An Empirical Test of Efficient Markets:

A Heuristic Predictive Model

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Abstract

Efficient market theory, due to the global financial crisis, is being intensely questioned and debated at the highest levels of academic finance. It is generally agreed that market systemic risk is increasing and a "systemic risk regulator" is required to manage the overall risk in the financial system. Stock price movements are not random nor serially independent, however, it is very difficult to prove autocorrelation using statistics. A three step process strips random white noise from stock market data. A predictive model based on market expectations is developed, using calculus, and a relative maxima and minima trading heuristic empirically tests stock market efficiency from 1928-2008. Including dividend and interest payments, the S&P trading-methodology portfolio is +146 percent superior and -34 percent less risky than the benchmark S&P 500 Index buy-and-hold portfolio. Splitting the data shows that systemic risk is increasing. This research explains how the stock market can be beaten over the long term and answers investors' number one asset management question.

Key Words: efficient markets; stock market heuristic predictive model; systemic risk; global financial crisis

1. Introduction

"Is now the best time to invest in the stock market?" is the number one asset management question that all long-term investors want to know and is answered in this research. A trading heuristic predictive stock market model is developed that allows long-term investors to make significantly more money at much lower risk than the benchmark buy-and-hold S&P 500 Index portfolio, thus demonstrating that the market is not efficient and can be beaten over the long term when investors know how.

It is well known that Markowitz's (1952) modern portfolio theory, and much of financial economic research, depends on markets being efficient, nevertheless, this research develops a trading heuristic and predictive model that are creative and insightful, and produces seminal findings which are the most significant reported in the literature during the previous 57 years.

Financial economists model the stock market as being efficient using the following assumptions: 1) all investors make financial decisions using rational expectations; 2) market prices incorporate and fully reflect available information, i.e., all trades are zero net present value transactions and provide proper pricing for accurate asset allocation; 3) markets are always in balance, and when randomly occurring information reported by the media moves stock prices, markets are self equilibrating; and 4) markets cannot be beaten on a risk-adjusted basis, i.e., if investors want to earn more money than the market, represented by a benchmark S&P 500 Index buy-and-hold portfolio, they have to take on more risk.

Models map territories and are never as detailed nor comprehensive, consequently, research in the literature questions the above efficient market assumptions and reports on anomalies, i.e., 1) behavioral finance looks at whether investors have rational expectations (Kumar and Lim 2008) (Graham et al. 2009) and if investors demonstrate irrational herd behavior that create market bubbles (Blasco and Ferreruela 2008): 2) the speed with which publicly announced information reported by the media affects market prices is extensively examined (Dellavigna and Pollet 2009); 3) the randomness of stock price movements are investigated (Lo and MacKinlay 1988), the serial independence of stock prices are tested (Rosenberg and Rudd 1982) (Ashley 1986) (Summers 1986), and whether markets are in equilibrium and how information shocks result in self-equilibrating markets are studied (Eraker 2008); and 4) risk and return of an individual stock or a specialized portfolio is compared to a benchmark, i.e., the buy-and-hold S&P 500 Index, to test if the stock market can be beaten on a risk adjusted basis (Briec et al. 2007) (Siegel and Woodgate 2007) (Kan and Smith 2008) (Basak et al. 2009).

Efficient market theory, due to the global financial crisis, is being intensely questioned and debated at the highest levels of academic finance (Stein 2009) and is, at present, a very hot topic in government, for practitioners and in the media. Possibly because the ongoing financial crisis has plunged the US and world economies into the severest recession since the Great Depression, the rethinking of all financial economic theories that led us into this credit crisis should be or are now being reevaluated. For as Mark Twain says, “What gets us into trouble is not what we don’t know. It’s what we know for sure that just ain’t so.”

It is generally agreed that financial systemic risk is increasing, so much so that the Treasury Department is proposing the establishment of a "systemic risk regulator' to manage overall risk throughout the financial system, including the oversight of the derivatives market, based on each financial firm's interdependence, balance sheet leverage and participation in the credit markets. A discussion of why stock market systemic risk is increasing follows.

2. The Credit Crisis and Systemic Risk

Credit risk, usually, is between two parties, lender and borrower. However, the securitization or pooling and repackaging of financial assets into different risk classes called tranches which are then sold internationally to investors, i.e., pension funds, mutual funds, insurance companies, other banks, sovereign wealth funds and hedge funds, has systemically distributed credit risk throughout the financial system.

The securitization of structured asset-backed securities include collateralized debt obligations (CDO) which primarily are residential real-estate mortgage-backed securities, including subprime, Alt-A, option ARM and prime mortgages, and collateralized loan obligations (CLO) which are principally business loans for corporate leveraged buyouts (LBO) or commercial real-estate ventures. The growing use of securitized CDO and CLO debt, which at one time was AAA rated by Moody's and Standard & Poor's (S&P) and is selling in the secondary market for as little as 30 cents on the dollar, has increased leverage in the financial markets by doubling then tripling debt-to-net-capital ratios, reaching 40-to-1. Financial companies are working diligently to reduce debt,

nevertheless, deleveraging remains challenging due to a discernible deterioration of asset values on bank balance sheets, thus exacerbating the credit crisis and increasing market systemic risk.

The Gramm-Leach-Bliley Financial Services Modernization Act (1999) legalized commercial bank, investment bank and insurance company mergers by repealing the Glass-Steagall Act which was enacted in 1933 to isolate imprudent bank speculation which played a role in the systemic collapse of the financial system, believed to be a major cause of the Great Depression.

The Commodity Futures Modernization Act of 2000 created a link to the "shadow banking sector," consisting of money market funds, investment banks, insurance companies, private equity funds and hedge funds, by forbidding United States (US) government regulation of swap derivatives and repealing state and local laws regulating gaming bucket-shops which were instituted to correct the excesses of the credit crisis panic of 1907. Laws deregulating the US financial system appear to be increasing counterparty credit risk and market systemic risk by linking the financial system even more tightly together through the use of unregulated swap derivatives on interest rates, currencies, credit, commodities and equities.

