

## CASE STUDY – EQUITY BUBBLES AND THE EFFICIENT MARKET HYPOTHESIS

**Michael Cosgrove**  
University of Dallas  
[mcos@gsm.udallas.edu](mailto:mcos@gsm.udallas.edu)

**Louis Gasper**  
University of Dallas  
[lgasper@gsm.udallas.edu](mailto:lgasper@gsm.udallas.edu)

**Daniel Marsh**  
University of Dallas  
[dmارش@gsm.udallas.edu](mailto:dmارش@gsm.udallas.edu)

***ABSTRACT:** Four cases of U.S. equity market bubbles and corrections are reviewed to assess the validity of the efficient markets hypothesis. They are the 1929 episode, the 1970s case, the October 1987 meltdown, and the late 1990s bubble. The S&P 500 price index, excluding dividends, is analyzed in real terms to assess the efficiency of the market through these various episodes. The finding of this paper is that, although policy actions probably accounted for much of the decline in equity prices in 1929 and in the 1970s, it could not account for all of it. The declines in 1987 and 2000-2002 seem unconnected to government policy or real economic variables. Hence fundamental mispricing of equities, persisting in some cases for years, appears evident.*

### INTRODUCTION

Perhaps the best known equity crash is the one of 1929, due to the work of Friedman and Schwartz (1963). Bernanke (2002) summed it up best on Milton Friedman's ninetieth birthday: "As everyone here knows, in their Monetary History, Friedman and Schwartz made the case that the economic collapse of 1929-33 was the product of the nation's monetary mechanism gone wrong."

The October 1987 equity crash is often remembered for its sudden and unexpected but ultimately transitory change in market valuation. The late 1990s equity bubble, which ended in the "dot com" crash of high tech stocks, remains fresh in investor minds. Schiller's work (2000) provides a perspective on that bubble relative to history. The market collapse of the late 1960s and early 1970s has also been a topic of analysis due to the major adverse economic and political events that occurred during that time period.

Outside the U.S., the performance of the Japanese economy and Bank of Japan has been a topic of interest. The Nikkei peaked in 1989. Its subsequent crash with anemic economic performance and deflation had some parallels to the U.S. experience in the post-1929 era. Bernanke (2003) spelled out his thoughts on monetary policy in Japan. See Cosgrove and Marsh (2005) for an analysis of the Bank of Japan and performance of the Nikkei in the post-1990 period.

### FRAMEWORK

According to the efficient market hypothesis, equity markets fully reflect all available information. The efficient market hypothesis evolved from Samuelson (1965) and became more functional with the work of Roberts (1967) and Fama (1970.) After Malkiel's work (1973) the efficient market hypothesis gained widespread acceptance. The idea evolved that all available information is correctly embedded in today's equity prices so that all future price changes will reflect news in the future and be independent of today's price changes.

But the acceptance of the efficient market hypothesis diminished over time after the 1987 crash and the huge equity bubble that developed in the late 1990s and subsequent bust. Malkiel (2003) discusses some critics of the efficient market hypothesis who believe that equity prices may be predictable based on fundamentals and past price patterns.

Efficiency as defined by Malkiel (2003) means financial markets are efficient when "... markets do not allow investors to earn above-average returns without accepting above-average risks." Commodity markets, in general, discount new information very rapidly. Financial markets are no different. But at the same time investor psychology and bandwagon effects obviously influence price behavior. Many such episodes can be cited. The basic argument is that, over a sufficiently long time, the efficient market hypothesis trumps other factors influencing pricing and, in the end, investors do not earn above-average risk adjusted returns. The hypothesis becomes less believable as the time required to correct what Alan Greenspan (1996) once called "irrational exuberance" becomes longer. At some point, the time required is so long as to make the efficient market hypothesis practically unusable.

Other factors that the efficient market hypothesis supposedly is able to upstage include factors such as sentiment and the age of professional managers. Work by Greenwood and Nagel (2006) suggested that the age of professional money managers may have contributed to the formation of asset price bubbles. They suggested that younger managers exhibited trend-chasing behavior in the late 1990s by betting on technology stocks which contributed to that bubble. Baker and Wurgler (2006) suggest investor sentiment "... is a belief about future cash flows and investment risks that is not justified by the facts at hand," and argue it likely contributed to the huge bubble in technology stocks during the late 1990s. Their implication seems to be that investor behavior needs to be one of the factors considered in the standard finance model of unemotional investors, implying a modified efficient market hypothesis.

