

Analyzing and Estimating Real Stock Returns

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It is now well established that real returns on the S&P 500 Index have averaged approximately 7% over long periods of time. Wilson and Jones [1987] were the first to carefully document this phenomenon. It was subsequently publicized by Siegel [2002] in his book on common stock returns. Recently, Jones and Wilson [2006] analyzed improved measures of both inflation and S&P 500 returns and reconfirmed that real stock returns averaged approximately 7% for the period 1926–2004.

While many investors have taken this average return for granted in recent years, questions must arise as to how likely such returns are to continue in the future, both in the short run and in the long run. After all, the dividend yield, an important component of the total return on stocks, is now very low by historical standards. Furthermore, most investors understand that averages are just that—averages—around which considerable variation can exist.

In attempting to estimate real stock returns over future periods, it is important to understand which of the determinants of real returns are likely to play the critical role, and over what time period. By carefully analyzing the determinants of real stock returns and focusing directly on those most likely to impact real returns over the next few years, investors should be able to make improved estimates of average real market returns.

This article identifies and measures the components of average real stock returns and

shows how they have contributed to average real returns over time. Furthermore, a simple methodology is demonstrated that allows investors to make estimates of average real returns over future periods conditional upon their assessments of the likely future values of the components of real returns. Investors can use this approach to judge for themselves the likelihood of real returns averaging any specified amount over some future time period.

DATA

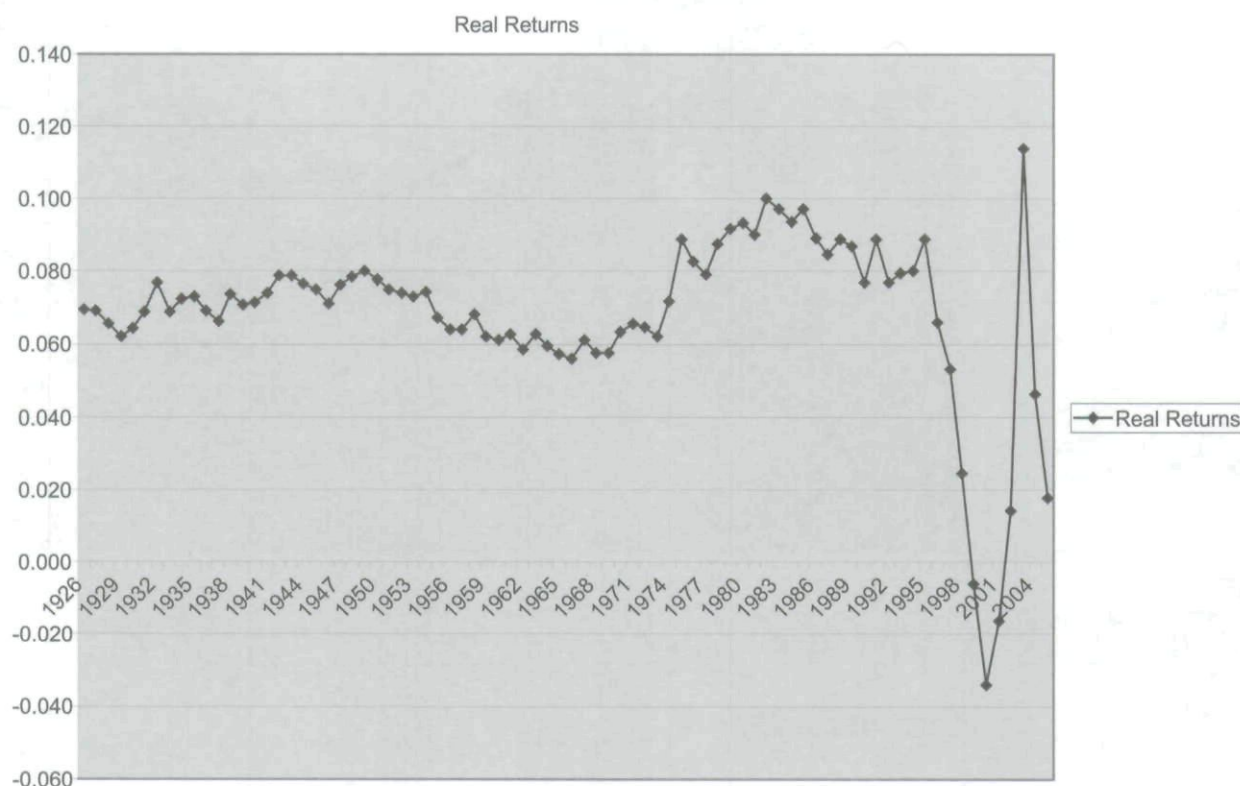
We use an updated version of the Wilson–Jones (WJ) [2002] dataset for the S&P 500 Index. The WJ dataset is a more complete version of the S&P 500 Index for the period 1926–1957, a period when the standard measures of the S&P 500 (such as Ibbotson Associates data) included only 90 companies. The WJ dataset includes prices, earnings, dividends, P/E ratios, growth rates, and inflation measures extending back to 1871.

