Small Stocks For The Long Run

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The growth of self-directed retirement accounts and discussion of possible overhaul of the Social Security system has increased the need for educating the individual investor about asset allocation and portfolio design. This paper analyzes individual asset returns and returns generated from three commonly suggested portfolios. The returns are analyzed over the period 1926 through June 1998, and four holding periods within that period. Investing in small stocks maximizes long run performance.
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Introduction

In the U.S. the amount of money invested in American mutual funds is 1,000 times greater than it was just over 50 years ago according to the Vanguard Group (1998). Prior to the 1960's the term asset allocation did not even exist. For the individual investor those were the days when broad diversification meant owning several dozen stocks and bonds along with some cash equivalents. Middle Americans invested most of their savings in big banks whose job was to be careful and produce income.[a] According to Nocera (1994), Americans hold a substantial fraction of their accumulated savings in mutual funds and are interested in how to best allocate them across asset classes. The growth of self-directed retirement accounts and the constant discussion of possible overhaul of the social security system has fostered the need for educating the individual investor about asset allocation and portfolio design.

The purpose of this paper is to educate the investor about the history of investment returns and their risk/return performance looking both at individual asset returns and returns generated from three commonly suggested portfolios. The returns are analyzed over the entire sample period 1926 through June 1998, as well as, within four holding periods across time. Characteristics of the individual asset classes and their relationship with each other are discussed and deviations from beliefs of commonly anticipated asset risk/return patterns are noted.

When designing a portfolio, investors must decide what mix of securities to use to satisfy their need for capital appreciation (growth) versus income. There are many other variables to consider when making this decision. One aspect of this decision concerns the amount of risk the investor is willing to take. Generally stocks are riskier than bonds; long-term bonds are riskier than short-term bonds; and corporate bonds are riskier than government bonds. Another consideration when designing a portfolio is the degree of liquidity the investor wishes to maintain. Liquid investments can be converted to cash without substantial loss of value in a relatively short period of time. The stock market is oriented more toward secondary market transactions and is therefore more liquid than the bond market. The investment horizon must also be determined. Portfolios can be designed with a short-term, intermediate-term, or long-term perspective. In addition, the investor must consider tax factors and the portfolio's ease of management.[b]

Support for the importance of asset allocation is shown in a study of 91 large pension plans covering the period 1974 through 1983 (Brinson, Hood. & Beebower,1986). The study attempts to distinguish the contribution of three factors: asset allocation policy, market timing, and security selection in the variation of total returns. Results from the study show that asset allocation performance is the primary factor when evaluating investment performance. The study was subsequently updated with more recent data (Brinson, Hood & Beebower, 1991) and the conclusion remains the same. The recent study shows that asset allocation policy accounts for almost 92% of investment performance, while security selection, market timing, and other factors accounts for 4.6%, 1.8%, and 2.1% respectively.

With evidence of the importance of asset allocation the current day investor is bombarded with cheap investment advice. These sources are readily available through newspapers, magazines, and the Internet. The Internet is

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overrun with investment advice from choosing a financial planner to on-line investment chat rooms. Table 1 shows allocation recommendations of three financial advisors. Each advisor's asset allocation recommendation is broken out into different risk preferences (Conservative, Moderate, and Aggressive). In general these advisors suggest holding more equity with higher levels of risk tolerance.

Table 1
Asset Allocation and Popular Advice

	Percent of Portfolio Allocated		
Investment Advisor & Risk Preference	Cash	Bonds	Stocks
1. Vanguard Group (1998)			
Conservative	0	60	40
Moderate	0	40	60
Aggressive	0	0	100
2. Merrill Lynch (Underwood & Brown, 1993)			
Conservative	20	35	45
Moderate	5	40	55
Aggressive	5	20	75
3. Jane Bryant Quinn (1991)			
Conservative	50	30	20
Moderate	10	40	50
Aggressive	0	0	100

A study by Bodie and Crane (1997) examined the asset allocation behavior of individuals as described in a unique 1996 survey of TIAA-CREF participants that had information about respondents' total asset holdings.[c] While they concluded that TIAA-CREF participants are better informed and more experienced at making their own investment choices than the general population, their results suggest that given enough information, education, and experience investors appear to follow the generally accepted investment principals as recommended by experts.

Studies such as Bodie and Crane's point to the growing importance of educating and informing the individual investor. Our study attempts to do just that by educating the investor about the history of investment returns and their risk/return performances through the use of both individual assets and representative portfolios over various investment time horizons. The characteristics of these returns are analyzed and historical deviations from common anticipated risk return tradeoffs, which are important to the investor's allocation decisions, are noted.

Data

The returns shown are obtained from the data disks provided by Ibbotson Associates.[d] Returns are generated on the basis of total return for each of the selected securities and portfolios over a variety of representative holding periods over the time period January 1926 through June 1998.[e] Although the securities and portfolios examined are domestic securities, the equity classes (S&P 500 and small stocks) do contain multinational corporations. The debt securities are strictly domestic (long-term corporate bonds, long-term government bonds, intermediate-term government bonds, and 30-day Treasury Bills).[f] The asset classes were chosen as representative of the type of investments typically made within the domestic market. The S&P 500 represents an investment into large well established companies. The portfolio of small stocks represents an investment into more speculative equity securities. The fixed income securities are represented by investments in long-term corporate bonds, long-term U.S. government securities, intermediate-term U.S. government securities, and a very liquid investment into U.S. 30-day Treasury Bills.