Credit default swaps (CDS) are over-the-counter (OTC) derivative contracts not traded on any exchange which, typically, are privately customized for each counterparty particapant where the purchaser of debt makes monthly payments to a third party CDS writer who guarantees the buyer against default by the CDO and CLO debt issuers. Normally, CDS are daisy-chain hedged together through a series of companies, resulting in considerable counterparty credit risk, where institutions become directly

interconnected and any one large company failure or the bankruptcy of many small firms may severely restrict credit availability and jeopardize sovereign risk by bringing down the entire financial system, including the "shadow banking sector," through a succession of correlated defaults.

The credit crisis, as this is written, bankrupted Lehman Brothers, forced Bear Stearns and Merrill Lynch into government sponsored takeovers, has the US government owning a 79.9 percent equity stake in AIG, may force the Federal Reserve to provisionally nationalize Citigroup and Bank of America, and requires many trillions of dollars in government subsidies and debt guarantees to stabilize the banking system. Credit default swaps, ironically, were created to reduce market systemic risk, but regrettably, counterparty credit risk seems to be noticeably increasing.

The credit crisis may be the partial result of the following deficiencies in the derivatives market: 1) swaps are not government regulated; 2) swap sellers are not required to maintain monetary reserves in case of security issuer default; and 3) naked swaps may be used as side bets by speculators to gamble on corporate creditworthiness regardless of who owns the underlying securities, thereby, interfering with price discovery, distorting economic incentives and increasing the frequency of systemically-devastating events.

The passage of recent US laws deregulating the financial markets contribute to the current credit crisis and increasing market systemic risk by creating a financial system which is globally interconnected through daisy-chain hedged and unregulated OTC CDS contracts, securitized with poor quality and highly leveraged CDO and CLO debt. The appetite for counterparty credit risk throughout the financial system, i.e., how much trust

firms can place in other companies when there is no transparency, is low and, for that reason, is curbing inter-bank lending and causing activity reduction in worldwide credit markets, exacerbating market systemic risk. Extensive bank and shadow banking system leverage, unregulated derivatives, and counterparty credit risk are complicating factors that are increasing systemic risk in the financial system and adversely affecting stock market efficiency.

3. Stripping Out Random White Noise From Stock Market Data

Daily movements of individual corporation stock prices do not follow a random walk process (Lo and MacKinlay 1988) and are not serially independent (Rosenberg and Rudd 1982) (Ashley 1986). While the above research seemingly calls the efficiency of the stock market into question, the results are not significant enough to change the assumptions in the academic literature, i.e., that markets are efficient, possibly because the authors did not strip away the random white noise in the stock price data to produce the convincing results of this research.

When using statistical methods to analyze stock market price data, it is very difficult to distinguish between an indisputable rootless series and one where the systemic element is faint (Summers 1986). Individual company stock price movements are composed of systemic risk and unsystemic risk. The unsystemic risk component is the completely random portion of the stock data that if filtered out will leave only the systemic risk of the overall market which is the basis for studying market efficiency. How to accomplish removing the random white noise of unsystemic risk in the price data is presented next.

There is theoretical support and empirical evidence for believing that aggregate indexes perform more systemically than their individual components. This is the result of a diminution of random elements due to averaging, leading to the subsequent appearance of systemic elements. As much as 50 percent of a company's stock price movements are unsystemic random fluctuations associated with the internal circumstances within each company. The remaining 50 percent of the company's stock price movement represents only market systemic risk. The best way to study stock market systemic risk is to use a diversified index portfolio as a proxy for the overall market. Consequently, rather than studying individual company stock price movements which include the randomness of unsystemic risk, two well diversified S&P 500 Index portfolios are used, one for trading and other held as a control benchmark, thereby focusing only on market systemic risk which is the first step in filtering out random stock market behavior.

When investing for the long term over 1, 2, 3, 4, 5 years or more, day-to-day stock price movements are immaterial to trading success and may be thought of as just daily market chatter. Concentrating on whether a stock price or the stock market will be either up or down tomorrow is not the correct question. Day-to-day stock price action is very volatile, so to dampen out this daily chatter and give perspective to what is actually occurring over the long term in the stock market, S&P 500 Index monthly price data are employed which is the second step in filtering out random stock market behavior.

Monthly price data are important in dampening out day-to-day price movements. However, using last month's price to predict next month's price is also not conducive to long-term trend development. To further smooth out price fluctuations in order to determine systemic risk in the market, nine and two month moving average trend lines

are fit to the S&P 500 Index monthly price data for trading portfolio B. Accordingly, S&P 500 Index nine and two month moving average trend lines smooth out data volatility and give an overall view of the long-term stock market trend which is the third step in filtering out random stock market behavior.

S&P Index Services supply the S&P 500 Index open, high, low and closing monthly price data, from 1928 through 2008, with nine and two month moving average trend lines fit to these data. Using a very long duration study of 81 years assures that market data are collected during normal times as well as when the stock market is under stress. In this way, the market price data are transformed to reduce the randomness of daily individual company stock price movements to concentrate on overall stock market systemic risk.

Two identical S&P 500 Index mutual funds, both with beta values equal to one ($B = 1$), represent only market systemic risk. S&P 500 Index portfolio A is the buy-and-hold benchmark while S&P 500 Index portfolio B uses the S&P 500 Index nine and two month moving average trend lines and relative maxima and minima trading heuristic to determine when to be either invested in the stock market or out and invested in risk-free 3-month Treasury bills (T-bills), as discussed next.

4. Model Development and Description of Methods

Using the three step process to strip out the random white noise in stock prices has solved only part of the problem. It is very difficult to prove autocorrelation in stock prices using statistical methods, perhaps requiring 5,000 years of data to do so (Summers 1986). Consequently, a new innovative approach is required and utilized in this research, i.e.,

developing a predictive model using calculus and a trading heuristic, techniques well known to management scientists but perhaps less understood and not as frequently employed by financial economists.

