Simple Moving Averages: A Ten-Year Test

by

Eric M. Wilder

A Project

Submitted to

Oregon State University

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in partial fulfillment of
the requirements for the
degrees of

Honors Baccalaureate of Science in Civil Engineering (Honors Scholar)

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AN ABSTRACT OF THE THESIS OF

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Abstract Approved:

Jimmy Yang

The intent of this thesis is to prove whether or not simple moving averages can be used to predict the future price performance of stocks and outperform the buy-and-hold method of investing in the stock market. The importance of this research is that if moving averages can predict future price performance then they could be used as a way to gain an advantage when investing in the stock market. Historical prices for 29 of the 30 stocks currently in the Dow Jones Industrial Average were used to empirically test a variety of moving average criteria to buy and sell stocks to see if the buy-and-hold method could be outperformed. It was found that the moving averages tested could not compete with the buy-and-hold method and that historical price movements could not predict future performance. The results in this thesis provided further evidence for the Efficient Market Hypothesis and the Random Walk Hypothesis and demonstrated that moving averages may not be a valid and successful way to invest in the stock market.

Key Words: Stock Market, Efficient Market, Random Walk, Moving Average, Technical Analysis

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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Eric M. Wilder, Author

Table of Contents

List of Figures

List of Tables

Simple Moving Averages: A Ten-Year Test

Section I

Introduction

This thesis was written with the intention of discovering if using certain basic technical analysis methods for investing in the stock market can yield higher returns, on average, than a simple buy-and-hold strategy. The type of technical analysis used was the crossing of moving averages; this method of investing was empirically tested with historical prices. Moving averages are a type of technical analysis that have been used to analyze trends in the stock market and signify when a stock should be bought or sold. A moving average is the average price of a stock over a specified duration, typically 5, 20, 100, 150 or 200-days. It is commonly believed among technical analysts that this method will yield higher returns and help reduce losses when investing in the stock market. The research completed for this thesis was used to explore the validity of this claim. Two types of moving average methods were used; first was the crossing of two moving averages and second was the crossing of a moving average with the price of the particular stock, with a given threshold.

Similar Past Study

In 1967, an article was written by Van Horne and Parker called "The Random-Walk Theory: An Empirical Test," in which a study was conducted to see if there was a correlation between past price movements and future prices of stocks. A simulated $10,000 was invested in

each of the thirty chosen stocks and they were analyzed from October 17, 1960 to June 30, 1966. The 30 stocks were chosen at random with no selection criteria. In this article stocks were bought and sold based on the price crossing three different moving averages, 200 days, 150 days, and 100 days. Five different thresholds were used for each of the three moving averages; 0, 2, 5, 10, and 15%. For example, this would mean that for a 200-day moving average and a ten percent threshold, the stock price must move ten percent above the 200-day moving average before it was bought. There are two main reasons for using thresholds, the first is to help minimize risk and the second is the higher the threshold the less trades that need to be made (Van Horne and Parker 1967).

It was found by Van Horne and Parker that the buy-and-hold strategy yielded better returns than any of the moving average and threshold combinations. The basis of this thesis was to conduct a similar study using the methodology listed above with more recent stocks and prices to see if past price behavior has more of a correlation with future prices than it did in the 1960's.

Section II

Literature Review

Haug and Hirschey (2006) researched a trend known as the January effect. In their article they presented evidence that during the month of January the average return in the stock market was nearly 3.5 percent and returned only 0.42 percent per month during the rest of the year from 1904 to 1974. Their overall conclusion was this: "A January effect in equal-weighted returns remains today that is both statistically significant and economically meaningful." Although this does not bear any direct meaning for technical analysis it does shed light on whether or not patterns do exist in the stock market and whether they can be used to make a profit (Haug and Hirschey 2006).

Fama's (1965) article, titled *Random Walks in Stock Market Prices*, discusses how random walks affect technical analysis and what must be done by analysts to prove that technical analysis actually works. "The empirical evidence to date provides strong support for the random walk model. In this light the only way the chartist can vindicate his position is to show that he can consistently use his techniques to make better than chance predictions of stock prices. It is not enough for him to talk mystically about patterns that he sees in the data. He must show that he can consistently use these patterns to make meaningful predictions of future prices (Fama 1965)."

This gets at the essence behind the research done in this thesis, to see if the patterns do exist and if they can lead to higher returns. For technical analysis to hold any weight as an investment strategy it must be proven that it can actually yield higher profits than just buying and holding a stock. By completing an empirical study of past price movements and their correlation

to future prices it should become clear whether a correlation exists between past and future prices of stocks.

Technical Analysis vs. Fundamental Analysis

This study focused solely on technical analysis for trading rules. Technical analysis is the use of past price history or trends to predict future price performance. Moving averages are just one of the many ways that can be used to indicate the beginning or ending of a trend in price movement. Technical analysis differs from fundamental analysis in that fundamental analysis uses information about a particular stock to analyze earnings and attempt to predict future performance based on information about past and estimated future fundamentals of stocks.