DETERMINANTS OF REAL STOCK RETURNS

Ibbotson and Chen [2003] developed a supply-side model of nominal stock returns which decomposes the geometric mean S&P 500 return for any period into a set of components, including inflation, real earnings growth, changes in the P/E ratio, and dividend yield.¹

EXHIBIT 1

Average Annual Real Returns over Various Time Periods Beginning in 1926 and Ending in 2005



Note: The first observation covers the period 1926–2005, the second observation 1927–2005, and so on.

Because in this article we focus only on real stock returns, we modify the Ibbotson–Chen model to consider only the real capital appreciation and the dividend yield, which together constitute the real return on stocks. Based on the Ibbotson–Chen supply-side model, the revised formulation is

$$R_t = [(1 + g_{REPS,t})(1 + g_{P/E,t}) - 1] + Inc_t + R_{inv,t} \quad (1)$$

where

R_t = real total return on stocks measured as a geometric mean,

$(1 + g_{REPS,t})(1 + g_{P/E,t}) = (1 + R_{cg,t})$ = real capital appreciation,

Inc_t = income component or dividend yield, and

$R_{inv,t}$ = (small) reinvestment return resulting from compounding.

Historically, the components in Equation (1) have combined to produce a geometric mean average real

return of approximately 7% over very long periods. For example, consider the data for the period 1926–2005:

$$6.92\% = [(1 + 1.89\%)(1 + 0.70\%) - 1] + 4.08\% + 0.24\% \quad (2)$$

Equation (2) shows that over this 80-year period real stock returns averaged approximately 7% on a compound basis, which is consistent with most investors' beliefs about average real stock returns.

Equation (1) shows that real earnings growth and the change in the P/E ratio combine to form the real capital appreciation for the S&P 500 Index. Multiplying these two components together in Equation (2) shows that real capital appreciation averaged 2.6% over the period 1926–2005.² Furthermore, we can see that real earnings growth over this long period was the more important of the two variables, at 1.89% compared to 0.70% for the P/E ratio contribution. We will examine each of these vari-

EXHIBIT 2

Average Annual P/E Contribution to Average Real Returns over Selected Periods

Time Period	No. of Years	Geometric Mean S&P 500 Index	Annualized P/E Contribution
1900–2005	106	9.67	0.00
1914–2005	92	10.08	0.36
1935–2005	71	11.27	-0.005
1946–2005	60	11.25	-0.02
1961–2005	45	10.61	0.00
1971–2005	35	11.31	0.00

ables, in turn, both from a historical perspective and from a forecasting perspective.

Although the real return has averaged approximately 7% over the long run, it has done so with considerable variation. Exhibit 1 shows compound annual average real returns over every period from 1926 to 2005. Each successive period covers one less year; thus, the first observation covers the period 1926–2005, the second, 1927–2005, and so forth.