Since most investors do not invest in a single asset class, but prefer to spread their risk over a number of asset classes, the effects of diversification are examined using three representative portfolios. The three portfolios included within the analysis are representative of the types of portfolios investors might utilize.[g] The portfolios include a mix of stocks, bonds and short-term assets (U.S. 30-day Treasury Bills) to add a measure of liquidity to the portfolios. Within each portfolio, income is generated from the periodic coupons from the debt securities and the dividends from the equity securities. The first portfolio (hereafter, Portfolio 1) is made up of 70% investment in equity represented by the S&P 500, 20% in debt represented by long-term corporate bonds, and 10% in liquid assets represented by 30-day Treasury Bills. The second portfolio (hereafter Portfolio 2) is more speculative and spans a wider range of investments: 40% investment in the S&P500, 30% in small stocks, 20% in long-term corporate bonds, 5% in intermediate term U.S. government securities, and 5% in our liquid asset (30-day Treasury Bills). The third portfolio (hereafter Portfolio 3) is more conservative than the other 2 portfolios and is weighted more towards fixed income securities. Portfolio 3 contains 40% investment in the S&P500, 20% in long-term corporate bonds, 20% in long-term government securities, 10% in intermediate-term U.S. government securities, and 10% in our liquid asset (30-day Treasury Bills). The appendix describes the six asset classes used

in this analysis in greater detail.

Summary of Results

Descriptive statistics for the six asset classes and the three representative portfolios are reported in Tables 2 through 7. Table 2 presents the summary statistics reported as annual percentage returns (although calculated on a monthly basis) over the 870-month period: January 1926 through June 1998. Table 3 summarizes the average annual return over twelve representative holding periods going back in time from June 1998 (last 6 months, 1-, 3-, 5-, 10-, 20-, 30-, 40-, 50-, 60-, 70-years, and 72-years 6 months which spans the entire period analyzed). Ranking of returns by asset class within each holding period is also shown. Our three portfolios are included within the rankings within each holding period to illustrate the effects of diversification. The three portfolios are consistently within the middle rankings over all 12 holding periods. Table 4 summarizes the rankings reported in Table 3 over the 12 holding periods in a frequency table. Descriptive statistics summarizing performance for four common holding periods (5-, 10-, 15-, and 20-years) over the 870 months are reported in Table 5. The statistics include average returns (arithmetic mean, geometric mean, and median), risk (standard deviations and betas), minimum, maximum, kurtosis, skewness, and the performance measures (Sharpe ratio, Treynor index, and Jenson's alpha).

The higher the performance measure is the better the portfolio performance, regardless as to which performance measure is used. The Sharpe ratio is a performance measure calculated as the ratio of excess portfolio return to the standard deviation. The ratio can be calculated as follows:

$$\text{Sharpe ratio} = (TR_P - R_F)/\sigma_P$$

where TR_P is the average total return for the portfolio or asset p during some period of time; R_F is the average risk-free rate of return during the period; and σ_p is the standard deviation of return for portfolio or asset p during the period. The Treynor performance measure is calculated as the ratio of excess portfolio return to beta. This ratio can be calculated as:

$$\text{Treynor ratio} = (TR_P - R_F)/\beta_P$$

where the return symbols TR_P and R_F are defined in the same manner as the Sharpe ratio and β_p is the beta for portfolio or asset p during the period. Jensen's alpha is also a measure of portfolio performance, calculated as the difference between what the portfolio actually earned and what it was expected to earn given the level of systematic risk. Jensen's alpha is calculated as:

$$\alpha_P = (R_P - R_F) - \beta_p (R_M - R_F)$$

where R_P and R_M are the average total return for the portfolio or asset p and the market portfolio respectively during some period of time; R_F is the average risk-free rate of return during the period; and β_p is the beta for portfolio or asset p during the period.

Note that two of the variables (skewness and kurtosis) listed within the descriptive statistics are not always reported. Skewness characterizes the degree of asymmetry of a distribution around the mean. Positive skewness indicates a distribution with an asymmetric tail extending towards the more positive values. Negative skewness indicates a distribution with an asymmetric tail extending towards more negative values. Kurtosis characterizes the relative peakedness or flatness of a distribution compared to the normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution. These variables give the investor a working perspective of the shape of the return distributions, instead of looking only at central tendency and variation measures.

Performance rankings are summarized in Table 6 for four representative holding periods (5-, 10-, 15-, and 20-years) analyzed in Table 5. The results compiled in Tables 5 and 6 include all 5-, 10-, 15-, and 20-year holding periods over the time period 1/1926 –6/1998. The asset class correlations are shown in Table 7.

Table 2 shows the summary statistics and rankings for the average returns (geometric mean, arithmetic mean, and medium), risk (standard deviation and beta[h]), performance measures (Sharpe's ratio, Treynor's index, and Jenson's alpha), minimums, maximums, number of negative periods, skewness, and kurtosis. The results are calculated on a monthly basis and then annualized for reporting purposes. The period covers January 1926 through June 1998, which includes 870 monthly observations. Our average return measures (geometric mean, arithmetic mean, and medium) follow expectations (i.e., higher historical returns are associated with securities with higher historical risk as measured by either standard deviations or betas). However, when you adjust the returns for risk, the benefits of diversification materialize. Portfolio 1, 2, and 3 which ranked fourth, third, and fifth respectively, by both average return and risk, tied for second and first when utilizing the Sharpe ratio. The other performance measures, the Treynor index

and the Jenson alpha, show smaller benefits from diversification. Although the S&P 500 index ranks second to the index for small stocks using any of the average measurements (geometric mean, arithmetic mean, or medium) and risk (Standard deviation or beta), on a risk adjusted basis, as measured by any of the three performance measures, it is ranked ahead of small stocks (4th versus 5th using the Sharpe ratio; 5th versus 8th using the Treynor index; and 3rd versus 9th using Jenson's alpha respectively for the S&P 500 versus the small stock portfolio). Although not shown, this is the same on an inflation adjusted return basis.[i] Note that all

Table 2
Summary Statistics (annual % returns): 1/1926 - 6/1998 (870 months)

	Geometric Mean		Arithmetic Mean		Median		Standard Deviation	
Asset Class	%	Rank	%	Rank	%	Rank	%	Rank
S&P 500	11.17	2	13.27	2	17.23	2	22.11	2
U.S. Small Stock	12.70	1	17.55	1	18.79	1	35.39	1
U.S. LT Corporate Bonds	5.77	6	6.01	6	4.78	6	7.19	7
U.S. LT Government Bonds	5.27	7	5.58	7	3.66	7	8.10	6
U.S. IT Government Bonds	5.27	8	5.37	8	3.14	9	4.57	8
U.S. 30 Day T-Bill	3.77	9	3.77	9	3.33	8	0.94	9
Portfolio 1	9.73	4	10.81	4	13.31	4	15.53	4
Portfolio 2	10.67	3	12.14	3	15.05	3	18.44	3
Portfolio 3	8.04	5	8.47	5	9.89	5	9.76	5
U.S. Inflation	3.09		3.11		2.94		1.98	