Random Walk vs. Efficient Market

The Random Walk Hypothesis states that the market cannot be predicted based on past performance and that price changes are purely random. The definition of the Random Walk Hypothesis and how it relates to technical analysis is as follows: "The basic random walk theory constitutes a refutation of technical analysis and simply states that successive stock price changes are statistically independent, and that historical stock price movements will, therefore, convey no information concerning future stock price movements (Jones 1973)."

The Efficient Market Hypothesis is correlated to the Random Walk Hypothesis and is based on the belief that stock prices fully reflect all known information. This means that any information that an investor believes can be used to turn a profit is essentially useless, because this information is already fully reflected in the price of the stock (Fama 1991). The investigation

of moving averages is an inquiry of both the Efficient Market Hypothesis and the Random Walk Hypothesis in trying to prove that stock prices are not random and can be predicted based on past price movements. Technical analysts typically do not believe in the Random Walk Hypothesis because they believe prices can be used as buy and sell indicators and that price movements are not random.

Using basic technical analysis to empirically test stocks and see if the price movements could have been predicted, will either build more evidence that the Efficient Market Hypothesis and the Random Walk Hypothesis may hold true, or indicate that future stock prices can be predicted using historical price movements. If this is true, then moving averages can be used to yield higher returns than buy-and-hold.

Section III

Importance

The importance of this study is to find out if moving averages are a better method for investing in the stock market, than a simple buy-and-hold strategy. One reason for looking at this particular method of technical analysis is that it is easy for any level of investor to incorporate simple moving averages in their trading criteria. Moving average charts can be found for free on many financial websites, such as Yahoo Finance or MSN Money. An example of a price history chart with moving averages can be seen in Figure 3.1. When the 5-day moving average crosses above the 20-day moving average that is a buy signal, and the sell signal is indicated when the 5-day moving average crosses below the 20-day moving average. This rule is based on the belief that the stock price is gaining momentum when the 5-day average crosses above the 20-day average and the stock price is losing momentum when the 20-day average crosses above the 5-day average.

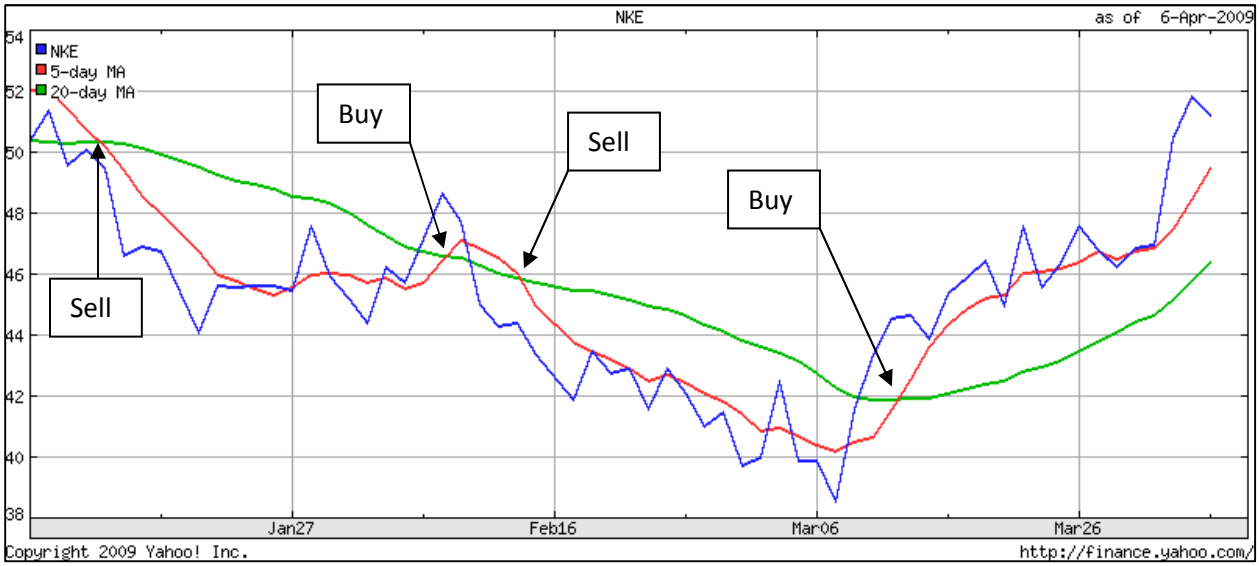

Figure 3.1: *Sample Moving Average Chart*

Figure 3.1 demonstrates how thresholds can help reduce risk when using moving averages. Without a threshold the first buy would have led to a purchase of the stock for about $48 per share and then sold for about $46 per share. This would have been a loss of $2 per share. The first buy would have been prevented if a threshold was imposed and the 5-day moving average was required to move at least 2% above the 20-day moving average. The stock would have then only been purchased on the second buy signal for about $44 per share.

