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Using Gordon's Rate of Return r to Forecast Long Term Returns and to Create a Ten Layer Portfolio with Superior Returns and Low Risk

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Abstract
I use the rate of return r in Gordin's equation P = d1 / r-g to forecast ten year returns which then form the basis of ten stock/bond portfolios. These portfolios are placed in staggered layers to form a combined portfolio. Over the period 1909 through 2024, this portfolio produces a geometric mean return of 9.07% per year, an arithmetic mean return of 10.01 % per year with a standard deviation of 12.95%. Over the same period the S&P 500 index produced a geometric return of 9.78% per year, an arithmetic mean return of 11.52% per year with a standard deviation of 19.09%.1 propose a new metric to gauge the extreme risk of a portfolio: one standard deviation below the mean of the portfolio's drawdowns.

Keywords: Stock Return Forecasting, Asset Allocation

1. Introduction

For the person or institution which invests for the long term, “for keeps", in the words of Keynes,1 the estimate of the long-term returns becomes of paramount importance. If returns are expected to be low, or even negative, the investor would shift his or her portfolio toward bonds, and toward stocks if high returns are expected. Shiller and Campbell (1988) formulated the method of predicting long term returns by using a ratio that later became well-known as "Cyclical Adjusted Price Earnings." It consists of the real S&P 500 price divided by the ten year moving average of the index's real earnings. They found a strong correlation between this metric and the following ten years of real returns. Haghani and White (2022 and 2023) have taken a similar approach, matching the earnings/price ratio of the S&P 500 index (which they call CAEY) to the 10 year inflation-indexed bond (TIPS) to create a yearly stock/bond allocation. Stocks and bonds invested yearly in accordance with this ratio have resulted in high returns with low volatility.

More recently (June,2024) Haghani and White have augmented CAEY by separating retained earnings and dividends, and applying a different multiplier to each. This action results in a higher ratio than 1/ CAPE and a higher correlation with real returns. The author of this paper (Van Sant) takes a different approach to creating a stock/bond portfolio by using a regression model to predict next year's return which is matched to the interest rate of long term bonds, then forming yearly stock/bond portfolios.

This paper proposes yet another combined forecast-plus-bond investment vehicle. I use what Myron Gordon (1959) calls "the rate of return" in his classic valuation equation:

$$P = d1 / r-g$$

where P is the current price of the stock or index, d1 is next year's dividend, g is the growth rate of future earnings, dividends and prices, and r is the rate of return of the stock or index. Re-arranging, the equation becomes.

$$r = dl / p + g$$

In Gordon's original formulation g represents the real rate of growth produced by the re-investment of retained earnings and therefore represents real growth of the security. But this equation "works" if g is expanded to include inflation. g then becomes ge+ q, where ge is the real rate of earnings growth and q is the expected inflation rate. Past as well as future returns can be analyzed within the context of the fuller representation. From 1925 through 2024, the mean geometric return of the S&P 500 index was 9.78% per year. Dividends grew at the rate of 4.56% per year, earnings at a 5.02% rate, and prices at a 5.69% rate. The dividend yield averaged 3.8%. Ultimately, it is the rate of growth of prices which satisfies Gordon's equation:

9.78 = (approximately) 3.80 + 5.69

Expected real returns are usually represented in the literature by e/p, as e/p incorporates both d/p, the cash return, and re/p, the retained earnings-to-price ratio (the expected real growth rate), consistent with the Gordon model. However, re/e is only an approximation of the expected rate of growth (of earnings, dividends and prices). Actual real growth is represented by retained earnings/ net worth, the yearly increase in the earning assets. If price equals net worth, then re/p and re/nw are equivalent, but historically price and net worth have rarely equaled one another (in fact, the differences have usually been extreme, with p/nw ranging from .25 to 2.3 over over the last 100 years). Multiplying re/pXp/nw gives re/nw, the true g in Gordin's equation. Growth from re/nw can be augmented by borrowing and issuing new stock, but retained earnings have accounted for almost all of corporate growth.2) I use a three year moving average of e in e/p to smooth out the occasional sharp rise or drop in the yearly earnings level. The market performs essentially the same operation, discounting the discontinuity of sudden jumps or declines in the yearly level. (Price and net worth from Wright (2004) and Fred, St. Louis, "Nonfinancial corporate business, corporate equities, liability level, and net worth, level.)

