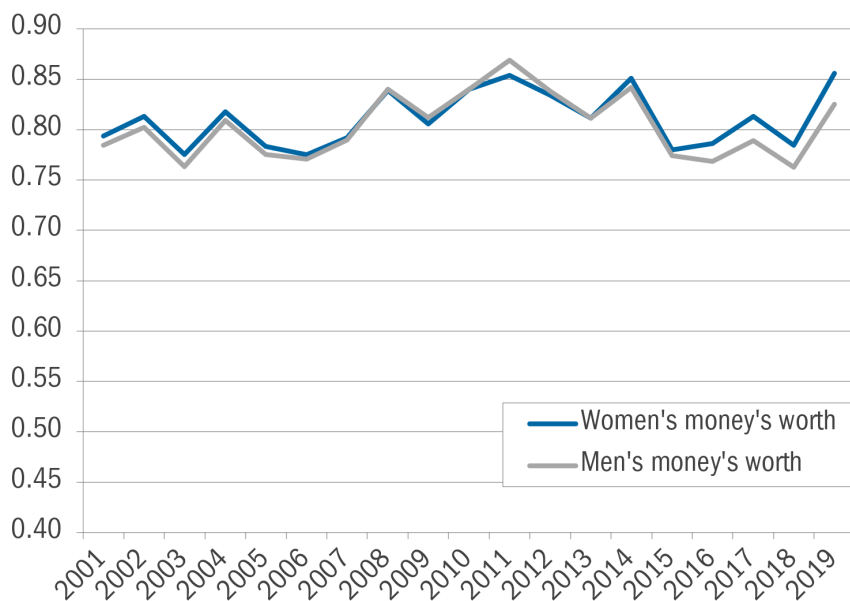
Money's worth and wealth equivalence for the full population

The methodology described above yields estimates of money's worth and wealth equivalence for each of the three lifetime income products—immediate annuities, indexed annuities, and deferred annuities. These estimates are presented for the full population by gender.

Money's worth for the full population

Figures 2-4 show the trends in money's worth over time for immediate, indexed, and deferred annuities, respectively. Year-to-year variations in values are apparent, but these are at least partially driven by estimation noise. Rather, the main takeaway from these estimates is that for all three products the values show no trend over time. That is, in the face of large changes in mortality and interest rates over the last two decades, insurers have adjusted pricing to keep money's worth from increasing. Moreover, the estimates are also comparable to those presented in Mitchell et al. (1999), implying that this stability has persisted since 1985 at least.

Figure 2. Money's worth for immediate annuities at age 65, by gender, 2001-2019

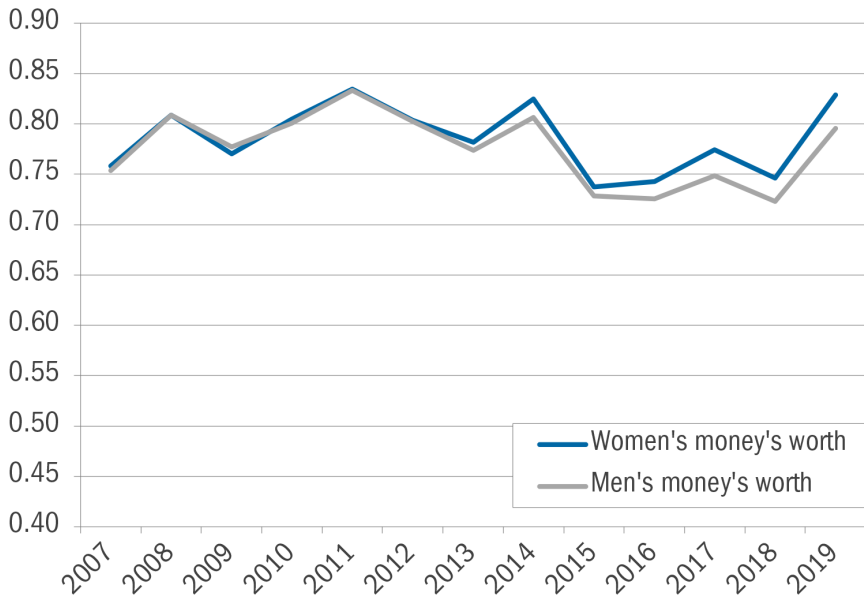


Source: Authors' calculations.

¹² This method follows Bound et al. (2014).