By empirically testing these methods of investing it will become more apparent if technical analysis works and if investors should use moving averages as investment strategies. If the trading criteria tested do not yield higher returns and the buy-and-hold method yields better results, then it will be clear that investors should use the buy-and-hold strategy rather than technical analysis when investing in the stock market and that the Efficient Market Hypothesis and the Random Walk Hypothesis may be true.

Section IV

Methodology

The methodology used in this thesis was done with the intention to conduct a similar study to that of Van Horne and Parker (1967), with more contemporary stocks and prices, to see if past price behavior has more of a correlation with future prices than it did in the 1960's. The initial plan was to invest $10,000 in each of the 30 stocks in the Dow Jones Industrial Average from January 2, 1998 to January 2, 2008. The reason for choosing stocks contained in the Dow Jones was to try and get a sample of stocks representative of what the average investor is likely to invest in and have some familiarity with. Since Kraft Foods Inc. has only been publicly traded since 2001; it did not meet the desired ten-year study period, so its price history data was not used in this study. Each of the other 29 stocks that were studied were all traded based on 18 different criteria, buy-and-hold, the crossing of 20-day and 5-day moving averages, the crossing of 200-day and 20-day moving averages, and the stock price crossing the 100, 150, and 200-day moving averages with 0, 2, 5, 10, and 15% thresholds. The 18 different criteria applied to 29 stocks for a total of 522 different tests. The buy-and-hold strategy simulates the use of $10,000 to buy as many shares as possible for each stock on January 2, 1998 and holds for the entire ten-year study period and sells on the final day, January 2, 2008. The 30 stocks of the Dow Jones can be found in Table 4.1 below:

Table 4.1: *The 30 Stocks of the Dow Jones*

Symbol-Name	Symbol-Name	Symbol-Name
AA-Alcoa	GM-General Motors	MMM-3M
AXP-American Express	HD-Home Depot	MRK-Merck
BA-Boeing	HPQ-Hewlett Packard	MSFT-Microsoft
BAC-Bank of America	IBM-IBM	PFE-Pfizer
C-Citigroup	INTC-Intel	PG-Proctor & Gamble
CAT-Caterpillar	JNJ-Johnson & Johnson	T-AT&T
CVX-Chevron	JPM-JP Morgan	UTX-United Tech
DD-Du Pont	KFT-Kraft*	VZ-Verizon
DIS-Disney	KO-Coca Cola	WMT-Wal-Mart
GE-General Electric	MCD-McDonalds	XOM-Exxon

*Not used in study

To incorporate splits and dividends over the ten year study period, the adjusted closing price of the stocks were used for the analysis. Each stock was bought and sold based on the criteria listed above, if a stock was still held when the study period ended on January 2, 2008, the stock was sold at the adjusted closing price on that day. The price history used in the analysis for all 29 stocks was downloaded from the Yahoo! Finance website. If the stock was to be bought or sold it would be done at the closing price of the day after the moving averages crossed. The closing price is not always the ideal price to use for analysis, as the closing price has a tendency to be either the high or the low stock price for the day (Boldt and Arbit 1984). In this instance the closing prices were the only price history data that was available as an adjusted price for splits and dividends. It is believed that since so many stocks were analyzed, the bias presented by only using the closing prices would average out to a good representation of the stock price.

Once all of the historical prices were collected and reduced down to the required timeframe, I calculated all of the required moving averages for each stock using the adjusted closing prices. For example, a 5-day moving average for a particular day would be calculated by averaging that day's closing price and the previous four day's closing price. In Table 4.2 below example formulas for calculating moving averages in Excel can be found:

Table 4.2: *Sample Moving Average Calculations*

Day	Price	5-Day MA
1	$ 30.56	-
2	$ 31.02	-
3	$ 33.65	-
4	$ 32.87	-
5	$ 31.54	=AVERAGE(Day 1:Day 5)
6	$ 30.99	=AVERAGE(Day 2:Day 6)
7	$ 29.87	=AVERAGE(Day 3:Day 7)
8	$ 29.66	=AVERAGE(Day 4:Day 8)
9	$ 30.44	=AVERAGE(Day 5:Day 9)
10	$ 28.74	=AVERAGE(Day 6:Day 10)

Transaction fees were included and assumed to be ten dollars per trade. In Table 5.1, in the results section, the final balance with transaction fees and the final balance without transaction fees can be found. The inclusion of transaction fees had no major effect on the final results; the reason is that before the fees were included, the buy-and-hold method yielded the highest closing balance, while utilizing the fewest trades. The average number of trades per year for each trading rule can be found in the Table 4.3 below:

Table 4.3: *Average Number of Trades per Year*

Rule	Trades/yr	Rule	Trades/yr	Rule	Trades/yr
Buy & Hold	0.2	100-10%	1.3	150-15%	0.8
5 x 20	16.2	100-15%	0.8	200-0%	10.2
20 x 200	2.5	150-0%	11.7	200-2%	3.8
100-0%	14.4	150-2%	4.2	200-5%	2.0
100-2%	5.1	150-5%	2.2	200-10%	1.0
100-5%	2.7	150-10%	1.1	200-15%	0.8

In the Table 4.3 the nomenclature is as follows, “5 x 20” is the 5-day moving average crossing the 20-day moving average and the “100-0%” is the 100-day moving average crossing the stock price with a 0% threshold. Including the trading fees did not change any of the results of this study, but could have had a significant effect if less money were to be invested in each of the 29 stocks. For example, if $1,000 were invested initially in each stock, instead of $10,000,

then the moving averages would yield even less money than they did, because the trading fees would have a much more significant impact on the final net balance.

The result of only investing $1,000 in each stock initially are shown below in Table 4.4. In this case, the transaction fees were subtracted off the final balances for each stock, so in some instances the fees were actually greater than the final balance. This resulted in negative final balances for two of the trading criteria, the 5-day crossed with the 20-day moving average and the 100-day moving average with no threshold. It is not possible to have a negative final balance, because in a real trading account the fees would be taken out as the trades occurred and the account balance would eventually just go to zero. The $1,000 investments were not initially part of this study and it was not anticipated that the transaction fees would have such an adverse effect on the final balances of each stock; otherwise the fees would have been incorporated as each trade was made. The significance would be that transaction fees have the potential to be a major downfall of technical analysis, especially if the principal invested is not great enough to warrant so many transactions, particularly in the case of trading criteria that require frequent trades. An example of this is the 5-day moving average crossed with the 20-day moving average trading criteria. This method averaged 16 trades per year, which is an average cost of $160 per year in trading fees, with only a $1,000 initial investment that is a large percentage of the investment lost just because of transaction fees

Table 4.4: Combined *Final Balances with $1,000 Initial Investments*

	Gross Balance	Net Balance
Buy-and-Hold	$ 60,433.69	$ 59,853.69
5 x 20	$ 33,108.43	$ (13,891.57)
20 x 200	$ 40,659.57	$ 33,419.57
100-0%	$ 31,616.83	$ (10,083.17)
100-2%	$ 36,034.72	$ 21,184.72
100-5%	$ 38,754.93	$ 30,894.93
100-10%	$ 41,303.45	$ 37,403.45
100-15%	$ 39,473.04	$ 37,093.04
150-0%	$ 34,313.26	$ 393.26
150-2%	$ 37,254.07	$ 24,934.07
150-5%	$ 38,579.12	$ 32,059.12
150-10%	$ 44,888.17	$ 41,588.17
150-15%	$ 39,662.93	$ 37,342.93
200-0%	$ 36,421.69	$ 6,701.69
200-2%	$ 38,528.80	$ 27,528.80
200-5%	$ 37,446.45	$ 31,746.45
200-10%	$ 46,807.39	$ 43,947.39
200-15%	$ 41,714.99	$ 39,514.99

Section V

Results

The results of this study are consistent with those from Van Horne and Parker (1967), in which no technical trading method yielded higher results than the buy-and-hold method. This is also consistent with the Random Walk Hypothesis and the Efficient Market Hypothesis, where it appears that future price performance cannot be predicted based on historical price movements alone. In Table 5.1 below the results for the total value of each trading technique can be seen:

Table 5.1: *Combined Final Balances with $10,000 Initial Investments*

	Gross Balance	Net Balance
Buy-and-Hold	$ 607,723.61	$ 607,143.61
5 x 20	$ 331,447.35	$ 284,447.35
20 x 200	$ 407,250.07	$ 400,010.07
100-0%	$ 315,570.22	$ 273,870.22
100-2%	$ 360,469.33	$ 345,619.33
100-5%	$ 387,675.62	$ 379,815.62
100-10%	$ 414,034.21	$ 410,134.21
100-15%	$ 394,338.68	$ 391,958.68
150-0%	$ 342,789.25	$ 308,869.25
150-2%	$ 372,058.41	$ 359,738.41
150-5%	$ 386,031.88	$ 379,511.88
150-10%	$ 449,651.92	$ 446,351.92
150-15%	$ 397,370.03	$ 395,050.03
200-0%	$ 364,210.36	$ 334,490.36
200-2%	$ 385,641.13	$ 374,641.13
200-5%	$ 374,641.02	$ 368,941.02
200-10%	$ 469,288.11	$ 466,428.11
200-15%	$ 417,441.36	$ 415,241.36

Using the buy-and-hold strategy a final gross balance of $607,723.61 was accumulated, this is equivalent to an annual compounded rate of return of 7.1%. The highest gross balance accumulated by any one of the technical trading rules was using the 200-day moving average with a ten percent threshold and this method accumulated $469,288.11, nearly $130,000 less

than the buy-and-hold over the span of ten years, this is equivalent to a rate of return of 3.4%. This result is important because it is now clearer that moving averages cannot be used to predict future price movements and that price movements may indeed be a random walk. Including transaction fees, the net balances for these methods were $607,143.61 and $466,428.11, respectively.