Exhibit 1 shows that average real returns were in the 6% to 8% range until about 1960, after which they declined somewhat. They started rising in the mid-1970s, staying in the 8% to 10% range until the mid 1990s. Lower-than-average real returns have been the norm since 1997 with one exception. Therefore, while it is correct to state that real stock returns have averaged approximately 7% over the very long run, it is clear that the variation around this average has been substantial. In other words, the notion of a 7% real return from stocks is heavily dependent upon averaging over a very long time period.

IMPORTANCE OF REAL EARNINGS GROWTH

The long-term average growth in real earnings for the period 1926–2005 was approximately 1.9%. This is in line with other estimates of the very long-run historical average growth in real earnings, such as the estimate presented by Bernstein and Arnott [2003].

Bernstein and Arnott presented evidence that earnings cannot grow faster than the macroeconomy. They argue that earnings must grow slower than the economy's gross domestic product (GDP) because the growth of

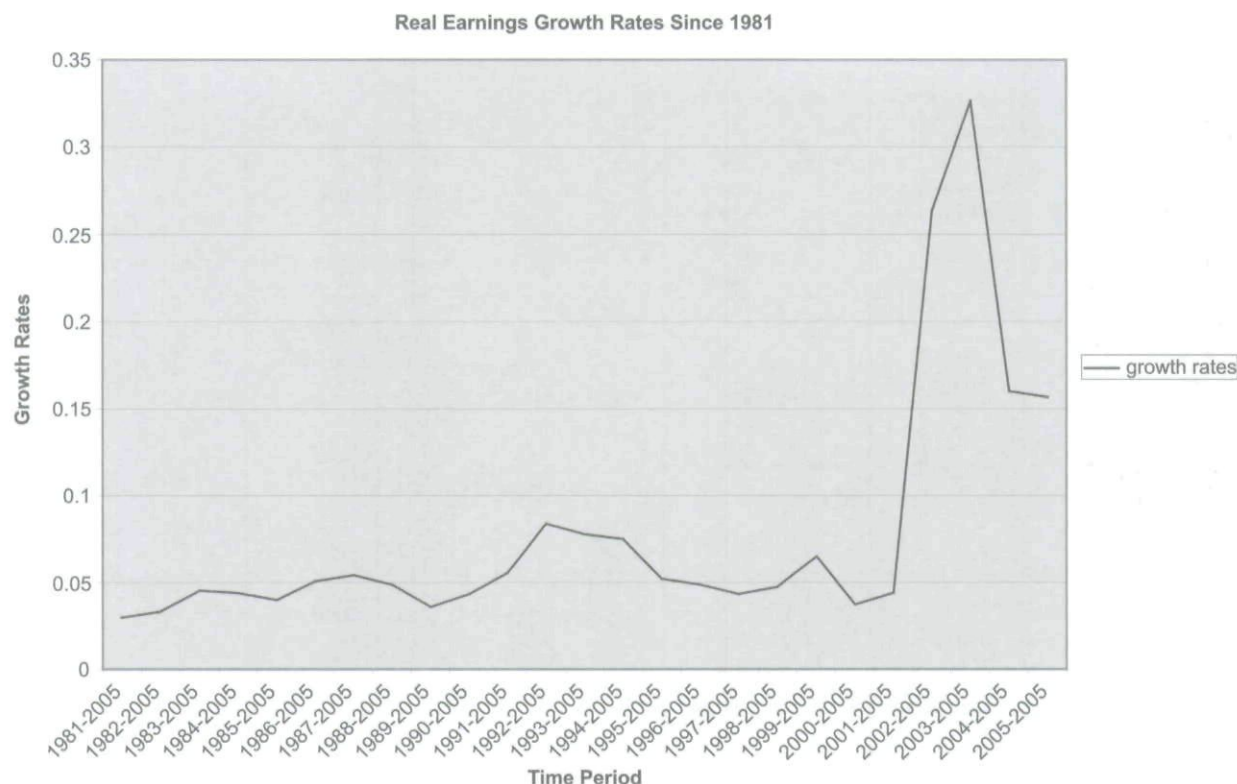
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EXHIBIT 3

