



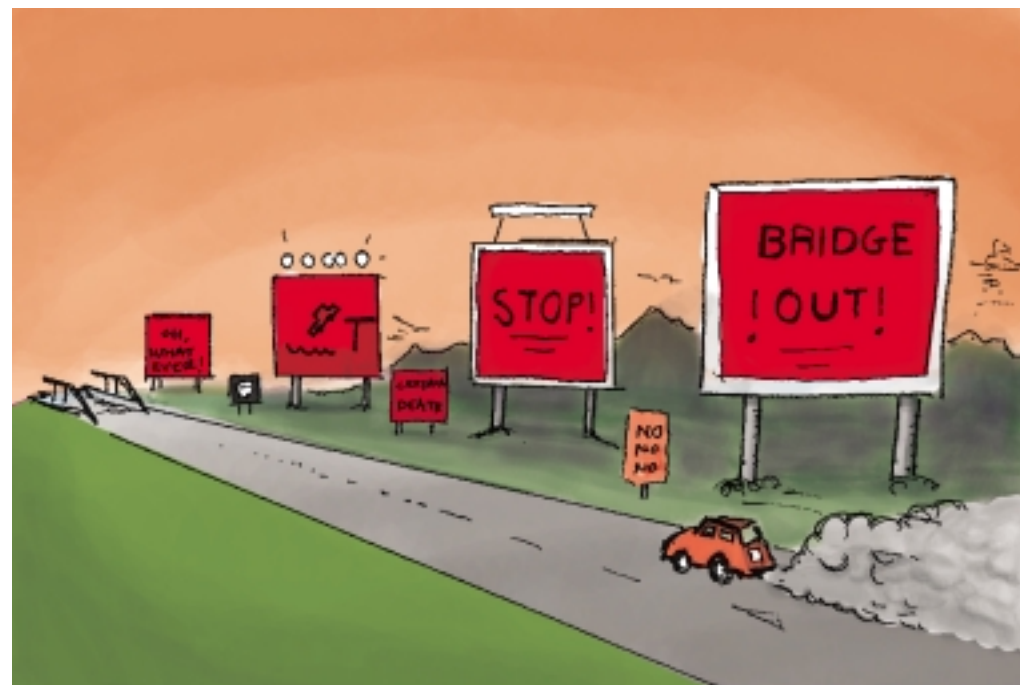
Bill Ziemba

# What Signals Worked and What Did Not, 1980–2009

In this issue and next we review various prediction signals and how they performed for various asset classes, with the main focus being on equity markets

In many, but not all, cases, the signals such as the bond-stock earnings yield differential, my T-measure of relative put and call options prices, Buffett's stock market to GDP measure, the January first five days and all of January indicator, sell in May and go away, and the VIX volatility index were very useful and accurate in predicting subsequent market declines and rises. Also, some short-term anomaly indicators such as options expiry, turn-of-the-month and year, holidays, and so on have had predictive value.

The real estate (subprime and other), credit, confidence, and economy-wide collapse of 2007–2009, with the vast number of toxic derivatives, has led to a very complex market to do well in. There is a bond bubble in supposedly "safe" government bonds, with extraordinarily low interest rates over long periods. At the same time, equities have fallen dramatically worldwide, with trillions lost around the globe. Many hedge

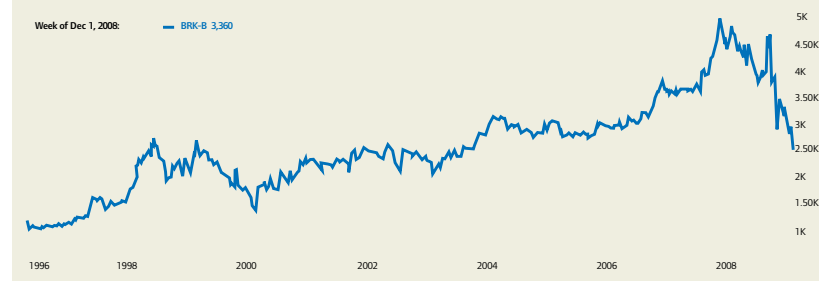


Honey, I'm not turning back to that undertakers just to ask for directions ...

