Smith Group
ASSET MANAGEMENT

Is the stock market undervalued? History says "Yes".

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Abstract

After more than a decade of below-normal returns in the U.S. stock market, many investors, including an expert panel convened by the CFA Institute, have a similarly negative expectation for future returns from U.S. stocks. This paper explores the possibility that recency bias may be responsible for this outlook. Recency bias causes us to treat recent events with more importance than events that are more distant in time.

To insulate our own forecast from recency bias, we employ a metric with which we can treat all years and all periods the same. That metric is the simple price/earnings ratio (P/E) of the S&P 500 index, which has had a strong historic relationship with future returns in the stock market. With historical data from 1950-2011, P/E has greater than 90% forecasting accuracy (R^2) of subsequent ten-year returns. Going out-of-sample for the period that begins January 1, 2012, we forecast a ten-year annualized return for the S&P 500 index of greater than 13%, better than the market's long-term average and significantly higher than the forecast of the CFA Institute's panel of experts.

Introduction

Prognosticating on the direction of the stock market is one of America's more popular past-times. For professionals whose job is managing other people's money, it is much more than a game. Yet even in this group significant behavioral bias can exist, related to varying life experiences, risk aversion and other factors.

In recent years a mostly negative mood has settled over U.S. stock markets. This is not surprising, as investors have now seen more than a decade of returns well below the long-term norm. Exhibit A shows the total annualized return for some of the major U.S. indexes between 2000 and 2011.

Exhibit A. Total annualized return to U.S. Stock indexes (January 1, 2000 – December 31, 2011)

S&P 500 Index	+0.6%[1]
Dow Jones Industrial Avg.	+2.9%[2]
NASDAQ Composite	-3.0%[3]
Russell 1000 Index	+1.0%[4]
Russell 2000 Index	+4.6%[5]

Many studies in the field of psychology have noted a distinct recency bias in the way people process information[6]. The more recent are our experiences, the greater the impact those experiences have on how we process information. For example, the 1980's, when the S&P 500 index returned 17.6% per year, and the 1990's, when it returned 18.2%, might be too distant in memory to have the impact of the more recent period shown in Exhibit A, when the S&P 500, for example, returned only 0.6% annually.

The surprising thing is that this bias has been shown to affect not only casual investors,[7] but those whose life's work is studying markets,[8] and who might otherwise be thought to be above such muddled thinking. Apparently we are all human!

A 2012 paper by Laurence Siegel[9] surveys a panel of noted experts on stock markets, convened by the CFA Institute,[10] and finds their outlook for the coming decade to be somewhat pessimistic. Not a single member of the panel forecast U.S. stock returns to match even their historic long-term average of 10%[11], much less the outsized returns of the 1980's and 1990's.

The CFA Institute convened a similar panel in 2001,[12] with some of the same experts. That panel, brought together near the height of the tech bubble, was very optimistic. They grossly overestimated the returns stocks would generate in the decade that followed. Siegel freely admits that what happened in between the two panels to sour the mood was a historically bad decade for U.S. stocks. What he does not consider is whether the panel participants may have exhibited recency bias in making their forecasts. If so, the forecasts of the 2001 panel may have been too rosy because the high returns of the 1980's and 1990's were fresh in the panelists' minds. Decades like the 1970's, a

difficult one for stocks, may have been given short shrift simply by being more distant.

Following this hypothesis, it may be reasonable to expect that the 2012 panel's forecast will turn out to be overly pessimistic, since the decade foremost in their memory was a historically bad one for stocks. Only time will tell, but in the meantime it is possible to construct a forecast that is, by design, free of recency bias, one which, apart from any other strengths or weaknesses, treats data from any and all years the same. If this forecast comes out higher than that of the panel, it would provide some support to the notion that recency bias is present in the panel's forecast.

Siegel's discussion is in terms of an equity risk premium (ERP). This is the extra return to stocks over and above a presumably risk-free asset such as 10-year U.S. Treasury notes. The theory of an ERP is that investors must be induced to hold riskier assets such as stocks by rewarding them with higher expected returns. But Siegel also notes that the premium disappears over significant periods of time. In other words, the relationship breaks down. This seems to us evidence that the concept of an ERP might not be the best way to analyze the stock market. In an attempt to keep our forecast as transparent and free from bias as possible, we chose an even simpler method.