	Maximum	Minimum	Negative Periods	Skewness	Kurtosis
Asset Class	%	%	#		
S&P 500	42.56	-29.73	326	0.43	10.07
U.S. Small Stock	73.46	-36.74	340	1.32	12.88
U.S. LT Corporate Bonds	13.76	-8.90	280	0.78	6.67
U.S. LT Government Bonds	15.23	-8.41	322	0.88	5.67
U.S. IT Government Bonds	11.98	-6.41	239	1.15	11.08
U.S. 30 Day T-Bill	1.35	-0.06	13	0.98	1.01
Portfolio 1	29.61	-20.83	321	0.43	9.13
Portfolio 2	38.45	-21.71	317	0.78	10.38
Portfolio 3	16.84	-12.59	320	0.44	6.25
U.S. Inflation	5.90	-2.06	161		

	Beta		Sharpe Ratio		Treynor Index		Jenson's α	
Asset Class		Rank		Rank		Rank		Rank
S&P 500	1.98	2	0.43	4	4.79	5	0.15	3
U.S. Small Stock	3.05	1	0.39	5	4.52	8	-0.60	9
U.S. LT Corporate Bonds	0.38	7	0.31	7	5.83	2	0.43	2
U.S. LT Government Bonds	0.38	6	0.22	8	4.69	6	-0.01	6
U.S. IT Government Bonds	0.20	8	0.35	6	8.17	1	0.68	1
U.S. 30 Day T-Bill	0.01	9	0.00	9	0.00	9	-0.02	7
Portfolio 1	1.46	4	0.45	2	4.80	4	0.13	5
Portfolio 2	1.80	3	0.45	2	4.66	7	-0.10	8
Portfolio 3	0.97	5	0.48	1	4.86	3	0.15	4

Note:
Portfolio 1 (70% S&P 500; 20% LT Corp Bonds; 10% T-Bills)
Portfolio 2 (40% S&P 500; 30% Sm Stk; 20% LT Corp Bonds; 5% IT Gvt Bonds; 5% T-Bills)
Portfolio 3 (40% S&P 500; 20% LT Corp Bonds; 20% LT Gvt Bonds; 10% IT Gvt Bonds; 10% T-Bills)

the portfolios with the most diversification (portfolios 1, 2, and 3, the S&P 500, and small stock) outperform the more homogeneous securities. Adjusting for risk also shows differences within the fixed income securities (long-term corporate debt, long-term government bonds, and intermediate-term government bonds). The intermediate-term government bonds, which historically yield an average 50 basis points less in annual return than their long-term corporate bonds, produce 4% more excess return per unit of risk (i.e., the Sharpe ratio of 0.35 versus 0.31). Another interesting statistic is the number of months that produced negative returns. The S&P 500 shows 326 negative return months out of 870 months. This compares with 340 negative months for the small stock portfolios. Within the fixed income securities, long-term corporate, long-term government, intermediate-term government bonds, and 30-day Treasury Bills show 280, 322, 239, and 13 negative periods respectively. Skewness shows all asset classes have positive tails, while kurtosis shows peakedness for most of the asset classes.

Table 3 contains the average annual holding period returns by security class over a representative set of holding periods. For example, the blue chip stocks as characterized by the S&P 500 out performed all other sectors for the six most recent periods illustrated (last 6 months, 1-, 3-, 5-, 10-, and 20-year holding periods). Small stocks out preformed all the other sectors on an average return basis at time horizons greater than 20 years. With the current turmoil in the market, (Russian and Asian crisis), the small stocks category reveals poor performance as shown by its 7^{th} and 6^{th} place rankings over the last 6 months and last year. The three portfolios, helped by diversification, consistently ranked at the high end of the ranking over the entire set of holding periods analyzed. An interesting fact from the debt sector is that long-term corporate bonds were dominated by long-term government bonds over the first 6 reporting periods (i.e., last 6 months, 1-, 3-, 5-, 10-, and 20-years.) Intermediate-term government bonds outperformed the long-term government bonds on a total return basis for all reporting periods of the last 40 years or longer. As expected, 30 day Treasury Bills (our most liquid asset class) shows the lowest return.

Table 4, a frequency table of rankings for the annual holding period returns shown in Table 3, shows a consistent pattern of what one would expect ex ante (i.e.,the assets with the higher risk also consistently show a higher return). The risk/return trade-off can be quantified by viewing the risk (as represented by either the standard deviation or beta) and return data (as represented by the arithmetic mean, geometric mean, or median return values) in Table 2 for the total period and in Table 5 for four representative holding periods. For instance, small firm stocks are perceived, and are shown in Table 2, to be riskier with a standard deviation of 35.4% and a beta of 3.05 for the total period, as compared to large firm stocks (σ = 22.1% and β = 1.98.) Long-term corporate bonds, which are generally thought to be riskier than long-term government bonds, are in fact themselves shown to be riskier in the long run (σ = 7.2% and β = 0.383) versus (σ = 8.1% and β = 0.384.) As reported in Table 5, these counterintuitive results do not change even when the entire holding period is broken into shorter representative holding periods.

Since many investors now have the ability to choose their own asset allocation decisions as part of their own individual retirement plans and they consider long-term government bonds to be one of the safest investments, it is important that inconsistencies are brought to light. In reality most investors are saving for a specific purpose, whether it be a child's college tuition or their own retirement sometime in the future. Consequently, they will have an investment horizon in mind and thus will follow a buy and hold strategy or at least attempt to maintain low turnover while structuring the portfolio over time. Table 5 shows the summary statistics of the various asset classes for 4 representative holding periods (5-, 10-, 15-, and 20-year increments) spanning the entire 72 year, 6 month horizon. For instance, average annual returns ranged from a high of 14.81% for small stocks (average 20-year holding period return) to a low of 3.77% for 30-day Treasury Bills (average 5-year holding period return).