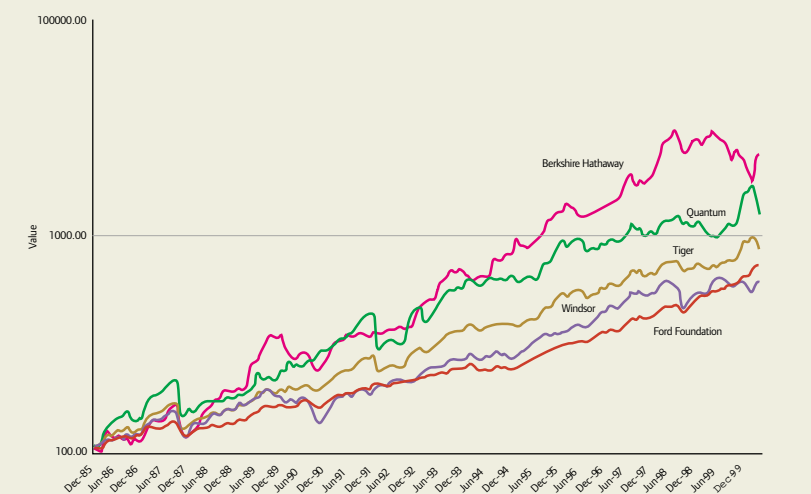
funds, pensions, endowments, and large trading groups have suffered huge losses.

Governments around the world have provided bailout funds, have bought toxic assets, and have become de facto large hedge funds with the ability to print money. But they have done a very poor job, with their funds allocated with little or no safeguards to prevent inappropriate use, and it seems not to have been targeted well towards the real problems, like the millions in the USA with mortgages well above their house value. Rather, it seems to be a bailout of Wall Street – and even that has been of dubious value. A major problem is that the government takes the losses and Wall Street takes the gains. But if you pour enough water, even if it largely misses the fire, the fire will eventually go out. The Fed and US government balance sheets and promises have risen from \$800 billion to \$10 trillion. The real question is whether the massive deficits and debt can increase productive capacity and productivity; if not, they will eventually lead to inflation and a weaker US dollar.

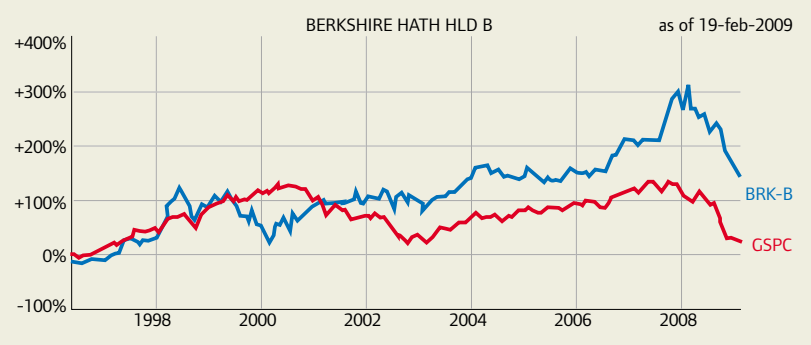
Figure 1: Historic high Berkshire Hathaway returns, 1985–2009



**Figure 2: Growth of assets, various high yielding funds, 1985–2000**



**Figure 3: Berkshire Hathaway versus the S&P 500, 1997–2009**



During President Obama's term, the total US debt is projected to be increased by more than all 43 previous US presidents combined, including the substantial debt from George W. Bush's administration from the two wars, where instead of taxes being raised to pay for them, they were actually lowered on the wealthy. The current increases will be the result of dealing with economic woes. My travels in this part of the world (Iran, Afghanistan) advised me long ago to just leave them alone. In total, that would be much less costly in money, lives, and stress. Of course, some dissidents need to be dealt with but that could be done in a much less costly way.

Is there a danger that the US or UK could go under, in the same way as Iceland? The free fall of the British pound is a big danger signal here.

Recessions from financial crises are known to last about twice as long as other recessions, so the GDP might fall up to 5 percent, especially in the UK. So we are left with a synopsis of what the future might bring, and possible future scenarios.

There are many interesting questions to consider, such as:

- Are the successful investment models, like the Yale endowment of

Swenson, Berkshire Hathaway, and long-term index investing of CAPM-based finance, now obsolete or will the past reappear as in previous downturns?

- Are Siegel's investing for the long run and those ideas tilted by seasonal and fundamental anomalies and factor models obsolete now?
- Are the great investors still great?
- Where are the monies left actually being invested and where should they be?
- How should asset-liability models be carried out?
- Can there be a Japanese 1990s-style lost generation?
- When will the US housing market stabilize and recover, and will this restore confidence in the equity markets and economy to spur buying to push the GDP higher?

## We start with something clever

How to turn a supposedly bad trade into a winner, assuming:

1. You have a long horizon; and
2. You have enough capital to weather storms – that is, this trade is not a large percentage of your total capital and you have a large amount of liquid assets.

Historically, Berkshire Hathaway, the fund run by Warren Buffett, has had very high mean returns, but not in 2007–2009 (see Figure 1). From 1977–2000, Berkshire's geometric mean return was 32 percent.

The wealth levels from December 1985 to April 2000 for the Windsor Fund of George Neff, the Ford Foundation, the Tiger Fund of Julian Robertson, the Quantum Fund of George Soros, and Berkshire Hathaway, as well as the S&P 500 total return index, are compared in Figure 2.