History As a Guide

In the long history of stock investing, investors have developed many computational techniques, such as the ERP, to help determine the best time to commit funds to the market. Some models and algorithms are very esoteric and incorporate long strings of variables purported to have statistical or logical links to future returns.

Since our goal is to develop a transparent forecast that we know to be free of recency bias, we chose a measure that is simple, well known and easily available. It is the twelve-month-trailing price-to-earnings ratio, or P/E, which is calculated using (a) the beginning of the forecasting period share price and (b) the earnings over the prior twelve-month period.

First, some relevant background: According to investing theory, the value of an individual stock is based on investors' collective best judgment of the discounted present value of the future earnings of a company. To calculate this, an investor would need to forecast the earnings year-by-year for a large number of years and also forecast a discount rate (usually approximated by the CPI[13] or Treasury bill rates) for all of those years. Not surprisingly, few investors actually do this, so the theory is mainly intended to replicate the way investors think in terms of setting the current share price relative to recently reported earnings. Roughly speaking, when earnings go up unexpectedly, share price is bid higher because investors anticipate a higher future earnings stream from holding the stock. The market price set by investors serves as the P in the P/E calculation.

The P/E of individual company shares and the collective P/E of a group of companies, such as those in the S&P 500 index, can vary widely over time. In theory, P/E should be higher when expected long-term earnings growth rates are higher than normal and/or when the discount rate is lower than normal. P/E should be lower when the opposite environment exists.

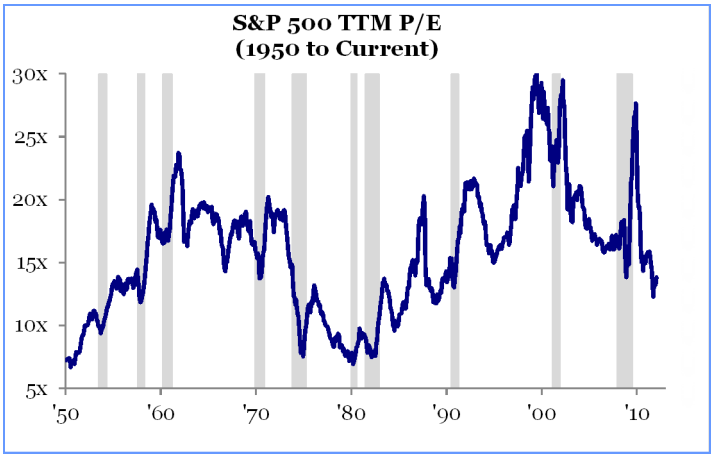
> ***"In practice, because humans with imperfect foresight are setting half of the P/E ratio (the P), the ratio varies with the mood of investors."***

Periods when investors are worried are characterized by low P/E's. Periods when investors are exuberant are characterized by high P/E's.

Historically low P/E periods include the early 1950's (Korean War/Soviet threat), the late 1970's (following the Vietnam War, the Arab oil embargo, Nixon's impeachment and general stagflation), and the current period to a lesser extent (a time of political gridlock, huge federal deficits, hangover from the Great Recession, the European financial crisis, etc.).

High P/E's are usually associated with economic expansion. Historically high P/E periods include most of the 1960's and the 1990's (the last couple of years of the 1990's was the highest P/E period in the last 60 years). The chart in Exhibit B shows the history of the P/E for the S&P 500 index portfolio from 1950 through 2011.

Exhibit B. Twelve-Trailing-Months P/E (TTM P/E) for the S&P 500 (January 1, 1950 – December 31, 2011)



Using P/E to Predict Future Returns

For the purposes of our analysis, it does not matter why a P/E level is what it is. All that matters is the number itself, as calculated at the beginning of each forecasting period. In the analysis presented below, the P/E is the beginning-of-period share price divided by the last four quarters' reported earnings per share. For example, if the share price is $48 and the company reported $4 total earnings for each of the last four quarters, the P/E is 12 (48/4).

