RATES OF RETURNS IN INDIVIDUAL RETIREMENT ACCOUNTS FROM 2000 THROUGH 2003: WINNERS AND LOSERS AND WHAT IT MEANS FOR RETIREMENT INCOME SECURITY*

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INTRODUCTION

THE LONG-TERM IMBALANCE OF THE SOCIAL Security trust fund and the decline in traditional employer-sponsored defined-benefit pension plans has led to a greater emphasis on the need for individuals to actively save for their own retirement. However, the amount of income available in retirement is not only a function of how much one saves for retirement during one's working life, but also the rate of return on those assets. If individuals investor poorly, particularly as compared to professional money managers, then increasing participation and contributions to self-directed retirement plans, like Individual Retirement Accounts (IRAs), alone might not be sufficient to ensure an adequate amount of retirement income. In fact, there is evidence that retirement plan participants are not adequately diversified, exhibit inertia with respect to rebalancing of accounts, and may not understand how to use diversified funds when available (Thaler and Benartzi, 2007).

One potential avenue to improving the returns of investors is through education. The importance of investment education for retirement plan participants has not been lost on policy makers, particularly in the aftermath of the Enron debacle in 2001. Lawmakers have passed legislation to require and encourage plans to provide more information, education, and safe guards to participants.[1] However, the evidence to date on improving participant decision making through education has been mixed.[2] On the other hand, behavioral economists have found that plan design can have significant effects on participation, particular through changes in default options.[3] Thaler and Benartzi (2007) suggest this mechanism may be an effective tool in promoting portfolio diversification for retirement plan participants. The efforts to improve plan design, however, relate to employer-provided plans and not to IRAs. IRAs are a large and growing share of self-directed retirement accounts: at the end of 2006 more than half ($4.2 trillion) of the total assets ($8.3 trillion) in define contribution and IRAs were held in IRAs (Brady and Holden, 2007).[4] Perhaps more significantly for targeting education efforts, IRAs usually allow for a greater number of investment options than employer plans thereby increasing the potential for more difficult investment decisions. Despite the growing size of IRAs and their potential impact on retirement security in the future, very little research has been done into the returns on investments in IRAs.[5]

In this research we focus on the annual returns of IRAs held by all taxpayers on a tax return[6] over the 4-year period 2000 through 2003. This analysis represents an initial examination of a unique data set consisting of a panel of tax returns with IRAs. In particular, our analysis compares returns on investments in IRAs by age cohort and income. We also compare the implied asset allocations under a two-asset portfolio consisting of the S&P 500 and 10-year Treasury Bonds. Our results suggest that the age of the investor is a good predictor of an investor's return on his IRA assets. In particular, we find that during the period 2000 through 2003, which included a 3-year bear market for equities, older participants weathered the storm better than younger participants. Our implied asset portfolio construction suggests that younger IRA participants had a higher equity allocation and made fewer adjustments to their portfolio allocation during this period. Moreover, our results suggest that when portfolios were adjusted, younger investors adjusted them in the wrong direction while older investors adjusted them in the correct direction given the direction that the markets moved.

DATA AND DESCRIPTIVE STATISTICS

The data used in this analysis includes a panel of tax returns filed with respect to tax years 1999 through 2003 provided by the Internal Revenue

Service's Statistics of Income (SOI). The panel consists of a random sample of tax returns (known as the continuous work history sample - CWHS) and a stratified sample of high-income tax returns. The panel consists of 83,418 returns filed for the 1999 tax year that when weighted is representative of all tax returns filed in 1999.

In addition to the tax return, the panel also includes taxpayer data from information returns. Two information returns from which we draw heavily for this analysis are Forms 5498 and 1099r. Both are filed annually with the Internal Revenue Service by the trustee or issuer of an IRA. The form 5498 provides data on the amount of contributions

an individual makes to his or her traditional, Roth, SEP, or Simple IRA and the fair market value of the assets in that account at the end of the year; and the Form 1099r provides information on the amount of distributions made from an IRA or other pension plan and annuity. We use this information to calculate the return on investment for assets held in IRAs.