As a proxy for expected inflation q I use the ten year moving average of past C.P.I. rate changes. The tight relationship between the bond market's determination of the long term interest rate and the 10 Year C.P.1.average reflects the market's adaptive projection of past experience into the future. Exhibit1 charts this intimate relationship between the 20 year treasury bond yield and the inflation moving average since 1960, showing how the bond market factored in an inflation premium to keep rates above the expected inflation rate. Note, however, that in the 2010's, when the Federal Reserve reduced short term rates to near zero, the two series coincide.

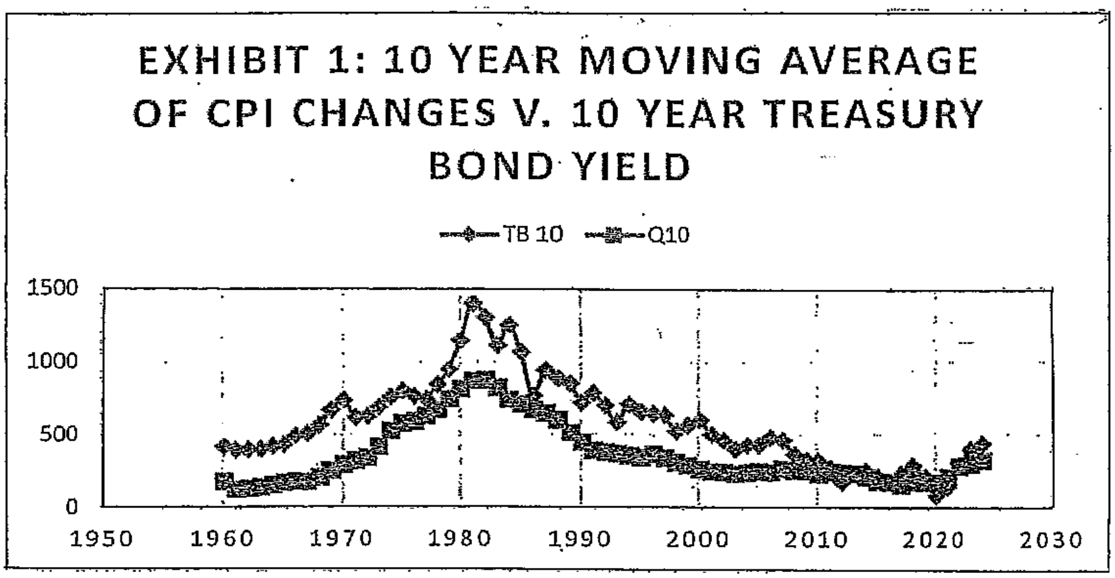

Exhibit 1: 10 Year Moving Average of CPI Changes V. 10 Year Treasury Bond Yield

Putting together the roles of re/nw and inflation expectations, the expected return equation becomes

R = d1/p + re/nw + 10 year CPI.

I use the above formulation of r to predict future returns. r is a poor predictor of yearly S&P500 returns: regressing r against the (nominal) yearly index returns yields an R^2 of .01 But regressed against the ten year return of the ten year S&P 500 index yields an R^2 of .45, a correlation which compares favorably with Shiller's CAPE when used in the same regression, which yields an R^2 of .21 (bearing in mind, however, that CAPE is designed to predict real returns). Exhibit 2 graphs r against the ten year return of the index from 1909 through 2024. r captures the major trends into the l990's, when r then under predicts the high returns during the dot-com bubble. r overpredicts the returns during the 2000's, which averaged close to zero, then underestimated the returns during the 2010's, the era of zero short term rates. The period from I965 through 1985 is particularly revealing. Yearly inflation averaged over 6% per year. Modiglioni and Cohn (1978) argued that at that time the market was grossly undervaluing stocks as a result of failing to account for the effect inflation would have in increasing the growth rate of earnings and prices in the future. In their view stock prices should be double their current level. But as Exhibit 3 shows, r barely kept pace with the rise in yields in the 70's and 80's. Doubling prices would have halved the 4% average dividend yield to 2%, dropping r well below the near-certain return of bonds. The market knew exactly what it was doing in keeping prices low relative to earnings, net worth, other fundamentals. 3