The basic theory our forecast will rest on is the following:

> ***"Other things being equal, when you buy stocks cheaply you are more likely to get a better investment return than when you buy them at a premium."***

While it seems startlingly simple, it turns out that applying this idea by using P/E as a means of determining relative cheapness or expensiveness is an excellent way to forecast stock market returns in the historical data.

We started with S&P 500 data from the time period 1950 through 2011, provided by Strategas Research Partners,[14] an economic consultancy and research firm based in New York City. We take the quarter-end P/E ratio for the S&P 500 index and match it with total returns to the S&P 500 beginning the day after that quarter's end and continuing for one, three, five and ten-years out. Dividing the quarter-end P/E ratios into quintiles from low to high, we get the results shown in Exhibit C.

Exhibit C. Compound Annual Return to the S&P 500 based on P/E quintile (January 1, 1950 – December 31, 2011)

P/E Group	P/E Range	1 Year	3 Year	5 Year	10 Year
Low quintile	6.8 to 11	19.6%	18.1%	17.5%	16.0%
2nd quintile	11.0 to 14.1	15.4%	13.1%	12.6%	14.3%
3rd quintile	14.1 to 17.1	11.5%	10.7%	10.1%	10.8%
4th quintile	17.2 to 18.9	8.6%	7.3%	7.8%	7.4%
High quintile	19.0 to 29.6	5.6%	5.5%	6.0%	5.0%

Looking at Exhibit C, two patterns are especially striking:

1. The consistency of the decline in returns going vertically from Low to High P/E quintiles.
2. Within each P/E group, the consistency of returns going horizontally across the various time periods.

The clear conclusion is that, other things being equal, lower P/E's result in better future returns than do higher P/E's, for all of the time periods measured.

Detailed Analysis

We now take a more granular look at the relationship between P/E and return found above. Using the same data, we focus on the longest return period of ten years. Most participants in the stock market say they are "long-term investors" (whether they behave that way is another matter). Assuming such investors have at least a ten-year horizon, we want to see if market P/E, as measured by the S&P 500, gives important information regarding expected returns.

In Exhibit D, only the whole number of the P/E is used, with decimals truncated. The count shows the number of periods in the data that began with that level of P/E. The returns shown are compound annual returns for the ten years following the date when the P/E became known. We show the arithmetic average returns of all ten-year periods that began with the indicated P/E and then bracket this between the worst and best annual returns.

Exhibit D. Ten-year returns to the S&P 500 for different starting levels of P/E (January 1, 1950 – December 31, 2011)

P/E	Count	Min	Average	Max
7	5	15.6%	16.8%	17.7%
8	12	14.8%	17.0%	18.5%
9	11	13.9%	15.8%	18.2%
10	11	11.3%	15.1%	17.2%
11	14	10.7%	14.1%	16.2%
12	14	10.6%	15.3%	19.2%
13	17	9.0%	13.1%	19.4%
14	10	6.9%	12.5%	18.8%
15	9	6.6%	12.6%	18.2%
16	14	5.6%	9.8%	17.8%
17	14	3.7%	7.7%	14.4%
18	29	2.8%	7.4%	15.1%
19	13	0.5%	5.9%	14.6%
20	3	7.6%	9.6%	12.7%
21	7	7.1%	9.4%	13.3%
22	6	3.3%	7.3%	12.9%
23	2	3.1%	5.1%	7.1%
24	1	1.4%	1.4%	1.4%
25	4	-0.4%	2.2%	3.5%
26	3	-1.6%	0.3%	2.7%
28	3	-1.4%	-1.0%	-0.7%
29	2	-3.0%	-2.6%	-2.2%
30	1	2.9%	2.9%	2.9%

As in Exhibit C, the inverse relationship between beginning-of-period P/E and future returns is strong and consistent, if not strictly monotonic.