We limit our analysis to tax returns that have IRA accounts with a positive fair market value in each year in the panel and no change in filing status during the analysis period. In Table 1, we provide descriptive statistics for the year 1999 for the full panel, for tax returns that have a positive

Table 1
Descriptive Statistics

	I	II	III	IV
		Only those with positive IRA account balances in 1999	Our Sample (positive IRA balances and constant marital status 1999-2003)	Column III as a percent of II
	Full Sample			
Un-weighted Returns	83,418	30,982	21,509	69.4%
Weighted Returns	127,033,387	32,641,826	21,229,101	65.0%
Percent Filing Jointly	39.3%	63.2%	70.6%	
Percent Filing Other	60.7%	36.8%	29.4%	
Percent with IRA Account in 1999	25.7%	100.0%	100.0%	
Mean Fair Market Value	$81,313	$81,313	$97,873	120.4%
Total Fair Market Value ($ billions)	$2,654	$2,654	$2,078	78.3%
Percent Making a Non-rollover Contribution	9.12%	33.0%	34.9%	
Mean Amount of Contribution	$2,977.6	$3,035.5	$3,366.6	110.9%
Total Non-rollover Contribution ($ billions)	$34.5	$32.7	$24.9	76.2%
Percent Making a Rollover Contribution	2.7%	10.5%	10.4%	
Mean Amount of Rollover	$55,398	$56,196	$62,544	111.3%
Total Rollover Contributions ($ billions)	$192.4	$191.8	$138.0	72.0%
Percent Making Any Contribution	11.06%	40.4%	41.7%	
Mean Amount of Contribution	$16,149	$17,042	$18,385	107.9%
Total Contributions ($ billions)	$227	$225	$163	72.6%
Percent with Distribution from IRA	10.5%	40.4%	39.8%	
Mean Amount of Distribution	$25,257	$25,411	$28,765	113.2%
Total Distributions from an IRA ($ billions)	$336	$335.0	$243	72.6%
Active IRA (deposit, rollover or distribution)	18.1%	67.6%	67.9%	
Tax Returns with Active IRA	22,951,442	22,049,871	14,425,044	65.4%
Mean Age of Primary in 1999	42.0	51.1	51.9	
Mean AGI	$46,419	$89,172	$100,395	112.6%
Total AGI ($ billions)	$5,886	$2,911	$2,131	73.2%

IRA account balance in 1999, and our sample, as described previously.

Column I shows that in 1999, approximately 127 million tax returns were filed. Thirty-nine percent of these tax returns were joint returns. The remaining 61 percent were filed as single returns, head of household, qualifying widower, or married filing separately. A little more than a quarter of all tax returns had an IRA account with a positive balance. These IRAs had an average fair market value of $81,313 and contained over $2,654 billion in assets in 1999. Further, total contributions made to these IRA accounts were substantial ($227 billion), with almost 85 percent ($192 billion) coming as rollovers from qualified plans or other IRAs.[7] The average age of the primary taxpayer and adjusted gross income ("AGI") for returns filed in 1999 was 42 and $46,419. Limiting the sample to tax returns that had an IRA with a positive fair market value in 1999 (column II) reduces the sample to about 31,000 observations that represent over 32 million taxpayers. Taxpayers with an IRA, on average, had a higher income ($96,688), were more likely to be married (about 63 percent were joint filers), and had a primary taxpayer who was older (51) than tax returns that did not have an IRA.

Column III provides descriptive statistics for tax returns and IRAs used in our analysis. Limiting the sample to tax returns with positive IRA account balances in each year of the panel and no change in filing status reduces the number of observations to just over 21,500, representing over 21 million taxpayers. Column IV facilitates the comparison between our sample and all tax returns with a positive IRA account balance in 1999 by showing the percentage of our sample to that sample. Our sample captures about 78 percent of the fair market value of IRAs in 1999, and 72-76 percent of the contributions and rollovers to IRAs and distributions from IRAs.[8] Not surprisingly, the average fair market value of IRAs in our sample is larger than that of all tax returns with IRAs in 1999 ($97,873 versus $81,313). Generally our sample of tax returns consist of taxpayers who are older and more likely to be married with larger, on average, account balances, contributions, distributions, and AGI than that for all tax returns with IRAs in 1999. Finally, in comparing our sample to all tax returns with an IRA in 1999, we find a similar percent of tax returns making a contribution or rollover to, and taking a distribution from an IRA.

