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What Can Marshmallows Teach Us About Social Security Deferral?

In the Stanford marshmallow experiments with preschool children a half century ago, researchers offered kids a choice: Eat one marshmallow now or wait 15 minutes for two goodies. Follow-up studies found that kids who had delayed gratification tended to perform better on standardized tests and other life measures.

Similarly, our research shows that for many individuals, delaying gratification by taking Social Security benefits later often maximizes lifetime benefits. Nonetheless, retirees frequently take benefits early, or most commonly, within a few months of retirement.

BENEFITS OF DEFERRAL

While the consequences of eating a marshmallow now versus having two later are rather trivial, the choice of whether to take Social Security benefits early, at retirement, or as late as age 70 can have meaningful implications for household welfare. At least at a basic level, the decision to defer is not a complex one. Ultimately, the key factors are 1) awareness of the risks that could affect one's life expectancy and 2) the real discount rate used to assess future outcomes.

Deferring Social Security benefits increases the real benefit payout by between 6.7% and 9.5% per year relative to taking benefits at age 62, the earliest age to claim benefits.[1] Furthermore, delaying payment from 66 to 70 can boost cumulative lifetime benefits by as much as 27% relative to taking benefits at the earliest possible age of 62.[2]

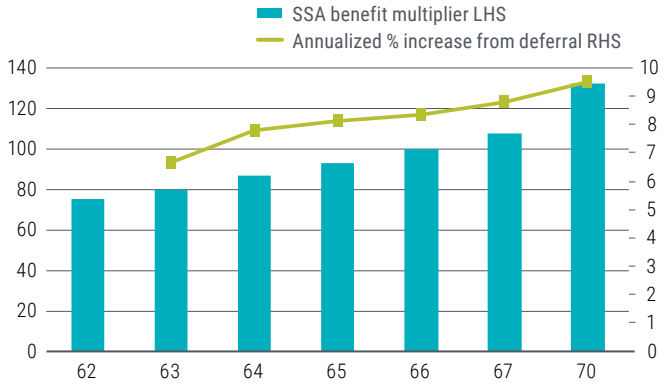
Figure 1 shows the payout relative to the current full retirement age of 66 and the annualized increase in payout from delaying, starting at age 62.

1 66 is the current Social Security Normal Retirement Age (SSNRA) for those born between 1943 and 1954. The SSNRA is the retirement age when the retiree accrues their full benefit payment.

2 For someone who lives to age 95, or around 10 years longer than normal life expectancy

Figure 1: It can pay to wait

Payout relative to full retirement age (66) and annualized payout increase from deferral at age 62



Source: PIMCO and the Social Security Administration as of November 2018

CALCULATING THE RETURNS FROM DEFERRAL

Unfortunately, people often mistake the payout increases shown in Figure 1 with the *rate of return* to deferring. However, the ratio of the higher payout to the non deferral payout is not the same as the rate of return, since one needs to consider income foregone from deferring and account for life expectancy.

A better way to look at the return is to evaluate the Social Security deferral as an "investment," whereby one forgoes an immediate benefit, and thus incurs an opportunity cost, in anticipation of a higher future payout. "Anticipation" is key because there is no guarantee the individual who defers will be around to reap the benefit, in whole or in part.

As described by Shoven and Slavov in "Does it Pay to Delay Social Security?" deferring one's Social Security benefit is equivalent to purchasing a deferred real life annuity.[3] At the heart of the decision is whether or not purchasing this annuity offered by the Social Security Administration makes sense economically. While there are many factors to consider when deciding if, and for how long, to defer benefit payments, the rate of return on this deferred real annuity is clearly of significant importance.

Because the deferral decision involves the trade-off between negative cash flows initially and expected positive incremental cash flows in the future, we can think of the return to deferral as representing the discount rate, which sets the net present value of these cash flows equal to zero. We calculate the net present value of a t to $t+k$ deferral strategy, $NPV_{(t\to t+k)}$, as follows:

$$NPV_{t\to t+k} = \sum_{i=t}^{t+k-1} S(i)\frac{-B_t}{(1+r_D)^i} + \sum_{i=t+k}^{T} S(i)\frac{(B_{t\to t+k} - B_t)}{(1+r_D)^i}$$

where r_D is the return to deferral; $S(i)$ is the probability of survival to the end of year i; B_t is the payment from taking the benefit immediately at time t; and $B_{(t\to t+k)}$ is the (higher) benefit payment from deferring from time t to time $t+k$. We solve for the r_D, which sets $NPV_{(t\to t+k)}$ equal to zero.[4,5] Note that the second term reflects the incremental benefit payment, which accounts for the fact that if one chose not to defer, they would have earned B_t throughout their life. Importantly, our calculation takes into account life expectancy, which includes both the risk of not living long enough to receive a deferred payout as well as the potential for living long past one's life expectancy.