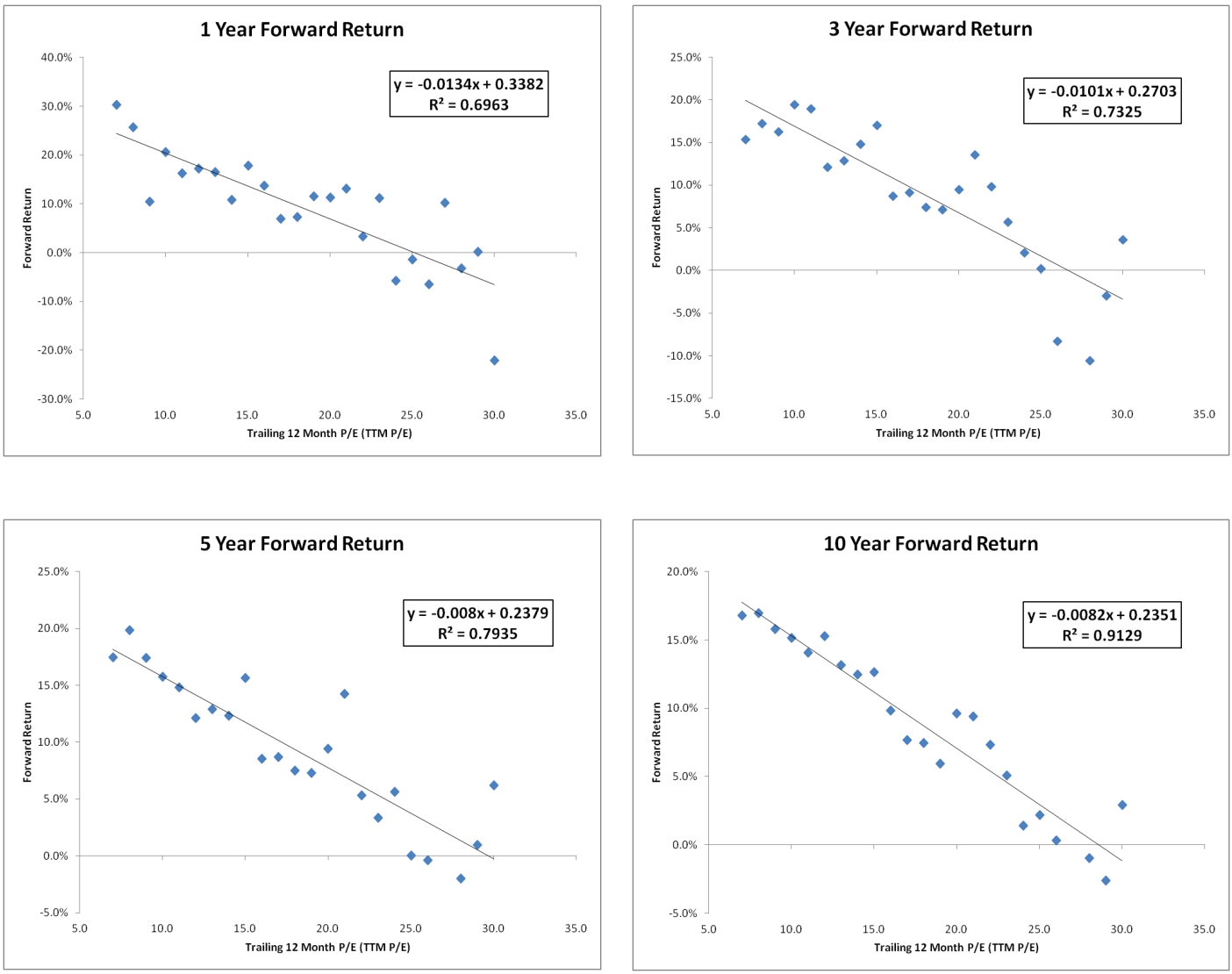
Predicting the Future

Having illustrated a statistical relationship between the stock market's P/E and future returns, we now want to develop a predictive tool based on that relationship. History is not a perfect guide to the future since every time period has its own unique features. But short of a crystal ball, history is all we have to work from. Furthermore, the link between P/E and returns is remarkably persistent in the data, and the underlying argument simple and logical. Using this historic relationship to predict future returns is a natural choice for producing a stock market forecast free of recency bias.