Real Earnings Growth Rates of S&P 500 Index over All Periods from 1981 through 2005



Note: The first period is 1981–2005, the second period is 1982–2005, and so forth.

existing companies is only part of the story. GDP growth depends in part on growth of new companies, which does not augment the growth in earnings and dividends of existing companies. Bernstein and Arnott estimate that earnings grow at a rate that is two percentage points lower than the rate of GDP growth. This “dilution” results from both the formation of new firms and seasoned equity issuances.

Over a very long period ending in 2000, according to Bernstein and Arnott, real GDP growth averaged about 3.7% a year. They report that, net of the dilution of two percentage points, average real earnings growth was 1.7% over the same period. As noted, for the specific period 1926–2005 the growth rate in real earnings was approximately 1.9%.

It is important to keep in mind that the real earnings growth rates (1.7% to 1.9%) are long-run average growth rates. When we analyze real earnings data over subperiods within the 1926–2005 timeframe, we find some small, but potentially significant, variation in the

growth rates. For example, for periods starting in 1960, 1970, and 1980, and ending in 2005, the average growth rate was in the range of 2.4% to 2.5%. Going back to 1940, the growth rate of real earnings through 2005 averaged 2.8%. These realized growth rates, which are considerably higher than the 1926–2005 long-run growth rate of 1.9%, become important when we consider shorter-run forecasts of the real return on stocks.

ROLE OF THE P/E RATIO

The role of the P/E ratio warrants close consideration. Although its impact has been smaller than that of real earnings growth, Equation (2) indicates that it was an important component of the approximate 7% real return on stocks over the period 1926–2005. More importantly, it may assume even greater importance in estimates of future average real returns over shorter periods of time because the market P/E has dropped substantially in the last few years.

EXHIBIT 4

Estimates of Real Return on S&P 500 with Various Assumptions about Real Earnings Growth, Contribution of P/E Ratio, and Dividend Yield

Estimated Real Returns	Estimated Real Earnings Growth	Expected P/E Contribution	Estimated Div. Yield	Reinvested Return
4.75	1.9	0.7	1.9	0.24
4.86	1.9	0.8	1.9	0.24
5.06	1.9	1.0	1.9	0.24
5.16	1.9	1.1	1.9	0.24
5.26	1.9	1.2	1.9	0.24
5.36	1.9	1.3	1.9	0.24
5.47	1.9	1.4	1.9	0.24
4.85	2.0	0.7	1.9	0.24
4.96	2.0	0.8	1.9	0.24
5.16	2.0	1.0	1.9	0.24
5.26	2.0	1.1	1.9	0.24
5.36	2.0	1.2	1.9	0.24
5.47	2.0	1.3	1.9	0.24
5.57	2.0	1.4	1.9	0.24
4.85	2.0	0.7	2.0	0.24
4.96	2.0	0.8	2.0	0.24
5.16	2.0	1.0	2.0	0.24
5.26	2.0	1.1	2.0	0.24
5.36	2.0	1.2	2.0	0.24
5.47	2.0	1.3	2.0	0.24
5.67	2.0	1.5	2.0	0.24
5.77	2.0	1.6	2.0	0.24
6.28	2.5	1.6	2.0	0.24
5.86	3.0	0.7	2.0	0.24
6.07	3.0	0.9	2.0	0.24
6.27	3.0	1.1	2.0	0.24
6.48	3.0	1.3	2.0	0.24
6.45	4.0	0.3	2.0	0.24
6.56	4.0	0.4	2.0	0.24
6.66	4.0	0.5	2.0	0.24
6.76	4.0	0.6	2.0	0.24
6.87	4.0	0.7	2.0	0.24
7.08	4.0	0.9	2.0	0.24
7.28	4.0	1.1	2.0	0.24
7.49	4.0	1.3	2.0	0.24
7.88	5.0	0.7	2.0	0.24
8.09	5.0	0.9	2.0	0.24
8.30	5.0	1.1	2.0	0.24

