Enhanced Risk Sharing Savings Accounts

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Current defined contribution pension plans expose participants to investment risk and longevity risk. Individual account owners are ill equipped to deal with either of these risks.

What is therefore needed, and what this paper is trying to explore, are approaches that attempt to:

1. Maintain the zero risk position for plan sponsors
2. Reduce or eliminate longevity risk
3. Reduce investment risk to the individual participant
4. Maximize retirement income by

4a. Maintaining the upside potential associated with risky assets, and

4b. Minimizing administrative expenses

There is no solution that addresses all five of these objectives perfectly. However, it is clear that current approaches in the context of defined contribution plans fall well short of achieving an acceptable balance. The typical "live off your savings" approach, presented in recommendations such as "consume only your interest earnings" or the "4 percent rule," completely fails to address some of the above mentioned goals. Annuities, on the other hand, do a near perfect job at addressing goals 1 through 3—but at the expense of goal 4.

This paper introduces the concept of enhanced risk sharing savings accounts (or ERiSSA plans[1]). Besides admittedly being chosen to remind the reader of the original goals of the now over 40-year-old Employee Retirement Income Security Act of 1974 (ERISA), in particular the "retirement income security" part that it in the end has fallen so woefully short of, the name is deliberately new (so as to not be confused with existing concepts such as "collective DC plans" in the Netherlands) and is meant to suggest the following elements:

- Risk sharing across account holders
- Individual accounts with individual ownership
- Enhanced features by virtue of combination with deferred annuities to address longevity risk

While much of the concept can apply during the accumulation phase of defined contribution plans as much as during the decumulation phase, this paper focuses primarily on the decumulation phase to be consistent with the objective of the call for papers.

The Concept

ERiSSA plans can be described as follows. There are individual (savings) accounts much like in traditional defined contribution accounts. At retirement, however, a small portion of the assets is used to purchase a deferred annuity, likely to age 85 or 90.

The remainder of the assets is invested based on the individual account holder's preference and risk tolerance. This means there is room for investment in risky assets such as equities.

The difference from traditional defined contribution accounts lies in the approach in which individual accounts are credited with investment returns. Specifically, there is a separate "buffer account" collectively owned by all participants in the plan rather than by any one individual account owner. This buffer account is intended to smooth actual realized investment returns. During years of favorable investment returns, only a portion of those returns are credited to the individual accounts, with the remainder going toward the buffer. Conversely, in years of unfavorable returns, the buffer is available to supplement returns credited to individual accounts. In addition, a one-time "buy in" would likely have to be assessed at the time of joining a fund that would be credited toward the buffer.

The details of what portion of the investment returns flow into the buffer and how the buffer is accessed to subsidize poor investment returns could differ from plan to plan and might be left to the market place to decide. However, a straight-forward example might call for a "central return area," consisting of a target return

1 The use of the term "plan" to denote ERiSSA arrangements is a loose one. It is certainly not meant to indicate any specific involvement by an employer. In fact, it is foreseen that most such arrangements would be provided by financial institutions.

(likely equal to something close to the historic average return for similar asset classes) along with more or less symmetrical bands around this target return. For example, a fund that invests in equities could have a central return area of 0 percent to 15 percent, centered around a target return of 7.5 percent. In years in which the actual investment return falls within this central return area, the buffer isn't impacted at all. No investment earnings flow into the buffer, nor are there any outflows. However, in years in which investment returns exceed the upper end of the central return area, some or all of the excess returns flow into the buffer. Conversely, when actual investment returns fall short of the lower end of the central return area, the buffer is used to at least partially make up for the shortfalls. The intent and expectation is that in most years, the return that is actually achieved will fall within the central return area and will therefore be acceptable to the account holder. More importantly, we expect that over the long run, the return will exceed that of risk-free assets and will do so with an acceptable level of risk.

Further, there can be rules about what to do in case of a very small or very large buffer. A very small buffer might result in the entire unfavorable investment return hitting the individual accounts (it would have to in the extreme case of the buffer being used up entirely). Conversely, an unusually large buffer might result in additional "bonus" returns being credited to the account.

However, no one individual account owner owns the buffer, nor even a part thereof. When an account owner dies, or withdraws their assets, any contribution to the buffer that could mathematically be attributed to their account stays behind and will serve to assist other members of the plan.

Comparison Against Goals

The following discusses how ERiSSA plans fare against the above mentioned objectives 1 through 4.

MAINTAIN THE ZERO RISK POSITION FOR PLAN SPONSORS

This one is easy. Employers can rest easy by knowing that the defined contribution status of their plans is not touched. ERiSSA plans don't oblige them to do anything beyond what they are currently doing. No risk, no higher cost, no adverse accounting implications.

REDUCE OR ELIMINATE LONGEVITY RISK

The only practical manner known to the author of how to deal with longevity risk is through insurance. A deferred annuity is comparatively inexpensive yet does a fine job eliminating the potential financial difficulties associated with very long life. Arguably, it deals precisely with the kind of situation insurance is meant for: to deal with the potentially high cost associated with a rare event.

The precise starting point (85 or 90 or maybe even 95) of the deferred annuity is relatively unimportant. It can differ between single men and single women. In cases where a pool of money has to last for the joint lifetimes of a couple, it might be tied to the younger spouse's age. Either way, the objective is purely to eliminate the financial risk of very long life. A challenge to the insurance industry would be to find more effective ways to deal with the inflation risk so as to ensure that payouts 30 or more years in the future are still meaningful in a variety of inflation scenarios.

Note that while long life is the primary concern when discussing longevity risk, when interpreted as the risk of living for a period of time significantly different than average—longer or shorter—then the risk of dying shortly after benefit commencement has to be taken into account as well. The author is convinced that the concern of "wasting" money when buying a traditional annuity (not one with a certain period) and dying young is at least one hurdle which prevents many consumers from annuitizing their DC accounts. ERiSSA plans maintain the individual account balance aspect of DC plans. In cases of an untimely death, the majority of the assets fall to the deceased's estate.

REDUCE INVESTMENT RISK TO THE INDIVIDUAL PARTICIPANT

This is the most difficult objective to address in a satisfactory manner. ERiSSA plans are not free of risk. In the most extreme adverse scenarios, the (then nonexistent) buffer does little to protect the individual account holder.

However, the author believes that some residual risk is acceptable if the overall package is more appealing, i.e., if it pushes out the kind of efficient frontier which balances risk and reward.

ERiSSA plans undoubtedly share risk. They are designed to do so by shifting returns between years, i.e., less return in particularly favorable years balanced with higher return in particularly unfavorable years. They are also designed to do so between individuals and between generations. A large buffer built up throughout a period of high returns will likely be available to help future generations throughout periods of low returns. As such, it stands to reason that from an individual perspective, investment risk is reduced, albeit not eliminated.

MAXIMIZE RETIREMENT INCOME

As indicated above, the objective is to maximize retirement income. This is accomplished in a number of ways:

a. Investment in risky assets—and the corresponding expected higher average returns over the long term—are possible. This means that over the long term, more money is available overall, which means more money goes toward retirement income.
b. Given the knowledge that an annuity kicks in at some point, the account balance does not have to last beyond a predetermined point in the future. As a result, it is acceptable for the money to be significantly depleted at around that time. Conversely, this means that more money is available for retirement income until that point.
c. All money—including the buffer—ultimately goes to the account holders. Excess returns that feed the buffer are ultimately used to supplement lower returns and to prop up retirement income at times when particularly needed.
d. The concept is fairly simple. It does not require a large administrative overhead or any risk charges. In fact, the administrative requirements of the individual account component of ERiSSA plans (as opposed to the deferred annuity aspect) is well within the scope of what fund managers along with 401(k) and IRA providers currently do—for fairly low fees. Low costs translate into higher retirement income.

Variations

We mentioned above that the specifics of how such arrangements are structured are best left to the market place to determine.