Once again using the same data, in Exhibit E we plot each beginning-of-period P/E against future compound average

annualized returns for one, three, five and ten-year periods. The downward sloping line is the least squares fit to the data points, and illustrates the inverse relationship between P/E and future returns. The formula in the upper right of each chart explains the precise mathematical relationship found in the data. The variable Y represents return (measured on the vertical axis) while X represents P/E (measured on the horizontal axis). R^2 represents how well the least squares line fits the data, and is an indicator of predictive power. If every data point was on the line, R^2 would be 1, indicating 100% accuracy in predicting the subsequent return values from the initial P/E values.

Exhibit E. The inverse relationship between P/E and return across four time periods (January 1, 1950 – December 31, 2011)



Some observations on the charts:

1. The inverse relationship between P/E and future returns, as indicated by the downward slope of the least-squares line, is consistent across all measurement periods, with a slope of between -0.8% and -1.3%.
2. The predictive power of the formula, as indicated by R^2, increases monotonically from shorter periods to longer periods.
3. For the longest period, ten years, the R^2 of 0.91 indicates 91% accuracy (within the data set) when using beginning-of-period P/E to predict future ten-year annualized returns for the stock market.

What About Now?

We began this paper discussing the recent forecast of a panel of stock market experts convened by the CFA Institute. We wondered if the pessimistic nature of the panel's forecast might be related to the fact that the past ten years have been so difficult for stocks. After all, underneath our academic credentials and industry reputations, we are all human and may be prone to behavioral quirks such as the recency bias.

For comparison purposes, we illustrated an unemotional and unbiased method of forecasting future stock market returns, one that rests on a simple theory and is statistically valid. Now we can use that method to come up with a forecast to compare with that of the panel.

The S&P 500 began 2012 with a P/E of 13.3. Exhibit F recreates Exhibit D, but shows only the P/Es below 14. There have been 17 periods since 1950 when a ten-year period began with a P/E of 13. The average annualized return for these periods was 13.1%. The worst of these periods had annualized returns of 9.0% and the best 19.4%. Expanding the analysis to include all periods with a stock market at the current P/E level or below, there are a total of 84 periods and ***none of those ten-year periods had an annualized return of less than 9.0%.***

Exhibit F. Ten-year returns to the S&P 500 for starting levels of P/E below 14 (January 1, 1950 – December 31, 2011)

TTM P/E	Count	Min	Average	Max
7	5	15.6%	16.8%	17.7%
8	12	14.8%	17.0%	18.5%
9	11	13.9%	15.8%	18.2%
10	11	11.3%	15.1%	17.2%
11	14	10.7%	14.1%	16.2%
12	14	10.6%	15.3%	19.2%
13	17	9.0%	13.1%	19.4%

Forecasting the next ten years annual return to the S&P 500 based on the current P/E, one would project no worse than 9% return, and perhaps significantly more. By comparison, Siegel's paper notes that even the most optimistic of the panelists projected returns for the next ten years to be below the long-term average of 10%, with the average forecast being in the 6-7% range. We cannot say with certainty whether recency bias played a role in the panel's forecast. But we can say that in our P/E-based forecast, it did not. As to which of the two forecasts will be more accurate, only time can tell.

Conclusion

No tools for predicting future returns from any investment are perfect, but in this paper we employ an unbiased, unemotional technique to forecast long-term returns from investing in the U.S stock market. Using the historic relationship between the price that investors pay for a company's most recent twelve-months earnings as a guide, we come out with a projection that is considerably more optimistic than many experts' opinions, including that of a recent panel convened by the CFA Institute.

Based partly on such opinions, investments in U.S. stocks have been experiencing a multi-year outflow. The importance of this paper to decision makers is to present an argument that a mid-single-digits assumed return for U.S. stocks could be incorrect, according to a forecasting technique with a long history of statistical credibility. Applying this technique to S&P 500 data at the beginning of 2012, we get an expected ten-year annualized return of about 13%, with a low estimate of 9%.