Berkshire Hathaway's returns have been very poor in 2007–2009, but it has still beaten the S&P 500 (see Figure 3). The S&P 500 closed at a bottom of 676 on March 9, 2009 and has now recovered to the 830 area as I write this in early April 2009. Berkshire B shares have recovered to the 3,000 level, still well below their 5,000 peak in 2007.

## Shorting S&P 500 puts in a declining market

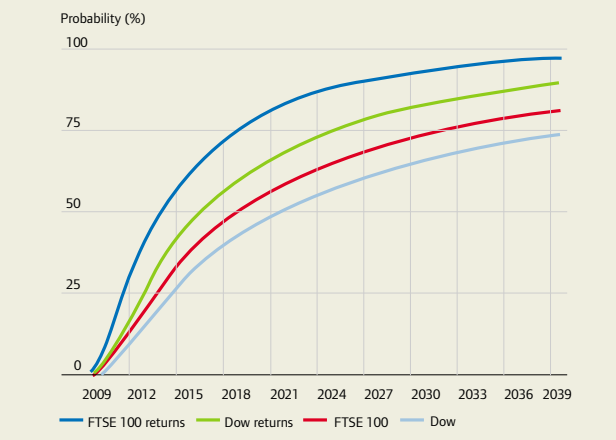
Warren Buffett, when the S&P 500, now about 830, was much higher, sold 15-year puts on the S&P 500 at the money with strikes at various levels but well over 1,000. He collected about \$4.5 billion from insurers who wanted to guarantee for certain clients no losses over a long horizon. These puts have a *value* now of over \$10 billion but they are not tradeable.

Their fear is justified because the S&P 500 had had four long periods with no gains, except for dividends, and only three periods with gains since 1900. We will return to this question below.

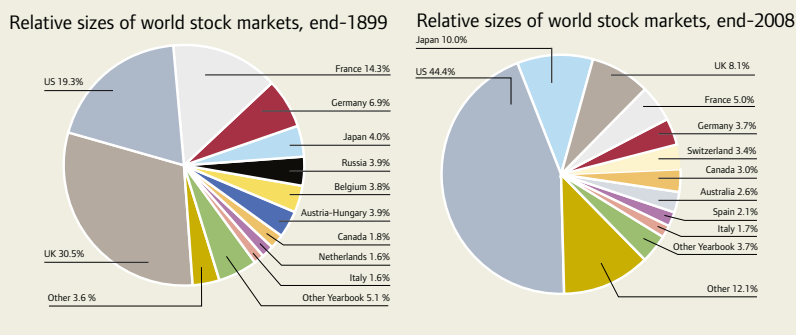
How likely are these puts to expire worthless with the S&P going back to the 2007 highs?

Figure 4 shows some calculations that estimate this. Recall that the 2000 high in the 1,500s was retouched in 2007 and in both cases, 2000–2003 and 2007–2009, the S&P 500 halved. So, these curves are suggestive but not definitive of what might happen. They are based on past data, starting from a drop in prices. A major difference in the 2007–2009 decline

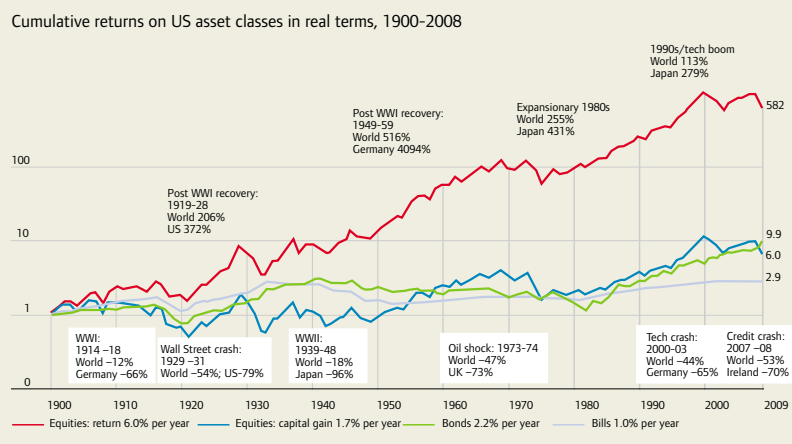
**Figure 4: Cumulative probability of regaining index highs (as of 23 January, 2009).**  
**Source: Dimson, Marsh, Staunton, 2009**



**Figure 5: Changing relative size of stock market around the world.**  
**Source: Dimson, Marsh, Staunton, 2009**



**Figure 6: Cumulative real returns, USA.**  
**Source: Dimson, Marsh, Staunton, 2009**



versus the 2000–2003 decline is that in the current drop, virtually all stocks have fallen in price, whereas in the earlier decline, very few stocks fell but they were the very large cap and telecommunications and technology, which comprise a large percentage of the index value. Indeed, an equally weighted S&P 500 index would not have fallen much. For details on 2000–2003, see Ziemba (2003). Hence, a return to the old highs in 2007 may be difficult in a similarly short time.