This might mean different smoothing techniques beyond the simple "all or nothing" approach outlined in the central return area shown above. Also, the concept of an initial "buy-in charge" was merely mentioned in passing above. Some charge is needed to build the initial buffer as well as to avoid diluting an already existing buffer by virtue of new joiners. On the other hand, an unrealistically large buy-in charge would discourage individuals from joining in the first place.

Similarly, the use of the buffer could be more sophisticated than a simple "peanut butter" approach for all. For example, account holders who have suffered particularly large losses in the past might get a larger share.

In general, there should also be rules or suggestions around the annual withdrawal amounts. The easiest approach consists of a table that gives percentages by age of the account balance at the beginning of the year, similar to the IRS' current required minimum withdrawal rules. Such percentages can vary based on deferral age, the targeted annual cost-of-living increase, etc. Alternatively, there could be some further smoothing to attempt to maintain a given level of annual withdrawals for as long as possible.

In reality, providers would likely want to perform extensive modeling as well as consumer research to determine the ideal combination of a nearly endless array of possible parameters. It would be up to some regulator or consumer protection agency to determine what illustrations to require to ensure the fair comparison of alternatives offered in the market place.

Regardless, the principles outlined above should hold true regardless of the specific variation.

An Example and Analysis

To illustrate the mechanics of ERiSSA plans, let's contemplate a simple example:

- $100,000 is invested into an ERiSSA arrangement that invests exclusively in equities. In fact, we assume the equities to mirror the Standard & Poor's 500 index[2] with a 25 basis point (bp) fee charged by the provider.

2 Historical returns for the S&P 500 taken from http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html.

- The decumulation phase starts at age 65, and a deferred annuity to age 85 is purchased. The cost of the annuity is assumed to be 12 percent of the principal.
- A central return area of 0 percent to 14 percent is chosen. Actual returns within that range are credited to the individual accounts without impact to the buffer. Excess returns go straight to the buffer (with no maximum), and shortfalls are compensated by the buffer to the maximum extent possible (even if it means completely depleting it).
- The initial buy-in premium is 10 percent. However, two variations are considered. In one example, the arrangement is completely new and therefore a buffer equal to 11 percent (i.e., 10/90) of the account balances exists. In the other example, the arrangement has been in effect for a while and a buffer has been built up equal to 33 percent of the account balances.
- Returns are credited annually (at the end of the year), and withdrawals are also made annually (at the beginning of the year). Withdrawal amounts equal what could be purchased for the account balance at any given time if investment returns of 7 percent (the target rate) were to be realized for the remainder of the period until age 85—at which point the capital is exhausted.

Tables 1 and 2 show the development of the relevant balances over time under both buffer scenarios. The investment returns assumed are those of the S&P 500 from 1970 to 1990.

The appendix shows the results of the calculations for the 20-year S&P 500 scenarios from 1930–50 through 1990–2010 in 10-year intervals. The development of the annual retirement income under each of these scenarios is shown in Tables 3 and 4 and Figures 1 and 2.

Overall, even in this simple example (real implementations would likely be more complex), the arrangement does a decent job maintaining reasonably steady retirement income that exceeds what would be available from annuities or via the 4 percent rule.

The exception is the 1930–50 scenario, which starts with catastrophic returns of −25 percent, −44 percent and −9 percent, which deplete the buffer and account balances in a manner that cannot be recovered from. This illustrates the unfortunate reality of the residual risk that exists with risky investments.

Open Questions

We recognize that there are some open questions. Specifically, there are potential questions on how the buffer is generated when a product is first launched. There are related questions about the size of a buy-in premium and about portability rules in general. Such questions, however, go beyond the scope of this paper, and are therefore best left for future research and contemplation.

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Table 1 1970–90 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/ (Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	3.56%	3.36%	3.36%	0.00%	2,426.36	8,800	144	8,944
66	74,640	9.04%	6,749	14.22%	14.02%	14.00%	0.02%	9,504.65	8,944	149	9,094
67	77,395	9.29%	7,191	18.76%	18.56%	14.00%	4.56%	9,828.61	9,094	3,342	12,436
68	80,033	9.57%	7,661	-14.31%	-14.51%	0.00%	-14.51%	-	12,436	(10,356)	2,079
69	72,372	9.89%	7,160	-25.90%	-26.10%	-22.71%	-3.39%	(14,810.78)	2,079	(2,079)	-
70	50,401	10.26%	5,172	37.00%	36.80%	14.00%	22.80%	6,332.11	-	10,403	10,403
71	51,561	10.69%	5,510	23.83%	23.63%	14.00%	9.63%	6,447.20	10,403	4,527	14,930
72	52,499	11.18%	5,871	-6.98%	-7.18%	0.00%	-7.18%	-	14,930	(3,255)	11,675
73	46,628	11.77%	5,487	6.51%	6.31%	6.31%	0.00%	2,596.03	11,675	82	11,757
74	43,738	12.46%	5,451	18.52%	18.32%	14.00%	4.32%	5,360.10	11,757	1,731	13,488
75	43,647	13.31%	5,808	31.74%	31.54%	14.00%	17.54%	5,297.43	13,488	6,713	20,200
76	43,136	14.34%	6,188	-4.70%	-4.90%	0.00%	-4.90%	-	20,200	(1,737)	18,464
77	36,949	15.65%	5,783	20.42%	20.22%	14.00%	6.22%	4,363.19	18,464	2,001	20,465
78	35,529	17.34%	6,161	22.34%	22.14%	14.00%	8.14%	4,111.47	20,465	2,449	22,914
79	33,479	19.61%	6,564	6.15%	5.95%	5.95%	0.00%	1,601.43	22,914	54	22,968
80	28,516	22.79%	6,500	31.24%	31.04%	14.00%	17.04%	3,082.30	22,968	3,796	26,763
81	25,099	27.59%	6,925	18.49%	18.29%	14.00%	4.29%	2,544.30	26,763	816	27,579
82	20,718	35.61%	7,378	5.81%	5.61%	5.61%	0.00%	748.36	27,579	27	27,606
83	14,088	51.69%	7,282	16.54%	16.34%	14.00%	2.34%	952.82	27,606	173	27,779
84	7,759	100.00%	7,759	31.48%	31.28%	n/a	n/a	-	27,779	-	27,779

Note: BOY indicates beginning of year; EOY indicates end of year.

Table 2 1970–90 Scenario with Larger Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	3.56%	3.36%	3.36%	0.00%	2,426.36	26,400	144	26,544
66	74,640	9.04%	6,749	14.22%	14.02%	14.00%	0.02%	9,504.65	26,544	149	26,694
67	77,395	9.29%	7,191	18.76%	18.56%	14.00%	4.56%	9,828.61	26,694	3,342	30,036
68	80,033	9.57%	7,661	-14.31%	-14.51%	0.00%	-14.51%	-	30,036	(10,356)	19,679
69	72,372	9.89%	7,160	-25.90%	-26.10%	0.00%	-26.10%	-	19,679	(16,890)	2,789
70	65,212	10.26%	6,692	37.00%	36.80%	14.00%	22.80%	8,192.85	2,789	13,460	16,249
71	66,713	10.69%	7,129	23.83%	23.63%	14.00%	9.63%	8,341.76	16,249	5,857	22,106
72	67,926	11.18%	7,596	-6.98%	-7.18%	0.00%	-7.18%	-	22,106	(4,211)	17,895
73	60,330	11.77%	7,099	6.51%	6.31%	6.31%	0.00%	3,358.89	17,895	106	18,001
74	56,590	12.46%	7,053	18.52%	18.32%	14.00%	4.32%	6,935.21	18,001	2,239	20,241
75	56,472	13.31%	7,514	31.74%	31.54%	14.00%	17.54%	6,854.12	20,241	8,685	28,926
76	55,812	14.34%	8,006	-4.70%	-4.90%	0.00%	-4.90%	-	28,926	(2,247)	26,679
77	47,806	15.65%	7,482	20.42%	20.22%	14.00%	6.22%	5,645.35	26,679	2,589	29,268
78	45,969	17.34%	7,972	22.34%	22.14%	14.00%	8.14%	5,319.66	29,268	3,169	32,437
79	43,317	19.61%	8,493	6.15%	5.95%	5.95%	0.00%	2,072.03	32,437	70	32,506
80	36,896	22.79%	8,410	31.24%	31.04%	14.00%	17.04%	3,988.05	32,506	4,911	37,417
81	32,474	27.59%	8,960	18.49%	18.29%	14.00%	4.29%	3,291.97	37,417	1,056	38,473
82	26,806	35.61%	9,546	5.81%	5.61%	5.61%	0.00%	968.27	38,473	35	38,508
83	18,228	51.69%	9,422	16.54%	16.34%	14.00%	2.34%	1,232.82	38,508	224	38,731
84	10,039	100.00%	10,039	31.48%	31.28%	n/a	n/a	-	38,731	-	38,731

Note: BOY indicates beginning of year; EOY indicates end of year.