4.1. Relative Maxima: Sell Stock

To identify a change in the long-term uptrend in the stock market, the first derivative (f') of the S&P 500 Index portfolio B nine-month moving average trend line function $f(L_9)$ is calculated immediately after the close of trading on the last trading day of each month, at time t. The S&P 500 Index nine-month moving average trend line function $f(L_9)$ is increasing and positive when its first derivative is greater than zero:

$$f'(L_9) > 0 \tag{1}$$

The transition from topping or rounding over to a long-term downtrend is identified by finding the relative maxima for the S&P 500 Index nine-month moving average trend line function $f(L_9)$, where its first derivative $f'(L_9) > 0$ changes to a negative slope:

$$f'(L_9) < 0 \tag{2}$$

Find:

$$m_9 \leq \tan(355°), \text{ at time t} \tag{3}$$

Equation (3) is valid when the S&P 500 Index nine-month moving average trend line function $f(L_9)$ slope (m_9) at time t is less than or equal to a 355 degree tangent line slope. A transition from topping or rounding over to long-term downtrend is partially confirmed and subject to the following two conditions, both of which are required for the "relative maxima: sell stock" decision to be declared.

Subject to,

First:

$$m_2 \leq \tan(353°), \text{ at time t} \tag{4}$$

Equation (4) is valid when the S&P 500 Index two-month moving average trend line function $f(L_2)$ slope (m_2) at time t is less than or equal to a 353 degree tangent line slope. A "relative maxima: sell stock" transition from topping or rounding over to long-term downtrend is partially confirmed, and:

Second:

$$X_1 \text{ and/or } X_2 \leq f(L_9), \text{ for month t} \tag{5}$$

X_1 is the opening S&P 500 Index price for month t while X_2 is the closing price for month t. When either the opening price for month t or the closing price for month t, or both the opening and closing prices for month t, are less than (below) or equal to the S&P 500 Index nine-month moving average trend line function $f(L_9)$, equation (5) is valid.

When a transition from topping or rounding over to a long-term downtrend is ultimately confirmed for the S&P 500 Index portfolio B nine and two month moving average trend lines (i.e., when equations (3), (4) and (5) at time t are all confirmed as valid), a "relative maxima: sell stock" is declared. All portfolio B shares are redeemed at the close of trading on the first trading day of the following month t + 1 and invested in risk-free 3-month T-bills.

4.2. Relative Minima: Buy Stock

To identify a change in the long-term downtrend in the stock market, the first derivative (f') of the S&P 500 Index portfolio B nine-month moving average trend line function $f(L_9)$ is calculated immediately after the close of trading on the last trading day of each month, at time t. The S&P 500 Index nine-month moving average trend line function $f(L_9)$ is decreasing and negative when its first derivative is less than zero:

$$f'(L_9) < 0 \qquad (6)$$

The transition from accumulation or bottoming to a long-term uptrend is identified by finding the relative minima for the S&P 500 Index nine-month moving average trend line function $f(L_9)$, where its first derivative $f'(L_9) < 0$ changes to a positive slope:

$$f'(L_9) > 0 \tag{7}$$

Find:

$$m_9 \geq \tan(5°), \text{ at time t} \tag{8}$$

Equation (8) is valid when the S&P 500 Index nine-month moving average trend line function $f(L_9)$ slope (m_9) at time t is greater than or equal to a 5 degree tangent line slope. A transition from accumulation or bottoming to long-term uptrend is partially confirmed and subject to the following condition which is required for the "relative minima: buy stock" decision to be declared.

Subject to,

$$\text{If (3), (4) and (5) at time t; then } f'(L_9) < 0, \text{ for months t + 1 and t + 2} \tag{9}$$

Once a transition from topping or rounding over to a long-term downtrend is confirmed as valid for month t, that declaration shall remain in force for the next two

months, t + 1 and t + 2, defining a negative slope for $f\,`(L_9)$. At stock market peaks $f\,`(L_9)$ can vacillate, consequently, a "relative minima: buy stock" should not be declared within two months of a "relative maxima: sell stock" declaration.

When a transition from accumulation or bottoming to a long-term uptrend is ultimately confirmed for the S&P 500 Index portfolio B nine and two month moving average trend lines (i.e., when equations (8) and (9) at time t are both confirmed as valid), a "relative minima: buy stock" is declared. All portfolio B funds are taken from the risk-free 3-month T-bill interest bearing account and invested in a S&P 500 Index mutual fund at the close of trading on the first trading day of the following month t + 1.

4.3. Trading Heuristic Flow Chart

This research proposes that rather than the efficient market assumption of stock prices moving randomly based on unpredictable earnings announcements by corporations in the media, that instead, the stock market is a discounting mechanism where professional traders anticipate by looking ahead and taking stock positions in expectation of future corporate earnings. Because traders are always looking ahead, most noticeably at a market top, the stock market is typically a long-term leading indicator and turns down prior to continuing poor economic conditions becoming generally evident, thereafter often taking years to turn around, the current global financial crisis being a prime example.

A flow chart of the relative maxima and minima trading heuristic methodology is found in Figure 1. Portfolio B: Trading Heuristic Flow Chart.

(Insert Figure 1 Here)

Thus, a predictive model based on market expectations is developed that answers the number one asset management question based on trading buy and sell signals, as discussed next.

5. Trading Buy and Sell Signals

Once the long-term stock market trend lines are identified, dependent upon the S&P 500 Index portfolio B "relative maxima: sell stock" and "relative minima: buy stock" declarations, there is a higher probability that overall long-term stock market momentum will continue, either upward or downward.

A long-duration empirical study of the data from 1928 through 2008 is used which is the most extensive duration study of those reviewed in the literature. Two identical S&P 500 Index no-load mutual fund portfolios are compared, differentiated solely by S&P 500 Index portfolio B nine and two month moving average trend lines and relative maxima and minima trading heuristic. Transaction costs for no-load mutual funds are zero and corporate survivorship bias is not an issue for either S&P 500 Index portfolio.