But Berkshire Hathaway has the use of the \$4.5 billion, so why not lend it out at a high coupon rate? They did to GE and Goldman Sachs at 10 percent in preferred stock with some free call options at much higher strikes than the current prices thrown in as part of the deal. Since

$$\$4.5 \text{ billion} * (1.10)^{15} = \$18.8 \text{ billion}$$

assuming that the premiums can be reinvested at the same rate, which is reasonable, since other deals have even higher coupon rates.

So, with his deep pockets, Berkshire Hathaway is likely to come out of this with a profit and has the very real possibility that the puts will expire worthless.

### Equities: Relative stock market sizes

Figure 5 shows the changing relative sizes of world stock markets from 1899–2008. Japan peaked at about 44 percent of the world at the end of 1989 and has since lost about 80 percent of its value.

Figure 6 shows the cumulative real returns among US asset classes from 1899–2009; equities, bonds, and bills from 1899–2009. The real returns for equities, bonds, and bills averaged 6 percent plus 1.7 percent capital gains and dividends, 2.2 percent and 1.0 percent, respectively. Figure 7 shows the

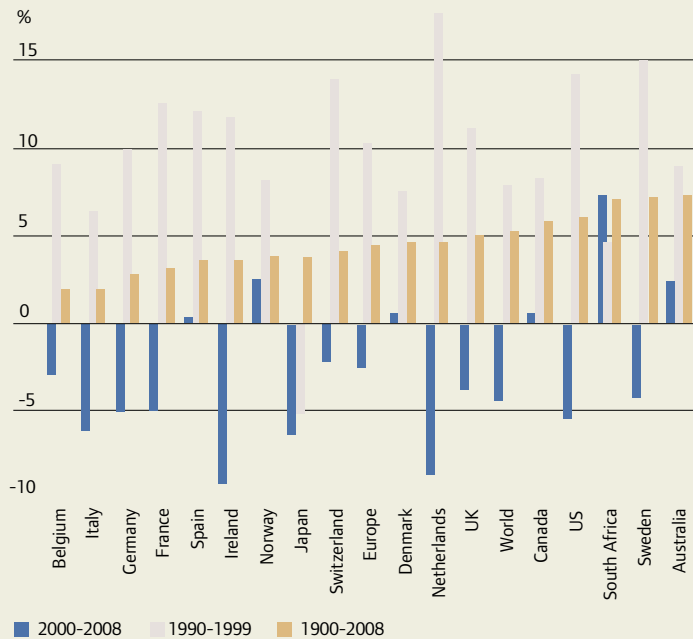
## But Berkshire Hathaway has the use of the \$4.5 billion, so why not lend it out at a high coupon rate?

real equity returns in three periods: 2000–2008, 1950–1999, and 1900–2008 for 18 countries plus the USA.

Equities have generated superior total real and nominal returns in the long run (see Table 1 for the period December 1925 to December 1998). Table 1 shows the total return of equities in the 73-year period from December 31, 1925 to December 31, 1998. Portfolio allocations based on risk aversion are shown in Table 2 (see Kallberg and Ziemba (1983) for the theory behind these calculations of the portfolios based on risk aversion). For those with very long horizons, a high amount of equities is suggested. A new key issue, then, is whether one could be in stocks when they are good and bonds or cash when stocks fall. We will discuss the bond–stock measure approach for this purpose.

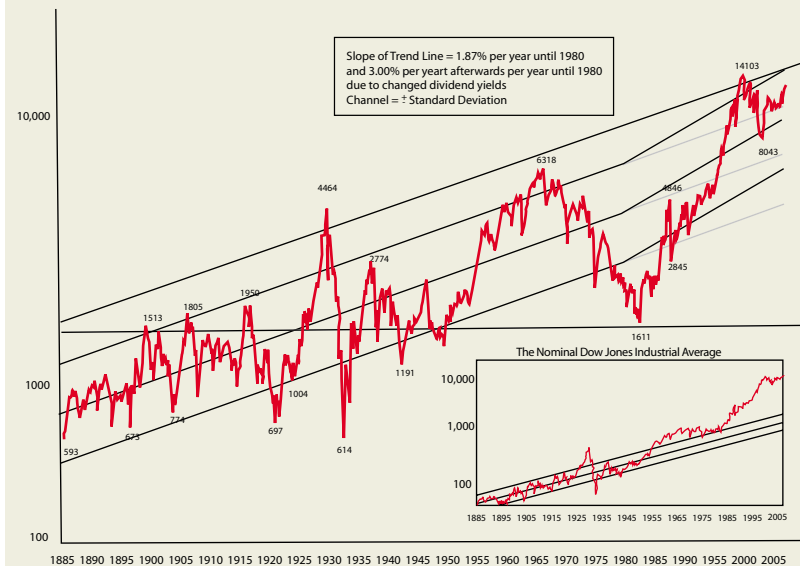
**Figure 7: Real equity returns. Source: Dimson, Marsh, Staunton, 2009**