## **ASSESSMENT**

The following are four cases in which we can question the validity of the efficient market hypothesis. Equity bubbles typically develop in response to a spate of good news, perhaps new technology and very positive market sentiment resulting in rapid appreciation of asset prices. That is followed by a correction period in which equity prices regress to their fundamental values. As that regression occurs, market sentiment may become very negative which could lead to unjustified asset depreciation. The S&P 500 price index excluding dividends is analyzed in real terms -- CPI adjusted -- to assess the efficiency of the market through these various episodes.

### **CASE I**

Work on the efficient market hypothesis didn't evolve until long after the infamous 1929 stock market crash. However there is extensive research on the crash as well as the Great Depression. See for example Galbraith (1955). The work of Friedman and Schwartz (1963) helped stimulate much of that research. It is instructive to review that period to determine if the efficient market hypothesis might have explained the sharp movements in equity prices.

The U.S. economy grew rapidly during the 1920s. Income tax rate reductions likely contributed to growth and economic optimism, as tax rates fell from a top rate of 73 percent in 1921 to 24 percent in 1929. Technological advances during that period were also instrumental in generating positive market sentiment suggesting what may have led to investors placing a high value on equities during the latter part of the 1920s.

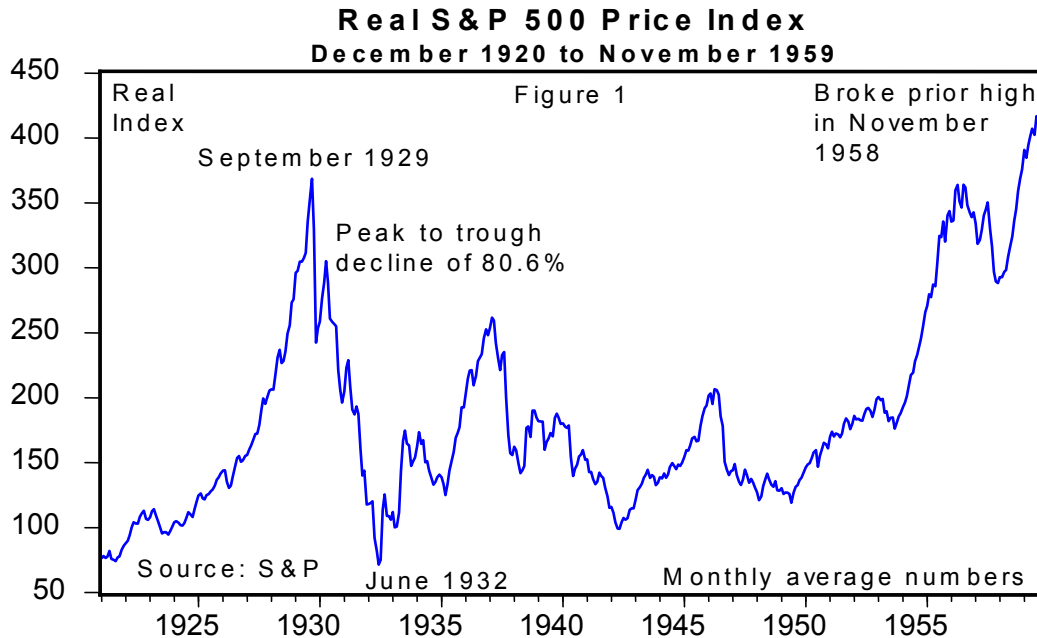
Work by Friedman and Schwartz (1963) on mistakes made by the Federal Reserve during the late 1920s and early 1930s was summarized by Bernanke (2004). Those mistakes included the tightening of monetary policy starting in the spring of 1928 and continuing until the October 1929 crash. That tightening was deemed not to have been necessary. Information on increasing interest rates and slowing money growth could have been interpreted by investors as adversely impacting equity prices. The efficient market hypothesis would imply a downward correction in equity prices due to those central bank policy moves which might explain the initial drop in stock prices. Although it must have taken time to establish that a definite change had occurred in policy, it could be argued that the market took a longer time, at least most of 1929, to discount that information into stock prices than is consistent with the hypothesis.