Assume a couple determines they will need $100,000 twenty years from now to pay for their child's college education. Given the historical returns, as summarized in Table 5, which class is the investors' best choice based on return alone? The estimated annual payment schedule (as chosen by the estimated average return) using the top three asset classes are $998.37 (14.81%), $1,552.21 (11.03%), and $1,561.14 (10.98%) for Small Stocks, Portfolio 1, and S&P 500 respectively.

Table 3
Average Annual Holding Period Returns by Security Class over Various Holding Periods (1/1926 - 6/1998)

As of June 1998:	Last 6 Months		Last 1 Year		Last 3 Years		Last 5 Years		Last 10 Years		Last 20 Years	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
S&P 500	38.57	1	30.21	1	30.26	1	23.06	1	18.54	1	17.42	1
U.S. Small Stock	10.25	7	18.06	6	19.16	4	19.04	2	14.37	4	16.54	2
U.S. LT Corporate Bonds	10.51	6	15.56	7	9.66	7	8.38	7	10.72	7	10.62	7
U.S. LT Government Bonds	12.37	5	20.24	5	10.53	6	9.15	6	11.43	6	10.84	.6
U.S. IT Government Bonds	7.78	8	9.86	8	6.48	8	5.44	8	8.27	8	9.67	8
U.S. 30 Day T-Bill	5.03	9	5.15	9	5.26	9	4.78	9	5.42	9	7.26	9
Portfolio 1	29.06	2	24.69	2	23.39	2	18.20	3	15.72	2	15.25	4
Portfolio 2	20.77	3	21.54	3	20.43	3	17.21	4	14.78	3	15.31	3
Portfolio 3	20.74	4	20.70	4	17.06	5	13.66	5	13.30	5	13.22	5
U.S. Inflation	2.25		1.75		2.27		2.47		3.29		4.69	
	Last 30 Years		Last 40 Years		Last 50 Years		Last 60 Years		Last 70 Years		Last 72 Yrs 6 Mo.	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
S&P 500	12.55	2	12.36	2	13.22	2	12.61	2	10.74	2	11.17	2
U.S. Small Stock	13.05	1	15.26	1	14.69	1	16.00	1	12.66	1	12.70	1
U.S. LT Corporate Bonds	8.90	6	7.17	6	6.15	6	5.60	6	5.75	6	5.77	6
U.S. LT Government Bonds	8.64	7	6.83	8	5.78	8	5.36	8	5.22	8	5.27	7
U.S. IT Government Bonds	8.52	8	7.12	7	6.10	7	5.43	7	5.31	7	5.27	8
U.S. 30 Day T-Bill	6.77	9	5.90	9	5.03	9	4.22	9	3.79	9	3.77	9
Portfolio 1	11.48	4	10.88	4	11.16	4	10.57	4	9.56	4	9.74	4
Portfolio 2	11.96	3	12.01	3	11.83	3	11.89	3	10.51	3	10.67	3
Portfolio 3	10.36	5	9.30	5	9.01	5	8.44	5	7.88	5	8.04	5
U.S. Inflation	5.29		4.42		3.90		4.17		3.28		3.09	

Note: Portfolio 1 (70% S&P 500; 20% LT Corp Bonds; 10% T-Bills)
Portfolio 2 (40% S&P 500; 30% Sm Stk; 20% LT Corp Bonds; 5% IT Gvt Bonds; 5% T-Bills)
Portfolio 3 (40% S&P 500; 20% LT Corp Bonds; 20% LT Gvt Bonds; 10% IT Gvt Bonds; 10% T-Bills

Table 4
Frequency Table: Rankings of Annual Holding Period Returns
(as shown in Table 3)

Ranking	1	2	3	4	5	6	7	8	9
S&P 500	6	6	0	0	0	0	0	0	0
U.S. Small Stock	6	2	0	2	0	1	1	0	0
U.S. LT Corporate Bonds	0	0	0	0	0	7	1	4	0
U.S. LT Government Bonds	0	0	0	0	2	4	2	4	0
U.S. IT Government Bonds	0	0	0	0	0	0	8	4	0
U.S. 30 Day T-Bill	0	0	0	0	0	0	0	0	12
Portfolio 1	0	4	1	7	0	0	0	0	0
Portfolio 2	0	0	11	1	0	0	0	0	0
Portfolio 3	0	0	0	2	10	0	0	0	0

Note: Portfolio 1 (70% S&P 500; 20% LT Corp Bonds; 10% T-Bills)
Portfolio 2 (40% S&P 500; 30% Sm Stk; 20% LT Corp Bonds; 5% IT Gvt Bonds; 5% T-Bills)
Portfolio 3 (40% S&P 500; 20% LT Corp Bonds; 20% LT Gvt Bonds; 10% IT Gvt Bonds; 10% T-Bills)

By investing in small stocks for a 20-year period, the investor will earn on average an annual return of 14.81%, which translates into an estimated annual payment of $998.37 to meet the $100,000 college fund requirement 20 years hence. This amounts to annual savings of over $500 when comparing with the next two best alternatives. In fact, looking at any investment horizon 15 years or more, small stocks beat all other asset classes including our diversified portfolios. This was true even on a risk/return perspective using all three performance

measures.

Does the answer change when the investor's investment horizon changes? For example, let's assume that the same investor has only 5 years to save for the college education fund. Looking again at Table 5, the summary results for the 810 five-year holding period returns and the risk/return measures show a slightly different picture for the investor. The total five-year holding period small stock returns are on average still larger than both Portfolio 1 and the S&P 500 (13.78%-small stocks versus 10.52%-Portfolio 1 or 10.56%-S&P 500). However, the high volatility in the small stocks (σ = 14.43%, β = 2.45) makes them an inferior investment to either Portfolio 1 or the S&P 500 on a risk/return basis. Consequently, if the investor plans far enough into the future and can tolerate risk, small stocks alone might fulfill their needs. Otherwise, a more moderate asset allocation would be called for.