RETURN ON INVESTMENT ANALYSIS

In this analysis we focus on the return on investment for our panel of tax returns. The analysis is done on all types of IRAs, including traditional, Roth, and employer-sponsored IRAs. To calculate the return on investment, all IRAs associated with a tax return are pooled together. The formula used to calculate return on investment is shown below:

$$\text{Return on Investment} = \frac{(A_t - A_{t-1}) + B - C}{(A_{t-1}) + \frac{1}{2}(C - B)},$$

where A is the account balance at the end of year t and t-1, B is the amount of benefits paid out of the account during year t, and C is the amount of contributions paid in to the account during year t.[9] The formula reflects a mid-year convention assumption that, on average, half of the net inflows that occur during the year are available for investment (i.e., net inflows occur at an even rate over the year).[10] For each year during the period 2000 through 2003, the return on investment is calculated for each taxpayer in our sample.

We also calculate a weighted average annual return for the whole period 2000 through 2003. The weight applied to each annual return is equal to the asset value of the IRA account in that year over the sum of the account balances for each year over the panel period.

RESULTS

Table 2 shows returns on investment for the entire sample at various points along the distribution of investment returns for groups of taxpayers. Our sample includes 21,509 tax returns that weight to approximately 21.2 million tax returns. The median investor in our sample lost money during each year of the bear market in equities (2000 through 2002) and, with the recovery in 2003, had a weighted annual average return on investment of about 1 percent over the 4-year period.

For example, the first row of Table 2 shows the return on investment for all taxpayers in the sample with an investment performance that placed them in the highest 10 percent of returns with respect to a year in the analysis period. The first cell in the first row shows that the return on investment was a gain of 49.5 percent for the tax return at the 90th percentile of investment performance in 2000. Alternatively, the bottom cell of column one shows that the tax return at the 10th percentile

Table 2
Return on Investment for All Returns

	Year				
ROI Percentile	2000	2001	2002	2003	4 Year
90th	49.5%	50.0%	35.7%	74.6%	47.4%
75th	8.4%	6.3%	3.9%	33.3%	10.8%
Median	-4.8%	-4.6%	-12.2%	23.1%	1.1%
25th	-13.0%	-15.9%	-23.1%	5.0%	-9.0%
10th	-30.7%	-28.4%	-32.2%	-8.7%	-22.5%

Sample = 21,509

of investment performance in 2000 had a loss of 30.7 percent. It is important to keep in mind that an investor at the 90th percentile of investment performance in 2000 may not be at the 90th percentile of investment performance in subsequent years, and indeed rarely was. Nonetheless, some investors achieved very high returns over the 4-year period, even with most of the period comprised of a bear market in equities.

The last column shows the annual weighted average return on investment for these tax returns over the 2000 through 2003 period. For example, the top row of this last column shows that the average annual return on investment for the tax return at the 90th percentile of average returns over this period was 47.4 percent; while the middle row shows that the median average annual return on investment throughout this period was 1.1 percent; and the bottom row shows that the average annual return on investment for the tax return at the 10th percentile was a loss of 22.5 percent.

Below, we examine returns on investment across two factors: age and income. Returns on investments in IRAs are likely to be influenced by a variety of other observable factors. For example, investors with larger account balances may achieve higher returns on investments because of greater access to investment advice; the allocation of IRA assets across different investments may differ depending on the size of one's IRAs relative to all savings; and age of the participant is likely to interact with many of these factors. We intend to pursue these issues in future research.

Returns on Investment by Age Cohort

Table 3 shows the same detail as Table 2, but separates the return on investment by the age of the primary taxpayer in 1999. The first part of the table limits the analysis to returns where the primary taxpayer was 30 years old or younger in 1999. The general result from Table 3 is that compared with all returns in our sample (Table 2), the youngest taxpayers had the worst performance at all percentiles in the range of investment performance. For example, investors under the age of 31 with a return placing him at the 90th percentile had a return of just 15.6 percent in 2000 as compared with a 49.5 percent return for the investor at the 90th percentile in our full sample. Meanwhile, the youngest, median investor had an average annual return of a loss of 4.3 percent over the 4-year period as compared with a gain of 1.1 percent for the median investor in our full sample.