Equity prices started to recover in 1930 but in September and October 1931 the Federal Reserve made another policy mistake according to Friedman and Schwartz (1963) by increasing interest rates to support the dollar. That central bank decision again helped send equity prices lower. The above monetary mistakes were perhaps large enough in themselves for investors to discount equity prices by a substantial percentage, at least initially. Sentiment and bandwagon effects were likely additive to the equity decline in that time period.

However the addition of adverse macro policy effects probably accounted for a substantial portion of that equity price decline and secondary damage to the real economy. Tariff increases became part of the Republican platform during the 1928 presidential election. During the week of October 21, 1929 the tariff bill written by Senator Smoot was being discussed on the Senate floor, Cosgrove (1996). On October 24, Black Thursday, the equity market declined sharply, likely reflecting the tariff issue. But that warning went unheeded. October 29 was a day of devastation as the increasing likelihood of tariffs finally caused investors to sharply reduce the market value of equities, for large tariffs were expected to have a very detrimental effect on the economy and corporate profits. Investors factored that new information on tariffs into equity prices which pushed equity prices lower. The Smoot-Hawley Tariff Act was signed in June 1930. Other countries responded by implementing tariffs which plunged the global economy into depression.

This adverse information, which had started accumulating in 1928, was not fully discounted into stock prices until the middle of 1932, fully two years after the last of the policy moves was taken. This length of time seems to be excessive and somewhat negates the usefulness of the efficient market hypothesis.

In real terms the S&P 500 price index didn't regain its prior high until November 1958 – 29 years later, Figure 1. Deflation in the 1930s was more than offset by higher inflation rates during the 1940s so that inflation was a positive 1.4%, on average, over the entire period.



### CASE I MISPRICING

The value that investors placed on equities during the late 1920s suggests a case of mispricing for two reasons: 1) The post-1929 equity decline erased the entire S&P 500 price gain that occurred from December 1920 to September 1929 – approximately nine years of gains, and 2) the length of time required to regain the prior high was approximately 29 years – roughly three times as long as the 1920s up-cycle. So it took 29 years for an investor holding the S&P 500 price index to regain his purchasing power. Prices outran the fundamentals for years before an over-correction that went even longer. If there had not been an over-correction, still some correction was clearly due as prices had run ahead of fundamentals in the latter 1920s.

There were both macro policy and monetary policy mistakes of sufficient magnitude to explain much of the equity price decline. However the proposed tariffs were part of the Republican platform in the 1928 presidential election. That was information which was not incorporated into equity prices until September 1929. Likewise monetary policy tightening occurred in 1928. So information on both adverse monetary and macro policy effects occurred in 1928. Investors chose to ignore that new information and continued to bid equity prices higher as positive market sentiment overrode fundamental factors.

Adverse macro events didn't appear to be fully incorporated into the equity valuations until the 1931-32 period – up to four years after those adverse macro events were underway. A rather lengthy period of mispricing existed calling into question the validity of EMH.