EXHIBIT 5

Estimates of Average Real Stock Returns over 2007–2011 Period Conditional on Estimated Real Earnings Growth Rates, 2% Dividend Yield, and Possible P/E Ratio Contribution

			Average real return of approximately
Historical real earnings growth ^a	2% dividend yield	Neutral market ^b	4.0%
Historical real earnings growth	2% dividend yield	Modest P/E effect ^c	5.0%
Assumed real earnings growth rate of 3%	2% dividend yield	Neutral market	5.0%
Assumed real earnings growth rate of 3%	2% dividend yield	Modest P/E effect	6.1%
Historical real earnings growth	2% dividend yield	Moderate P/E effect ^d	6.1%
Average real earnings growth of the last 10 years ^e	2% dividend yield	Neutral market	6.9%
Average real earnings growth of the last 10 years	2% dividend yield	Modest P/E effect	8%

^aThe historical growth rate for real earnings over the period 1926–2005 was 1.9%.

^bA neutral market assumes no change in the P/E ratio from its 2006 value.

^cA modest P/E effect refers to the year-end P/E of 17.4 in 2006 rising to 18.4 over a 5-year period.

^dA moderate P/E effect refers to the year-end P/E of 17.4 in 2006 rising to 19.4 over a 5-year period.

^eThe average real earnings growth rate for the period 1999–2005 was 4.9%.

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A complete examination of the contribution of the P/E ratio can be accomplished by estimating the supply-side equation for every period of years beginning in 1926. Thus, the first estimate is for 1926–2005, the second for 1927–2005, and so forth. When this is done, we find that the P/E ratio has typically contributed very little, if anything, to average real returns over long-run periods.

Exhibit 2 shows the contribution of the P/E ratio over selected periods of time. Typically, over the long run this contribution is extremely small, or zero. This indicates that valuation has been basically neutral, on average, over most long periods of time.

As it turns out, the year 1926, the starting point for many of the analyses of market returns, is an unusual year in the overall history of market returns. Ibbotson and Chen's analysis of the period 1926–2000 estimated the impact of the P/E ratio to be 1.25% for the period. Updating their equation through 2005, the impact of the P/E was estimated to be 0.70% for the period 1926–2005 due to the decline in the market P/E since 2000.

What makes 1926 different? The beginning P/E ratio in 1926 was 10.22, whereas the ending P/E ratio in 2005 was 17.8. Obviously, a P/E ratio that increases over time indicates a higher market valuation at the end of the period as opposed to the beginning of the period.³

AVERAGE REAL RETURNS OVER THE LONG RUN

If real stock returns are to average approximately 7% on an annual basis over the long run, the combination of real capital appreciation and dividend yield, along with a small reinvestment term, must combine to 7%, as they have in the past. Ibbotson and Chen, in making their supply-side forecast of the expected *long-term, sustainable* nominal geometric mean return on equities of 9.15%, assumed no P/E effect. That is, they assumed that market valuation would be neutral over the long run. According to Ibbotson and Chen, the other variables in Equation (1) represent what companies have "supplied" (in terms of real returns) over the "modern" period starting in 1926.

It is obvious from the supply-side model that one of three sets of circumstances must occur if long run average *real* returns are to approximate 7%, given today's environment: 1) the dividend yield must return to a more "normal" amount, much closer to the historical average; 2) the real capital appreciation component must be larger than its historical average to make up for the lower divi-

dend yield; or 3) a combination of these two events must occur—that is, a somewhat higher real capital appreciation compared to the historical average combined with a somewhat higher dividend yield compared to the current dividend yield.