Some investors, either risk adverse individuals or those limited by various pension plan regulations, may purposely limit the proportion invested in equity securities regardless of the investment horizon. Given the present set of options, with the 20-year holding period, it appears that either the long-term corporate bonds or intermediate-term government bonds may be the best choice. Table 5 shows that when evaluating just return, long-term corporate bonds do better in most cases than the other choices. However, when an adjustment for risk is made, the intermediate-term government bonds look more appealing under the various performance measures over the four holding periods analyzed.

Table 6 summarizes the frequency of rankings of average returns by the four reported holding periods (5, 10, 15, and 20-years). When looking at the 750 ten-year holding periods, the number one asset as measured by total return was small stocks (58.80% or 441/750 first place finishes). This was followed by the S&P 500 (30.4% or 228/750), long-term corporate bonds (7.47% or 56/750), intermediate-term governments (1.87% or 14/750), Treasury Bills (1.33% or 10/750), and long-term governments (0.13% or 1/750). This type of distribution is representative over the four holding periods.

The correlation matrix in Table 7 reinforces the close association of movements of similar asset classes. For example, the two stock classes examined are highly correlated (0.84). In addition, the bond classes are also highly correlated with each other (long-term corporate with long-term governments 0.85, with intermediate-term governments 0.78 and between long-term and intermediate-term governments 0.85). Treasury bills have low correlation with other asset classes, and with the three portfolios.

Since most investors do not invest in a single asset class, but prefer to spread their risks over a number of asset classes the effects of diversification were examined through our three representative portfolios. In addition, an investor would have been able to decrease risk (as measured by the portfolio standard deviation) while still maintaining the return generated by a single asset class. For example, a portfolio made up of 13.57% of the S&P 500, 66.18% of intermediate-term government bonds, and 20.24% of 30-day Treasury-Bills would have achieved the same return (5.77% as measured by the geometric return) while experiencing lower risk (4.58% standard deviation versus 4.78%) when compared with a 100% investment in the long-term corporate bonds. Similarly, a diversified portfolio achieves a higher return while being exposed to the same amount of risk as a single asset class. For example, a portfolio consisting of 31.26% of the S&P 500, 8.10% of long-term corporate bonds, and 60.64% of intermediate-term government bonds would have generated a higher return (7.15% versus 5.27%) for the same amount of risk as was possible with a portfolio of long-term government bonds. Thus, the different portfolios made up of the various asset classes dominate the individual assets when evaluated in a risk/return framework except for the small stock portfolio and our Treasury Bills, which are on the endpoints of the efficient frontier.[j]

Table 5
Return Statistics over 4 Holding Periods Spanning the Period: 1/1926 - 6/1998

5-year Holding Period Annual Returns (%) 1/1926 - 6/1998 (810 overlapping 5-year Holding Periods)									
	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio 1	Portfolio 2	Portfolio 3
Mean(AM)	10.56	13.78	5.69	5.12	5.31	3.77	10.52	9.95	7.29
Mean(GM)	10.21	12.82	5.58	5.02	5.24	3.73	10.20	9.70	7.20
Median	11.27	13.81	4.50	4.09	4.51	2.98	11.97	10.89	6.79
σ	8.55	14.43	4.72	4.73	3.65	3.08	8.26	7.27	4.54
Beta	1.53	2.45	0.59	0.62	0.47	0.34	1.60	1.51	0.94
Minimum	-17.36	-31.63	-2.31	-3.27	0.66	0.06	-18.13	-15.42	-5.05
Maximum	36.12	56.78	23.92	24.60	19.46	11.13	36.66	33.80	21.73
Kurtosis	1.01	0.76	1.69	2.04	1.30	-0.47	1.36	1.23	0.65
Skewness	-0.79	-0.26	1.23	1.40	1.23	0.64	-0.95	-0.75	0.31
Sharpe	0.79	0.69	0.41	0.28	0.42	0.00	0.82	0.85	0.78
Treynor	4.42	4.08	3.24	2.18	3.23	0.00	4.23	4.10	3.76
Jenson	1.27	1.20	-0.21	-0.88	-0.17	-1.21	1.01	0.76	0.15
10-year Holding Period Annual Returns (%) 1/1926-6/1998 (750 overlapping 10-year Holding Periods)									
	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
Mean(AM)	10.92	14.14	5.45	4.89	5.22	3.80	10.85	10.15	7.34
Mean(GM)	10.78	13.91	5.38	4.82	5.17	3.76	10.74	10.08	7.29
Median	11.08	14.32	3.85	3.83	4.28	3.09	12.06	10.75	6.40
σ	5.50	7.14	3.85	3.90	3.32	3.02	4.88	4.05	3.29
Beta	1.21	1.36	0.90	0.98	0.84	0.71	1.19	1.15	1.02
Minimum	-4.95	-9.26	0.60	-0.07	1.17	0.14	-4.93	-2.69	0.96
Maximum	21.43	30.58	16.94	16.35	13.73	9.20	19.01	17.98	15.79
Kurtosis	-0.57	0.85	0.09	0.31	-0.50	-1.21	0.27	0.38	-0.31
Skewness	-0.45	-0.49	1.03	1.19	0.82	0.40	-0.84	-0.72	0.72
Sharpe	1.29	1.45	0.43	0.28	0.43	0.00	1.45	1.57	1.08
Treynor	5.88	7.60	1.84	1.11	1.69	0.00	5.92	5.53	3.48
Jenson	2.76	5.44	-1.57	-2.45	-1.61	-2.56	2.76	2.21	-0.12
15-year Holding Period Annual Returns (%) 1/1926-6/1998 (690 overlapping 15-year Holding Periods)									
	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
Mean(AM)	10.96	14.62	5.10	4.58	5.05	3.83	10.98	10.23	7.21
Mean(GM)	10.86	14.51	5.04	4.52	5.01	3.79	10.90	10.18	7.17
Median	11.06	14.90	3.72	3.29	4.01	3.27	11.93	10.67	6.68
σ	4.60	4.92	3.41	3.47	3.12	2.93	4.00	3.29	2.84
Beta	1.06	1.08	1.02	1.08	0.96	0.80	1.04	1.04	1.02
Minimum	-0.41	-1.95	1.02	0.23	1.38	0.21	0.40	1.39	2.35
Maximum	19.68	24.61	14.17	14.00	11.36	8.33	17.99	17.09	14.84
Kurtosis	-0.83	2.02	-0.19	0.09	-0.93	-1.49	-0.13	-0.02	-0.19
Skewness	-0.33	-1.13	1.01	1.15	0.73	0.28	-0.69	-0.61	0.81
Sharpe	1.55	2.20	0.37	0.22	0.39	0.00	1.79	1.95	1.19
Treynor	6.70	10.03	1.24	0.69	1.28	0.00	6.88	6.15	3.30
Jenson	3.38	7.00	-2.34	-3.07	-2.14	-2.82	3.48	2.74	-.23
20-year Holding Period Annual Returns (%) 1/1926-6/1998 (630 overlapping 20-year Holding Periods)									
	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
Mean(AM)	10.98	14.81	4.70	4.19	4.81	3.80	11.03	10.20	7.03
Mean(GM)	10.92	14.76	4.66	4.15	4.77	3.76	10.99	10.18	7.01
Median	11.52	14.87	3.88	3.18	3.63	3.30	11.34	10.23	6.57
σ	3.39	3.29	2.78	2.83	2.77	2.73	2.92	2.37	2.11
Beta	0.75	0.89	1.10	1.15	1.11	1.01	0.80	0.89	0.96
Minimum	1.89	5.42	1.33	0.46	1.58	0.42	2.63	3.80	3.00
Maximum	17.71	21.90	10.71	10.84	10.08	7.73	16.65	15.34	12.95
Kurtosis	-0.69	0.08	-0.54	-0.32	-1.07	-1.56	-0.11	-0.01	0.15
Skewness	-0.36	-0.48	0.93	1.04	0.70	0.23	-0.54	-0.30	0.83
Sharpe	2.12	3.35	0.32	0.14	0.36	0.00	2.46	2.71	1.53
Treynor	9.61	12.41	0.82	0.34	0.91	0.00	9.03	7.20	3.37
Jenson	4.63	7.98	-2.85	-3.53	-2.80	-3.44	4.49	3.37	-0.05