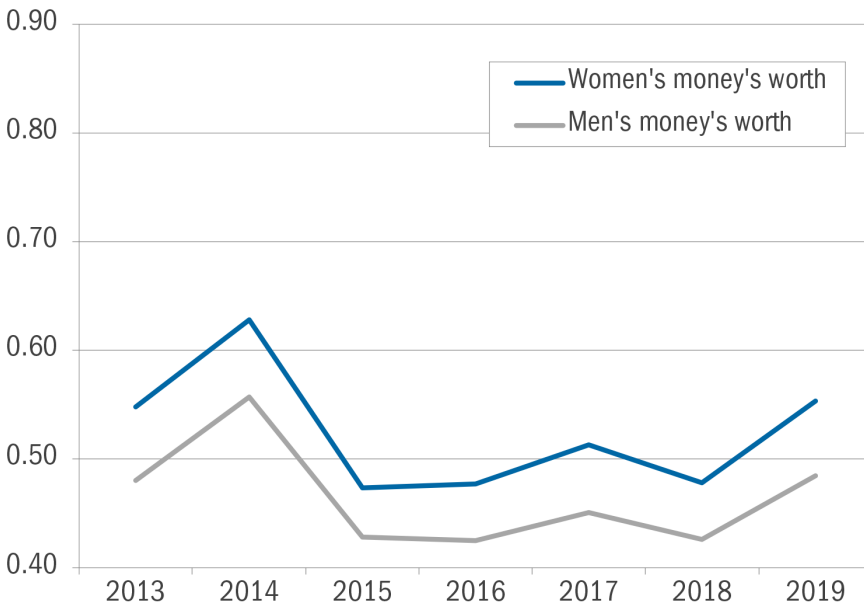
¹³ These death rates are then used to estimate a Gompertz-Makeham survival function that alleviates the small sample-size of individual age-gender-race-education cells, as in Brown (2002).

Figure 3. Money's worth for immediate annuities with a 3-percent COLA at age 65, by gender, 2007-2019



Source: Authors' calculations.

Figure 4. Money's worth at age 65 for annuities with payment deferred to age 85, by gender, 2013-2019



Source: Authors' calculations.

The second observation regarding these estimates is that the money's worth of immediate annuities is consistently higher than for the other two products. Nominal immediate annuities have a money's worth about 3 cents higher than the indexed annuities. In the case of deferred annuities, however, this difference is much more substantial, hovering around a 30-cent difference. This low expected value of deferred annuities may be surprising given how much attention these products have received recently.¹⁴ However, the widely touted benefits of deferred annuities are not based on their expected values, but rather their insurance value. The analysis, therefore, proceeds to estimate the insurance value of these three products next.

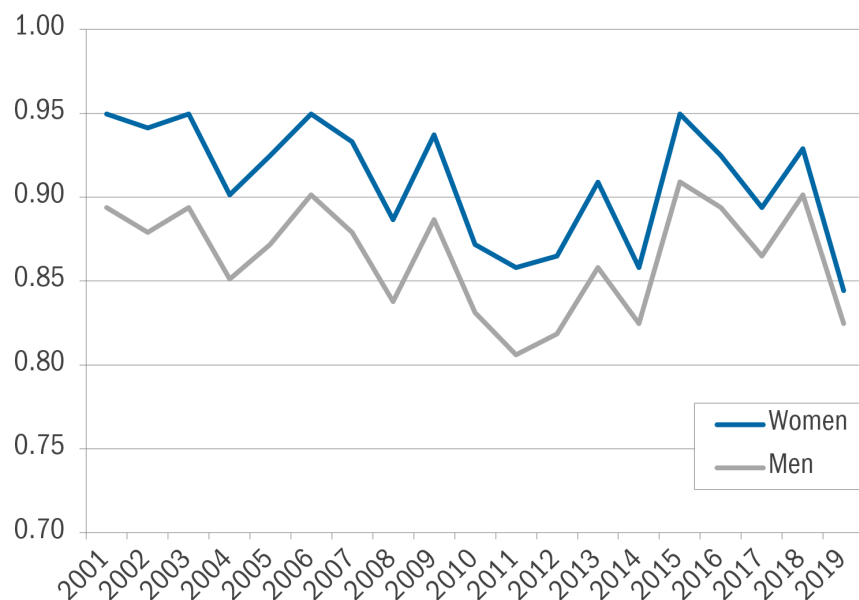
Wealth equivalence of annuity products over time

However, the purpose of annuities is to insure and protect against longevity risk, that is outliving one's

assets. The appropriate question to evaluate these lifetime income products is, therefore, the share of starting wealth an individual would require to be as well off with annuitization as they would be without access to the annuity (for example, one might need only 0.85 as much wealth in a world with annuities to be as well off as in a world without annuities). That is, what is the wealth equivalence of the annuities.