During the 3-year bear market that corresponds to the first three years of the analysis period, the youngest investors underperformed relative to all investors in our sample. In particular, the youngest, median investor had annual investment returns of -8.8, -12.8, and -22.3 percent, while the median investor in our sample had returns of -4.8, -4.6, and -12.2 percent in years 2000 through 2002. Once the securities markets reversed course during 2003, the youngest investors showed slightly better gains in most investment performance ranges than the full sample.

The second part of Table 3 shows the return on investment of IRAs associated with tax returns of primary taxpayers between the ages of 31 and 40 in 1999. Generally, this next group of taxpayers outperformed their younger peers. In each year and over the four year period, the 31-to-40-year-old investor at the 10th percentile had smaller losses than the investor at the same percentile among those less than 31 years old. As can be seen by comparing the last column of Table 3 for these two age groups, this next youngest group outperformed the youngest group at every percentile over the entire 4-year period.

Table 3
ROI by Age of Primary Taxpayer on Return in 1999

Percentile	2000	2001	2002	2003	4 Year
	Primary Taxpayer Under Age 31				
90th	15.60%	22.20%	4.20%	53.90%	14.20%
75th	4.50%	1.70%	-10.00%	33.50%	3.90%
Median	-8.80%	-12.80%	-22.30%	25.60%	-4.30%
25th	-23.10%	-24.00%	-29.40%	9.20%	-13.60%
10th	-39.70%	-36.10%	-42.30%	-5.80%	-26.60%
Observations	N= 717	N= 717	N= 717	N= 717	N= 717
	Primary Taxpayer Age 31 through 40				
90th	17.10%	16.70%	5.20%	51.30%	19.20%
75th	4.80%	2.80%	-6.40%	31.20%	4.80%
Median	-6.70%	-10.80%	-19.10%	25.40%	-3.20%
25th	-18.30%	-20.30%	-26.00%	8.80%	-11.40%
10th	-35.20%	-31.20%	-34.50%	-2.30%	-23.60%
Observations	N= 3,014	N= 3,014	N= 3,014	N= 3,014	N= 3,014
	Primary Taxpayer Age 41 through 50				
90th	21.00%	15.60%	5.50%	47.00%	25.50%
75th	5.40%	3.70%	-1.50%	30.60%	5.00%
Median	-3.80%	-8.60%	-16.40%	23.30%	-2.00%
25th	-15.00%	-17.50%	-24.10%	5.60%	-10.30%
10th	-31.10%	-28.10%	-31.50%	-0.10%	-22.60%
Observations	N= 5,847	N= 5,847	N= 5,847	N= 5,847	N= 5,847
	Primary Taxpayer Age 51 through 61				
90th	54.10%	55.50%	58.00%	107.30%	63.90%
75th	8.20%	6.30%	4.40%	36.20%	13.50%
median	-0.30%	-4.50%	-11.10%	22.90%	1.70%
25th	-12.20%	-15.10%	-22.40%	4.50%	-8.60%
10th	-30.30%	-27.30%	-32.10%	-23.40%	-25.30%
Observations	N= 6,789	N= 6,789	N= 6,789	N= 6,789	N= 6,789
	Primary Taxpayer Older than 61 Years of Age				
90th	94.80%	98.90%	88.70%	115.30%	97.40%
75th	24.80%	22.90%	16.80%	38.30%	28.00%
median	6.10%	5.20%	2.50%	18.30%	6.10%
25th	-2.90%	-5.50%	-12.80%	4.70%	-1.60%
10th	-18.70%	-19.80%	-26.40%	-20.10%	-16.40%
Observations	N= 5,141	N= 5,141	N= 5,141	N= 5,141	N= 5,141

The middle part of Table 3 shows the return on investment performance of IRAs associated with tax returns of primary taxpayers between the ages of 41 and 50 in 1999. Consistent with the prior comparison between the two youngest age groups, taxpayers between the ages of 41 and 50 generally outperformed younger taxpayers at each percentile during the first three years when the securities markets were declining and had a similar performance during 2003 when the markets rebounded. The investor at the 10th percentile in this age group had smaller losses than the inves-

tor at the 10th percentile in the 31-to-40-year-old age group (who in turn had smaller losses than the under 31-year-old group) for all years. Likewise the median investor in this age group outperformed younger taxpayers in each year Moreover, across the 4-year period, the 41-to-50-year-old age group outperformed the 31-to-40-year-old age group at every percentile.