Real equity returns around the world in recent periods and over the long run



**Figure 8: The trend is up but it is quite bumpy. Source: Siegel, 2008**

The Real Dow Jones Industrial Average, February 1885 through December 2006 (in Dollars)



**Table 1: Equities have generated superior returns in the long run, December 1925 to December 1998. Source: Ibbotson, 1999, in Swensen (2000)**

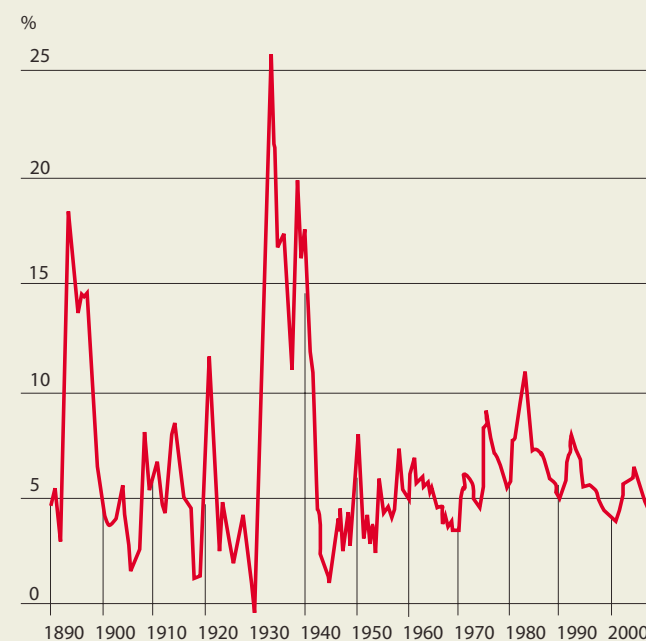
Asset Class	Multiple
Inflation	9 times
Treasury bills	15 times
Treasury bonds	44 times
Corporate bonds	61 times
Large-capitalization stocks	2,351 times
Small-capitalization stocks	5,117 times

**Table 2: Portfolio allocation: Percentage of portfolio recommended in stocks based on all historical data ( $R_A$  = risk aversion index). Source: Siegel (2008) and Ziemba (2003)**

Risk Tolerance	$R_A$	Holding Period			
		1 year	5 years	10 years	30 years
Ultraconservative	10	8.1%	23.3%	39.5%	71.4%
Conservative	6	25.0%	40.6%	60.1%	89.7%
Moderate	4	50.0%	63.1%	87.2%	114.9%
Risk taking	2	75.0%	79.8%	108.3%	136.5%

**Figure 9: US unemployment. Source: Dimson, Marsh, Staunton, 2009**

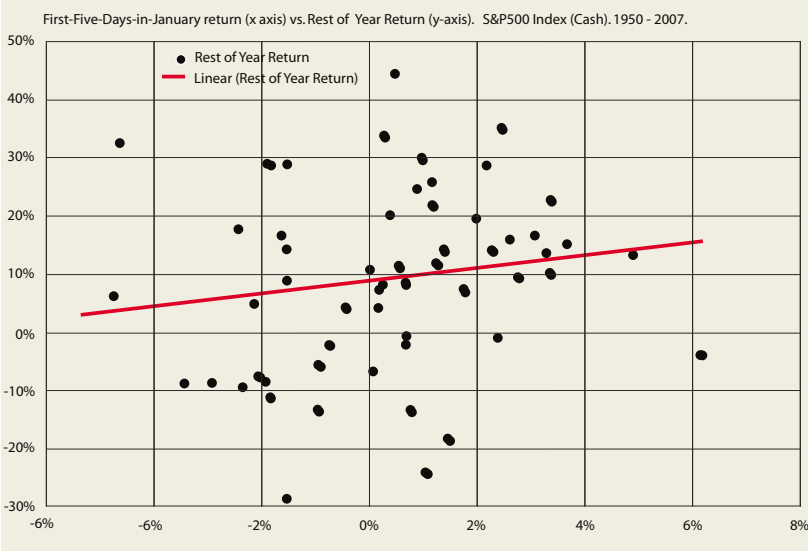
US unemployed rate from 1890 to 2008



**Table 3: The last six years of the January barometer**

	January	ROY	Year
2004	2.00%	6.86%	8.99%
2005	-2.53%	5.67%	3.00%
2006	2.54%	10.80%	13.30%
2007	1.41%	2.09%	3.53%
2008	-6.10%	-34.48%	-38.49%
2009 (to 20 February)	-8.57%	-4.00%	-12.63%