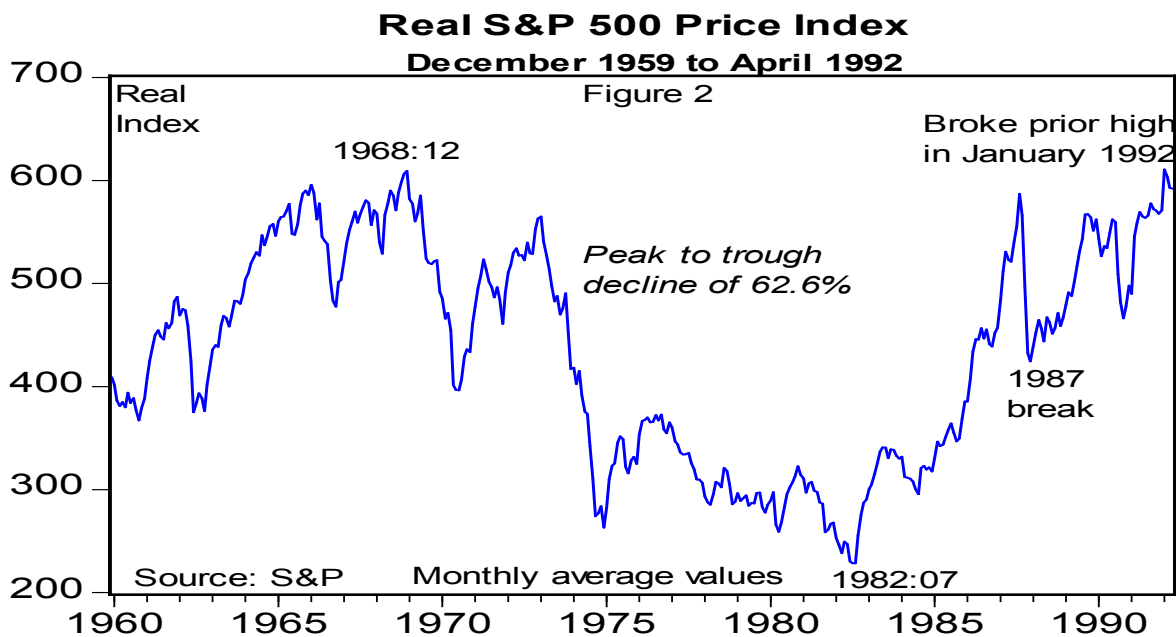
### CASE II

Work on EMH was becoming operational during correction phase of the Case II equity cycle with the publication of the book by Malkiel (1973). The run-up in equity prices during the 1960s was fueled in part by robust economic growth due to the Kennedy tax cuts. President Kennedy began promoting tax rate reductions in mid-1962. The Committee for Economic Development generated additional support for Kennedy's rate reductions with publication of their report entitled "Reducing Tax Rates for Production and Growth (1962).

Following the Kennedy-Johnson staged tax rate reductions starting in 1964, two major macro policy events occurred after the peak in equity prices in the late 1960s. One was the August 1971 New Economic Policy which included wage-price controls and the jettisoning of the quasi-gold standard. The other was the Arab OPEC oil embargo in October 1973 which lasted until March 1974, resulting in a sharp increase in the crude oil price. This was a severe adverse supply-side shock to the global economy – a dramatic change in the external environment. The Federal Reserve acted to compound the real side effect by monetizing the oil price increases, leading to sharply higher rates of expected inflation.

Many argue that the equity market is a discounting mechanism. In real terms, the S&P 500 price index peaked in late 1968 – five years before the oil embargo and three years before wage-price controls. However a recession started in December 1969 so the application of the efficient market hypothesis could perhaps apply to the S&P 500 peaking in late 1968. Investors had no foreknowledge of an oil embargo in 1968, but may have anticipated the recession plus the increase in the inflation premium in bond yields during the second part of the 1960s. This could have led to the equity market peak in 1968.

It is plausible that the efficient market hypothesis was at work in lowering equity prices, and that rational investors sold equities in advance of the recession and expected worsening inflation. Once the oil embargo occurred, which was likely unanticipated, a sharp reduction in equity valuations was implied since the sharp oil price increase behaved in a fashion similar to that of a large tax rate increase. It was a large and sudden negative shock to the economy that required adjustments to the discounted value of cash flow expectations by investors. It could be argued that it was an orderly decline. At the same time it is quite possible that during the 60 percent equity market price decline, that negative market sentiment and bandwagon effects played a meaningful role. But in time it became clear that U.S. monetary and regulatory policies were less than optimal, which could have added to the decline. Perhaps it could be argued that the decline in equity valuations due to repricing decisions of rational investors wasn't excessive in relation to the series of adverse events and policy decisions occurring during that time.