The bid-ask spread and whether closing prices can actually be attained are unimportant, because, mutual fund companies calculate net asset values at the close of trading each day which is the trading point in this study. Valid trading buy or sell signals are declared immediately after the close of trading on the last trading day of month t, one

business day prior to the actual stock trading day, i.e., at the close of trading on the first trading day of the following month t + 1, allowing ample time to make mutual fund transactions.

6. Assigning Dividends and Interest Payments

While A & B portfolios are invested in the S&P 500 Index they both receive identical dividend payments, consequently, for this study, no accounting for either portfolio's dividends accrued during these concurrent time periods in the stock market is undertaken. When portfolio B is transferred out of the stock market into an interest bearing account, the interest earned is at the risk-free 3-month T-bill rate, therefore, a determination of whether 3-month T-bill interest rates are either higher or lower than S&P 500 Index dividend yield payments is required.

Over this empirical study from Jan. 3, 1928 to Dec. 31, 2008 (a total of 972 months), S&P 500 Index dividend yields average 3.98 percent, based upon S&P 500 Index historical annual dividend data supplied by S&P Index Services. During the same period, 3-month T-bill interest rates average 3.70 percent based on data from the Federal Reserve Statistical Release. Average 3-month T-bill interest rates less than S&P 500 Index dividend yields are expected over the entire 972 month planning horizon, given the risk-free nature of T-bills. However, the timing of dividend and interest payments concern speculators.

S&P 500 Index dividend yields and 3-month T-bill interest rates fall into two distinct phases. The first phase is from 1928 through 1959, S&P 500 Index dividend yields

average 5.28 percent and 3-month T-bills average 1.02 percent. Beginning in 1960, a marked shift in corporate dividend governance lowered dividend yields and at the same time events in the economy increased 3-month T-bill interest rates. During the second phase, from 1960 through Dec. 31, 2008, S&P 500 Index dividend yields average 3.12 percent and 3-month T-bills interest rates average 5.46 percent.

Consequently, from 1928 through 1959, when portfolio B is at times out of the S&P 500 Index no-load mutual fund and invested at the risk-free 3-month T-bill interest rate, dividends accrue to the buy-and-hold S&P 500 Index portfolio A at the dividend yield to interest rate differential of 4.26 percent (5.28% - 1.02%) per year or 0.00355 per month. The number of S&P portfolio A shares are increased by dividing the dividend-interest differential earned by the S&P 500 Index share price at the time when the S&P portfolio B portfolio is reinvested.

Similarly, from 1960 through 2008, when portfolio B is periodically out of the S&P 500 Index no-load mutual fund and invested at the risk-free 3-month T-bill interest rate, interest accrues to portfolio B at the interest rate to dividend yield differential of 2.34 percent (5.46% - 3.12%) per year or 0.00195 per month. The number of portfolio B shares are increased by dividing the interest-dividend differential earned by the S&P 500 Index share price at the time when portfolio B is reinvested in the S&P 500 Index no-load mutual fund. An economic model analysis of the data is presented next using S&P 500 Index nine and two month moving average trend lines and relative maxima and minima trading heuristic.

7. Trading Heuristic: Calculations and Analysis

Portfolios A and B, when invested in the stock market, are in identical S&P 500 Index no-load mutual funds. An equal amount of money is initially invested in each portfolio, i.e., $1,000 dollars. Portfolio B may trade into the S&P 500 Index no-load mutual fund or out, earning interest in risk-free 3-month T-bills. All S&P 500 Index no-load mutual fund shares or 3-month T-bills are redeemed for cash at the conclusion of this study, on Dec. 31, 2008. All stock market trades are performed at the close of trading on the first trading day of month t + 1, as a result of the S&P 500 Index portfolio B relative maxima and minima trading heuristic.

Portfolio A is the buy and hold strategy and $1,000 dollars are invested at the close of trading on the first trading day of 1928, on January 3rd , in a S&P 500 Index no-load mutual fund at the S&P 500 Index price of $17.76 dollars per share. The 56.306 shares purchased are held until redeemed on Dec. 31, 2008 for the S&P 500 Index price of $903.25 dollars per share or a total of $50,858.39 dollars.

When portfolios A and B are invested concurrently in the S&P 500 Index, dividends are paid to both portfolios at the same rate, therefore, dividend payments are identical and are not included in these calculations. From 1928 through 1959, while portfolio B is periodically invested at the risk-free 3-month T-bill interest rate, shares are added to portfolio A because S&P 500 Index dividend yields are higher than 3-month T-bill interest rates. Portfolio A adds dividend-interest differential payments at the rate of 4.26 percent per year or 0.00355 per month. Table 1. S&P 500 Index Portfolio A: Additional Shares – 1928 through 1959, steps through the added share calculations for portfolio A.

(Insert Table 1 Here)

The additional portfolio A shares due to dividend-interest differential payments increase from 56.306 to 91.817 shares, up through the end of 1959. Each time portfolio B is traded out of the S&P 500 Index no-load mutual fund into 3-month T-bills, portfolio A receives higher dividends than portfolio B receives in interest, so a dividend-interest differential accrues on 3/1/33 by taking portfolio A's 56.306 shares times S&P 500 Index share price of $5.77, equaling $324.89 dollars, times 27 months, which represents the accumulated duration before portfolio B is transferred back into the S&P 500 Index no-load mutual fund, times 0.00355 to equal $31.14 dollars, representing the dividend-interest differential payment credited to portfolio A. The 5.397 shares added to portfolio A, shown in the last column of Table 1, is calculated by dividing the $31.14 dollars of dividend-interest differential earned by the S&P 500 Index share price of $5.77. In this way through 1959, each time portfolio B earns interest by trading out of the stock market, portfolio A is credited with the difference in higher dividends over interest payments.