In Figure 5.1, the net balance for each trading rule are plotted in a column chart with the buy-and-hold balance plotted as a line across the top to compare just how close the technical trading rules were to competing with the buy-and-hold method. Something noteworthy can be seen on this figure, the trend that the final balances of the trading rules with thresholds follow. They tend to peak at the moving averages used with a ten percent threshold. This means that if moving averages are to be used they should be used with a ten percent threshold. This compares with the results from Van Horne and Parker (1967) in that their findings had the highest returns for all moving averages with 10% thresholds.

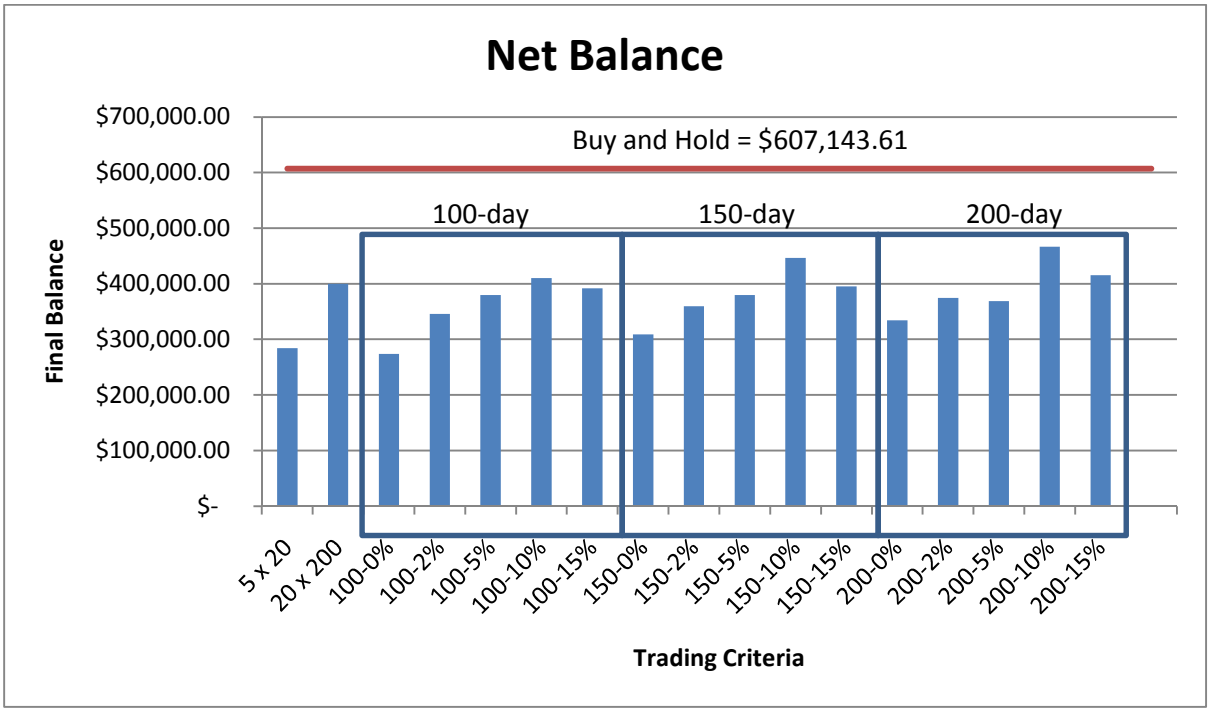

Figure 5.1: *Combined Final Balances Compared to Buy-and-Hold*

Conclusion

The results from this empirical research support the Random Walk Hypothesis and the Efficient Market Hypothesis, in that the stock prices in this study could not be predicted based on past performance and it is more lucrative to use the buy-and-hold method over technical trading rules. Another significance is that technical trading rules and programs seen on television that advertise surefire methods for investing in the stock market may not be as lucrative as they are portrayed to be. The most important thing to be taken away from the finding in this study is that amateur investors should stick to a simple buy-and-hold method for investing their money in the stock market. If moving averages are to be used by investors, then based on this study and the results from Van Horne and Parker (1967), investors who do not use the buy-and-hold method and are using moving averages, should use a 200-day moving average with a ten percent threshold.

One limitation of this study was the lack of investing opportunities for the cash that is held when not invested in the market. The reason for not assuming an investment opportunity for cash was that the margin of difference between the balances of the buy-and-hold method and any of the technical trading rules was so great that the cash investments would have made no significant difference in the final results. Another limitation of this study is that the Dow Jones Industrial Average contains highly traded large cap stocks and the results from this study may have been drastically different for stocks with different market capitalizations.