### CASE II MISPRICING

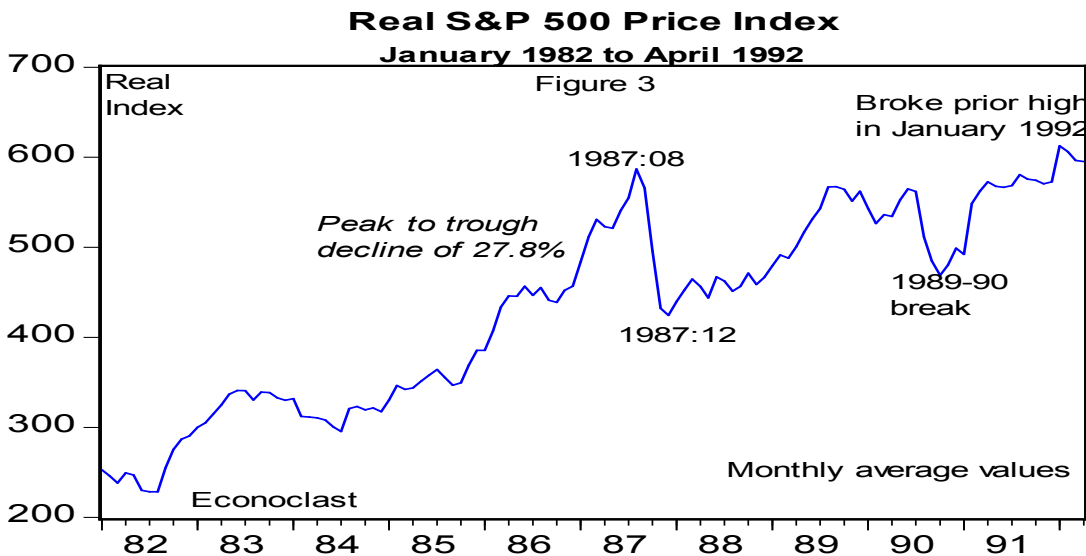
The value that investors placed on equities in the immediate post-August 1971 New Economic Policy period which included wage-price controls and the jettisoning of the quasi-gold standard, however, may have been excessive. This was the time period from a cyclical trough in July 1954 to a cyclical high in January 1973 – part of the era of the so-called Nifty Fifty stocks favored by institutional investors. This advance may have implied mispricing because the market advanced in real terms after their implementation, even though the adverse effects of wage-price controls on the economy was well understood at the time.

The length of time required to regain the prior high of December 1968 was approximately 23 years. The trough of the cycle took the equity market level down to July 1954 – a 14-year retracement. It took 23 years for investors holding the S&P 500 price index to regain their purchasing power. At the same time investors couldn't have anticipated the oil price shock or the high and rising inflation rates post-embargo due in large part to inept monetary policy.

### CASE III

This case – the October 1987 meltdown -- was a correction within the December 1968 to January 1992 equity cycle as the August 1987 pre-crash high was broken in January 1992 at the same time as the December 1968 high. The crash of October 1987 is described by Malkiel (2003) as an event that behaviorists could only explain by resort to psychological considerations. However changing fundamentals such as higher bond yields, a major tightening of monetary policy as measured by a slowdown in growth of both the monetary base and M1, talk of a possible merger tax, plus concern about a further weakening of the dollar could have, cumulatively, led to a revaluation of equities.

At the same time once the revaluation was underway on October 19 it seems probable that adverse market sentiment and bandwagon effects kicked in to exacerbate a correction that, under normal conditions, may have lasted several months or a year. The result was that much of the correction took place in one day. There is certainly merit to that argument that the efficient market hypothesis did hold as fundamentals suggested equity valuations could be lower. But the manner of the revaluation suggests there may have been more than the efficient market hypothesis at work.



### CASE III MISPRICING

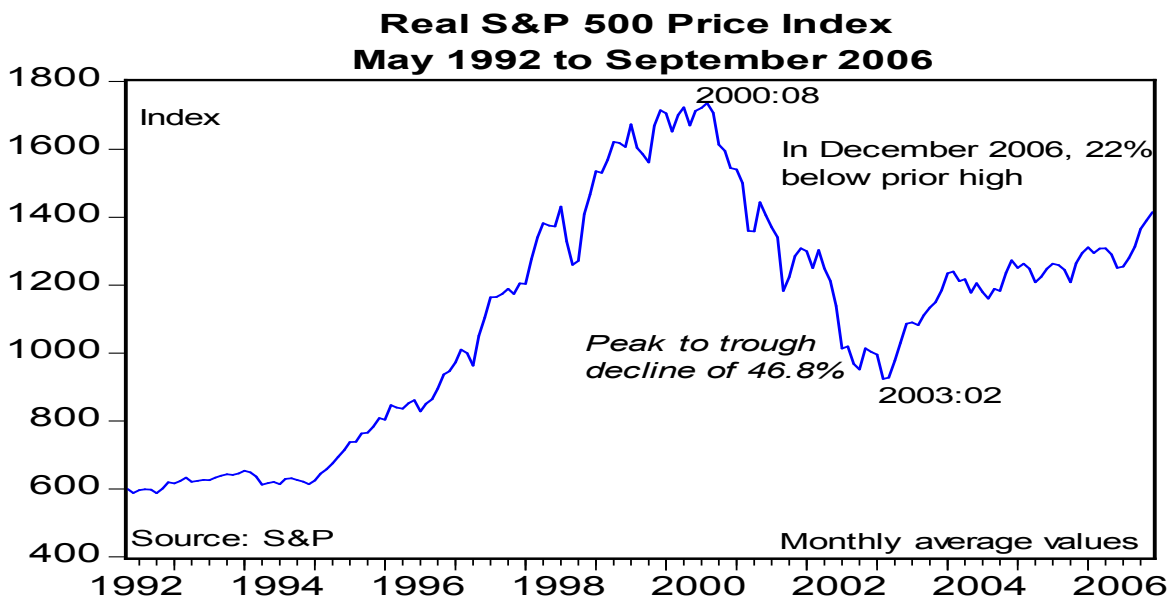
EMH analysts argue that the changing fundamentals could have accounted for the majority of the October 1987 meltdown. But those adverse fundamentals such as a major tightening of monetary policy and higher bond yields had been ongoing. It appears the market got ahead of its fundamentals and fear took over once the correction got underway which pushed the equity market back to its mean or intrinsic value.