Table 3 All Scenarios with Small Buffer

Year	1930-50	1940-60	1950-70	1960-80	1970-90	1980-2000	1990-2010
1	6,987	6,987	6,987	6,987	6,987	6,987	6,987
2	5,685	6,530	7,444	6,539	6,749	7,444	6,530
3	2,984	5,425	7,931	6,967	7,191	6,957	6,957
4	2,548	5,780	8,450	6,511	7,661	7,412	6,976
5	2,714	6,158	7,897	6,937	7,160	7,897	7,156
6	2,537	6,561	8,414	7,391	5,172	7,819	6,764
7	2,703	6,990	8,964	7,750	5,510	8,331	7,206
8	2,880	6,533	8,984	7,243	5,871	8,876	7,678
9	2,691	6,411	8,396	7,717	5,487	8,761	8,180
10	2,867	6,321	8,946	7,977	5,451	9,334	8,715
11	2,680	6,734	9,352	7,455	5,808	9,945	9,285
12	2,504	7,175	8,752	7,202	6,188	9,294	8,678
13	2,341	7,644	9,325	7,673	5,783	9,902	8,110
14	2,494	8,144	8,715	8,175	6,161	9,929	7,580
15	2,657	7,612	9,285	7,640	6,564	10,186	8,075
16	2,831	8,110	9,893	7,140	6,500	9,627	8,343
17	3,016	8,640	10,373	7,607	6,925	10,257	8,158
18	2,819	8,659	9,695	8,105	7,378	10,928	8,691
19	2,766	8,093	10,329	7,575	7,282	11,643	8,552
20	2,727	8,622	10,677	7,526	7,759	12,404	7,992
Avg.	**3,071**	**7,156**	**8,940**	**7,406**	**6,479**	**9,197**	**7,831**

Table 4 All Scenarios with Large Buffer

Year	1930-50	1940-60	1950-70	1960-80	1970-90	1980-2000	1990-2010
1	6,987	6,987	6,987	6,987	6,987	6,987	6,987
2	6,530	6,530	7,444	6,539	6,749	7,444	6,530
3	4,195	6,103	7,931	6,967	7,191	6,957	6,957
4	3,582	6,502	8,450	6,511	7,661	7,412	6,976
5	3,816	6,927	7,897	6,937	7,160	7,897	7,156
6	3,566	7,380	8,414	7,391	6,692	7,819	6,764
7	3,799	7,863	8,964	7,750	7,129	8,331	7,206
8	4,048	7,349	8,984	7,243	7,596	8,876	7,678
9	3,783	7,211	8,396	7,717	7,099	8,761	8,180
10	4,031	7,110	8,946	7,977	7,053	9,334	8,715
11	3,767	7,575	9,352	7,455	7,514	9,945	9,285
12	3,521	8,071	8,752	7,202	8,006	9,294	8,678
13	3,290	8,599	9,325	7,673	7,482	9,902	8,110
14	3,506	9,162	8,715	8,175	7,972	9,929	7,580
15	3,735	8,562	9,285	7,640	8,493	10,186	8,075
16	3,979	9,122	9,893	7,140	8,410	9,627	8,343
17	4,240	9,719	10,373	7,607	8,960	10,257	8,158
18	3,962	9,741	9,695	8,105	9,546	10,928	8,691
19	3,888	9,104	10,329	7,575	9,422	11,643	8,552
20	3,834	9,699	10,677	7,526	10,039	12,404	7,992
Avg.	**4,103**	**7,966**	**8,940**	**7,406**	**7,858**	**9,197**	**7,831**

Figure 1 All Scenarios with Small Buffer

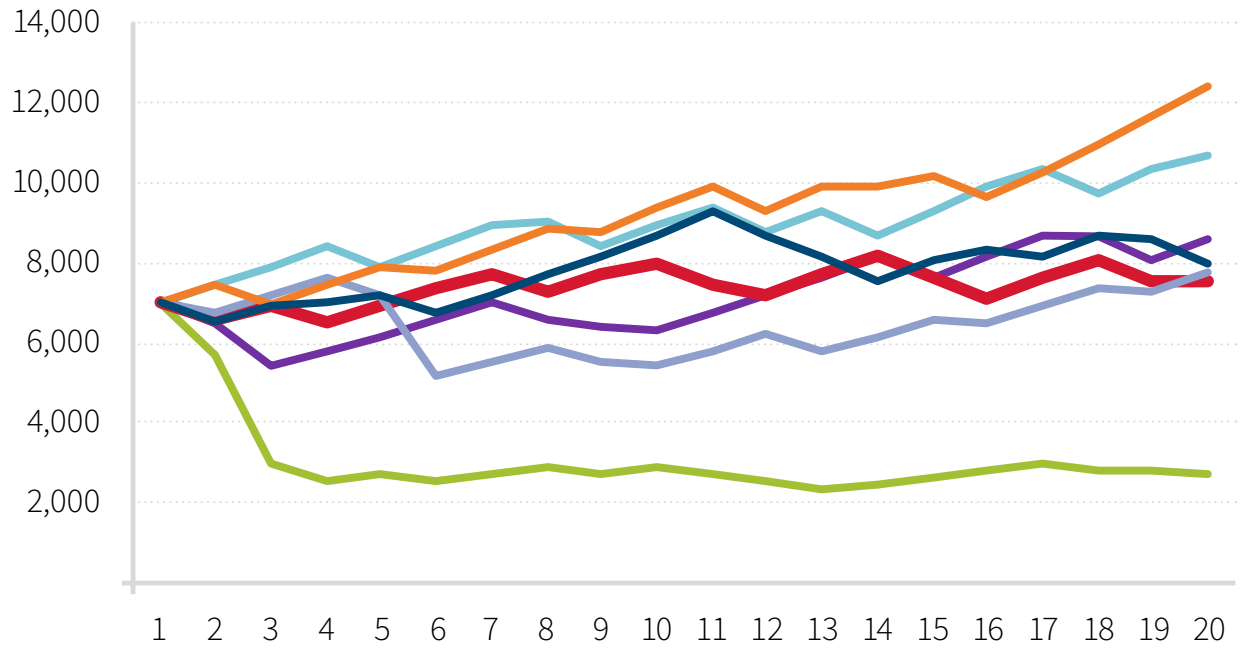
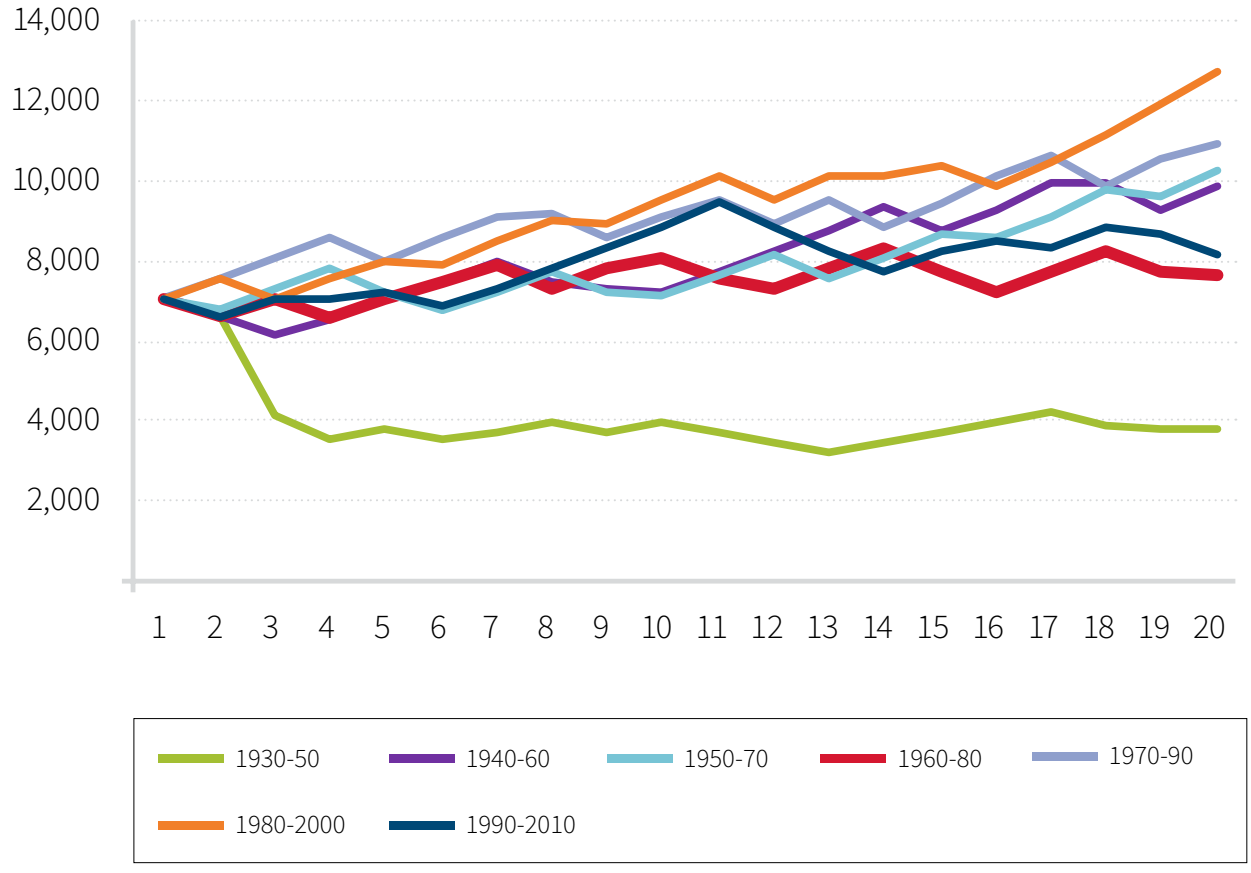