**Figure 10: First five days in January versus Rest of Year return. S&P 500 index (cash), 1950–2007**



The trend is up but it's quite bumpy (see Figure 8). There have been four periods in the US markets where equities had essentially zero gains in nominal terms: 1899–1919, 1929–1954, 1964–1981, and 1997–2009. Indeed, there were only three periods in which there were gains (without dividends): 1919–1929, 1954–1984, and 1981–1997. Siegel (2008) shows that in all 30-year periods from 1900–2006, stocks with dividends included beat bonds. In nearly all but not all 20-year periods stocks have beaten bonds; see the discussion in Siegel (2008).

US unemployment is likely to reach the 10 percent area in late 2009 or early 2010, and then improve (see Figure 9). It is already above 10 percent in California. The US unemployed plus underemployed rate in April 2009 is 15.6 percent, and Vice President Biden predicted that there will be job losses in all months of 2009. This is well below the depression levels of over 25 percent but quite high by current standards.

### Gold coins

The World Gold Council has confirmed a shortages of coins. Q4:2008 investors in Europe and North America bought 148.5 tonnes of gold coins and bars, a jump of 811 percent compared with Q4: 2007, which pushed the

global retail investment up almost 400 percent to 304.2 tonnes. Retail investors in France, for example, became net buyers of gold for the first time in a quarter of a century at the end of 2008.

Investment inflows into gold exchange traded funds (ETFs) reached 94.7 tonnes, up 18 percent, but down from the record 150 tonnes in Q3:2008.

The SPDR Gold Trust holdings reached 1,008.8 tonnes, up by 228.6 tonnes, becoming the world's 7th holder of gold bullion, having absorbed about 10 percent of global annual mine output in the past seven weeks. Meanwhile, jewelry and industrial are weak, down 5.5 percent to 538.9 tonnes and down 10.4 percent to 98.6 tonnes, respectively, and rising prices have encouraged an increase in gold scrap, up 15 percent to 320 tonnes (*Financial Times*, February 21, 2009).

### The January barometer gave a big clue in the first week of 2008

Over the years, I have written papers at Frank Russell Company with Chris Hensel (2000), and later with two MIT students, on the January barometer. This was discussed in the January 2008 issue of *Wilmott*. The main results, with more than 50 years' data for the USA (and other countries), are:

- If January is negative, then the rest of the year is negative or positive about 50 percent of the time, and if the returns are positive, they are not high but if the returns are negative, they are large negative. The S&P 500 fell 6.1 percent in January 2008, so we expected February and onwards to be rocky. There were losses in five straight months from November 2007 to March 2008. And the rest of the year was very negative, with 2008 losing 38.49 percent.
- If January is positive, then the probability that the rest of the year is positive is about 85 percent, and the positive returns are high and the negative returns are not very negative.

The January barometer has worked for the past six years (see Table 3). January 2008 was 55th worst of the 59 years from 1950–2008.

A related study is to look at the first five days at the turn of the year (-1 to +4) as shown in Figure 10.

- But it is known that if these days are negative, it is a very bad signal for future returns.
- These were very negative.
- The Stock Traders Almanac 2009 does this but using +1 to +5
- In 2008, these five days were -5.3 percent, *the worst in all 59 years from 1950–2008*.

Using the STA 2009 data, Constantine Dzhavarov helped me reach the following results.

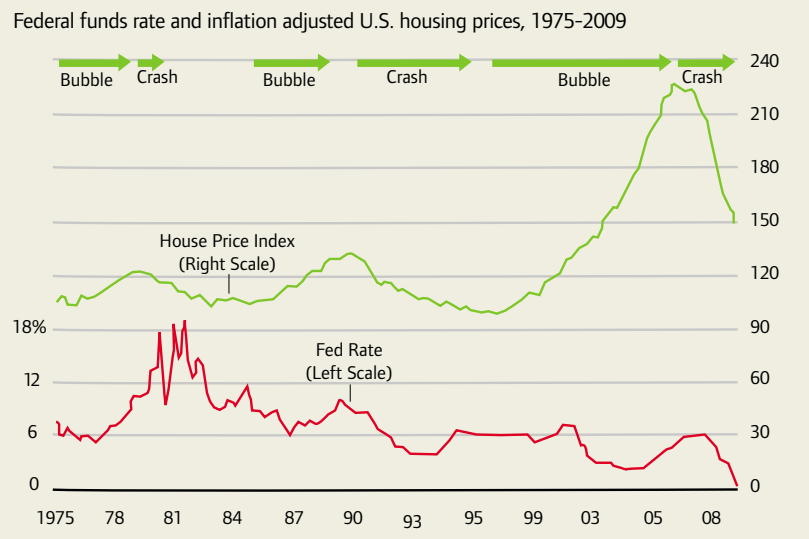
We have the following rest of the year versus the five-day returns for all years, for years with negative five-day returns, and for years with positive five-day returns [with *t*-statistics in parentheses]. Figure 10 shows the following regression of the first five days in January returns versus the rest of the year returns for all 58 years. That equation plus those for positive and negative first five days in January follow.

