Ray's Analysis

Manage a $1M portfolio for maximum growth

Ray's Analysis Note by
Ray Xiao | rui.xiao@tufts.edu

Sector Interviews

Summary The notes summarize equity/fixed income performance according to given data; Ideas borrowed from Paul Merriman, the president of an investment advisory firm in Seattle.

http://www.fundadvice.com/articles/dfa/how-to-manage-a-1-million-portfolio-for-maximum-growth-income.html

Equity or Fixed Income

Paul Merriman and his staffs calculated this table to determine the exact combination of assets that are mostly likely to achieve their clients' financial goals.

Exhibit 1: Paul Merriman's Equity/Fixed income expected return and risk

Fine Tuning Your Asset Allocation
Equity Portion is 50% US / 50% International

	Fixed Income Portfolio	10% Equity Portfolio	20% Equity Portfolio	30% Equity Portfolio	40% Equity Portfolio	50% Equity Portfolio	60% Equity Portfolio	70% Equity Portfolio	80% Equity Portfolio	90% Equity Portfolio	100% Equity Portfolio	S&P 500 Index w/Dividends
1970	10.7%	9.3%	7.9%	6.5%	5.0%	3.6%	2.1%	.7%	(0.8)%	(2.2)%	(3.7)%	4.0%
1971	6.5	8.8	11.2	13.6	16.0	18.4	20.9	23.4	25.9	28.4	31.0	14.3
1972	2.2	4.6	7.0	9.4	11.9	14.4	17.0	19.6	22.3	24.9	27.7	19.0
1973	5.3	2.7	0.1	(2.5)	(5.0)	(7.5)	(10.0)	(12.4)	(14.8)	(17.1)	(19.5)	(14.7)
1974	8.3	4.5	0.9	(2.6)	(6.0)	(9.4)	(12.6)	(15.8)	(18.9)	(21.9)	(24.8)	(26.5)
1975	6.8	10.8	14.8	19.0	23.2	27.5	31.9	36.3	40.9	45.5	50.2	37.2
1976	10.1	11.7	13.2	14.7	16.3	17.8	19.2	20.7	22.1	23.5	24.9	23.8
1977	2.0	4.2	6.3	8.6	10.8	13.1	15.4	17.8	20.2	22.7	25.2	(7.2)
1978	4.5	7.0	9.6	12.1	14.8	17.4	20.1	22.9	25.6	28.5	31.3	6.6
1979	9.6	10.2	10.7	11.2	11.7	12.1	12.6	13.0	13.4	13.8	14.1	18.4
1980	10.0	11.7	13.4	15.0	16.7	18.3	19.9	21.5	23.1	24.7	26.3	32.4
1981	19.2	17.7	16.1	14.6	13.0	11.5	10.0	8.4	6.9	5.4	3.9	(4.9)
1982	24.2	23.0	21.9	20.7	19.5	18.3	17.1	15.9	14.7	13.5	12.3	21.4
1983	7.0	9.3	11.7	14.1	16.5	19.0	21.5	24.1	26.7	29.4	32.1	22.5
1984	10.0	9.6	9.1	8.7	8.2	7.7	7.2	6.7	6.2	5.6	5.1	6.3
1985	17.3	19.7	22.1	24.6	27.2	29.8	32.4	35.1	37.8	40.5	43.3	32.2
1986	13.4	15.4	17.4	19.4	21.4	23.5	25.5	27.6	29.6	31.7	33.8	18.5
1987	3.7	5.5	7.2	8.8	10.4	12.0	13.5	14.9	16.2	17.4	18.6	5.2
1988	5.2	7.2	9.3	11.4	13.6	15.7	18.0	20.2	22.5	24.8	27.1	16.8
1989	8.1	9.7	11.3	12.9	14.6	16.2	17.9	19.5	21.2	22.9	24.6	31.5
1990	8.9	6.4	3.9	1.5	(0.9)	(3.3)	(5.7)	(8.1)	(10.4)	(12.6)	(14.9)	(3.2)
1991	10.8	12.5	14.2	16.0	17.7	19.4	21.2	22.9	24.7	26.4	28.1	30.5
1992	5.2	5.0	4.9	4.7	4.5	4.4	4.2	4.0	3.8	3.6	3.4	7.7
1993	7.3	9.3	11.4	13.4	15.5	17.6	19.7	21.9	24.1	26.3	28.6	10.0
1994	(2.8)	(2.2)	(1.5)	(0.9)	(0.2)	0.4	1.1	1.7	2.3	3.0	3.6	1.3
1995	11.0	11.7	12.3	13.0	13.7	14.4	15.0	15.7	16.4	17.0	17.7	37.4
1996	7.9	8.4	8.8	9.2	9.6	10.0	10.3	10.7	11.1	11.4	11.8	23.1
1997	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.0	33.4
1998	6.4	6.5	6.7	6.7	6.8	6.7	6.7	6.5	6.3	6.1	5.8	28.6
1999	3.1	5.1	7.0	9.0	11.0	13.0	15.0	17.1	19.2	21.2	23.3	21.0
2000	5.5	4.5	3.4	2.3	1.3	0.2	(0.9)	(1.9)	(3.0)	(4.1)	(5.2)	(9.1)
2001	4.9	4.4	3.7	3.1	2.4	1.7	0.9	0.1	(0.7)	(1.5)	(2.4)	(11.9)
2002	6.7	5.1	3.4	1.7	0.1	(1.7)	(3.4)	(5.1)	(6.8)	(8.5)	(10.3)	(22.1)
2003	1.4	5.6	9.8	14.2	18.8	23.5	28.3	33.3	38.4	43.7	49.2	28.7
2004	0.8	2.9	4.9	7.0	9.1	11.3	13.5	15.7	17.9	20.1	22.4	10.9
Annual Return	7.5	8.3	9.0	9.7	10.4	11.1	11.8	12.4	13.0	13.6	14.2	11.3
Standard Deviation	3.4	3.6	4.4	5.6	7.0	8.5	10.1	11.7	13.4	15.1	16.8	17.4
Worst Month	(2.9)	(2.4)	(3.0)	(4.4)	(6.1)	(8.1)	(10.2)	(12.3)	(14.5)	(16.6)	(18.7)	(21.5)
Worst 3 Months	(4.2)	(3.5)	(3.5)	(5.3)	(7.8)	(10.2)	(12.6)	(15.0)	(17.4)	(19.8)	(22.1)	(29.5)
Worst 12 Months	(2.8)	(2.7)	(2.8)	(6.3)	(10.9)	(15.4)	(19.7)	(23.8)	(27.7)	(31.5)	(35.1)	(38.9)
Worst 36 Months	8.6	12.2	8.0	3.9	(0.1)	(4.1)	(7.9)	(11.9)	(15.8)	(19.6)	(23.3)	(40.9)
Worst 60 Months	20.4	23.2	21.1	17.4	13.7	10.0	6.2	2.3	(1.5)	(5.4)	(9.3)	(17.5)