Figure 2 All Scenarios with Large Buffer



Appendix

Table 1A 1930–50 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-25.12%	-25.32%	-12.93%	-12.39%	(9,339.95)	8,800	(8,800)	—
67	32,117	9.29%	2,984	-8.64%	-8.84%	-8.64%	-0.20%	(2,517.08)	—	—	—
68	26,616	9.57%	2,548	49.98%	49.78%	14.00%	35.78%	3,369.52	—	8,660	8,660
69	27,438	9.89%	2,714	-1.19%	-1.39%	0.00%	-1.39%	—	8,660	(294)	8,365
70	24,723	10.26%	2,537	46.74%	46.54%	14.00%	32.54%	3,106.06	8,365	7,264	15,629
71	25,292	10.69%	2,703	31.94%	31.74%	14.00%	17.74%	3,162.52	15,629	4,053	19,682
72	25,752	11.18%	2,880	-35.34%	-35.54%	0.00%	-35.54%	—	19,682	(8,083)	11,599
73	22,872	11.77%	2,691	29.28%	29.08%	14.00%	15.08%	2,825.34	11,599	3,084	14,682
74	23,006	12.46%	2,867	-1.10%	-1.30%	0.00%	-1.30%	—	14,682	(222)	14,461
75	20,139	13.31%	2,680	-10.67%	-10.87%	0.00%	-10.87%	—	14,461	(1,863)	12,598
76	17,459	14.34%	2,504	-12.77%	-12.97%	0.00%	-12.97%	—	12,598	(1,910)	10,688
77	14,955	15.65%	2,341	19.17%	18.97%	14.00%	4.97%	1,765.98	10,688	652	11,340
78	14,380	17.34%	2,494	25.06%	24.86%	14.00%	10.86%	1,664.10	11,340	1,315	12,655
79	13,551	19.61%	2,657	19.03%	18.83%	14.00%	4.83%	1,525.11	12,655	548	13,203
80	12,419	22.79%	2,831	35.82%	35.62%	14.00%	21.62%	1,342.34	13,203	2,092	15,295
81	10,930	27.59%	3,016	-8.43%	-8.63%	0.00%	-8.63%	—	15,295	(667)	14,628
82	7,915	35.61%	2,819	5.20%	5.00%	5.00%	0.00%	254.80	14,628	10	14,638
83	5,351	51.69%	2,766	5.70%	5.50%	5.50%	0.00%	142.17	14,638	5	14,643
84	2,727	100.00%	2,727	18.30%	18.10%	n/a	n/a	—	14,643	—	14,643

Table 2A 1930–50 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-25.12%	-25.32%	0.00%	-25.32%	-	26,400	(18,140)	8,260
66	72,213	9.04%	6,530	-43.84%	-44.04%	-31.26%	-12.78%	(20,535.55)	8,260	(8,260)	-
67	45,148	9.29%	4,195	-8.64%	-8.84%	-8.64%	-0.20%	(3,538.36)	-	-	-
68	37,415	9.57%	3,582	49.98%	49.78%	14.00%	35.78%	4,736.67	-	12,173	12,173
69	38,570	9.89%	3,816	-1.19%	-1.39%	0.00%	-1.39%	-	12,173	(414)	11,760
70	34,754	10.26%	3,566	46.74%	46.54%	14.00%	32.54%	4,366.32	11,760	10,211	21,971
71	35,554	10.69%	3,799	31.94%	31.74%	14.00%	17.74%	4,445.67	21,971	5,697	27,667
72	36,200	11.18%	4,048	-35.34%	-35.54%	0.00%	-35.54%	-	27,667	(11,363)	16,305
73	32,152	11.77%	3,783	29.28%	29.08%	14.00%	15.08%	3,971.69	16,305	4,335	20,640
74	32,341	12.46%	4,031	-1.10%	-1.30%	0.00%	-1.30%	-	20,640	(311)	20,328
75	28,310	13.31%	3,767	-10.67%	-10.87%	0.00%	-10.87%	-	20,328	(2,619)	17,709
76	24,543	14.34%	3,521	-12.77%	-12.97%	0.00%	-12.97%	-	17,709	(2,685)	15,025
77	21,023	15.65%	3,290	19.17%	18.97%	14.00%	4.97%	2,482.52	15,025	917	15,942
78	20,215	17.34%	3,506	25.06%	24.86%	14.00%	10.86%	2,339.29	15,942	1,848	17,790
79	19,049	19.61%	3,735	19.03%	18.83%	14.00%	4.83%	2,143.91	17,790	770	18,560
80	17,458	22.79%	3,979	35.82%	35.62%	14.00%	21.62%	1,886.97	18,560	2,941	21,501
81	15,365	27.59%	4,240	-8.43%	-8.63%	0.00%	-8.63%	-	21,501	(938)	20,563
82	11,126	35.61%	3,962	5.20%	5.00%	5.00%	0.00%	358.18	20,563	14	20,577
83	7,522	51.69%	3,888	5.70%	5.50%	5.50%	0.00%	199.86	20,577	7	20,585
84	3,834	100.00%	3,834	18.30%	18.10%	n/a	n/a	-	20,585	-	20,585