$$\text{Rest} = 0.0854 + 1.11 \text{ five-day, } N = 58, R^2 = 2.5\%$$

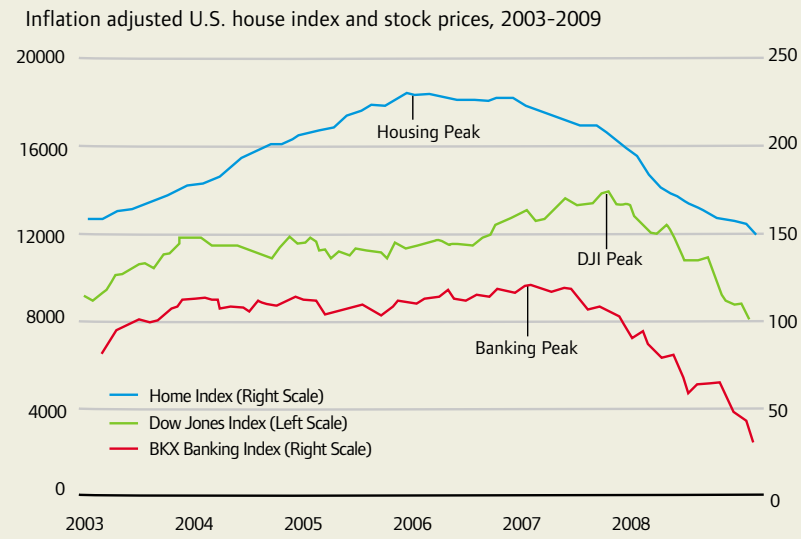
(4.13)            (1.20)



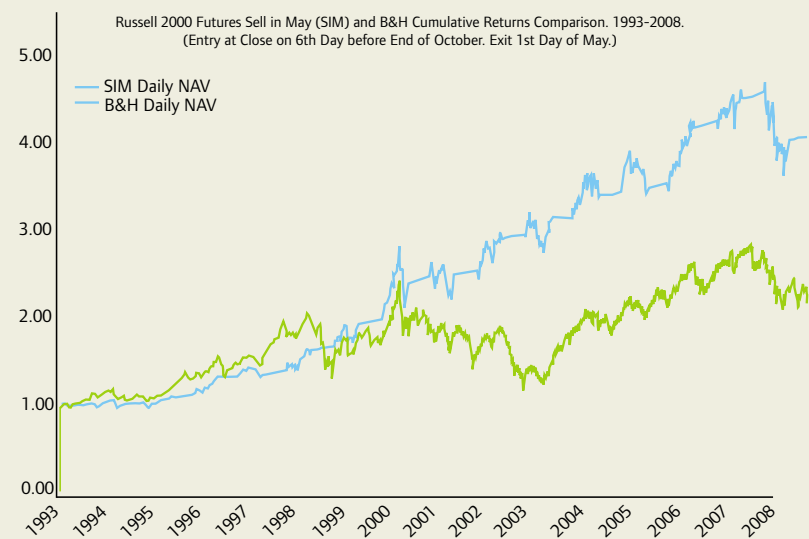
**Figure 11: The Fed and the bubble. Source: Gjerstad and Smith (2009)**



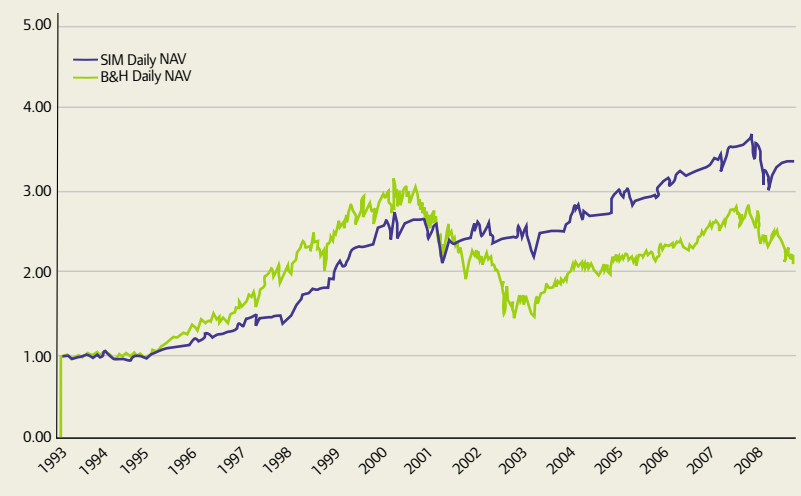
**Figure 12: The bubble bursts. Source: Gjerstad and Smith (2009)**