Fiduciaries, trustees, financial advisers and other decision-makers with the responsibility of investing for the benefit of others should seriously consider whether the negative outlook driving many of the current discussions about future U.S. stock returns are warranted, viewed in the light of this information.

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Disclosures and Sources…….

Smith Asset Management Group, LP
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Stephen S. Smith, CFA, Founder and CEO, Smith Asset Management Group, LP

Mr. Smith founded Smith Group Asset Management, a Dallas-based investment management organization, in 1995, and serves as the company's Chief Investment Officer. He began his career in the late 1960's as an engineer with NASA in the lunar landing program. He joined Wachovia Bank as a computer systems analyst in the mid-1970's, and transitioned to the bank's investment management division in order to help design and implement a portfolio management system. Mr. Smith left Wachovia and joined what is now known as Bank of America in 1983. He held a number of senior investment positions at Bank of America until he departed in 1995 to found Smith Group. Mr. Smith has an engineering degree and an MBA, both from the University of Alabama, and he was awarded the Chartered Financial Analyst (CFA) designation in 1981. Mr. Smith is a member of the CFA Institute and the CFA Society of Dallas-Ft. Worth. Mr. Smith is an active volunteer in his community, and serves on the board of directors for a number of charitable organizations.

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[1] Standard & Poor's 500 Index - S&P 500: An index of 500 stocks chosen for market size, liquidity and industry grouping, among other factors. The S&P 500 is designed to be a leading indicator of U.S. equities and is meant to reflect the risk/return characteristics of the large cap universe.

[2] Dow Jones Industrial Average – DJIA: The Dow Jones Industrial Average is a price-weighted average of 30 significant stocks traded on the New York Stock Exchange and the NASDAQ.

[3] NASDAQ Composite Index: A market-capitalization weighted index of the more than 3,000 common equities listed on the NASDAQ stock exchange. The types of securities in the index include American depositary receipts, common stocks, real estate investment trusts (REITs) and tracking stocks. The index includes all NASDAQ listed stocks that are not derivatives, preferred shares, funds, exchange-traded funds (ETFs) or debentures.

[4] Russell 1000 Index: An index of approximately 1,000 of the largest companies in the U.S. equity markets, the Russell 1000 is a subset of the Russell 3000 Index. The Russell 1000 (maintained by the Russell Investment Group) comprises over 90% of the total market capitalization of all listed U.S. stocks

[5] Russell 2000 Index: An index measuring the performance of the 2,000 smallest companies in the Russell 3000 Index, which is made up of 3,000 of the biggest U.S. stocks. The Russell 2000 serves as a benchmark for small cap stocks in the United States

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[7] Pinkser, Robert. "Primacy or Recency? A Study of Order Effects When Nonprofessional Investors are Provided a Long Series of Disclosures."*Behavioral Research in Accounting* 23(1). 2011: 161-183.

[8] Ashton, Robert H. and Anna M. Cianci. "Motivational and Cognitive Determinants of Buy-Side and Sell-Side Analyst Earnings Forecasts: An Experimental Study." *The Journal of Behavioral Finance* 8(1). 2007: 9-19.

[9] Siegel, Laurence B. "Jeremy Siegel, Rob Arnott and Other Experts Forecast Equity Experts Forecast Equity Returns." *Advisor Perspectives* white paper. February 7, 2012.

[10] CFA Institute is a global, not-for-profit organization comprising the world's largest association of investment professionals. With over 100,000 members, and regional societies around the world.

[11] For the period Jan. 1, 1996 – Dec. 31, 2011, the S&P500 total annualized return was 9.78%. For the period Jan. 1, 1950 – Dec. 31, 2011, the S&P500 total annualized return was 10.96%.

[12] Siegel, 1.

[13] The Consumer Price Index (CPI) is a measure of the average change over time in the prices paid by U.S. urban consumers for a market basket of consumer goods and services.

[14] Strategas Research Partners is an institutional broker-dealer focused on investment and sector strategy, macro-economics, policy research, and technical analysis.