Table 3A 1940–60 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-10.67%	-10.87%	0.00%	-10.87%	-	8,800	(7,705)	1,095
66	72,213	9.04%	6,530	-12.77%	-12.97%	-11.10%	-1.87%	(7,292.91)	1,095	(1,095)	-
67	58,390	9.29%	5,425	19.17%	18.97%	14.00%	4.97%	7,415.17	-	2,738	2,738
68	60,381	9.57%	5,780	25.06%	24.86%	14.00%	10.86%	7,644.10	2,738	6,039	8,777
69	62,245	9.89%	6,158	19.03%	18.83%	14.00%	4.83%	7,852.15	8,777	2,821	11,598
70	63,939	10.26%	6,561	35.82%	35.62%	14.00%	21.62%	8,032.93	11,598	12,520	24,118
71	65,411	10.69%	6,990	-8.43%	-8.63%	0.00%	-8.63%	-	24,118	(4,925)	19,193
72	58,421	11.18%	6,533	5.20%	5.00%	5.00%	0.00%	2,594.40	19,193	104	19,297
73	54,482	11.77%	6,411	5.70%	5.50%	5.50%	0.00%	2,643.95	19,297	96	19,393
74	50,716	12.46%	6,321	18.30%	18.10%	14.00%	4.10%	6,215.29	19,393	1,909	21,302
75	50,610	13.31%	6,734	30.81%	30.61%	14.00%	16.61%	6,142.62	21,302	7,376	28,678
76	50,018	14.34%	7,175	23.68%	23.48%	14.00%	9.48%	5,998.10	28,678	4,147	32,825
77	48,842	15.65%	7,644	18.15%	17.95%	14.00%	3.95%	5,767.63	32,825	1,710	34,535
78	46,965	17.34%	8,144	-1.21%	-1.41%	0.00%	-1.41%	-	34,535	(470)	34,065
79	38,821	19.61%	7,612	52.56%	52.36%	14.00%	38.36%	4,369.26	34,065	12,034	46,099
80	35,578	22.79%	8,110	32.60%	32.40%	14.00%	18.40%	3,845.62	46,099	5,109	51,208
81	31,314	27.59%	8,640	7.44%	7.24%	7.24%	0.00%	1,641.62	51,208	45	51,254
82	24,316	35.61%	8,659	-10.46%	-10.66%	0.00%	-10.66%	-	51,254	(1,638)	49,616
83	15,656	51.69%	8,093	43.72%	43.52%	14.00%	29.52%	1,058.89	49,616	2,248	51,864
84	8,622	100.00%	8,622	12.06%	11.86%	n/a	n/a	-	51,864	-	51,864

Table 4A 1940–60 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-10.67%	-10.87%	0.00%	-10.87%	-	26,400	(7,705)	18,695
66	72,213	9.04%	6,530	-12.77%	-12.97%	0.00%	-12.97%	-	18,695	(8,388)	10,307
67	65,683	9.29%	6,103	19.17%	18.97%	14.00%	4.97%	8,341.32	10,307	3,080	13,387
68	67,922	9.57%	6,502	25.06%	24.86%	14.00%	10.86%	8,598.85	13,387	6,793	20,181
69	70,019	9.89%	6,927	19.03%	18.83%	14.00%	4.83%	8,832.88	20,181	3,174	23,354
70	71,925	10.26%	7,380	35.82%	35.62%	14.00%	21.62%	9,036.24	23,354	14,084	37,438
71	73,581	10.69%	7,863	-8.43%	-8.63%	0.00%	-8.63%	-	37,438	(5,540)	31,898
72	65,718	11.18%	7,349	5.20%	5.00%	5.00%	0.00%	2,918.44	31,898	117	32,014
73	61,287	11.77%	7,211	5.70%	5.50%	5.50%	0.00%	2,974.17	32,014	108	32,123
74	57,050	12.46%	7,110	18.30%	18.10%	14.00%	4.10%	6,991.57	32,123	2,147	34,270
75	56,931	13.31%	7,575	30.81%	30.61%	14.00%	16.61%	6,909.82	34,270	8,297	42,567
76	56,266	14.34%	8,071	23.68%	23.48%	14.00%	9.48%	6,747.25	42,567	4,665	47,232
77	54,942	15.65%	8,599	18.15%	17.95%	14.00%	3.95%	6,488.00	47,232	1,923	49,155
78	52,831	17.34%	9,162	-1.21%	-1.41%	0.00%	-1.41%	-	49,155	(528)	48,627
79	43,669	19.61%	8,562	52.56%	52.36%	14.00%	38.36%	4,914.98	48,627	13,537	62,164
80	40,022	22.79%	9,122	32.60%	32.40%	14.00%	18.40%	4,325.93	62,164	5,747	67,911
81	35,225	27.59%	9,719	7.44%	7.24%	7.24%	0.00%	1,846.65	67,911	51	67,962
82	27,353	35.61%	9,741	-10.46%	-10.66%	0.00%	-10.66%	-	67,962	(1,842)	66,120
83	17,612	51.69%	9,104	43.72%	43.52%	14.00%	29.52%	1,191.14	66,120	2,529	68,649
84	9,699	100.00%	9,699	12.06%	11.86%	n/a	n/a	-	68,649	-	68,649

Table 5A 1950–70 Scenarios with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	30.81%	30.61%	14.00%	16.61%	10,109.84	8,800	12,139	20,939
66	82,323	9.04%	7,444	23.68%	23.48%	14.00%	9.48%	10,483.07	20,939	7,248	28,187
67	85,362	9.29%	7,931	18.15%	17.95%	14.00%	3.95%	10,840.37	28,187	3,213	31,401
68	88,272	9.57%	8,450	-1.21%	-1.41%	0.00%	-1.41%	-	31,401	(966)	30,435
69	79,822	9.89%	7,897	52.56%	52.36%	14.00%	38.36%	10,069.48	30,435	27,734	58,169
70	81,994	10.26%	8,414	32.60%	32.40%	14.00%	18.40%	10,301.31	58,169	13,686	71,855
71	83,882	10.69%	8,964	7.44%	7.24%	7.24%	0.00%	5,424.07	71,855	150	72,005
72	80,342	11.18%	8,984	-10.46%	-10.66%	0.00%	-10.66%	-	72,005	(7,464)	64,541
73	71,358	11.77%	8,396	43.72%	43.52%	14.00%	29.52%	8,814.63	64,541	18,712	83,253
74	71,776	12.46%	8,946	12.06%	11.86%	11.86%	0.00%	7,451.71	83,253	126	83,379
75	70,282	13.31%	9,352	0.34%	0.14%	0.14%	0.00%	85.30	83,379	122	83,501
76	61,016	14.34%	8,752	26.64%	26.44%	14.00%	12.44%	7,316.85	83,501	6,606	90,107
77	59,580	15.65%	9,325	-8.81%	-9.01%	0.00%	-9.01%	-	90,107	(4,427)	85,679
78	50,255	17.34%	8,715	22.61%	22.41%	14.00%	8.41%	5,815.62	85,679	3,577	89,256
79	47,356	19.61%	9,285	16.42%	16.22%	14.00%	2.22%	5,329.90	89,256	921	90,177
80	43,401	22.79%	9,893	12.40%	12.20%	12.20%	0.00%	4,087.98	90,177	67	90,244
81	37,596	27.59%	10,373	-9.97%	-10.17%	0.00%	-10.17%	-	90,244	(2,714)	87,530
82	27,223	35.61%	9,695	23.80%	23.60%	14.00%	9.60%	2,453.94	87,530	1,718	89,248
83	19,982	51.69%	10,329	10.81%	10.61%	10.61%	0.00%	1,024.20	89,248	19	89,267
84	10,677	100.00%	10,677	-8.24%	-8.44%	n/a	n/a	-	89,267	-	89,267