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Appendix

Final Balances per Stock

	AA-Alcoa		AXP-American Express	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 24,470	$ 24,450	$ 21,520	$ 21,500
5 x 20	$ 4,785	$ 3,205	$ 8,652	$ 6,752
20 x 200	$ 17,131	$ 16,891	$ 13,231	$ 12,971
100-0%	$ 9,929	$ 8,329	$ 8,062	$ 6,422
100-2%	$ 8,809	$ 8,109	$ 10,792	$ 10,272
100-5%	$ 13,455	$ 13,155	$ 17,216	$ 16,996
100-10%	$ 17,338	$ 17,198	$ 15,887	$ 15,767
100-15%	$ 18,813	$ 18,733	$ 11,236	$ 11,136
150-0%	$ 10,294	$ 9,134	$ 8,045	$ 6,645
150-2%	$ 12,323	$ 11,863	$ 9,019	$ 8,499
150-5%	$ 14,315	$ 14,075	$ 17,708	$ 17,528
150-10%	$ 15,570	$ 15,450	$ 12,974	$ 12,874
150-15%	$ 17,738	$ 17,658	$ 9,536	$ 9,436
200-0%	$ 12,063	$ 10,923	$ 7,316	$ 5,916
200-2%	$ 14,989	$ 14,489	$ 9,413	$ 8,933
200-5%	$ 11,553	$ 11,333	$ 12,215	$ 12,035
200-10%	$ 18,901	$ 18,801	$ 13,256	$ 13,156
200-15%	$ 15,141	$ 15,061	$ 11,308	$ 11,228

	BA-Boeing		BAC-Bank of America	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 20,605	$ 20,585	$ 19,589	$ 19,569
5 x 20	$ 17,222	$ 15,842	$ 9,948	$ 8,188
20 x 200	$ 16,653	$ 16,473	$ 9,814	$ 9,574
100-0%	$ 13,756	$ 12,596	$ 10,748	$ 9,568
100-2%	$ 13,968	$ 13,468	$ 9,407	$ 8,927
100-5%	$ 23,762	$ 23,562	$ 9,725	$ 9,485
100-10%	$ 13,421	$ 13,241	$ 7,188	$ 7,048
100-15%	$ 18,138	$ 18,038	$ 6,231	$ 6,151
150-0%	$ 20,056	$ 19,156	$ 7,411	$ 6,411
150-2%	$ 16,770	$ 16,410	$ 7,045	$ 6,565
150-5%	$ 13,296	$ 13,096	$ 6,204	$ 5,944
150-10%	$ 15,495	$ 15,355	$ 8,413	$ 8,293
150-15%	$ 23,963	$ 23,883	$ 5,791	$ 5,691
200-0%	$ 21,231	$ 20,631	$ 8,283	$ 7,243
200-2%	$ 19,992	$ 19,712	$ 7,543	$ 7,163
200-5%	$ 20,159	$ 20,019	$ 8,711	$ 8,511
200-10%	$ 20,905	$ 20,805	$ 7,323	$ 7,203
200-15%	$ 26,412	$ 26,352	$ 4,229	$ 4,109

	C-Citigroup		CAT-Caterpillar	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 14,831	$ 14,811	$ 36,474	$ 36,454
5 x 20	$ 11,190	$ 9,710	$ 8,458	$ 6,718
20 x 200	$ 15,116	$ 14,896	$ 24,451	$ 24,171
100-0%	$ 10,927	$ 9,647	$ 16,723	$ 15,463
100-2%	$ 9,730	$ 9,190	$ 27,503	$ 27,053
100-5%	$ 12,809	$ 12,549	$ 20,114	$ 19,814
100-10%	$ 20,982	$ 20,882	$ 24,150	$ 24,010
100-15%	$ 13,783	$ 13,723	$ 14,807	$ 14,707
150-0%	$ 8,967	$ 7,807	$ 15,918	$ 14,718
150-2%	$ 8,489	$ 8,009	$ 20,441	$ 20,021
150-5%	$ 10,592	$ 10,352	$ 22,797	$ 22,617
150-10%	$ 24,915	$ 24,855	$ 20,690	$ 20,570
150-15%	$ 17,283	$ 17,223	$ 12,589	$ 12,469
200-0%	$ 11,594	$ 10,334	$ 16,054	$ 14,874
200-2%	$ 10,026	$ 9,566	$ 17,586	$ 17,106
200-5%	$ 12,499	$ 12,299	$ 17,453	$ 17,253
200-10%	$ 23,173	$ 23,113	$ 15,435	$ 15,315
200-15%	$ 15,428	$ 15,368	$ 19,217	$ 19,137