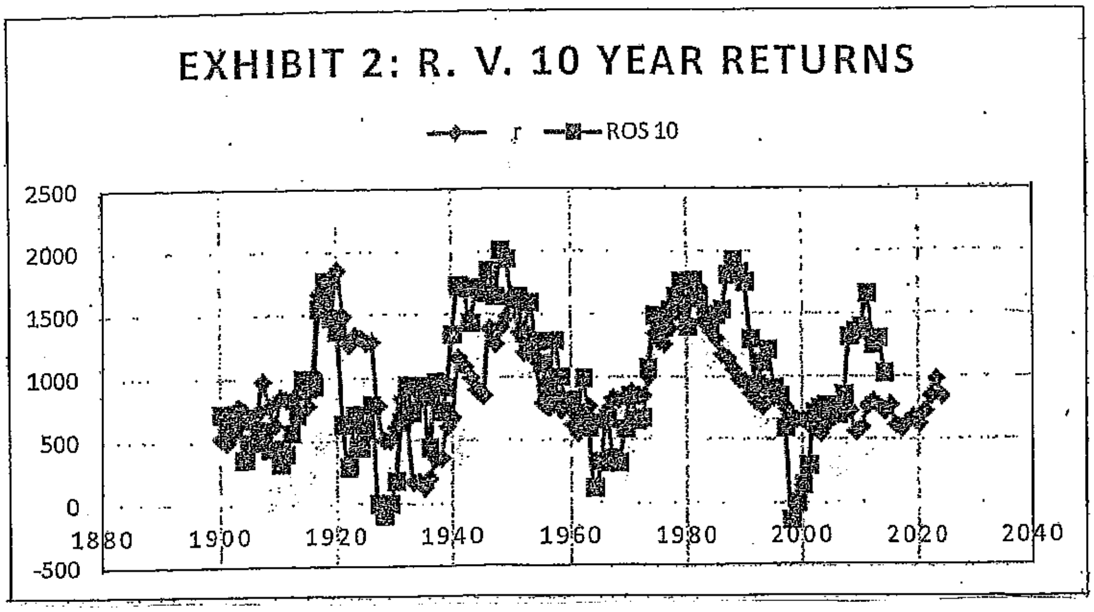

Exhibit 2: R. V. 10 Year Returns

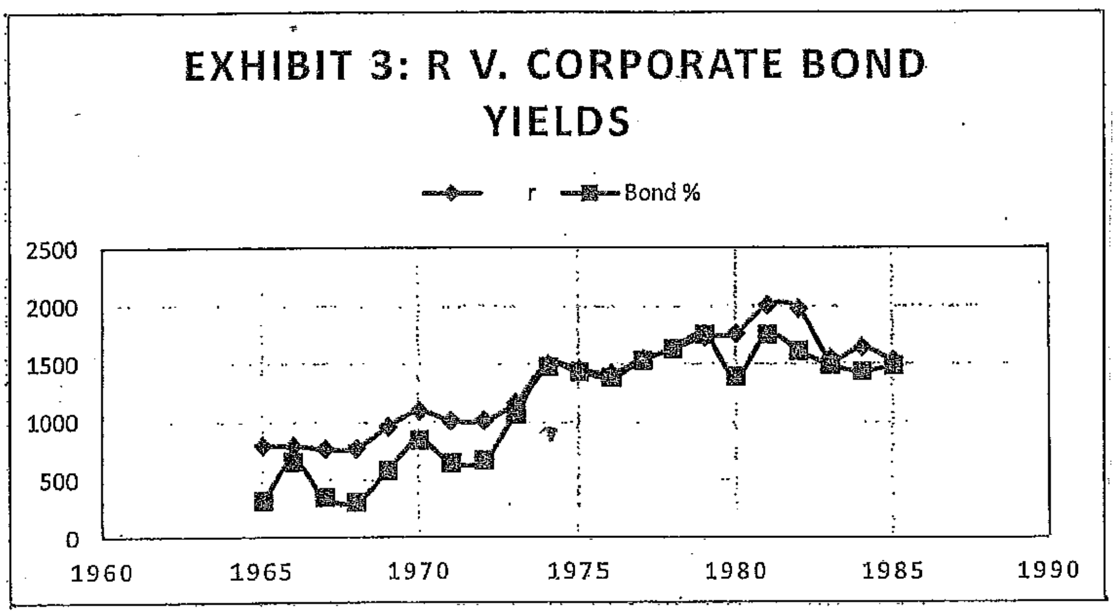

Exhibit 3: R V. Corporate Bond Yields

Setting Up the Ten Layer Portfolio

Success in forecasting 10 year returns suggests that r can be used to construct portfolios lasting ten years, with a mix of stocks and bonds, their percentages in the mix determined by the level of r in relation to the current bond interest rate. Creating a single string of yearly end-to-end portfolios would not be optimal, as doing so would forego 90% of the yearly predictions. I therefor constructed ten layers of ten year portfolios. The portfolios are all operating at the same time, but their start dates are staggered. 1909 is the base year when all portfolios have a value of 1. A stock/bond ratio is assigned to each portfolio serially, commencing with the stock/bond ratio of 1900 assigned to the tenth portfolio, the 1901 ratio assigned to the ninth portfolio and so on, until the ratio of