Table 6A 1950–70 Scenarios with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	30.81%	30.61%	14.00%	16.61%	10,109.84	26,400	12,139	38,539
66	82,323	9.04%	7,444	23.68%	23.48%	14.00%	9.48%	10,483.07	38,539	7,248	45,787
67	85,362	9.29%	7,931	18.15%	17.95%	14.00%	3.95%	10,840.37	45,787	3,213	49,001
68	88,272	9.57%	8,450	-1.21%	-1.41%	0.00%	-1.41%	-	49,001	(966)	48,035
69	79,822	9.89%	7,897	52.56%	52.36%	14.00%	38.36%	10,069.48	48,035	27,734	75,769
70	81,994	10.26%	8,414	32.60%	32.40%	14.00%	18.40%	10,301.31	75,769	13,686	89,455
71	83,882	10.69%	8,964	7.44%	7.24%	7.24%	0.00%	5,424.07	89,455	150	89,605
72	80,342	11.18%	8,984	-10.46%	-10.66%	0.00%	-10.66%	-	89,605	(7,464)	82,141
73	71,358	11.77%	8,396	43.72%	43.52%	14.00%	29.52%	8,814.63	82,141	18,712	100,853
74	71,776	12.46%	8,946	12.06%	11.86%	11.86%	0.00%	7,451.71	100,853	126	100,979
75	70,282	13.31%	9,352	0.34%	0.14%	0.14%	0.00%	85.30	100,979	122	101,101
76	61,016	14.34%	8,752	26.64%	26.44%	14.00%	12.44%	7,316.85	101,101	6,606	107,707
77	59,580	15.65%	9,325	-8.81%	-9.01%	0.00%	-9.01%	-	107,707	(4,427)	103,279
78	50,255	17.34%	8,715	22.61%	22.41%	14.00%	8.41%	5,815.62	103,279	3,577	106,856
79	47,356	19.61%	9,285	16.42%	16.22%	14.00%	2.22%	5,329.90	106,856	921	107,777
80	43,401	22.79%	9,893	12.40%	12.20%	12.20%	0.00%	4,087.98	107,777	67	107,844
81	37,596	27.59%	10,373	-9.97%	-10.17%	0.00%	-10.17%	-	107,844	(2,714)	105,130
82	27,223	35.61%	9,695	23.80%	23.60%	14.00%	9.60%	2,453.94	105,130	1,718	106,848
83	19,982	51.69%	10,329	10.81%	10.61%	10.61%	0.00%	1,024.20	106,848	19	106,867
84	10,677	100.00%	10,677	-8.24%	-8.44%	n/a	n/a	-	106,867	-	106,867

Table 7A 1960–80 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	0.34%	0.14%	0.14%	0.00%	101.10	8,800	144	8,944
66	72,314	9.04%	6,539	26.64%	26.44%	14.00%	12.44%	9,208.55	8,944	8,314	17,258
67	74,984	9.29%	6,967	-8.81%	-9.01%	0.00%	-9.01%	-	17,258	(5,992)	11,266
68	68,017	9.57%	6,511	22.61%	22.41%	14.00%	8.41%	8,610.88	11,266	5,296	16,562
69	70,117	9.89%	6,937	16.42%	16.22%	14.00%	2.22%	8,845.25	16,562	1,529	18,091
70	72,026	10.26%	7,391	12.40%	12.20%	12.20%	0.00%	7,885.46	18,091	129	18,220
71	72,520	10.69%	7,750	-9.97%	-10.17%	0.00%	-10.17%	-	18,220	(6,458)	11,762
72	64,771	11.18%	7,243	23.80%	23.60%	14.00%	9.60%	8,053.87	11,762	5,638	17,400
73	65,582	11.77%	7,717	10.81%	10.61%	10.61%	0.00%	6,139.46	17,400	116	17,516
74	64,004	12.46%	7,977	-8.24%	-8.44%	0.00%	-8.44%	-	17,516	(4,617)	12,899
75	56,027	13.31%	7,455	3.56%	3.36%	3.36%	0.00%	1,632.02	12,899	97	12,996
76	50,204	14.34%	7,202	14.22%	14.02%	14.00%	0.02%	6,020.37	12,996	95	13,091
77	49,023	15.65%	7,673	18.76%	18.56%	14.00%	4.56%	5,789.04	13,091	1,968	15,059
78	47,139	17.34%	8,175	-14.31%	-14.51%	0.00%	-14.51%	-	15,059	(5,576)	9,483
79	38,965	19.61%	7,640	-25.90%	-26.10%	0.00%	-26.10%	-	9,483	(8,113)	1,370
80	31,325	22.79%	7,140	37.00%	36.80%	14.00%	22.80%	3,385.88	1,370	5,563	6,933
81	27,571	27.59%	7,607	23.83%	23.63%	14.00%	9.63%	2,794.90	6,933	1,962	8,895
82	22,758	35.61%	8,105	-6.98%	-7.18%	0.00%	-7.18%	-	8,895	(1,023)	7,872
83	14,654	51.69%	7,575	6.51%	6.31%	6.31%	0.00%	446.69	7,872	14	7,887
84	7,526	100.00%	7,526	18.52%	18.32%	n/a	n/a	-	7,887	-	7,887

Table 8A 1960–80 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	0.34%	0.14%	0.14%	0.00%	101.10	26,400	144	26,544
66	72,314	9.04%	6,539	26.64%	26.44%	14.00%	12.44%	9,208.55	26,544	8,314	34,858
67	74,984	9.29%	6,967	-8.81%	-9.01%	0.00%	-9.01%	-	34,858	(5,992)	28,866
68	68,017	9.57%	6,511	22.61%	22.41%	14.00%	8.41%	8,610.88	28,866	5,296	34,162
69	70,117	9.89%	6,937	16.42%	16.22%	14.00%	2.22%	8,845.25	34,162	1,529	35,691
70	72,026	10.26%	7,391	12.40%	12.20%	12.20%	0.00%	7,885.46	35,691	129	35,820
71	72,520	10.69%	7,750	-9.97%	-10.17%	0.00%	-10.17%	-	35,820	(6,458)	29,362
72	64,771	11.18%	7,243	23.80%	23.60%	14.00%	9.60%	8,053.87	29,362	5,638	35,000
73	65,582	11.77%	7,717	10.81%	10.61%	10.61%	0.00%	6,139.46	35,000	116	35,116
74	64,004	12.46%	7,977	-8.24%	-8.44%	0.00%	-8.44%	-	35,116	(4,617)	30,499
75	56,027	13.31%	7,455	3.56%	3.36%	3.36%	0.00%	1,632.02	30,499	97	30,596
76	50,204	14.34%	7,202	14.22%	14.02%	14.00%	0.02%	6,020.37	30,596	95	30,691
77	49,023	15.65%	7,673	18.76%	18.56%	14.00%	4.56%	5,789.04	30,691	1,968	32,659
78	47,139	17.34%	8,175	-14.31%	-14.51%	0.00%	-14.51%	-	32,659	(5,576)	27,083
79	38,965	19.61%	7,640	-25.90%	-26.10%	0.00%	-26.10%	-	27,083	(8,113)	18,970
80	31,325	22.79%	7,140	37.00%	36.80%	14.00%	22.80%	3,385.88	18,970	5,563	24,533
81	27,571	27.59%	7,607	23.83%	23.63%	14.00%	9.63%	2,794.90	24,533	1,962	26,495
82	22,758	35.61%	8,105	-6.98%	-7.18%	0.00%	-7.18%	-	26,495	(1,023)	25,472
83	14,654	51.69%	7,575	6.51%	6.31%	6.31%	0.00%	446.69	25,472	14	25,487
84	7,526	100.00%	7,526	18.52%	18.32%	n/a	n/a	-	25,487	-	25,487