Calculating the total value of portfolio A at the end of the study is as follows. The additional S&P 500 shares due to dividend-interest differential payment calculations are 35.511 shares (91.817 ending shares minus 56.306 initial shares), times the S&P 500 Index redemption price on Dec. 31, 2008 of $903.25, shown on Table 2, equaling $32,075.31 dollars. The total value of buy-and-hold S&P 500 Index portfolio A on Dec. 31, 2008 is $82,933.70 dollars ($50,858.39 + $32,075.31).

The results for portfolio B are determined by trading in and out the S&P 500 Index no-load mutual fund based on S&P 500 Index nine and two month moving average trend lines and relative maxima and minima trading heuristic, as shown in Table 2. S&P 500 Index Portfolio B: Gain from Trading - 1928 through 2008.

(Insert Table 2 Here)

The initial $1,000 dollar investment in S&P 500 Index portfolio B on 1/3/28 of 56.306 shares, at $17.76 dollars per share, is redeemed on 12/2/29 at $20.95 per share for a total of $1,179.61 dollars. From 12/2/29 to 3/1/33, portfolio B is out of the stock market and invested in risk-free 3-month T-bills. Portfolio B is reinvested in the S&P 500 Index on 3/1/33 at $5.77 dollars per share, purchasing a total of 204.438 shares. Portfolio B is redeemed on 5/1/34 for a total of $2,138.42 dollars (204.438 shares times $10.46 per share).

As a result of trading, the original $1,000 investment in the S&P 500 Index portfolio B grows to $151,484.00 dollars (108.558 shares times $1,395.42 per share), when redeemed on 2/1/08 for 3-month T-bills which earn interest until the close of this study, on Dec. 31, 2008. The interest-dividend differential payment calculations for portfolio B are included next in Table 3. S&P 500 Index Portfolio B: Additional Shares – 1960 through 2008.

(Insert Table 3 Here)

Beginning in 1960, 3-month T-bill interest rates begin to dominate S&P 500 Index dividend yields. Accordingly, the interest rate versus dividend yield differential advantage shifts to portfolio B which adds interest-dividend differential payments at the rate of 2.34 percent per year or 0.00195 per month when S&P 500 Index portfolio B is invested in 3-month T-bills.

Portfolio B total shares from trading, shown in Table 2, are transferred and listed for the appropriate date in the second column on Table 3, to begin the additional shares earned from interest-dividend differential calculations. Portfolio B redeems all S&P 500 Index shares on 3/1/60 and purchases 3-month T-bills for 11 months until re-entering the stock market on 2/1/61. The additional share calculation for the interest-dividend differential payment on 2/1/61 is 137.826 shares times the per share S&P 500 Index price of $61.90, equaling $8,531.43 dollars, times 11 months invested in T-bills times 0.00195 per month which equals $183.00 dollars earned, listed in the second to last column on Table 3. The interest-dividend differential payment of $183.00 dollars is divided by the S&P 500 Index price of $61.90, resulting in 2.956 additional shares, listed in the last column of Table 3. The additional portfolio B shares due to interest-dividend differential payments from 1960 through 2008 totals 39.032 shares, shown in the lower right-hand corner of Table 3.

Portfolio B is traded out of the S&P 500 Index no-load mutual fund into 3-month T-bills on 2/1/08 with additional shares earned due to the interest-dividend differential equaling 35.435 shares (39.032 shares minus 3.597 shares earned after 2/1/08), times $1,395.42, the S&P 500 Index share price on 2/1/08 shown on Table 2, equaling $49,446.71 dollars. Adding in portfolio B's interest-dividend differential earned over 11

months from 2/1/08 to 12/31/08, totals $3,249.33 dollars, as shown in row C-12/31/08 on Table 3. The total value of interest-dividend differential payments for portfolio B is $52,696.04 dollars ($49,446.71 + $3,249.33).

Total funds in the trading heuristic S&P 500 Index portfolio B account on Dec. 31, 2008 equals $204,180.04 dollars ($151,484.00 + $52,696.04). Trading heuristic S&P 500 Index portfolio B, by a total of $121,246.34 dollars ($204,180.04 - $82,933.70), is +146 percent superior to buy-and-hold S&P 500 Index portfolio A, from Jan. 3, 1928 to Dec. 31, 2008.

8. Risk-Adjusted Returns

Portfolio B is superior to portfolio A by +146 percent, furthermore, each portfolio has a different risk profile. When either portfolio A or B is invested in the S&P 500 Index, a proxy for the overall stock market, each has a beta value equal to one (B_A=1) (B_B=1). When portfolio B is invested in risk-free 3-month T-bills, it has a beta value equal to zero (B_B=0). Portfolio B is in T-bills for 327 months out of a total planning horizon of 972 months or 34 percent of the of the time and is invested in the S&P 500 Index no-load mutual fund the remaining 66 percent of the time.

Using a proportional weighting measure for portfolio risk over the entire 972 months planning horizon, the beta value for portfolio B (B_B) is a linearly additive total of the securities invested, equaling: B_B = 0.34 (0) + 0.66 (1) = 0.66. The buy-and-hold S&P 500 Index portfolio A has a beta value equal to one (B_A=1) throughout the planning horizon.

Trading heuristic S&P 500 Index portfolio B makes +146 percent more money than buy-and-hold S&P 500 Index portfolio A and is -34 percent less risky, from Jan. 3, 1928 to Dec. 31, 2008.

9. Splitting the Data

Splitting the 1928–2008 data sets in half and reporting on each segment separately tests whether the stock market is displaying more systemic risk through time which replicates an out-of-sample study, and also gives an understanding of how recent US financial regulatory laws are contributing to the credit crisis, and correspondingly, increasing market systemic risk.

To study how systemic risk is changing through time, S&P Index Services and Federal Reserve Statistical Release data sets are evenly split in two. The planning horizon for this research is 972 months, from Jan. 3, 1928 to Dec. 31, 2008. The midpoint occurs after 486 months, on May 1, 1967, which is an existing reinvestment date, shown on Table 2. Accordingly, for portfolios A & B, on May 1, 1967, the data are divided in half: Segment 1: (1/3/28 to 5/1/67) and Segment 2: (5/1/67 to 12/31/08).