The next group in Table 3 consists of tax returns with primary taxpayers between the ages of 51 and 61 in 1999. The investment performance for this age group generally exceeds the performance

of the age 41 to 50 taxpayer group for every year through 2002. Losses are smaller and gains are larger. The annual median investment performance is better as well. In fact, for years 2000, 2001, and 2002, the investment performance of any age category is generally superior to that of any younger age category. Over the 4-year period, the median return on investment is increasing with the age of the taxpayer.

The final group in Table 3 consists of tax returns of primary taxpayers older than 61 years of age in 1999. The investment performance of this group exceeds all younger taxpayers during years 2000, 2001, and 2002 when the equities markets performed poorly. During 2003, when the equities markets reversed their declines and improved, these taxpayers generally had weaker performance in their IRA accounts than younger taxpayers. For example, the median investor in this group had a return on investment of 18.3 percent during 2003 while the return for the median investor age 51 to 61 was 22.9 percent; the return for the median investor age 41 to 50 was 23.3 percent; the return for the median investor age 31 to 40 was 25.4 percent; and the return for the median investor less than 31 was 25.6 percent. As shown in the last column of Table 3, this age group outperformed all other IRA account holders at each point in the distribution of earnings.

Table 4 summarizes the average annual return on investment in IRAs during the period 2000 through 2003 for each age cohort described in Table 3. What is striking about this table is that at each point in the percentile distribution of returns described by a row, the average annual return on investment for this period is monotonically increasing with age (with the lone exception being the 51-to-61-year-old investor at the 10th percentile of returns). For example, the average return on investment for the median investors in each cohort starting with those less than 31 years old was a loss of 4.3 percent, a

loss of 3.2 percent, a loss of 2 percent, a gain of 1.7 percent, and a 6.1 percent return for those ages 62 and older.

Returns on Investment by Income

Apart from the strong correlation between the age of the primary taxpayer and the return on investment in IRAs, are there other strong indicators of investment performance during this time period? For example, if higher-income investors purchase more and better investment advice, then we might observe a correlation between income and return on investment. Table 5 shows the average annual return on investment across the 2000 through 2003 time period by a 4-year weighted average of adjusted gross income for each taxpayer in our sample. This table is interesting for what it does not tell us. We find no evidence of a strong correlation between adjusted gross income and investment performance. For example, the investor at the 90th percentile with AGI of less than $50,000 had a similar return on investment (56 percent) as the investor at the 90th percentile with AGI greater than $10 million (who had a return on investment of 57 percent). Also, the investor at the 10th percentile with AGI of less than $50,000 had a better return on investment (loss of 21 percent) than the investor at the 10th percentile with AGI greater than $10 million (who had a loss of 28 percent). Between these extremes, Table 5 does not appear to show any clear pattern of results. The apparent absence of any correlation between income and returns suggest a more complicated relationship that we intend to pursue in future research.

Implied Portfolios

A third perspective on the investment performance of IRA accounts could be provided by comparing actual returns to those of a model portfolio appropriate for the taxpayer based on his investment objectives and appetite for bear-

Table 4
Average ROI by Age of Primary Taxpayer for Years 2000 through 2003

	Age				
ROI Percentile	*Under 31*	*31 to 40*	*41 to 50*	*51 to 61*	*62 and older*
90th	14.2%	19.2%	25.5%	63.9%	97.4%
75th	3.9%	4.8%	5.0%	13.5%	28.0%
median	-4.3%	-3.2%	-2.0%	1.7%	6.1%
25th	-13.6%	-11.4%	-10.3%	-8.6%	-1.6%
10th	-26.6%	-23.6%	-22.6%	-25.3%	-16.4%

Table 5
Return on Investment for Returns by 4 Year Averaged Adjusted Gross Income