Table 9A 1970–90 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	3.56%	3.36%	3.36%	0.00%	2,426.36	8,800	144	8,944
66	74,640	9.04%	6,749	14.22%	14.02%	14.00%	0.02%	9,504.65	8,944	149	9,094
67	77,395	9.29%	7,191	18.76%	18.56%	14.00%	4.56%	9,828.61	9,094	3,342	12,436
68	80,033	9.57%	7,661	-14.31%	-14.51%	0.00%	-14.51%	-	12,436	(10,356)	2,079
69	72,372	9.89%	7,160	-25.90%	-26.10%	-22.71%	-3.39%	(14,810.78)	2,079	(2,079)	-
70	50,401	10.26%	5,172	37.00%	36.80%	14.00%	22.80%	6,332.11	-	10,403	10,403
71	51,561	10.69%	5,510	23.83%	23.63%	14.00%	9.63%	6,447.20	10,403	4,527	14,930
72	52,499	11.18%	5,871	-6.98%	-7.18%	0.00%	-7.18%	-	14,930	(3,255)	11,675
73	46,628	11.77%	5,487	6.51%	6.31%	6.31%	0.00%	2,596.03	11,675	82	11,757
74	43,738	12.46%	5,451	18.52%	18.32%	14.00%	4.32%	5,360.10	11,757	1,731	13,488
75	43,647	13.31%	5,808	31.74%	31.54%	14.00%	17.54%	5,297.43	13,488	6,713	20,200
76	43,136	14.34%	6,188	-4.70%	-4.90%	0.00%	-4.90%	-	20,200	(1,737)	18,464
77	36,949	15.65%	5,783	20.42%	20.22%	14.00%	6.22%	4,363.19	18,464	2,001	20,465
78	35,529	17.34%	6,161	22.34%	22.14%	14.00%	8.14%	4,111.47	20,465	2,449	22,914
79	33,479	19.61%	6,564	6.15%	5.95%	5.95%	0.00%	1,601.43	22,914	54	22,968
80	28,516	22.79%	6,500	31.24%	31.04%	14.00%	17.04%	3,082.30	22,968	3,796	26,763
81	25,099	27.59%	6,925	18.49%	18.29%	14.00%	4.29%	2,544.30	26,763	816	27,579
82	20,718	35.61%	7,378	5.81%	5.61%	5.61%	0.00%	748.36	27,579	27	27,606
83	14,088	51.69%	7,282	16.54%	16.34%	14.00%	2.34%	952.82	27,606	173	27,779
84	7,759	100.00%	7,759	31.48%	31.28%	n/a	n/a	-	27,779	-	27,779

Table 10A 1970–90 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	3.56%	3.36%	3.36%	0.00%	2,426.36	26,400	144	26,544
66	74,640	9.04%	6,749	14.22%	14.02%	14.00%	0.02%	9,504.65	26,544	149	26,694
67	77,395	9.29%	7,191	18.76%	18.56%	14.00%	4.56%	9,828.61	26,694	3,342	30,036
68	80,033	9.57%	7,661	-14.31%	-14.51%	0.00%	-14.51%	-	30,036	(10,356)	19,679
69	72,372	9.89%	7,160	-25.90%	-26.10%	0.00%	-26.10%	-	19,679	(16,890)	2,789
70	65,212	10.26%	6,692	37.00%	36.80%	14.00%	22.80%	8,192.85	2,789	13,460	16,249
71	66,713	10.69%	7,129	23.83%	23.63%	14.00%	9.63%	8,341.76	16,249	5,857	22,106
72	67,926	11.18%	7,596	-6.98%	-7.18%	0.00%	-7.18%	-	22,106	(4,211)	17,895
73	60,330	11.77%	7,099	6.51%	6.31%	6.31%	0.00%	3,358.89	17,895	106	18,001
74	56,590	12.46%	7,053	18.52%	18.32%	14.00%	4.32%	6,935.21	18,001	2,239	20,241
75	56,472	13.31%	7,514	31.74%	31.54%	14.00%	17.54%	6,854.12	20,241	8,685	28,926
76	55,812	14.34%	8,006	-4.70%	-4.90%	0.00%	-4.90%	-	28,926	(2,247)	26,679
77	47,806	15.65%	7,482	20.42%	20.22%	14.00%	6.22%	5,645.35	26,679	2,589	29,268
78	45,969	17.34%	7,972	22.34%	22.14%	14.00%	8.14%	5,319.66	29,268	3,169	32,437
79	43,317	19.61%	8,493	6.15%	5.95%	5.95%	0.00%	2,072.03	32,437	70	32,506
80	36,896	22.79%	8,410	31.24%	31.04%	14.00%	17.04%	3,988.05	32,506	4,911	37,417
81	32,474	27.59%	8,960	18.49%	18.29%	14.00%	4.29%	3,291.97	37,417	1,056	38,473
82	26,806	35.61%	9,546	5.81%	5.61%	5.61%	0.00%	968.27	38,473	35	38,508
83	18,228	51.69%	9,422	16.54%	16.34%	14.00%	2.34%	1,232.82	38,508	224	38,731
84	10,039	100.00%	10,039	31.48%	31.28%	n/a	n/a	-	38,731	-	38,731

Table 11A 1980–2000 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	31.74%	31.54%	14.00%	17.54%	10,109.84	8,800	12,811	21,611
66	82,323	9.04%	7,444	-4.70%	-4.90%	0.00%	-4.90%	-	21,611	(3,519)	18,091
67	74,879	9.29%	6,957	20.42%	20.22%	14.00%	6.22%	9,509.10	18,091	4,361	22,452
68	77,431	9.57%	7,412	22.34%	22.14%	14.00%	8.14%	9,802.68	22,452	5,840	28,291
69	79,822	9.89%	7,897	6.15%	5.95%	5.95%	0.00%	4,279.53	28,291	144	28,435
70	76,204	10.26%	7,819	31.24%	31.04%	14.00%	17.04%	9,573.89	28,435	11,790	40,225
71	77,959	10.69%	8,331	18.49%	18.29%	14.00%	4.29%	9,747.89	40,225	3,126	43,351
72	79,376	11.18%	8,876	5.81%	5.61%	5.61%	0.00%	3,955.03	43,351	141	43,492
73	74,455	11.77%	8,761	16.54%	16.34%	14.00%	2.34%	9,197.15	43,492	1,669	45,161
74	74,891	12.46%	9,334	31.48%	31.28%	14.00%	17.28%	9,178.01	45,161	11,459	56,620
75	74,735	13.31%	9,945	-3.06%	-3.26%	0.00%	-3.26%	-	56,620	(1,983)	54,638
76	64,791	14.34%	9,294	30.23%	30.03%	14.00%	16.03%	7,769.55	54,638	9,007	63,645
77	63,266	15.65%	9,902	7.49%	7.29%	7.29%	0.00%	3,890.27	63,645	107	63,751
78	57,255	17.34%	9,929	9.97%	9.77%	9.77%	0.00%	4,623.74	63,751	95	63,846
79	51,950	19.61%	10,186	1.33%	1.13%	1.13%	0.00%	471.93	63,846	84	63,930
80	42,236	22.79%	9,627	37.20%	37.00%	14.00%	23.00%	4,565.23	63,930	7,565	71,495
81	37,174	27.59%	10,257	22.68%	22.48%	14.00%	8.48%	3,768.40	71,495	2,336	73,831
82	30,686	35.61%	10,928	33.10%	32.90%	14.00%	18.90%	2,766.08	73,831	3,774	77,605
83	22,524	51.69%	11,643	28.34%	28.14%	14.00%	14.14%	1,523.35	77,605	1,560	79,165
84	12,404	100.00%	12,404	20.89%	20.69%	n/a	n/a	-	79,165	-	79,165