Weighting by survival probability is critically important. For intuition, Figure 2 shows the raw and survival-weighted cash flows for deferring from age 65 to 70.[6] In the early periods, the survival-weighted and raw cash flows are largely the same because the probability of survival is quite high. However, with the passage of time the survival-weighted cash flows fall significantly below the raw values, as the probability of survival falls each year. This is a subtle point that retirees need to consider in formulating their deferral decision: The negative cash flows of deferral are highly certain, but the future positive cash flows are less so.

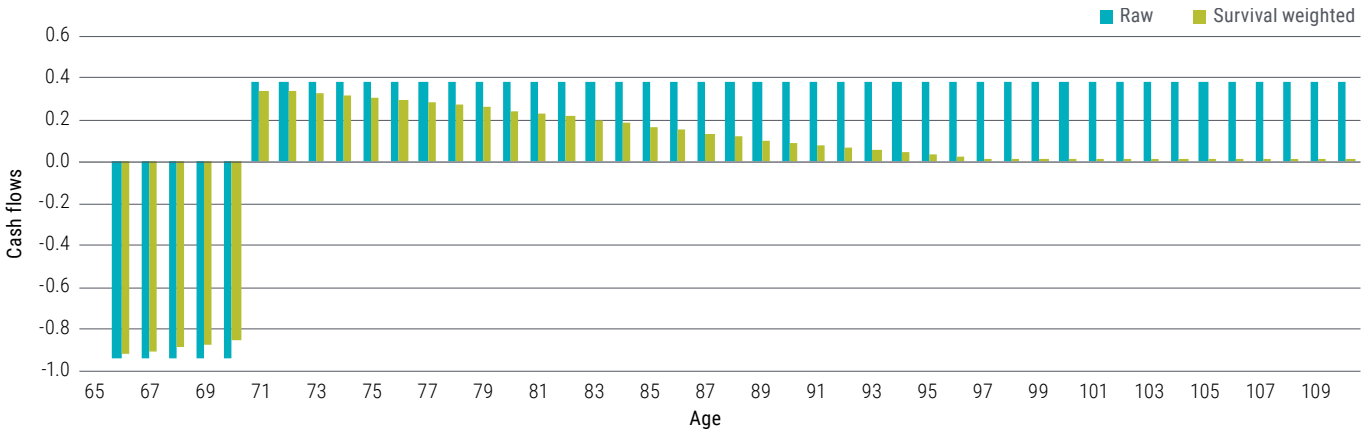
3 For married couples, the deferral decision is more complex, since the secondary earner will receive the primary earner's benefit in the event the primary earner dies before the secondary earner. As such, delaying the primary earner's benefit is equivalent to purchasing a second-to-die life annuity. In this paper we only consider the deferral benefit for a single male. See Shoven and Slavov (2014) for a detailed discussion of this issue.

4 We assume for simplicity that all cash flows occur at the end of the year in order to be consistent with the time horizon of the survival probabilities. Survival probabilities come from the Social Security Administration Actuarial Life Table https://www.ssa.gov/oact/STATS/table4c6.html. We set T=120.

5 Because Social Security automatically modifies benefit payments based on a cost-of-living index, all return calculations should be considered to be real returns. To convert to nominal returns, one simply needs to add back expected inflation.

6 Raw cash flows are simply the unweighted cash flows from deferral. Survival-weighting the cash flows entails multiplying the raw cash flow by the associated probability of surviving up to that particular year, starting from age 65.

Figure 2: Raw versus survival-weighted cash flows for a 65 to 70 deferral strategy



Hypothetical example for illustrative purposes only. The model output included here is not based on any particular financial situation, or need, and is not intended to be, and should not be construed as a forecast, research, investment advice or a recommendation for any specific PIMCO or other strategy, product or service. The model is limited to analyzing the optimal retirement income stream. Investors should speak with their financial advisors regarding the investment mix that may be right for them based on their financial situation and investment objectives.