1909 is assigned to the first portfolio. (For the bond interest rates, I use Standard and Poor's corporate bond yields from 1900 to 1918 and Moody's composite investment grade yields from 1919 through 2024) The 1909 stock/bond ratio is 71/29, reflecting an r of 11.31% and a bond yield of 4.51 % .Two sub portfolios are formed within the first portfolio: a pure stock and a pure bond portfolio. Beginning in 1910, the stock portfolio rises (or falls) with the yearly change in the return of the S&P500 index and the bond portion compounds yearly at the rate of interest. After ten years this portfolio terminates and a new stock/bond mix is created in 1919 using the r level and bond rate of that year. This repeating ten year formation process continues until 2019, when the last portfolio is formed, lasting, like all portfolios, until the end of 2024. The second portfolio uses the 1908 r and interest rate levels to create the stock/bond mix. Like the first (and all) portfolios, the value of the two sub-portfolios begins to change in l910. But this portfolio terminates in 1918, then reforms every ten years. Finally, the tenth portfolio operates for only one year, 1910, when it then reforms. Its last reformation is in 2020. In this fashion, a portfolio is terminating and reforming every year between 1909 and 2020. This process ensures that old values are gradually dropped and new ones added. Using staggered 10 year portfolios takes full advantage of r's superior long-term forecasting ability, allowing short-term errors in the forecast, when they occur, to be corrected, more often than not, within the full ten year span. The yearly portfolio levels are added together creating a single summed level. The combined portfolio's return is the yearly change in the summed levels.

The combined portfolio produces a geometric mean return of 9.07% per year, an arithmetic mean return of 10.01% and a standard deviation of 12.95%. The comparable figures for the S&P500 index over the same 1909 to 2024 period is a geometric mean return of 9.78% per year, an arithmetic mean return of 11.52% and a standard deviation of 19.09%. The combined portfolio's Sharpe ratio is

$$\frac{10.01 - 3.60}{12.95} = .49$$

which compares with the index's Sharpe ratio of .41. Sharpe's ratio grew out of the Capital Asset Pricing Model which keys off the risk free rate, the rate that sets the standard against which the return of all other securities is measured, However, subtracting the risk free rate (i.e. the treasury bill rate) from the return discriminates against securities which have a lower mean return but an equally low standard deviation. Dividing the mean return by the standard deviation without subtracting the risk free rate produces a pure return/risk metric allowing for a more useful (to the investor) comparison between two securities with different mean returns. Dividing the layered portfolio's return by its standard deviation produces a return risk ratio of .77, while the index's ratio is .60.

The size of the layered portfolio's drawdowns provides an even more telling distinction between the two return series. From 1909 through 2024, both the S&P500 index and the layered portfolio experienced 31 drawdowns, the index's drawdowns averaging 12.2 % and the layered portfolio's 5.10%. Examining one of the more severe drawdowns enhances the significance of the layered portfolio's resistance to volatility. In the market decline of 2008 the index return fell 37% from December 2007 to December 2008, the layered portfolio lost 12%. An even greater contrast emerges when the declines from the market peak in October 2007 to its nadir in February 2009 are compared. The index lost 51 %, the layered portfolio 21%.

Any portfolio with a stock/bond mix will reduce volatility and the size of its drawdowns. But the layered portfolio here adds extra value to a portfolio by enhancing net return when the r/yield ratio is high and reducing the risk of drawdowns when the r/yield ratio is low. The mean stock/bond ratio of the layered portfolio is 62/38. A portfolio maintaining that ratio every year from 1909 through 2024 would have achieved an 8.28% geometric mean return, well below the layered portfolio's 9.07% return.