	CVX-Chevron		DD-Dupont	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 32,938	$ 32,918	$ 9,737	$ 9,717
5 x 20	$ 14,911	$ 13,191	$ 5,073	$ 3,353
20 x 200	$ 16,065	$ 15,705	$ 4,241	$ 3,881
100-0%	$ 9,503	$ 7,803	$ 8,073	$ 6,673
100-2%	$ 12,866	$ 12,386	$ 7,762	$ 7,222
100-5%	$ 17,158	$ 16,958	$ 8,033	$ 7,773
100-10%	$ 16,970	$ 16,870	$ 4,363	$ 4,203
100-15%	$ 22,692	$ 22,652	$ 6,260	$ 6,200
150-0%	$ 10,959	$ 9,539	$ 5,324	$ 3,984
150-2%	$ 15,759	$ 15,299	$ 5,475	$ 4,955
150-5%	$ 15,271	$ 15,071	$ 5,103	$ 4,843
150-10%	$ 23,696	$ 23,636	$ 5,179	$ 5,059
150-15%	$ 16,878	$ 16,818	$ 3,374	$ 3,274
200-0%	$ 10,625	$ 8,825	$ 3,292	$ 1,992
200-2%	$ 14,066	$ 13,586	$ 4,656	$ 4,156
200-5%	$ 12,739	$ 12,519	$ 4,144	$ 3,864
200-10%	$ 25,148	$ 25,088	$ 4,482	$ 4,362
200-15%	$ 15,355	$ 15,295	$ 3,355	$ 3,255

	DIS-Disney		GE-General Electric	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 10,548	$ 10,528	$ 18,492	$ 18,472
5 x 20	$ 2,729	$ 949	$ 9,671	$ 8,031
20 x 200	$ 13,363	$ 13,163	$ 22,174	$ 21,994
100-0%	$ 13,795	$ 12,515	$ 9,766	$ 8,306
100-2%	$ 12,384	$ 11,944	$ 13,924	$ 13,584
100-5%	$ 14,740	$ 14,480	$ 13,392	$ 13,172
100-10%	$ 7,949	$ 7,769	$ 20,424	$ 20,344
100-15%	$ 7,540	$ 7,440	$ 11,419	$ 11,339
150-0%	$ 12,565	$ 11,565	$ 14,386	$ 13,466
150-2%	$ 9,521	$ 9,121	$ 16,336	$ 16,056
150-5%	$ 11,384	$ 11,184	$ 21,792	$ 21,672
150-10%	$ 7,691	$ 7,531	$ 21,757	$ 21,677
150-15%	$ 7,419	$ 7,319	$ 18,469	$ 18,409
200-0%	$ 10,564	$ 9,744	$ 15,803	$ 15,103
200-2%	$ 12,211	$ 11,971	$ 16,730	$ 16,470
200-5%	$ 10,604	$ 10,444	$ 20,792	$ 20,692
200-10%	$ 7,445	$ 7,305	$ 22,755	$ 22,695
200-15%	$ 10,965	$ 10,885	$ 27,775	$ 27,735

	GM-General Motors		HD-Home Depot	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 7,189	$ 7,169	$ 14,642	$ 14,622
5 x 20	$ 14,377	$ 12,857	$ 4,756	$ 3,036
20 x 200	$ 4,401	$ 4,161	$ 15,237	$ 14,997
100-0%	$ 13,344	$ 12,224	$ 6,789	$ 5,309
100-2%	$ 12,376	$ 11,856	$ 10,476	$ 9,936
100-5%	$ 10,730	$ 10,450	$ 8,126	$ 7,766
100-10%	$ 7,506	$ 7,326	$ 13,635	$ 13,495
100-15%	$ 3,681	$ 3,541	$ 12,308	$ 12,208
150-0%	$ 10,428	$ 9,548	$ 11,157	$ 9,877
150-2%	$ 13,896	$ 13,516	$ 13,755	$ 13,335
150-5%	$ 10,005	$ 9,785	$ 14,051	$ 13,831
150-10%	$ 7,447	$ 7,287	$ 15,362	$ 15,222
150-15%	$ 4,895	$ 4,775	$ 19,786	$ 19,726
200-0%	$ 9,571	$ 8,711	$ 14,884	$ 14,064
200-2%	$ 9,008	$ 8,648	$ 14,062	$ 13,682
200-5%	$ 7,502	$ 7,302	$ 15,468	$ 15,288
200-10%	$ 6,178	$ 6,058	$ 15,864	$ 15,764
200-15%	$ 3,937	$ 3,817	$ 20,159	$ 20,099