Source: PIMCO and the Social Security Administration as of November 2018

Table 1: Real rates of return to deferral strategies: normal life expectancy

SSA life expectancy		Expected return to deferral (IRR)								
		Deferral age								
		62	63	64	65	66	67	68	69	70
Retirement age	62		2.1%	3.1%	3.0%	2.7%	2.7%	2.5%	2.1%	1.8%
	63			4.0%	3.4%	2.9%	2.8%	2.5%	2.1%	1.7%
	64				2.9%	2.3%	2.4%	2.1%	1.8%	1.3%
	65					1.8%	2.2%	1.9%	1.5%	1.0%
	66						2.6%	2.0%	1.4%	0.8%
	67							1.4%	0.8%	0.2%
	68								0.2%	-0.4%
	69									-1.0%
	70									

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Source: PIMCO and the Social Security Administration as of November 2018

For individuals with no reason to believe that their life expectancy differs from the average, Table 1 shows real returns, r_D, for deferral strategies based on life expectancy data from the Social Security Administration for a typical male.[7] The returns are uniformly positive, and largely in the 2%–3% range for deferrals up to age 68. When considering a deferral strategy, one would want to weigh the real returns shown in Table 1 against the current level of real interest rates. The values in Table 1 are generally higher than the current 5-year Treasury Inflation-Protected Securities (TIPS) yield of around 1%, as of November 2018. This implies that returns to deferral are relatively attractive for those with normal life expectancy.[8]

The boxed returns in Table 1 show the returns for delaying by a single year. Working backward from age 69, the return from deferring to age 70 is -1%. As such, a 69-year-old would likely

7 Life expectancy for a typical female is one to two years longer than the typical male. However, this makes little difference in terms of the return-to-deferral calculations. As such, all of our data is on life expectancy data for an average male.

8 In reality, one would want to weigh the real returns in Table 1 against the market real rate of interest for the deferral horizon. We use the 5-year TIPS yield as a general guide for the level of real rates today.

not choose to defer an additional year. Continuing this logic, a 68-year-old considering deferring to age 69 would face an expected return of only 0.2%, which is also below today's risk-free real rates. Hence, a 68-year-old would likely avoid deferring as well. The 67 to 68 deferral yields an expected return of 1.4%, which is well above today's 1-year real rate. As such, Table 1 indicates that deferring to age 68 is likely optimal from an expected return perspective given today's yield levels. Delaying beyond age 68 potentially produces real returns below today's market rates. The optimal deferral age, however, will vary with the level of interest rates in the economy at the time of the deferral decision, and circumstances unique to the individual.

Table 2 shows the number of years that the retiree would need to live, starting from the age at which they choose to defer (the retirement age in Table 2), for the decision to breakeven from a cash flow perspective. Breakeven levels range between 14 and 19 years from the retirement age. Table 2 also shows the likelihood of living beyond the breakeven point, given normal life expectancy. These percentages indicate that the likelihood of outliving the breakeven point is better than 50/50 for all deferral strategies. Favorable odds, but no slam dunk. Deferral, therefore, can be economically beneficial but not-so-decidedly clear that it can be chosen without evaluating a number of individual-specific factors.

Table 2: Breakeven years for deferral strategy and probability of survival: normal life expectancy (age 82)

Breakeven years from retirement age

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		16	15	16	17	17	17	18	19
63			14	15	16	16	17	17	18
64				14	15	16	16	17	18
65					15	15	16	17	18
66						14	15	16	17
67							15	16	17
68								16	17
69									17
70									

SSA life expectancy **Probability of living past breakeven**

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		67%	70%	67%	64%	64%	64%	61%	57%
63			71%	68%	65%	65%	62%	62%	58%
64				69%	66%	63%	63%	59%	55%
65					63%	63%	60%	56%	52%
66						65%	61%	57%	53%
67							58%	54%	50%
68								51%	46%
69									43%
70									

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Source: PIMCO and the Social Security Administration as of November 2018

ACCOUNTING FOR DIFFERENT LIFE EXPECTANCIES

Life expectancy is correlated with wealth. The poorest 5% of Social Security claimants live on average six years less than the broad population, and the wealthiest can expect to live an additional six years on average.[9] This is true for a variety of reasons – career opportunities, consistency of employment, likelihood of smoking, and access to quality healthcare being among the most important.