Figures 5-7 show the wealth equivalence of nominal immediate annuities, annuities with a 3-percent escalation, and deferred annuities that begin paying out at age 85, respectively, by gender. As with money's worth, the wealth equivalence of these products shows little time trend. More interesting is the comparison of wealth equivalence across products.

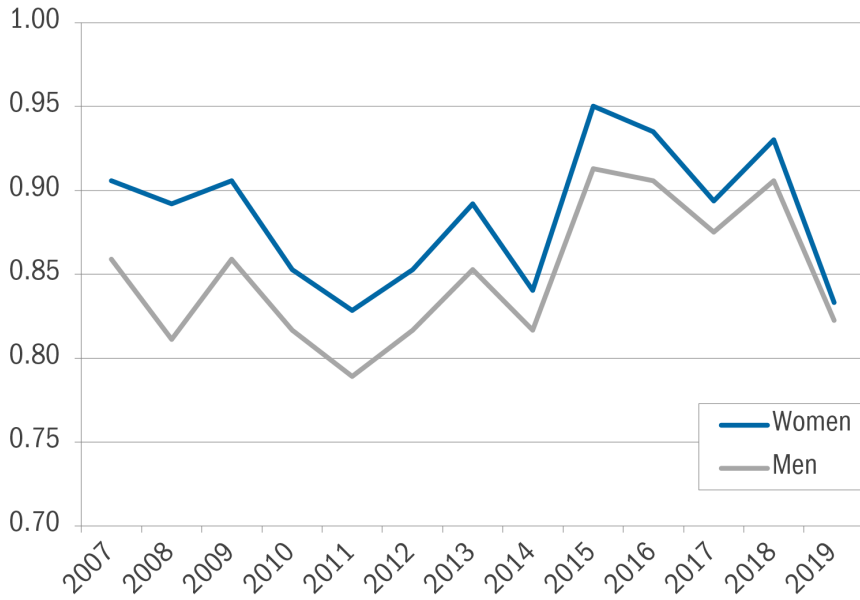
Figure 5. Wealth equivalence for immediate annuities at age 65, by gender, 2001-2019



Source: Authors' calculations.

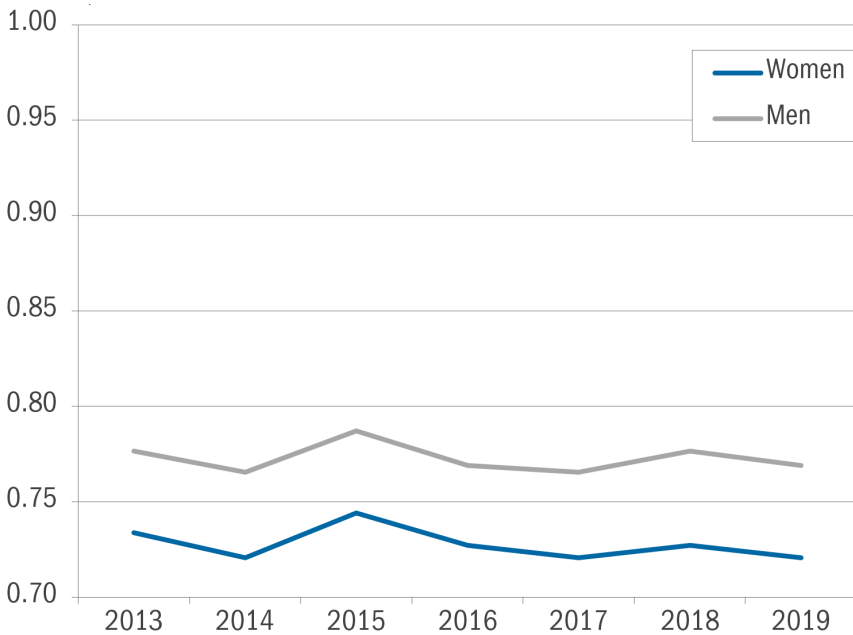
¹⁴ See Horneff et al. (2020) and Munnell, Wettstein, and Hou (forthcoming).

Figure 6. Wealth equivalence for immediate annuities with a 3-percent COLA at age 65, by gender, 2007-2019



Source: Authors' calculations.

Figure 7. Wealth equivalence at age 65 for annuities with payment deferred to age 85, by gender, 2013-2019



Source: Authors' calculations.