Note: For Portfolio 1, 2, and 3, see note Table 3.

Table 6

Frequency Table: Average Holding Period Returns Ranked by Security

Rankings by Total Return Average 5-year Holding Periods 1/1926-6/1998 (810 overlapping 5-year Holding Periods)									
Rank	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
1	224	423	82	34	43	4	0	0	0
2	122	24	85	59	42	27	308	130	13
3	47	109	43	68	68	16	253	153	53
4	216	14	36	45	13	91	32	292	71
5	38	11	38	37	43	67	40	38	498
6	48	8	174	139	105	109	22	121	84
7	41	25	155	110	243	47	62	48	79
8	26	47	162	103	252	87	93	28	12
9	48	149	35	215	1	362	0	0	0
Rankings by Total Return Average 10-year Holding Periods 1/1926-6/1998 (750 overlapping 10-year Holding Periods)									
Rank	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
1	228	441	56	1	14	10	0	0	0
2	86	64	29	44	48	19	299	161	0
3	65	96	38	37	39	26	291	142	16
4	226	26	17	9	9	20	34	323	86
5	21	5	31	29	28	64	44	48	480
6	34	14	133	134	194	90	12	61	79
7	24	34	218	115	164	75	16	15	88
8	18	46	226	75	254	76	54	0	1
9	48	24	2	306	0	370	0	0	0
Rankings by Total Return Average 15-year Holding Periods 1/1926-6/1998 (690 overlapping 15-year Holding Periods)									
Rank	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
1	121	524	45	0	0	0	0	0	0
2	143	60	8	43	2	1	269	164	0
3	134	42	3	4	37	2	360	104	4
4	193	23	2	7	19	26	8	376	36
5	36	3	13	10	66	40	2	26	494
6	33	9	205	84	231	57	4	20	47
7	3	3	186	125	118	107	39	0	109
8	18	1	228	97	217	121	8	0	0
9	9	25	0	320	0	336	0	0	0
Rankings by Total Return Average 20-year Holding Periods 1/1926-6/1998 (630 overlapping 20-year Holding Periods)									
Rank	S&P500	Sm Stk	LT Corp	LT Gvt	IT Gov	T-Bill	Portfolio1	Portfolio2	Portfolio3
1	33	597	0	0	0	0	0	0	0
2	261	33	12	0	0	0	174	150	0
3	76	0	10	8	0	0	425	111	0
4	229	0	9	3	0	0	20	369	0
5	17	0	22	3	41	52	1	0	494
6	2	0	251	37	200	53	0	0	87
7	1	0	90	184	165	131	10	0	49
8	11	0	236	121	224	38	0	0	0
9	0	0	0	274	0	356	0	0	0

Note: Portfolio 1 (70% S&P 500; 20% LT Corp Bonds; 10% T-Bills)
Portfolio 2 (40% S&P 500; 30% Sm Stk; 20% LT Corp Bonds; 5% IT Gvt Bonds; 5% T-Bills)
Portfolio 3 (40% S&P 500; 20% LT Corp Bonds; 20% LT Gvt Bonds; 10% IT Gvt Bonds; 10% T-Bills)

Table 7
Correlation Matrix: Portfolio Returns 1/1926 - 6/1998

	S&P 500	U.S. Small Stk	U.S. LT Corp	U.S. LT Gvt	U.S. IT Gvt	U.S. 30 Day TBill	Portfolio 1	Portfolio 2	Portfolio 3
S&P 500	1.00								
U.S. Small Stock	0.84	1.00							
U.S. LT Corporate Bonds	0.24	0.18	1.00						
U.S. LT Government Bonds	0.18	0.10	0.85	1.00					
U.S. IT Government Bonds	0.14	0.08	0.78	0.85	1.00				
U.S. 30 Day T-Bill	-0.02	-0.04	0.10	0.12	0.22	1.00			
Portfolio 1	0.99	0.83	0.33	0.26	0.21	-0.00	1.00		
Portfolio 2	0.95	0.95	0.31	0.22	0.18	-0.02	0.96	1.00	
Portfolio 3	0.94	0.77	0.53	0.50	0.43	0.04	0.97	0.92	1.00