It should not be surprising then that returns for those with materially shorter life expectancy are far lower than those with normal life expectancy. Deferral returns for shorter-life-expectancy individuals are shown in Table 3. They are almost uniformly negative and get steadily worse as one extends deferral. Furthermore, the probabilities of surviving past the breakeven age are almost all below 50%. Thus, for those with shorter life expectancies, taking retirement benefits at an earlier age is often preferable to deferring.[10]

Table 3: Real rates of return to deferral strategies and probability of survival: short life expectancy (age 76)

Short life expectancy — **Expected return to deferral (IRR)**

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		-1.0%	-0.1%	-0.3%	-0.7%	-0.9%	-1.3%	-1.8%	-2.4%
63			0.8%	0.1%	-0.6%	-0.9%	-1.3%	-1.9%	-2.6%
64				-0.7%	-1.4%	-1.4%	-1.9%	-2.5%	-3.2%
65					-2.1%	-1.8%	-2.3%	-3.0%	-3.7%
66						-1.6%	-2.4%	-3.2%	-4.1%
67							-3.2%	-4.1%	-4.9%
68								-4.9%	-5.8%
69									-6.6%
70									

Short life expectancy — **Probability of living past breakeven**

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		46%	50%	46%	41%	41%	41%	36%	32%
63			51%	47%	42%	42%	37%	37%	32%
64				48%	43%	38%	38%	33%	28%
65					39%	39%	34%	29%	25%
66						40%	35%	30%	25%
67							31%	26%	21%
68								22%	18%
69									14%
70									

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Source: PIMCO and the Social Security Administration as of November 2018

9 Source: The Health Inequality Project

10 To compute the probability distribution for different life expectancies, we modify the death probability distribution provided by the Social Security Administration. We do this by perturbing the original distribution by minimizing the squared deviations from the original probabilities, subject to the constraints that the expected years until death is -6 and +6 years, respectively, and that the full probability distribution sums to one.

On the flip side, those with long life expectancies experience significantly higher real returns to deferral, ranging between 2% and 6% per year. Such returns are far higher than what we observe in TIPS markets today. Those with life expectancies six years longer than average should therefore consider a full deferral of benefits to age 70. This contrasts with an optimal deferral age of 68 for those with normal life expectancy. As expected, the probabilities of living longer than the breakeven age are quite high for this cohort, ranging between 80% and 95%. These findings make the deferral choice for those with long life expectancies very compelling.

DEFERRING GRATIFICATION

Why is the marshmallow experiment relevant now? Participants in the first studies are now 62 to 65 and on the verge of Social Security benefit election. Second, the consequences are far greater – think of the Social Security deferral decision as giving up a marshmallow for a few periods for additional marshmallows each and every year *for the rest of one's life*.

And while more recent work[11] has cast some doubt as to the extendibility of the Marshmallow's study's conclusions, the benefits to deferring Social Security are reasonably clear: Deferral can be economically beneficial, particularly for those with above-average life expectancy. Whether we're talking about a childhood treat, or one's ability to enjoy their golden years, deferring gratification may be a decision worth considering.

Table 4: Real rates of return to deferral strategies and probability of survival: long life expectancy (age 88)

Long life expectancy — **Expected return to deferral (IRR)**

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		4.3%	5.3%	5.3%	5.0%	5.0%	4.8%	4.6%	4.2%
63			6.3%	5.8%	5.2%	5.2%	5.0%	4.6%	4.2%
64				5.2%	4.7%	4.8%	4.6%	4.3%	3.9%
65					4.2%	4.7%	4.4%	4.0%	3.6%
66						5.1%	4.5%	4.0%	3.4%
67							4.0%	3.4%	2.9%
68								2.8%	2.3%
69									1.7%
70									

Long life expectancy — **Breakeven years of living retirement age**

Retirement age \ Deferral age	62	63	64	65	66	67	68	69	70
62		94%	96%	94%	93%	93%	93%	91%	89%
63			96%	95%	93%	93%	92%	92%	89%
64				95%	93%	92%	92%	90%	87%
65					92%	92%	90%	87%	84%
66						92%	90%	87%	84%
67							87%	84%	80%
68								81%	76%
69									71%
70									

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Source: PIMCO and the Social Security Administration as of November 2018

11 "Why Rich Kids Are So Good at the Marshmallow Test," *The Atlantic*, 1 June 2018

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