ROI Percentile:	less than $50,000	$50,000 to $100,000	$100,000 to $250,000	$250,000 $500,000	$500,000 to $1,000,000	$1,000,000 to $3,000,000	$3,000,000 to $10,000,000	over $10,000,000
					AGI			
90th	56.0%	48.0%	42.0%	32.0%	31.0%	37.0%	44.0%	57.0%
75th	12.0%	11.0%	10.0%	7.0%	7.0%	10.0%	9.0%	21.0%
median	3.0%	1.0%	-1.0%	-1.0%	-2.0%	0.0%	-5.0%	1.0%
25th	-7.0%	-9.0%	-10.0%	-11.0%	-11.0%	-9.0%	-15.0%	-7.0%
10th	-21.0%	-22.0%	-25.0%	-26.0%	-27.0%	-22.0%	-35.0%	-28.0%
observations	N=4,239	N=4,107	N=3,257	N=1,820	N=1,656	N=2,369	N=2,093	N=1,967

ing risk. Because we do not have access to either age-specific model portfolio performance over the time period, or profiles of investor objectives, we cannot know whether an investor followed a strategy appropriate for him. However, we can construct an implied portfolio for an investor based on that investor's return on investment. To do this, we use the annual total return on the Standard and Poor's 500 index and the annual total return on the Treasury 10-year bond to construct the implied two-asset portfolio that would result in a return on investment equal to that calculated for the median investor in each age group for each year in our sample.[11]

Table 6 shows two panes of information. The top pane shows the implied two-asset portfolio, and the bottom pane shows the corresponding return on investment for the median investor (this information is also shown in Table 3 above).

The first row and columns of the top pane show that for investors less than 31 years old in 1999, the median return on investment for 2000 of a loss of about 9 percent (shown in the bottom pane) could have been produced by a portfolio that held 8 percent of its assets in the Treasury 10-year bond and 92 percent of its assets in the S&P 500 index. Using these constructed portfolios, what inferences can be drawn about the investment performances of IRA owners? Continuing across the top row of the top pane, the implied portfolio allocations for the youngest, median IRA account holders shows a shift toward equities and entirely out of bonds from 2000 to 2001 and 2002. In 2003, the youngest, median investor's implied portfolio shows a slight shift away from equities (from 100 percent to 89 percent) towards bonds (from 0 percent to 11 percent).

The median investor in the less than 31-year-old group, however, was not the only one moving deeper into equities from 2000 to 2001: the median investor in all but one age group moved deeper into equities during this period. The lone exception was the over 61-years-of-age group, whose implied portfolio in 2000 compared to 2001 shows a shift from 81 percent to 98 percent in Treasury 10-year bonds and 19 percent to 2 percent for the S&P 500 index. From 2002 to 2003, all but one of the median investors moved away from equities at a time when the equity markets advanced significantly. The lone exception, again, was those over 61 years of age whose implied portfolio shows a shift from 34 percent in 2002 to 63 percent in

Table 6
**Implied Annual Portfolio Consisting of the Total Return on the Treasury 10-Year Bond
and the S&P 500 Index for the Median Investor by Age Category**

Age of Primary Taxpayer	2000		2001		2002		2003		Total IRA Return
	Bond	Equity	Bond	Equity	Bond	Equity	Bond	Equity	
under 31	8%	92%	0%	100%	0%	100%	11%	89%	-4%
31-40	13%	87%	7%	93%	8%	92%	12%	88%	-3%
41-50	28%	72%	19%	81%	15%	85%	19%	81%	-2%
51-61	47%	53%	43%	57%	30%	70%	20%	80%	2%
over 61	81%	19%	98%	2%	66%	34%	37%	63%	6%

Annual Median Rate of Return in IRA Accounts By Age

Age of Primary Taxpayer	2000	2001	2002	2003	Total IRA Return
under 31	-9%	-13%	-22%	26%	-4%
31-40	-7%	-11%	-19%	25%	-3%
41-50	-4%	-9%	-16%	23%	-2%
51-61	0%	-5%	-11%	23%	2%
over 61	6%	5%	3%	18%	6%

2003 of assets in the S&P 500 index. Meanwhile, the implied equity positions from 2002 to 2003 of the median investor went from 100 to 89 percent for those less than 31 years old; from 93 to 92 percent for those 31 to 40 years old; from 81 to 85 percent for those 41 to 50 years old; and from 70 to 80 percent for those 51 to 61 years old. Not surprisingly, the median investor over 61 years of age had the highest return on investment during this time period with an investment gain of 6 percent. One overall impression these data give is that the younger the investor, the more likely the implied investment portfolio moved in the "wrong" direction with respect to the performance of the capital markets in any year.