For a fund with a commitment to making regular periodic payments, declines like that suffered by the index from 2007 to 2009 can pose an existential threat. The experience of the closed-end fund Liberty All Star Equity Fund illustrates the perils which can attend an all-equities fund which attempts to maintain net asset value while also paying out income and disbursing capital gains. Exhibit 4 records the stock prices, asset values and distributions of the Liberty All Star Equity Fund from 1999 through 2012. The stock price peaked at $13.50 in 2000, then felt to $10 during the post dot-com bubble bear market. The price remained at that level until near the end of 2007, when it began to fall, ultimately reaching $2 ½ per share in 2008 and 2009. The price then recovered to $5. The stock is now trading, at the beginning of 2026, at just above $6. From 2000 through 2009, the fund distributed $7.10 per share from income and capital gains, almost perfectly matching the decline in asset value from $13.50 per share in 2000 to $5.48 in 20l2. Over this same time span the S&P500 index rose 8%.There will be more major market declines in the future, and assuming the fund does not modify its business plan, it faces extinction.

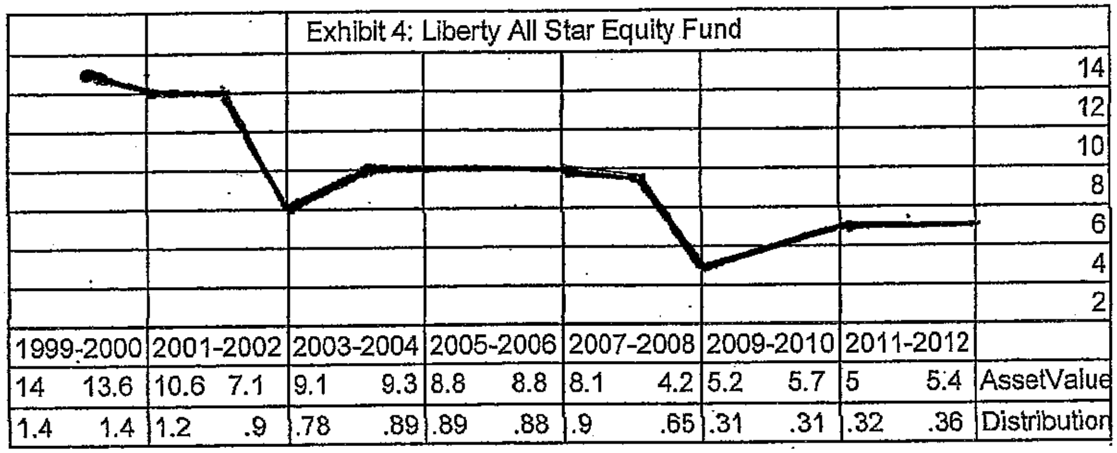

Exhibit 4: Liberty All Star Equity Fund

The danger inherent in an all-stock fund that makes regular distributions is further exemplified by the consequence of adopting the plan of R.H. Thayer and J.P. Williamson in their l994 paper "College and University Endowments: Why Not l00% Equities?" In their study they show that the assets of an all S&P500 fund over the period from l976 to March, 1994 would have gained 16% more in value than a 60%/40% stock-bond fund while making the same distributions. Setting aside the criticism that the authors picked a particularly auspicious period for stocks to make their comparison, the proposal does not allow for the asset loss occasioned by the rare, but inevitable, severe bear market. Exhibit 5 traces the path of the asset value of an all-stock fund paying out 5% of its assets every year. The path of the 10 layer portfolio making the same payments is shown for comparison. The study period runs from 2000 through 2014. Both funds start with a value of 100, By the end of 2002, the all-stock fund has lost nearly 1/2 of its value, by which point many managers would have felt compelled to sell some stock to preserve principal. Those managers who stayed the course and retained all assets would have seen the fund's asset value fall to 45 in 2008, increasing the pressure to sell, especially among those managers whose relationship to the fund or its beneficiary was fiduciary in nature. For those who did not compromise principal at that point, matters got worse. Over the next two months, the index fell another 17%, bringing the asset value down to 39.6%, a loss of 60% of the start value. The 10 layer portfolio, also making 5% payouts never saw its asset value fall below 70, a concerning level but not a crisis.