9.1. Segment 1: (1/3/28 to 5/1/67)

Segment 1: Portfolio A: (1/3/28 to 5/1/67) — The value of buy-and-hold S&P 500 Index portfolio A at the close of trading on May 1, 1967 is 91.817 shares, from Table 1, times

the S&P 500 Index share price of $93.87 on 5/1/67, from Table 2, equaling $8,618.86 dollars.

Segment 1: Portfolio B: (1/3/28 to 5/1/67) — The value of trading heuristic S&P 500 Index portfolio B at the close of trading on May 1, 1967 is 111.652 shares, from Table 2, times the S&P 500 Index share price of $93.87 on May 1, 1967, equaling $10,480.77 dollars. Additional shares purchased with interest-dividend differentials earned, from Table 3, amounts to 7.520 shares times the S&P 500 Index share price of $93.87, equaling $705.90 dollars; summing to a grand total of $11,186.67 dollars ($10,480.77 + $705.90).

Conclusion for Segment 1: (1/3/28 to 5/1/67) — The economic improvement in trading heuristic S&P 500 Index portfolio B over buy-and-hold S&P 500 Index portfolio A is $2,567.81 dollars ($11,186.67 - $8,618.86) or +30 percent, at only 64 percent of the risk (B_B = 0.64), i.e., portfolio B is in risk-free 3-monthT-bills for 173 months, out of a total of 486 months during segment 1, from 1/3/28 to 5/1/67.

9.2. Segment 2: (5/1/67 to 12/31/08)

As of May 1, 1967, buy-and-hold S&P 500 Index portfolio A's value is $8,618.86 dollars while trading heuristic S&P 500 Index portfolio B's value is $11,186.67 dollars.

Segment 2: Portfolio A: (5/1/67 to 12/31/08) — Portfolio A's value on Dec. 31, 2008 is $82,933.70, less portfolio A's value on May 1, 1967 of $8,618.86, equaling $74,314.84 dollars of profit earned, from 5/1/67 to 12/31/08.

Segment 2: Portfolio B: (5/1/67 to 12/31/08) — Portfolio B's value on Dec. 31, 2008 is $204,180.04, less portfolio B's value on May 1, 1967 of $11,186.67, equaling $192,993.37 dollars of profit earned, from 5/1/67 to 12/31/08.

Conclusion for Segment 2: (5/1/67 to 12/31/08) — The economic improvement in trading heuristic S&P 500 Index portfolio B over buy-and-hold S&P 500 Index portfolio A is $118,678.53 dollars ($192,993.37 - $74,314.84) or +160 percent, at 68 percent of the risk (B_B = 0.68)), i.e., portfolio B is in 3-month T-bills for 154 months, out of a total of 486 months during segment 2, from 5/1/67 to 12/31/08.

Splitting the data sets at their midpoints indicate stock market systemic risk at +30 percent from Jan. 3, 1928 to May 1, 1967, and increasing to +160 percent from May 1, 1967 to Dec. 31, 2008, perhaps resulting from the passage of US financial regulatory laws which are increasing credit risk and market systemic risk, and consequently, worsening the global financial crisis.

10. Is Now The Best Time To Invest In The Stock Market?

The trading heuristic predictive model for S&P 500 Index portfolio B called a market top on February 1, 2008 at an S&P 500 Index value of 1,395.42, as shown on Table 2. As this is written (August 8, 2009), the S&P 500 Index is at 1,010.48, a 28 percent advantage for the trading heuristic S&P 500 Index portfolio B over the benchmark S&P 500 Index buy-and-hold portfolio A. Perhaps more importantly, the heuristic model is predicting that regardless of the current happy talk coming out of Washington, D.C., the rosy perceptions and supposed green shoots sprouting in the economy, the stock market is not

expected to have a lasting long-term V or U shaped recovery, but instead, experience another severe downturn, resulting in a W pattern, and only then eventually improving at some future date.

The stock market is predicted, as of August 8, 2009, to go through another severe second dip to retest the March 6, 2009 intraday low of 667 on the S&P 500 Index. Consequently, based on this research, it is believed that this is **not** the best time to be a long-term investor in the US stock market which answers the number one asset management question that all long-term investors want to know.

11. Conclusion

A three step process strips away the random white noise from stock market price data. A predictive model based on market expectations, using calculus, is developed and a maxima and minima trading heuristic determines when portfolio B should be either in a S&P 500 Index no-load mutual fund or out and invested in interest bearing, risk-free 3-month T-bills. Trading heuristic S&P 500 Index portfolio B is +146 percent superior to benchmark buy-and-hold S&P 500 Index portfolio A ($204,180.04 vs. $82,933.70), from Jan. 3, 1928 to Dec. 31, 2008. Additionally, S&P portfolio B is -34 percent less risky than S&P portfolio A, as a result of being invested in risk-free 3-month T-bills for 327 out of 972 months. The stock market can be beaten over the long term, when you know how.

Splitting the 1928–2008 data sets in half and reporting on each segment separately tests whether the stock market is demonstrating more systemic risk through time. From Jan. 3, 1928 to May 1, 1967, the economic improvement of trading heuristic S&P 500

Index portfolio B over buy-and-hold S&P 500 Index portfolio A is +30 percent, at only 64 percent of the risk. From May 1, 1967 to Dec. 31, 2008, the economic improvement of portfolio B over portfolio A is +160 percent, at 68 percent of the risk. Stock market systemic risk is probably increasing as a result of overleveraging by banks, securitization of poor quality debt, new financial deregulation laws, unsubstantiated agency AAA credit ratings and derivative counterparty credit risk, thus, exacerbating the global financial crisis.

It now appears clear that the academic economics' profession did not see the credit crisis coming and that incorrect financial economic theories are culpable, and without rethinking and correcting suspect financial economic theories it will be nearly impossible to summon the US political courage to create and implement the necessary policies to successfully emerge from this global financial crisis in an effective and timely manner.