Note: Portfolio 1 (70% S&P 500; 20% LT Corp Bonds; 10% T-Bills)
Portfolio 2 (40% S&P 500; 30% Sm Stk; 20% LT Corp Bonds; 5% IT Gvt Bonds; 5% T-Bills)
Portfolio 3 (40% S&P 500; 20% LT Corp Bonds; 20% LT Gvt Bonds; 10% IT Gvt Bonds; 10% T-Bills)

Conclusion

Asset allocation has been shown to be the most important factor when calculating investment performance with small stocks being the dominant asset class for long run investing. It is important for the investor to be educated about investment and portfolio returns in order to make the best investment decisions, especially with the growing popularity of self directed retirement accounts. This paper summarizes the returns and excess returns per unit of risk for six major asset classes and 3 representative portfolios over the period 1/1926 through 6/1998. Inconsistencies in commonly anticipated relationships are also discussed. The information presented is offered as an aid to individual investors trying to determine what types of assets are best suited for their investment horizon and risk preferences. While past history is no guarantee of what is to come, it does give the individual investor the knowledge of what has been historically the best performing assets given the investor's unique investment horizon and risk preferences.

Appendix

The asset classes used are defined within the Ibbotson program as follows:

Standard and Poor's 500 Index (S&P 500): This index is a readily available, carefully constructed, market value weighted benchmark of common stock performance. Market value weighted means that the weight of each stock in the index, for a given month, is proportionate to its market capitalization (price times the number of shares outstanding) at the beginning of that month. Currently, the S&P Composite Index includes 500 of the largest stocks (in terms of stock market value) in the United States; prior to March 1957 it consisted of 90 of the largest stocks. From 1977 to the present, the common stock total return has been provided by the American national Bank and Trust Company of Chicago, which modifies monthly income numbers provided by Wilshire Associates, Santa Monica, California. Dividends (measured as of the ex-dividend date) are accumulated over the month and invested on the last trading day of the month in the S&P 500 index at the day's closing level. Prior to 1977, the total return for a given month was calculated by summing the capital appreciation return and the income return as described below. Capital appreciation return is the portion of total return, which results from asset class price changes as reported in Standard and Poor's Trade and Securities Statistics. Income return is the portion of total return, which results from a periodic cash flow such as dividends. Quarterly dividends were extracted from rolling yearly dividends reported quarterly in Standard and Poor's Trade and Securities Statistics, then allocated to months within each of the monthly dividends within quarters.

U.S. Small Stocks: For 1982-present, the Small Company Stock return series is the total return achieved by the Dimensional Fund Advisors (DFA) Small Company 9/10 (for ninth and tenth deciles) Fund. The fund is a market value weighted index of the ninth and tenth deciles of the NYSE, plus stocks listed on the AMEX and OTC with the same or less capitalization as the upper bound of the NYSE ninth decile. Stocks are not purchased if their market capitalization is small than $10 million (although they are held if they fall below that level). A company's stock is not purchased if the company becomes bankrupt. Stocks remain in the portfolio if they rise into the eighth NYSE decile or higher. The returns for the Fund represent after-transactions-cost returns.

The equities of smaller companies from 1926-1980 are represented by the historical series developed by Professor Rolf W. Banz, This is composed of stocks making up the fifth quintile (i.e., the ninth and tenth deciles) of the NYSE. The portfolio was first ranked and formed as of December 31, 1925. This portfolio was "held" for five years, with value weighted portfolio returns calculated monthly. Every five years the portfolio was rebalanced (i.e., all of the stocks on the NYSE were re-ranked, and a new portfolio of those falling in the ninth and tenth deciles was formed) as of December 31, 1930 and every five years thereafter through December 31, 1980. This method avoided survivorship bias by including the return after the delisting or failure of a stock in constructing the portfolio returns. For 1981, DFA updated the returns using Professor Banz's methods. The data for 1981 are significant to only three decimal places (in decimal form).

U.S. Long-Term Corporate Bond Total Return: 1969-present Corporate Bond Total Returns are represented by the Saloman Brothers Long-Term High-Grade Corporate Bond Index. The index includes nearly all

Aaa and Aa rated bonds with at least 10 years to maturity. If a bond is downgraded during a particular month, its return is included in the index for that month before removing it from future portfolios. 1926-1968: Total returns were calculated by summing the capital appreciation returns and the income returns. For the period 1946-1968, Ibbotson and Sinquefield backdated the Saloman Brothers' index, using Saloman's monthly yield data with a methodology similar to that used for 1969-1945. Capital appreciation returns were calculated from yields assuming (at the beginning of each monthly holding period) a 20-years maturity, a bond price equal to par, and a coupon equal to the beginning-of-period yield. For the period 1926-1945, Standard and Poor's monthly High-Grade Corporate Composite yield data were used, assuming a 4% coupon and a 20-year maturity. The conventional present-value formula for bond price was used for the beginning and end-of-month prices. The monthly income return was assumed to be one-twelfth of the coupon.

U.S. Long-Term Government Bond Total Return: The total return on long-term government bonds from 1977 to 1991 are constructed from data from The Wall Street Journal. Over 1926-1976, data are obtained from the Government bond file at the Center of Research in Security Prices (CRSP), Graduate School of Business, University of Chicago. Each year, a one-bond portfolio with a term of approximately 20 years and a reasonably current coupon was used, and whose returns did not reflect potential tax benefits, impaired negotiability, or special redemption or call privileges. Where callable bonds had to be used, the term of the bond was assumed to be a simple average of the maturity and first call dates minus the current date. The bond was "held" for the calendar year and returns were computed. Total returns for 1977-1991 are calculated as the change in the flat price or and-interest price. For 1977-1991, capital appreciation is taken as the total return minus the income return for the month. For the 1926-1976, the capital appreciation return is obtained from the CRSP Government Bond File.