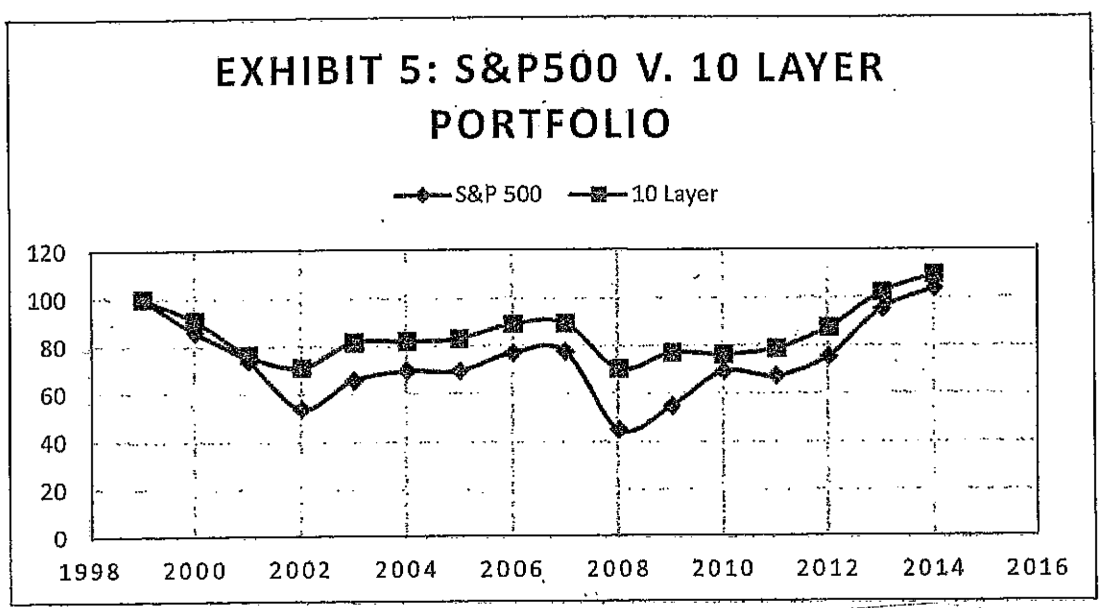

Exhibit 5: S&P 500 V. 10 layer portfolio

The Liberty All Star Equity Fund and the hypothetical 100% stock fund examples demonstrate the need for descriptive metrics which alert the potential investor to both the likely return but also the degree of maximum risk. Return/volatility ratios provide the return information but the standard deviation of the yearly returns only hints at the extent of maximum risk. R.C. Merton (1969) derived a formula by which one can calculate the percent of a portfolio that should be allocated to a risky asset. The formula consists of the Sharpe ratio with the standard deviation in the denominator multiplied by the investor's index of risk aversion:

$$\% = \frac{\text{mean return}}{\text{standard deviation} \times \text{index of risk aversion}}$$

Merton's formula is an advancement, as it focuses more attention on the risk aspect of the investment. But it doesn't tell the investor what the risk *is*.

I propose as a maximum risk level metric, the level that is one standard deviation below the portfolio's mean drawdown level. This metric alerts the investor to the probable ultimate risk the investor faces in choosing a portfolio format. From 1909 through 2024,both the S&P500 index and the ten layer portfolio sustained 31 drawdowns, and they did so in the same years. The drawdowns of the index averaged -13.03% with a standard deviation of 10.64%. The ten layer portfolio's drawdowns averaged -5.58% with a standard deviation of 8.57%. With 31 years of downturns, you can expect that one in six of them will fall below one standard deviation below the mean, which in fact is what occurs with both portfolios. Exhibit 6 lists the five drawdowns of each portfolio which exceed one standard deviation below the mean of the drawdowns, together with the year the drawdown occurred. The first four of the index's extreme drawdowns would have warned an investor in the 1990's of the danger to an all stock portfolio should a drawdown of comparable dimension occur. The ten layer portfolio's data, in contrast, would have had the opposite effect, assuring the investor that the portfolio's losses would be manageable and would not threaten the survival of the portfolio.

	Exhibit 6		
Year	S&P DD's		10 L DD's
1930	-24.96%		-19.65%
1931	-43.34%		-34.79%
1937	-35.03%		-19.95%
1974	-26.47%		-10.17%
2008	-37%		-16.25%
Mean	-33.25%		-20.17%

Exhibit 6

2. Conclusion

The ability of Gordon's expected market return r to forecast ten year stock returns can be used to construct a series of ten year portfolios all operating simultaneously. Making use of this long-term portfolio set-up takes full advantage of r's predictive power, which in turn leads to a portfolio with high returns and low volatility. In exchange for a loss of only 71 basis points in yearly returns compared to a buy-and hold S&P500 portfolio, over the 1909 to 2024 period, the holder of the ten layer portfolio would have achieved vastly reduced volatility and protection from severe drawdowns. This paper also introduces a new portfolio analysis metric: one standard deviation below the mean of a portfolio's drawdowns. This metric alerts the prospective investor to the extent of probable future severe drawdowns.

Footnotes

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