After stripping away the random white noise from stock price movements and developing a heuristic predictive model based on market expectations, this empirical test of stock market data clearly does **not** support efficient markets **nor** modern portfolio theory. The implications of this research are wide ranging and far reaching:

- The stock market should not be thought of as a "large casino" where stock market price movements are random, serially independent and all trades are zero net present value transactions.
- Fundamentals and fundamental analysis are crucial for long-term success in the stock market and for the economy overall, i.e., it should not be automatically assumed that market prices are correct and assets are being allocated properly.

- Efficient markets, modern portfolio theory and the financial economic theories that rely on them have to be completely rethought.
- The trading heuristic predictive stock market model presented here can earn significantly more money at much lower risk, thus beating the market over the long-term, and is used to answer the number one question that long-term investors want to know, i.e., "Is now the best time to invest in the stock market?"

The trading heuristic model presented expects, as of August 8, 2009 with the S&P 500 Index at 1,010.48, more downside risk for the stock market, resulting in a retesting of the March 6, 2009 intraday low of 667 on the S&P 500 Index, and unless US economic policies are changed, continued recession-like conditions for the economy over the much longer term. This research predicts that now is **not** the best time to be a long-term investor in the US stock market.

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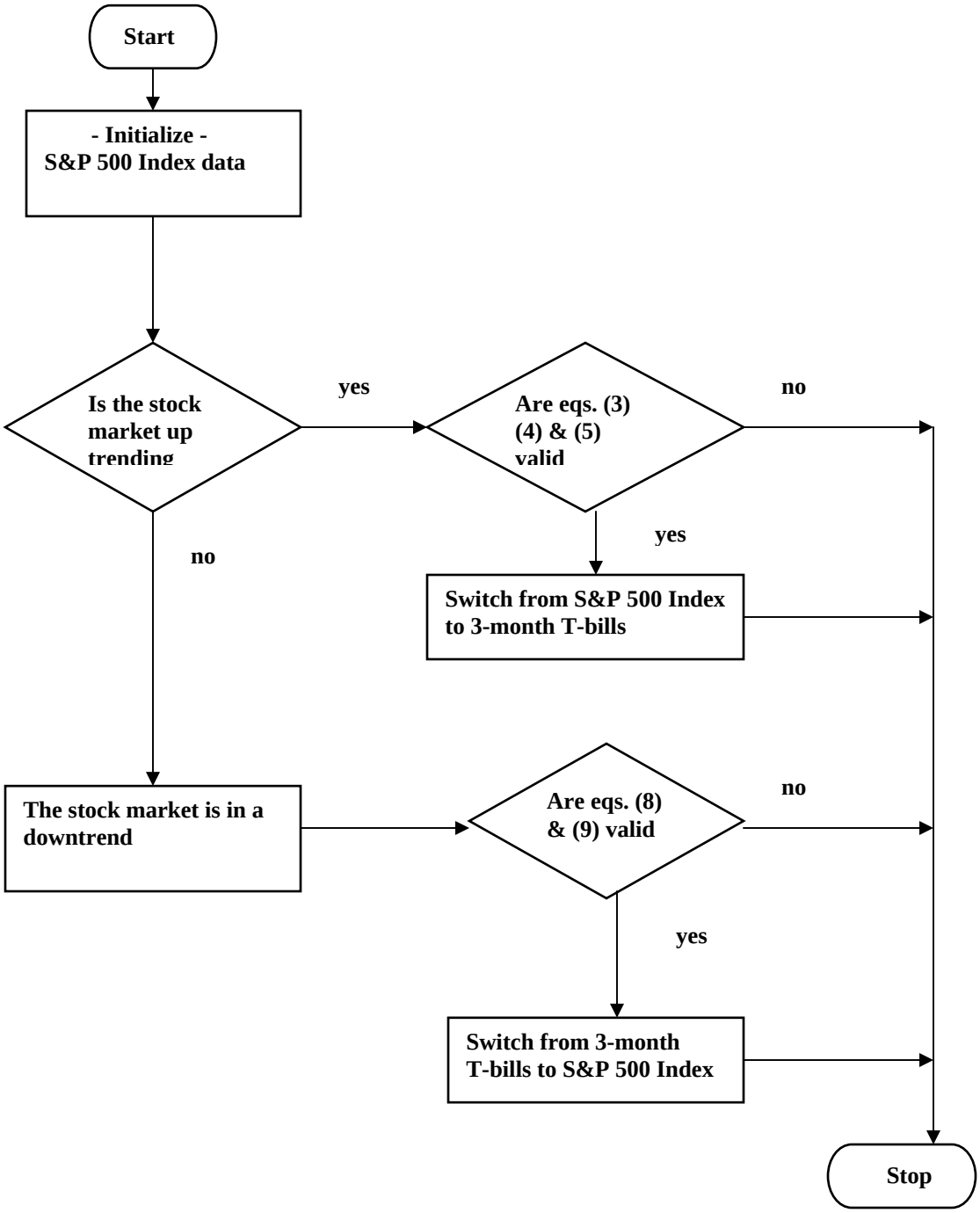

Figure 1. Portfolio B: Trading Heuristic Flow Chart

Table 1 S&P 500 Index Portfolio A: Additional Shares – 1928 through 1959

Date	Total Shares (Rounded)	S&P 500 Index Price	Portfolio A Value	Months	Dividend-Interest Diff.	Additional Shares
(R)12/2/29						
(I) 3/1/33	56.306	$5.77	$324.89	27 mo	31.14	5.397
(R) 5/1/34						
(I) 8/1/35	61.703	11.04	681.20	15	36.27	3.285
(R) 8/2/37						
(I) 10/1/38	64.988	12.46	809.75	14	40.24	3.230
(R) 5/1/39						
(I) 12/1/39	68.218	12.29	838.40	8	23.81	1.937
(R) 7/1/40						
(I) 12/1/42	70.155	9.28	651.04	30	69.34	7.472
(R)10/1/46						
(I) 8/1/47	77.627	15.80	1226.51	10	43.54	2.756
(R) 1/2/48						
(I) 7/1/48	80.383	16.70	1342.40	6	28.59	1.712
(R) 4/1/49						
(I)10/1/49	82.095	15.52	1274.11	6	27.14	1.749
(R) 6/1/53						
(I) 3/1/54	83.844	26.25	2200.91	11	85.95	3.274
(R) 2/1/57						
(I) 8/1/57	87.118	47.79	4163.37	6	88.68	1.856
(R)11/1/57						
(I) 8/1/58	88.974	47.49	4225.38	9	135.00	2.843
Totals	91.817 sh			142 mo	$632.32	35.511 sh