Table 12A 1980–2000 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	31.74%	31.54%	14.00%	17.54%	10,109.84	26,400	12,811	39,211
66	82,323	9.04%	7,444	-4.70%	-4.90%	0.00%	-4.90%	-	39,211	(3,519)	35,691
67	74,879	9.29%	6,957	20.42%	20.22%	14.00%	6.22%	9,509.10	35,691	4,361	40,052
68	77,431	9.57%	7,412	22.34%	22.14%	14.00%	8.14%	9,802.68	40,052	5,840	45,891
69	79,822	9.89%	7,897	6.15%	5.95%	5.95%	0.00%	4,279.53	45,891	144	46,035
70	76,204	10.26%	7,819	31.24%	31.04%	14.00%	17.04%	9,573.89	46,035	11,790	57,825
71	77,959	10.69%	8,331	18.49%	18.29%	14.00%	4.29%	9,747.89	57,825	3,126	60,951
72	79,376	11.18%	8,876	5.81%	5.61%	5.61%	0.00%	3,955.03	60,951	141	61,092
73	74,455	11.77%	8,761	16.54%	16.34%	14.00%	2.34%	9,197.15	61,092	1,669	62,761
74	74,891	12.46%	9,334	31.48%	31.28%	14.00%	17.28%	9,178.01	62,761	11,459	74,220
75	74,735	13.31%	9,945	-3.06%	-3.26%	0.00%	-3.26%	-	74,220	(1,983)	72,238
76	64,791	14.34%	9,294	30.23%	30.03%	14.00%	16.03%	7,769.55	72,238	9,007	81,245
77	63,266	15.65%	9,902	7.49%	7.29%	7.29%	0.00%	3,890.27	81,245	107	81,351
78	57,255	17.34%	9,929	9.97%	9.77%	9.77%	0.00%	4,623.74	81,351	95	81,446
79	51,950	19.61%	10,186	1.33%	1.13%	1.13%	0.00%	471.93	81,446	84	81,530
80	42,236	22.79%	9,627	37.20%	37.00%	14.00%	23.00%	4,565.23	81,530	7,565	89,095
81	37,174	27.59%	10,257	22.68%	22.48%	14.00%	8.48%	3,768.40	89,095	2,336	91,431
82	30,686	35.61%	10,928	33.10%	32.90%	14.00%	18.90%	2,766.08	91,431	3,774	95,205
83	22,524	51.69%	11,643	28.34%	28.14%	14.00%	14.14%	1,523.35	95,205	1,560	96,765
84	12,404	100.00%	12,404	20.89%	20.69%	n/a	n/a	-	96,765	-	96,765

Table 13A 1990–2010 Scenario with Small Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-3.06%	-3.26%	0.00%	-3.26%	-	8,800	(2,210)	6,590
66	72,213	9.04%	6,530	30.23%	30.03%	14.00%	16.03%	9,195.68	6,590	10,660	17,251
67	74,879	9.29%	6,957	7.49%	7.29%	7.29%	0.00%	4,951.52	17,251	136	17,387
68	72,874	9.57%	6,976	9.97%	9.77%	9.77%	0.00%	6,438.22	17,387	132	17,518
69	72,336	9.89%	7,156	1.33%	1.13%	1.13%	0.00%	736.53	17,518	130	17,649
70	65,916	10.26%	6,764	37.20%	37.00%	14.00%	23.00%	8,281.34	17,649	13,723	31,372
71	67,434	10.69%	7,206	22.68%	22.48%	14.00%	8.48%	8,431.85	31,372	5,228	36,600
72	68,659	11.18%	7,678	33.10%	32.90%	14.00%	18.90%	8,537.43	36,600	11,647	48,247
73	69,519	11.77%	8,180	28.34%	28.14%	14.00%	14.14%	8,587.47	48,247	8,796	57,043
74	69,927	12.46%	8,715	20.89%	20.69%	14.00%	6.69%	8,569.60	57,043	4,217	61,261
75	69,781	13.31%	9,285	-9.03%	-9.23%	0.00%	-9.23%	-	61,261	(5,463)	55,798
76	60,496	14.34%	8,678	-11.85%	-12.05%	0.00%	-12.05%	-	55,798	(6,140)	49,658
77	51,818	15.65%	8,110	-21.97%	-22.17%	0.00%	-22.17%	-	49,658	(9,603)	40,055
78	43,708	17.34%	7,580	28.36%	28.16%	14.00%	14.16%	5,057.96	40,055	5,188	45,243
79	41,186	19.61%	8,075	10.74%	10.54%	10.54%	0.00%	3,489.88	45,243	66	45,309
80	36,601	22.79%	8,343	4.83%	4.63%	4.63%	0.00%	1,308.35	45,309	57	45,366
81	29,566	27.59%	8,158	15.61%	15.41%	14.00%	1.41%	2,997.21	45,366	345	45,710
82	24,406	35.61%	8,691	5.48%	5.28%	5.28%	0.00%	829.72	45,710	31	45,742
83	16,544	51.69%	8,552	-36.55%	-36.75%	0.00%	-36.75%	-	45,742	(2,921)	42,821
84	7,992	100.00%	7,992	25.94%	25.74%	n/a	n/a	-	42,821	-	42,821

Table 14A 1990–2010 Scenario with Large Buffer

BOY Age	BOY Principal	With-drawal Percentage	With-drawal ($)	Return					Buffer BOY Balance	Buffer In/(Out)	Buffer EOY Balance
				S&P 500	After Fee	To Acct	To Buffer	To Acct ($)			
65	79,200	8.82%	6,987	-3.06%	-3.26%	0.00%	-3.26%	-	26,400	(2,210)	24,190
66	72,213	9.04%	6,530	30.23%	30.03%	14.00%	16.03%	9,195.68	24,190	10,660	34,851
67	74,879	9.29%	6,957	7.49%	7.29%	7.29%	0.00%	4,951.52	34,851	136	34,987
68	72,874	9.57%	6,976	9.97%	9.77%	9.77%	0.00%	6,438.22	34,987	132	35,118
69	72,336	9.89%	7,156	1.33%	1.13%	1.13%	0.00%	736.53	35,118	130	35,249
70	65,916	10.26%	6,764	37.20%	37.00%	14.00%	23.00%	8,281.34	35,249	13,723	48,972
71	67,434	10.69%	7,206	22.68%	22.48%	14.00%	8.48%	8,431.85	48,972	5,228	54,200
72	68,659	11.18%	7,678	33.10%	32.90%	14.00%	18.90%	8,537.43	54,200	11,647	65,847
73	69,519	11.77%	8,180	28.34%	28.14%	14.00%	14.14%	8,587.47	65,847	8,796	74,643
74	69,927	12.46%	8,715	20.89%	20.69%	14.00%	6.69%	8,569.60	74,643	4,217	78,861
75	69,781	13.31%	9,285	-9.03%	-9.23%	0.00%	-9.23%	-	78,861	(5,463)	73,398
76	60,496	14.34%	8,678	-11.85%	-12.05%	0.00%	-12.05%	-	73,398	(6,140)	67,258
77	51,818	15.65%	8,110	-21.97%	-22.17%	0.00%	-22.17%	-	67,258	(9,603)	57,655
78	43,708	17.34%	7,580	28.36%	28.16%	14.00%	14.16%	5,057.96	57,655	5,188	62,843
79	41,186	19.61%	8,075	10.74%	10.54%	10.54%	0.00%	3,489.88	62,843	66	62,909
80	36,601	22.79%	8,343	4.83%	4.63%	4.63%	0.00%	1,308.35	62,909	57	62,966
81	29,566	27.59%	8,158	15.61%	15.41%	14.00%	1.41%	2,997.21	62,966	345	63,310
82	24,406	35.61%	8,691	5.48%	5.28%	5.28%	0.00%	829.72	63,310	31	63,342
83	16,544	51.69%	8,552	-36.55%	-36.75%	0.00%	-36.75%	-	63,342	(2,921)	60,421
84	7,992	100.00%	7,992	25.94%	25.74%	n/a	n/a	-	60,421	-	60,421