**Figure 13: Sell in May and go away results (Russell, 2000)**



**Figure 14: S&P 500 futures sell in May (SIM) and B&H cumulative returns comparison, 1993–2008. (Entry at close on 6th day before the end of October; exit on 1st day of May.)**



For negative five-day returns, we have

$$\text{Rest} = -0.0223 - 3.15 \text{ five-day, } N = 22, R^2 = 4.4\%$$

The mean for the negative five-day returns was  $-0.02018$ , with a standard deviation of  $0.01091$ . For positive five-day returns, we have

$$\text{Rest} = 0.116 + 0.094 \text{ five-day +, } N = 36, R^2 = 0.0\%$$

(2.99)      (0.05)

Positive five-day returns averaged  $0.01714$ , with a standard deviation of  $0.01444$ .

The separation of negative and positive five-day returns does provide a signal. Of course, with such lows, the results are suggestive but not statistically significant.

### Bubbles?

Even when traders in an asset market know the value of the asset, bubbles form dependably. Bubbles can arise when some agents buy not on funda-

mental value, but on price trend or momentum. If momentum traders have more liquidity, they can sustain a bubble longer (Gjerstad and Smith, 2009).

The bubble in housing prices, fueled by subprime loans, securitization, and low interest, pushed housing costs above the long-term average of about 30 percent of income, at a time when income disparity between rich and poor was rising and ordinary house income was, at best, stable. Clearly, this was unsustainable and the bubble would have to burst.

Housing has had two other bubbles, in 1976–1979 and 1986–1989, but during those periods, Fed policy was *leaning against the wind* and thus able to moderate them but this time it was creating the wind, with Fed fund rates reaching their lowest level since 1955, when the rate series began (Gjerstad and Smith, 2009).

The increase in housing costs was outside the CPI, so not recognized as inflation. A number of analysts have noted a similarity in the events of the past 10 years with the period leading up to the Great Depression. Most significant was the increase in mortgage debt, which went from \$9.35 billion

## A number of analysts have noted a similarity in the events of the past 10 years with the period leading up to the Great Depression

in 1920 to \$29.44 billion in 1929, representing an increase in the share of household wealth from 10.2 percent to 27.2 percent in that period.

The current situation quickly deteriorated when the cost to insure mortgage-backed securities exploded from \$50,000 plus a \$9,000 annual premium for \$10 million of insurance to over \$900,000 (plus the annual premium) (Gjerstad and Smith, 2009). And then the trouble quickly spread.

Gjerstad and Smith compare the two crashes:

1. December 1999 to September 2002: wiped out \$10 trillion in assets and caused no damage to the financial system
  2. Current crash: wiped out \$3 trillion and devastated the financial system.
- In the first, the declining assets were held by institutional and individual investors that either owned the assets outright or held only a small fraction on margin, so losses were absorbed by their owners. In the second, the declining housing assets were purchased on margin with mortgages of 90 percent and 100 percent. In some cases, borrowers who had purchased at low levels remortgaged and then saw their home value decline 50 percent or more. As the bubble burst, millions of homes became worth less than the loans on them. The original lenders did not hold onto the mortgages but they were repackaged and resold, so the huge losses were transmitted to

lending institutions, investment banks, investors in mortgage-backed securities, sellers of credit default swaps, and the insurer of last resort, the US Treasury (see Figures 11 and 12).

Gjerstad and Smith hypothesize that a financial crisis originating in consumer debt, especially that concentrated at the low end of the wealth and income distribution, can be transmitted quickly and forcefully into the financial system. Therefore, we are in the midst of the second great consumer debt crash after a massive consumption binge, fueled by easy mortgage credit (Gjerstad and Smith, 2009).

### Sell in May and go away

We end this column with a simple anomaly that has worked well: *sell in May and go away*.

It is well known that September and October are historically the worst stock market months in the USA, UK, and the rest of the world. The crash of 1929, the crash of 1987, and many other large declines have occurred in October. September actually has the lowest mean return.

2007–2008 were very weak stock market years, with large declines. For example, in September and October 2008, the S&P 500 fell 9.08 percent and 16.94 percent in these months. Figure 13 shows that the rule *sell in May and go into cash* greatly outperformed a buy and hold strategy in 1993–2008. On average, November is the best turn of the month.

Figures 13 and 14 show the wisdom of such a strategy for the Russell 2000 small cap index and the S&P 500 large cap index (both value weighted). We know that the strongest months are November to February, while September and October have historically had very poor returns, with many stock market crashes, especially in October (see, for example, Keim and Ziemba, 2000). Thanks to Constantine Dzhavarov for helping me with these calculations.

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