U.S. Intermediate-Term Government Bond: The return calculations for the intermediate bonds are obtained in a similar fashion to the method outlined under long-term government bonds, except that maturities of 5 to 15 years are used.

U.S. (30 Day) Treasury Bill Total Returns: For the U.S. Treasury bill index, data from The Wall Street Journal are used for 1977-present; the CRSP U.S. Government Bond File is the source until 1976. Each month one-bill portfolio containing the shortest-term bill having not less than one month to maturity is constructed. (The bill's original term to maturity is not relevant.) To measure holding period returns for the one-bill portfolio, the bill is priced as the last trading day of the previous month-end and as the last trading day of the current month. The total return on the bill is the month-end price divided by the previous month-end price, minus one.

Endnotes

a. *For a complete discussion of the last 30 years of investment history see Marmer (1996) and Gibson (1996).*

b. *See Campbell (1996) for a complete discussion of risk and return trade-offs, including alternative measures for evaluating risk. Also, see Gibson (1996, Chapter 2) for a detailed overview of Capital Markets.*

c. *TIAA-CREF is a 183 billion dollar organization that manages self-directed retirement funds for the staff of some 6,000 universities, secondary schools, and other nonprofit organizations.*

d. It would also be possible to obtain the raw data from the *Stocks, Bonds, Bills, and Inflation 1999 Yearbook: Market Results for 1926-1998*, a periodical published by Ibbotson Associates and typically available in university libraries.

e. The analysis was also undertaken using inflation adjusted total return with identical results in terms of rankings and with the descriptive statistics differing by a scalar.

f. *While even the U.S. represents a minority share of the world's capital markets and gains from international diversification are possible, the existence of the home bias for investors is widely documented. For equity home bias see Cooper and Kaplanis (1994) and French and Poterba (1991). For fixed income home bias see Hogan, Greenleaf and Kish (1995).*

g. *These portfolios are not meant to be the only types of portfolios investors utilize. They are just representative of the types of portfolios they could use and of course investors preferences do change across time as the market changes.*

h. *Beta is a mathematical measure of the sensitivity of rates of return on a portfolio or a given stock compared with the rates of return on the market as a whole. Our reported betas are calculated using historical returns over the respective period and utilizing an equal weighted portfolio of the six asset classes as a proxy for the market.*

i. *Since inflation is a major factor in determining an investor's real return on various investment options, we analyzed each of the options using the inflation adjusted returns. We utilized Ibbotson's definition of inflation, which relies on the rate of change of consumer goods measured as the Consumer Price Index for All Urban Consumers (CPI-U), not seasonally adjusted. Unfortunately, the inflation rate as derived by the CPI is not measured over the same period as the other asset returns. All the security returns are measured from one month-end to the next month-end. CPI commodity prices are collected during the month. Thus, measured inflation rates lag the other series by about one-half month. Prior to January 1978, the CPI (as compared with CPI-U) was used. The U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C., constructs both inflation measures.*

j. The mean/variance criterion states that if and only if the expected return on security A is greater than or equal to the expected return on security B and the variance (or standard deviation) of security A is less than or equal to the variance (or standard deviation) of security B, with one strict inequality holding, then security A dominates security B (i.e., if either $[E(R_A) \geq E(R_B)$ and $\sigma_A^2 < \sigma_B^2]$ or $[E(R_A) > E(R_B)$ and $\sigma_A^2 \leq \sigma_B^2]$ then A dominates B).

References

Bodie, Z. & Crane, D. (1997). Personal investing: Advice, theory, and evidence. *Financial Analysts Journal*, *53*(6), 13-23.

Brinson, G., Hood, L. & Beebower, G. (1986). Determinants of portfolio performance. *Financial Analysts Journal*, *42*(4), 39-44.

Brinson, G., Hood, L. & Beebower, G. (1991). Determinants of portfolio performance II: An update. *Financial Analysts Journal*, *47*(3), 40-48.

Campbell, J. Y. (1996). Understanding risk and return. *Journal of Political Economy*, *104*(2), 298-345.

Cooper, I. & Kaplanis, J. (1994). Home bias in equity portfolios, inflation hedging, and international capital market equilibrium. *The Review of Financial Studies*, *7*(1), 45-60.

Gibson, R. C. (1996). *Asset allocation: Balancing financial risk* (2nd ed.), New York: Irwin.

French, K. & Poterba, J. (1991). Investor diversification and

international equity markets. *American Economic Review, 81*(2), 222-226.
Hogan, K., Greenleaf, J. & Kish, R. J. (1995). Global fixed income diversification: Actual versus potential gains. *Journal of Multinational Financial Management, 5*(4), 11-29.
Ibbotson Associates. (1999). *Stocks, bonds, bills, and inflation 1999 Yearbook: Market results for 1926-1998*. Chicago: Ibbotson Associates.
Jensen, M. (1969). Risk, the pricing of capital assets, and the evaluation of investment portfolios. *Journal of Business 42*(2), 167-247.
Marmer, H. (1996). Visions of the future: The distant past, yesterday, today, and tomorrow. *Financial Analysts Journal, 52*(3), 9-12.
Nocera, J. (1994). *A Piece of the Action*. New York: Simon & Schuster.
Quinn, J. B. (1991). *Making the Most of Your Money.* New York: Simon & Schuster.
Sharpe, W. (1966). Mutual fund performance. *Journal of Business, 39*(1), 119-138.
Treynor, J. (1965). How to rate management of investment funds. *Harvard Business Review, 43*(1), 63-75.
Underwood, D. & P. Brown. (1993). *Grow rich slowly: The Merrill Lynch guide to retirement planning*. New York: Viking.
Vanguard Group (1998, Summer). *Money whys: Investment information provided by the Vanguard Group*.. Valley Forge, PA: The Vanguard Group.

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