The value to consumers of both types of immediate annuities is similar. However, the insurance value of deferred annuities is appreciably greater than that of the immediate annuities. This finding is in sharp contrast to the relatively low *expected value* of deferred annuities. The high insurance value for deferred annuities stems from their unique focus on protecting against the small probability of living a very long time.

All these results pertain to the average individual of each gender. Gender is accounted for by insurers when setting premiums. However, it is the only personal characteristic annuity providers typically use in pricing in the United States. Both money's worth and insurance value may vary across individuals along other dimensions, such as race and education.

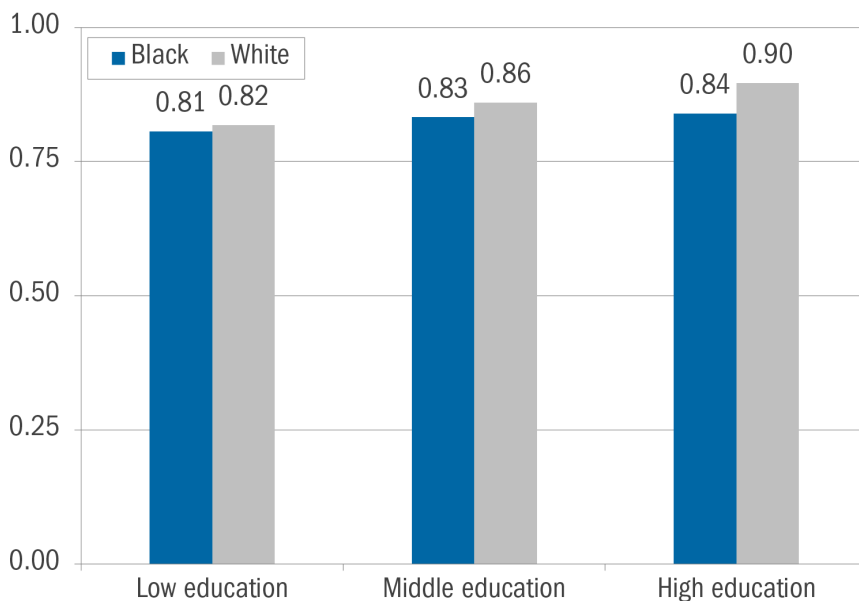
Money's worth and insurance value of annuities by socioeconomic status

The following analysis focuses on immediate annuities and looks first at money's worth and then wealth equivalence by SES.

Money's worth by socioeconomic status

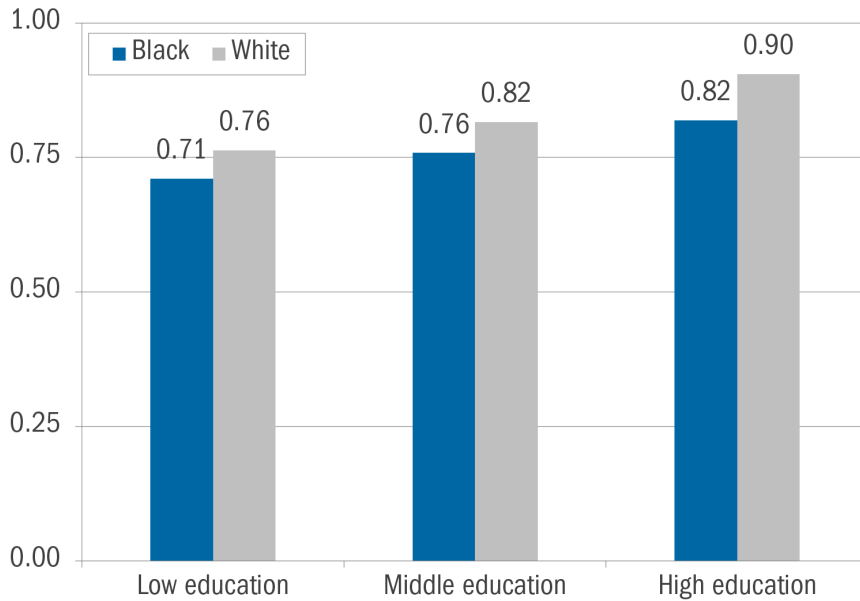
Figures 8a and 8b (for women and men, respectively) show the money's worth of immediate annuities in 2019 by education tercile for Blacks and whites. A noticeable gap in the expected value of annuities is clear, with higher-education groups in every year enjoying a larger expected value from immediate annuities than lower-education groups.

Figure 8a. Money's worth of a nominal immediate annuity for women at age 65 in 2019, by SES group



Source: Authors' calculations.