CONCLUSION

This paper represents an initial step in examining returns on investments in IRAs using a panel data set consisting of taxpayers with an IRA. We find that during the 3-year bear market in equities from 2000 through 2002, younger participants suffered greater losses than older participants. And although younger investors generally outperformed their older counterparts in 2003, the return was not enough to overcome the losses in the prior three years. Given these results, it is not surprising that our implied portfolio analysis suggests that younger investors were more heavily invested in equities during this period. But, we also find that younger investors were less likely to adjust their portfolios

during this period, and when they did adjust portfolios, younger investors may have adjusted them in the wrong direction given the direction that the markets moved. Meanwhile, older investors appear to have reacted more appropriately to the changing market and with larger portfolio adjustments than younger investors during the period.

While large equity holdings are not necessarily inconsistent with a long-term investment strategy for young investors, the extent that these investors held equities may be too large when compared to the appropriate asset mix suggested by age-appropriate life-cycle funds.[12] One way that may provide for an increase in risk-adjusted returns is to encourage those with an IRA to take advantage of life-cycle funds.[13] However, research suggest that educating participants about the value of such funds may not be sufficient.

In all, IRAs are a growing source of retirement income for many, and unique from 401(k) plans in terms of participants' access to various investments and information. More research is needed to assess the investment behavior of IRA participants within their IRAs and as part of their overall retirement savings, and how best to design policies to maximize these participants potential retirement income.

Notes

[1] For example, the Pension Protection Act of 2006 included provisions related to investment advice.

[2] See Thaler and Benartzi (2007) for a summary of some of the studies that have examined participant education.

[3] Automatic enrollment in 401(k) plans has been proven to be very effective at increasing participation rates (Madrian and Shea, 2001). Some have raised the possibility of expanding the auto-enrollment feature to IRAs to further expand participation in retirement savings accounts (Iwry and John, 2007).

[4] Holden and Bogdan (2008) found, based on a May 2007 survey, that about one-third of households had a traditional IRA, about 15 percent had a Roth IRA, and 8 percent had an employer-sponsored IRA (SEP and Simple IRAs are collectively referred to as employer-sponsored IRAs).

[5] Munell, Soto, Libby, and Prinzivalli (2006) found that assets in defined benefit plans had higher returns than 401(k) plans, and both had higher returns than IRAs. Their calculation of investment returns for 401(k) plans and defined-benefit plans was plan based; while, the calculation of IRA returns was done using aggregate data.

[6] A tax return will consist of a primary taxpayer and may consist of a secondary taxpayer and dependents.

[7] Brady and Holden (2007), using data from the Federal Reserve Board's Survey of Consumer Finances, found that about half of all traditional IRA assets in 2004 were held in rollover IRAs. They also found that 59 percent of households owning a traditional IRA included rollover assets.

[8] Distributions from an IRA would include a distribution that is rolled over into another IRA.

[9] This formula is identical to that used by Munell, Soto, Libby, and Prinzivalli (2006) in which they compared median rates of returns in defined benefit and 401(k) plans. In their paper, the unit of analysis was a defined-benefit plan or a 401(k) plan; whereas, our unit of analysis is all IRAs held by taxpayers on a tax return.

[10] We suspect that IRA contributions and maybe distributions are lumpy during the year, but our data does not allow us to observe the timing of contributions or distributions.

[11] The total returns on the S&P 500 and the 10-year Treasury bond during this period were -9.1 percent and 9.8 percent for 2000; -11.9 percent and 5.5 percent for 2001; -22.1 percent and 15.2 percent for 2002; and 29 percent and 0.5 percent for 2003. The total annual returns were taken from Table 1181 of the Statistical Abstract of the United States for 2007 and 2002 for each year. The Treasury 10-year bond total annual return for 2000 was estimated based on data taken from Global Investment Dimensions Long Term Bonds total returns (www.globalfinancialdata.com).

[12] Life-cycle funds are investment vehicles that consist of equity and fixed-income assets in which the asset allocation is automatically modified to a more conservative mix as the participant ages and approaches retirement.

[13] For example, Yamaguchi, Mitchell, Mottola, and Utkus (2007) found that participants with a life-cycle type fund (referred to as "passive rebalancers") were found to have larger annual returns when compared to those who did not and were inactive investors (nontraders). Holden, VanDerhei, Alonso, and Copeland (2007) found for a large sample of 401(k)s that new and recent hires were more likely to select a balanced fund (lifestyle or life-cycle funds).

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