The meltdown retraced the real S&P price index back to February 1986. Approximately 1.5 years of equity gains were wiped out in one day. So in hindsight it appears to have been a mispricing issue as the change in fundamentals had been there prior to the crash.

### CASE IV

The late 1990s equity market bubble is another example that many refer to as being irrational and is cited as evidence why the efficient market hypothesis could not be supported. Malkiel (2003) argues that “Even if all market participants rationally price common stocks as the present value of all future cash flows expected, it is still possible for excesses to develop.” It is clear in hindsight that large excesses did develop in the late 1990s. Once investors realized the bubble existed, one could suggest that the efficient market hypothesis won out. But it is clear that massive excesses or bubbles develop which perhaps can better be explained by psychological manias and/or band wagon effects than by the efficient market hypothesis.

One possibility for the excesses is that mutual fund managers in the late 1990s placed excessive bets on technology stocks and that these younger managers exhibited trend-chasing characteristics, according to Greenwood and Nagel (2006.) That behavior is consistent with research conducted in a laboratory setting by Smith, Suchanek and Williams (1988), suggesting that bubbles and crashes are less likely to occur when participants had prior experience with chaotic market conditions. Baker and Wurgler suggest that waves of market sentiment do have important effects on individual securities and the market as a whole. Certainty in the late 1990s this appeared to have been the case.



**CASE IV MISPRICING**

This bubble appears to be a case of massive mispricing by investors – the nearly 47% decline in the real S&P 500 index is a measure of the degree of mispricing by investors. The retracement took the S&P 500 real price index back to latter 1996 levels so that over three full years of equity gains were wiped out. And the real S&P 500 index still remained approximately 20% below its prior high as of December 2006.

The case of massive mispricing can be illustrated by comparing this cycle to Cases I and II – the 1929 crash and post-1968 collapse. In both of those earlier cases, the economic fundamentals turned extremely adverse and the present value of cash flows was dramatically reduced by the changed fundamentals implying a large repricing of equities. In contrast, economic fundamentals in both the U.S. and global economy remained positive in Case IV. In turn the present value of cash flows would not be impacted by changing economic fundamentals such as with the Case I experience of the Great Depression and wage-price controls and high inflation rates of Case II.

Had the August 2000 real S&P 500 index peak been followed by a dramatic worsening of fundamentals the EMH may have had validity. But fundamentals remained positive other than a mild 2001 recession. So the excesses of the late 1990s likely reflected a combination of factors ranging from extremely favorable market sentiment, bandwagon effects and age of professional money managers.

**LESSONS LEARNED**

The characteristics of the three major equity cycles over the past 75 plus years are summarized in the table below. There were a number of smaller cycles within these larger cycles such as the 1987 break discussed in Case III. But the focus of this paper is on the major cycles, declines, retracement and length of time required for the real S&P 500 price index to return to its prior high. A complete cycle is the total length of time from the pre-crash high to the point that the prior inflation-adjusted high is reached so it includes the period of decline after the peak.

<b>Major Equity Cycles</b>						
<i>(As Measured by the S&amp;P 500 Real Price Index)</i>						
<u>Peak Year</u>	<u>Peak Month</u>	<u>% Decline</u>	<u>Trough</u>	<u>Retracement*</u>	<u>Prior High**</u>	<u>Years to High***</u>
1929	September	80.6	Jun.1932	Dec. 1920	Nov. 1958	29
1968	December	62.6	Jul. 1982	Jul. 1954	Jan. 1992	23
2000	August	46.8	Feb. 2003	Oct. 1996	??	??