Figure 8b. Money's worth of a nominal immediate annuity for men at age 65 in 2019, by SES group



Source: Authors' calculations.

Racial differences in money's worth also exist, even conditional on relative education. For example, in 2019 white men in the top tercile of their education distribution had a money's worth that was 8 cents more than Black men in the same relative position in their educational distribution. For women in the top educational tercile, the gap was 6 cents. For men in the bottom tercile, the gap was 5 cents, and for women in the bottom tercile it was 1 cent. These differences reflect the varying mortality rates of the different groups.

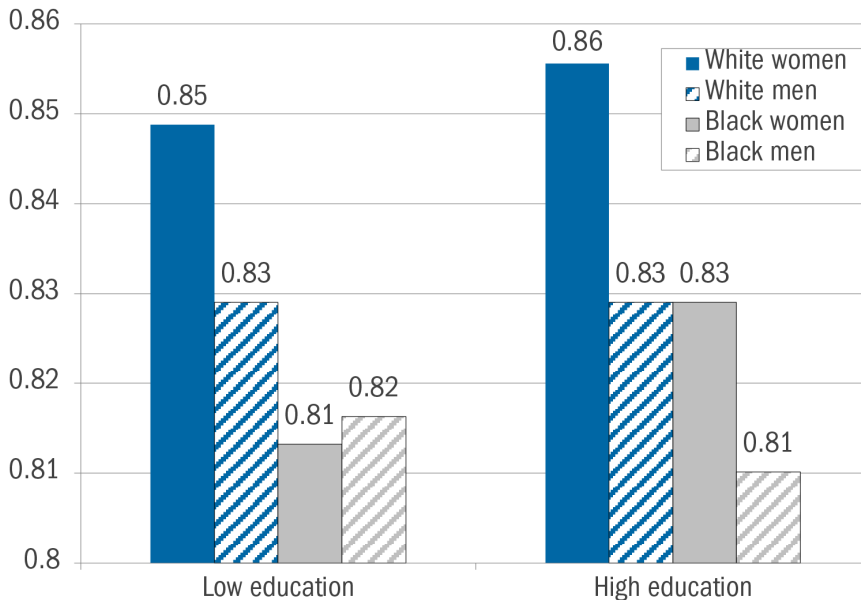
As with the full population, money's worth does not tell the whole story for different SES groups, because it neglects the longevity insurance value of the products.

The analysis next turns to estimating the utility value of immediate annuities by SES.

The wealth equivalence of immediate annuities by socioeconomic status

Figure 9 shows the wealth equivalence of an immediate annuity for the bottom and top education groups of both genders and races considered in 2019. The most striking result is that annuities are preferred to non-annuitization for all groups, despite some having a low money's worth. Even the group that benefits least, high-education white women, would be willing to give up 14 percent of starting wealth to have the option of annuitization.

Figure 9. Wealth equivalent of immediate annuities for top and bottom education terciles, by gender and race, in 2019



Source: Authors' calculations.

No particular pattern by gender or education is apparent in the estimates. All those analyzed would be willing to part with 14-19 percent of starting wealth in return for longevity insurance.

In terms of race, annuitization is consistently more valuable for Blacks than for whites. This pattern persists even though whites tend to live longer, and thus reflects the greater *uncertainty* of longevity for Blacks (Sasson 2016).


Conclusion

This *brief* estimates the money's worth and the wealth equivalence of three types of commercial annuities to capture both the expected value of such lifetime income products and the value of the insurance they provide.

The main findings for the full population are that the money's worth of lifetime income products has remained stable despite rising life expectancies and falling interest

rates, because insurers have lowered the payout per dollar of premium of their offerings. Furthermore, the value of these products including their function as insurance has also remained constant. Finally, while the expected value of deferred annuities is substantially lower than that of immediate annuities, their insurance value is greater because they protect more effectively against outliving one's assets.

Regarding heterogeneity in the value of immediate annuities, the analysis confirms the intuition that groups with lower life expectancies have lower expected returns from lifetime income products. Blacks have lower returns than whites of similar relative education, and those with lower education have lower returns than those with higher education within racial groups. However, this pattern does not hold when accounting for the insurance value of annuities. In particular, Blacks tend to get better value than whites despite their lower expected returns from such products, likely because Blacks have more uncertain longevity alongside lower expected lifespans.



These results highlight the costs and benefits of lifetime income products. They also provide some evidence of the disparities across socioeconomic groups in the cost

of such products. However, the results also raise the possibility that some groups with particularly high costs may stand to gain the most from longevity insurance.

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