(I) Invest in the S&P 500 Index no-load mutual fund
(R) Redemption of S&P portfolio B and start of investment in 3-month T-bills
Average Dividend Yield Less Interest Rate Differential: 4.26% per year or 0.00355 per month

Table 2 S&P 500 Index Portfolio B: Gain from Trading - 1928 through 2008

Date	Total Shares (Rounded)	S&P 500 Index Price	Portfolio B Value
(I) 1/3/28	56.306	$ 17.76	$1000.00
(R) 12/2/29		20.95	1179.61
(I) 3/1/33	204.438	5.77	
(R) 5/1/34		10.46	2138.42
(I) 8/1/35	193.697	11.04	
(R) 8/2/37		17.07	3306.41
(I) 10/1/38	265.362	12.46	
(R) 5/1/39		10.86	2881.83
(I) 12/1/39	234.486	12.29	
(R) 7/1/40		9.87	2314.38
(I) 12/1/42	249.394	9.28	
(R)10/1/46		14.92	3720.96
(I) 8/1/47	235.504	15.80	
(R) 1/2/48		15.34	3612.63
(I) 7/1/48	216.325	16.70	
(R) 4/1/49		14.94	3231.90
(I) 10/1/49	208.241	15.52	
(R) 6/1/53		24.15	5029.02
(I) 3/1/54	191.582	26.25	
(R) 2/1/57		44.62	8548.39
(I) 8/1/57	178.874	47.79	
(R) 11/1/57		40.44	7233.66
(I) 8/1/58	152.320	47.49	
(R) 3/1/60		56.01	8531.44
(I) 2/1/61	137.826	61.90	
(R) 6/1/62		59.38	8184.11
(I) 4/1/63	122.425	66.85	
(R) 7/1/66		85.61	10480.80
(I) 5/1/67	111.652	93.87	
(R) 8/1/69		93.47	10436.11
(I) 3/1/71	107.589	97.00	
(R) 1/3/72		101.67	10938.57
(I) 4/3/72	101.773	107.48	
(R) 7/2/73		102.90	10472.44
(I) 6/2/75	113.118	92.58	
(R) 5/2/77		98.93	11190.76
(I) 9/1/78	107.936	103.68	
(R) 10/1/81		117.08	12637.15
(I) 12/1/82	91.098	138.72	
(R) 3/1/84		158.19	14410.79
(I) 12/3/84	88.507	162.82	
(R) 12/1/87		232.00	20533.62
(I) 9/1/88	79.480	258.35	
(R) 6/1/90		363.16	28863.96
(I) 3/1/91	77.912	370.47	

(R) 5/2/94		453.02	35295.69
(I) 2/1/95	75.033	470.40	
(R) 11/1/00		1421.22	106638.40
(I) 7/1/03	108.558	982.32	
(R) 2/1/08		1395.42	$151484.00
(C) 12/31/08	167.710	903.25	

(I) Invest in the S&P 500 Index no-load mutual fund
(R) Redemption of S&P portfolio B and start of investment in 3-month T-bills
(C) Portfolio B redeemed for cash on 12/31/08

Table 3 S&P 500 Index Portfolio B: Additional Shares – 1960 through 2008

Date	Total Shares - Table 2	S&P 500 Index Price	Portfolio B Value	Months	Interest-Dividend Diff.	Additional Shares
(R) 3/1/60						
(I) 2/1/61	137.826	$ 61.90	$8531.43	11 mo	$183.00	2.956
(R) 6/1/62						
(I) 4/1/63	122.425	66.85	8184.11	10	159.59	2.387
(R) 7/1/66						
(I) 5/1/67	111.652	93.87	10480.77	10	204.38	2.177
(R) 8/1/69						
(I) 3/1/71	107.589	97.00	10436.13	19	386.66	3.986
(R) 1/3/72						
(I) 4/3/72	101.773	107.48	10938.56	3	63.99	0.595
(R) 7/2/73						
(I) 6/2/75	113.118	92.58	10472.46	23	469.69	5.073
(R) 5/2/77						
(I) 9/1/78	107.936	103.68	11190.80	16	349.15	3.368
(R)10/1/81						
(I) 12/1/82	91.098	138.72	12637.11	14	344.99	2.487
(R) 3/1/84						
(I) 12/3/84	88.507	162.82	14410.71	9	252.91	1.553
(R)12/1/87						
(I) 9/1/88	79.480	258.35	20533.66	9	360.37	1.395
(R) 6/1/90						
(I) 3/1/91	77.912	370.47	28864.06	9	506.56	1.367
(R) 5/2/94						
(I) 2/1/95	75.033	470.40	35295.52	9	619.44	1.317
(R)11/1/00						
(I) 7/1/03	108.558	982.32	106638.69	32	6654.25	6.774
(R) 2/1/08						
C-12/31/08	167.710	903.25	151484.05	11	3249.33	3.597
Totals				185 mo	$13804.31	39.032sh

(I) Invest in the S&P 500 Index no-load mutual fund
(R) Redemption of S&P portfolio B and start of investment in 3-month T-bills
C - Portfolio B is redeemed for cash on 12/31/08
Average Interest Rate Less Dividend Yield Differential: 2.34% per year or 0.00195 per month