If dividend yields remain below 4%, real capital appreciation must make up the difference. What if real earnings growth continues to average the historical mean of approximately 1.9% over the long run? In that case, real capital appreciation of 2.6% would depend upon a P/E contribution as it did in the 1926–2005 period. As noted earlier, 1926 was a somewhat unique year in terms of the starting P/E ratio, being below average, and such may not be the case in the future. If there is little or no contribution from the P/E ratio, real earnings growth will have to be the driving force behind real capital appreciation.

ESTIMATING REAL RETURNS OVER THE NEXT FEW YEARS

Given the current low dividend yields, it seems reasonable to posit only a small probability of a dramatic change in the yield over the next several years. Barring a drastic decline in the S&P 500 Index, the likelihood of a dividend yield approaching the historic average of approximately 4% anytime soon appears to be very small.

Current dividend yields of roughly 1.9% are much different from the historical average of over 4%. An obvious and quick conclusion is that under such conditions, we should not expect real returns on the S&P 500 to continue to average nearly 7% as they have over the long-run past. The historical average real capital appreciation of 2.6% combined with the current low dividend yield of approximately 1.9% suggest average real returns of about 4.7% to 4.8% (including the reinvestment term) on a compound annual average basis. However, the shorter-run future may not be as gloomy as this quick conclusion suggests.

Real earning growth in recent periods has exceeded its historical average by wide margins. Exhibit 3 shows that real earnings growth rates have equaled or exceeded 3% a year over each successive time period starting in 1981 and ending in 2005 (i.e., the number of years included in each time period decreases by one as the start year moves from 1981 to 1982 to 1983, and so on). Combined with some growth in the P/E ratio, investors may in fact be able

to achieve a real return over the next few years closer to the historical average of 7%.

Using the supply-side model for real stock returns, we can estimate possible future real returns, depending upon the assumptions made. Exhibit 4 shows various combinations of real earnings growth, P/E contribution, and dividend yield (along with the reinvestment term) and the resulting real returns on stocks. For example, if real earnings growth remains at the long-term average of 1.9%, a modest P/E contribution, combined with a dividend yield of 2%, produces real returns of over 5%. Real earnings growth rates of 3%, combined with modest P/E contributions, produce real stock returns in the 6% range. And real earnings growth rates of 4%, combined with modest P/E contributions, result in real returns in the 7% range.

What constitutes a modest P/E ratio contribution? The P/E ratio on the S&P 500 Index on a trailing 12-month basis was 17.4 at the end of 2006. An increase in the P/E ratio to only 18.4 at the end of five years produces a P/E contribution of 1.1. Over a three-year period, this contribution would be 1.9. An increase in the P/E ratio to 19.4 over a five-year period would produce a

contribution of 2.2, and over a three-year period, 3.7. Therefore, if an investor has only modest expectations about the market P/E ratio increasing over the next few years, real stock returns can match the long-term averages if real earnings growth rates continue at recent levels.

It should be noted that the 2006 year-end P/E ratio on the S&P 500 of 17.4 was relatively close to the average P/E ratio for the 1926–2005 period of about 16.3.⁴ Therefore, it is reasonable to talk about modest contributions from the P/E ratio in future years, because the P/E declined sharply from a high of 46.5 which it reached in 2001. This contrasts sharply with the findings of Carlson, Pelz, and Wohar [2002] who presented statistical evidence suggesting the P/E ratio may have shifted upward to a new level in 1992. They estimated the new normal bound to be between 20 and 25, which clearly did not occur as the P/E quickly retreated to a more normal level by 2006.

It is a positive development for investors that the P/E ratio has declined to its current level, because it is more reasonable to assert that the P/E can rise from a level of 17 than from a level of 25 or so. Furthermore, Siegel

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[2002] has argued that there is no fundamental reason why the “normal” P/E ratio cannot change over time.