Source: Cosgrove & S&P

\* Month and year level that equity prices retraced back to

\*\* Month and year level before the prior high was broken

\*\*\* Years required to attain that prior high

The percentage peak-to-trough decline has been diminishing since the Great Crash, reflecting a combination of better information and lower level of volatility in the U.S. It took 29 years to breach the September 1929 peak, and 23 years to breach the December 1968 peak. It may only take one decade or less or to regain the August 2000 peak. But the two earlier cycles encountered sizable corrections before

reaching the prior high. The same event may yet occur with the current cycle – a sharp correction due to some unforeseen event which might stretch out the time it takes to regain the prior high.

The degree of mispricing was probably most pronounced in the bubble leading up to the August 2000 high. Reason – the economic environment turned extremely unfriendly toward equities in the periods following both the 1929 peak and 1968 peak. But adverse information on fundamentals in those earlier cases, which had accumulated, was not fully discounted into stock prices until after the adverse policy moves were taken which implied a mispricing issue.

In comparison, economic parameters were positive before the August 2000 peak and remained basically positive through 2006, except for a brief 2001 recession. There have been major geopolitical issues such as terrorism, wars, and a higher price of energy, but global economic fundamentals such as low inflation rates, low bond yields, and the trend toward open markets has continued. When economic fundamentals remain positive it appears that, as expected, the equity market has a smaller sell-off from the bubble peak than when fundamentals turn negative. Likewise the time to regain the prior high is likely to be much less.

## REFERENCES

- Baker, Malcolm and Jeffery Wurgler (2006). “Investor Sentiment in the Stock Market.” December 19. Prepared for the *Journal of Economic Perspectives*.  
[http://www.people.hbs.edu/mbaker/cv/papers/Sentiment\\_Draft\\_19.pdf](http://www.people.hbs.edu/mbaker/cv/papers/Sentiment_Draft_19.pdf)
- Bernanke, Ben S. (2002). “Remarks by Governor Ben S. Bernanke.” *The Federal Reserve Board*, November 8.
- Bernanke, Ben S. (2003). “Remarks by Governor Ben S. Bernanke.” *The Federal Reserve Board*, May 31.
- Bernanke, Ben S. (2004). “Remarks by Governor Ben S. Bernanke.” *The Federal Reserve Board*, March 2.
- Cosgrove, Michael H. (1996). *The Cost of Winning*. New Brunswick: Transaction Publishers.
- Cosgrove, Michael (2006). “Equity Cycles and Mispricing.” *The Econoclast*, 28:11.
- Cosgrove, Michael and Daniel Marsh (2005). “Japan Since 1990: A Case of Monetary Failure.” *Journal of International Finance and Economics*, I, 99-106.
- Fama, E. (1970). “Efficient Capital Markets: A Review of Theory and Empirical Work.” *Journal of Finance* 25, 383-414.
- Friedman, Milton and Anna J. Schwartz (1963). *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press.
- Galbraith, John Kenneth (1955). *The Great Crash*. New York: Houghton Mifflin.
- Greenspan, Alan (1996). “The Challenge of Central Banking in a Democratic Society.” 1996 Francis Boyer Lecture, *The American Enterprise Institute for Public Policy Research*, Washington, D.C.

Greenwood, Robin and Stefan Nagel (2006). "Inexperienced Investors and Bubbles." September 5. <http://faculty-gsb.stanford.edu/nagel/pdfs/Mfage.pdf>.

Malkiel, Burton G. (1973). *A Random Walk Down Wall Street*. New York: W.W. Norton & Co.

Malkiel, Burton G. (2003). "The Efficient Market Hypothesis and Its Critics." *Journal of Economic Perspectives*, Winter, Volume17, 59-82.

Samuelson, Paul (1965). "Proof that Properly Anticipated Prices Fluctuate Randomly." *Industrial Management Review*, Spring, 6, 41-49.

Shiller, Robert (2000). *Irrational Exuberance*. Princeton University Press.

Smith, Vernon, Gerry Suchanek, and Arlington Williams (1988). "Bubbles, Crashes and Endogenous Expectations in Experimental Spot Markets." *Econometrica* 56, 1119-1151.

The Committee for Economic Development (1962). *Reducing Tax Rates for Production and Growth*, New York.