Source: Paul Merriman

Manage a $1M portfolio for maximum growth

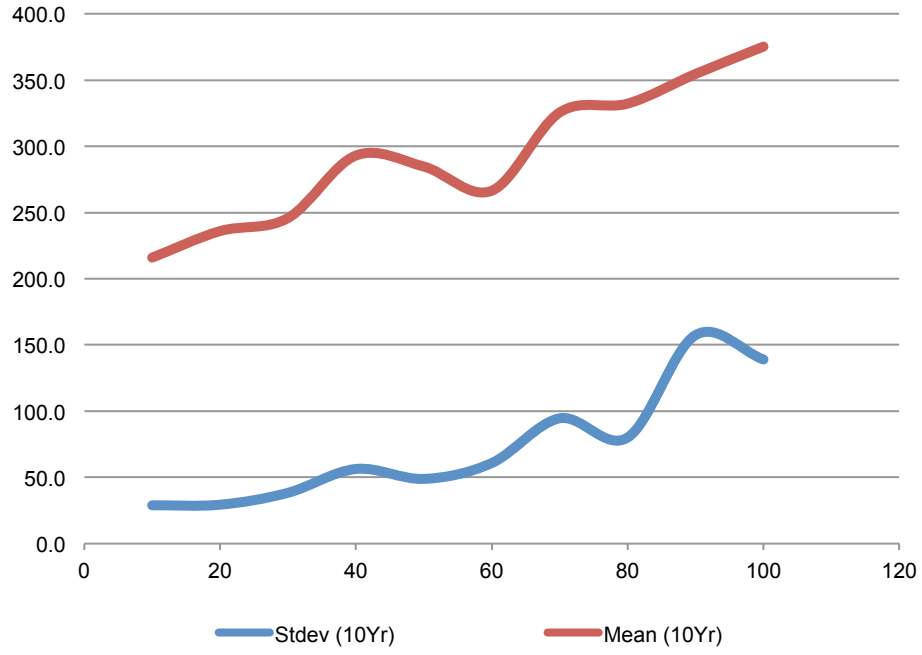
If we just look at the annual return and standard deviation, it is very intuitive to find out the relationship between the portion of equity and fixed income securities: **the higher equity is invested, the higher expected returns you get, the higher risk you will have.** This is intuitive and is probably taught in all microeconomics 101. However, if we apply the data to find the growth of 100 in 10 years, we will surprisingly see this:

Exhibit 2: 10Yr Growth of 100 Dollars

Equity/Portfolio(%)	10	20	30	40	50	60	70	80	90	100
Initial amount ($)	100	100	100	100	100	100	100	100	100	100
Drift	8.3%	9.0%	9.7%	10.4%	11.1%	11.8%	12.4%	13.0%	13.6%	14.2%
Volatility	3.6%	4.4%	5.6%	7.0%	8.5%	10.1%	11.7%	13.4%	15.1%	16.8%
Time step	1	1	1	1	1	1	1	1	1	1
Mean ($, 10Yr)	215.9	236.0	245.8	293.0	284.7	266.5	325.6	332.2	354.6	375.3
Stdev ($, 10Yr)	28.9	29.4	38.3	56.4	48.9	60.8	94.6	80.1	157.5	139.0

Source: Bloomberg, Ray's Analysis

Exhibit 3: 10Yr Growth of 100 Dollars



Source: Bloomberg, Ray's Analysis

We are actually surprised to find that placing 40/60 Equity/fixed income might yield a better 10 Yr growth of 100 dollars results than 50/50. We believe this is due to higher return/risk in 40/60 allocation. We tested this data by applying Brownian motion and generate 20 sets of randomized growth of 100 dollars data using the expected return and standard deviation data from Paul Merriman. If we increase our sample size to 2000 or larger and the conclusion remains, it would be interesting because it is generally expected to have a higher expected return with a higher equity portion. However, larger variation/risk might yield a bad case, which harms the long-term performance.