Exhibit 5 provides a summary of some estimated average real stock returns over a future five-year period (2007–2011). These representative estimates are obviously conditional upon investor expectations as to the real earnings growth rate, the contribution (if any) of the P/E ratio, and the dividend yield. We assume a dividend yield on the S&P 500 Index of 2% in all of the estimates.

Exhibit 5 indicates that real returns in the range of 6% to 7% are possible in two scenarios. One, the real earnings growth rate approximates the historical average, but the P/E ratio expands modestly from its 2006 year-end value to 18.4. Two, the real earnings growth rate continues at the more rapid average rate that occurred over the period 1996–2005. In this case, average real returns of approximately 7% would be realized even with a neutral market (i.e., no P/E contribution).

Of course, the real earnings growth rate could slow to between the long-term historical growth rate of 1.9% and the more recent 10-year growth rate of 4.9%. Assuming a 3% growth rate in real earnings, as illustrated in Exhibit 5, average real stock returns could range between 5% and 6%, if there is essentially no change in the P/E ratio or a very modest change (for example, from 17.4 to 18.4).

WHAT HAPPENS IF THE MARKET P/E RATIO DECLINES?

When making forecasts of future expected real returns, it is prudent to consider the case of declining P/E ratios, because the P/E ratio did decline in recent years. The P/E ratio dropped from 32.6 in 1998 to 17.4 in 2006, resulting in, on average, a negative P/E contribution.

The average P/E ratio on the S&P 500 Index between 1926 and 2005 was between 16 and 16.5. Clearly, the P/E of 17.4 at the end of 2006 could decline toward the long-run mean. This case was recently made by Bogle [2007] who speculated about a *nominal* return of approximately 7% annually over the next decade. Bogle derived this number by first estimating an investment return of 2% dividend yield plus 6% long-term earnings growth. However, he suggested that because of a potential decline in the P/E ratio from its current level of approximately 17, the P/E ratio might revert to a more typical 16 or so. This would reduce the investment return of 8% to 7%. In terms of real stock returns, this would be about 4%.

SUMMARY AND CONCLUSION

The supply-side model developed by Ibbotson and Chen [2003] can be modified to analyze and estimate average real returns on the S&P 500 Index. This model provides a clear understanding of the variables that determine average real stock returns over a given period of time—real earnings growth, contribution of the P/E ratio, and dividend yield (plus a small reinvestment term).

Real earnings growth and the P/E contribution combine to form the real capital appreciation component of real stock returns. Over the long-run past, specifically the period 1926–2005, real earnings growth has been the more important of the two variables. Over many long-run periods, the P/E contribution is negligible, or zero; that is, market valuation is neutral. For some start dates, however, such as 1926, the P/E ratio makes a significant contribution to average real returns. In the past, average dividend yields typically have exceeded 4%, forming a large part of average real returns. Current, and expected, low dividend yields have the potential to significantly change average real returns.

The supply-side model can be used by investors to make estimates of expected average real returns over shorter periods, based on their expectations for the model's parameters. Given the low current dividend yield of the S&P 500 Index, a real return close to the long-run average of 7% requires an above-average growth in real earnings, some P/E contribution, or both. Such estimates, however, are entirely feasible because real earnings growth has been above the long-run average for significant periods of time and an increase in the market's P/E ratio is clearly a possibility in the future given the recent return to its approximate long-term average.

ENDNOTES

¹We use the Ibbotson and Chen model intact as published. This model completely explains average compound stock returns. Therefore, it is not necessary to account for factors such as share repurchases.

² $(1.0189 * 1.0070) - 1.0 = 2.6\%$.

³The same is true for 1951. Over the 55-year period from 1951 to 2005, the P/E ratio had twice the impact on the average return for the S&P 500 Index relative to the impact of the period from 1926 to 2005 of 1.43%. The beginning P/E ratio for 1951 was only 8.14.

⁴This calculation leaves out the 1932 value of 136.5 on the grounds that such a value will not be seen again, barring a return of depression-like conditions found only in the 1930s.

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