	HPQ-Hewlett Packard		IBM-IBM	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 22,182	$ 22,162	$ 21,442	$ 21,422
5 x 20	$ 6,857	$ 5,197	$ 27,108	$ 25,568
20 x 200	$ 28,741	$ 28,601	$ 7,759	$ 7,439
100-0%	$ 20,267	$ 18,947	$ 9,635	$ 8,275
100-2%	$ 26,717	$ 26,257	$ 8,170	$ 7,630
100-5%	$ 29,766	$ 29,546	$ 8,634	$ 8,294
100-10%	$ 30,026	$ 29,886	$ 10,001	$ 9,861
100-15%	$ 17,705	$ 17,585	$ 9,750	$ 9,630
150-0%	$ 26,418	$ 25,678	$ 12,576	$ 11,396
150-2%	$ 29,837	$ 29,497	$ 13,807	$ 13,427
150-5%	$ 35,987	$ 35,827	$ 12,165	$ 11,925
150-10%	$ 35,297	$ 35,197	$ 11,995	$ 11,875
150-15%	$ 18,146	$ 18,046	$ 9,594	$ 9,494
200-0%	$ 28,995	$ 28,335	$ 10,890	$ 9,850
200-2%	$ 36,049	$ 35,769	$ 8,529	$ 8,109
200-5%	$ 26,027	$ 25,867	$ 7,159	$ 6,919
200-10%	$ 30,721	$ 30,621	$ 10,738	$ 10,618
200-15%	$ 17,349	$ 17,249	$ 8,448	$ 8,348

	INTC-Intel		JNJ-Johnson & Johnson	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 15,030	$ 15,010	$ 24,029	$ 24,009
5 x 20	$ 11,292	$ 9,852	$ 9,312	$ 7,552
20 x 200	$ 16,980	$ 16,800	$ 15,805	$ 15,605
100-0%	$ 13,054	$ 11,454	$ 9,535	$ 8,075
100-2%	$ 11,378	$ 10,738	$ 11,012	$ 10,572
100-5%	$ 17,490	$ 17,130	$ 15,255	$ 15,055
100-10%	$ 16,994	$ 16,814	$ 11,258	$ 11,158
100-15%	$ 11,581	$ 11,441	$ 12,558	$ 12,518
150-0%	$ 18,618	$ 17,778	$ 13,729	$ 12,749
150-2%	$ 18,621	$ 18,181	$ 14,825	$ 14,525
150-5%	$ 17,030	$ 16,770	$ 16,144	$ 15,964
150-10%	$ 22,879	$ 22,719	$ 12,726	$ 12,646
150-15%	$ 12,478	$ 12,358	$ 12,748	$ 12,708
200-0%	$ 13,951	$ 13,291	$ 17,959	$ 17,159
200-2%	$ 15,167	$ 14,827	$ 18,331	$ 18,091
200-5%	$ 14,112	$ 13,872	$ 13,679	$ 13,519
200-10%	$ 21,031	$ 20,911	$ 11,873	$ 11,773
200-15%	$ 14,900	$ 14,800	$ 12,784	$ 12,724

	JPM-JP Morgan		KO-Coca Cola	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 15,991	$ 15,971	$ 10,933	$ 10,913
5 x 20	$ 11,469	$ 9,749	$ 7,643	$ 6,043
20 x 200	$ 7,482	$ 7,202	$ 5,107	$ 4,847
100-0%	$ 7,286	$ 5,766	$ 7,075	$ 5,755
100-2%	$ 6,053	$ 5,393	$ 9,178	$ 8,718
100-5%	$ 6,365	$ 6,025	$ 10,713	$ 10,513
100-10%	$ 5,564	$ 5,364	$ 7,466	$ 7,346
100-15%	$ 9,899	$ 9,799	$ 3,965	$ 3,865
150-0%	$ 5,624	$ 4,204	$ 7,192	$ 6,152
150-2%	$ 6,765	$ 6,245	$ 6,905	$ 6,545
150-5%	$ 7,514	$ 7,254	$ 6,729	$ 6,509
150-10%	$ 6,703	$ 6,543	$ 7,190	$ 7,070
150-15%	$ 7,476	$ 7,376	$ 5,316	$ 5,236
200-0%	$ 6,119	$ 5,019	$ 6,324	$ 5,324
200-2%	$ 6,865	$ 6,345	$ 6,202	$ 5,842
200-5%	$ 8,127	$ 7,887	$ 6,028	$ 5,808
200-10%	$ 6,769	$ 6,629	$ 7,021	$ 6,901
200-15%	$ 8,019	$ 7,919	$ 4,809	$ 4,709

	MCD-McDonalds		MMM-3M	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 28,189	$ 28,169	$ 24,724	$ 24,704
5 x 20	$ 12,714	$ 11,174	$ 13,189	$ 11,549
20 x 200	$ 21,187	$ 20,927	$ 8,923	$ 8,603
100-0%	$ 17,118	$ 15,978	$ 6,544	$ 5,124
100-2%	$ 21,580	$ 21,160	$ 6,382	$ 5,842
100-5%	$ 19,041	$ 18,761	$ 5,358	$ 5,038
100-10%	$ 24,592	$ 24,472	$ 11,134	$ 11,034
100-15%	$ 50,006	$ 49,966	$ 10,631	$ 10,611
150-0%	$ 17,651	$ 16,531	$ 5,678	$ 4,278
150-2%	$ 20,233	$ 19,873	$ 6,429	$ 5,889
150-5%	$ 15,257	$ 15,017	$ 4,916	$ 4,616
150-10%	$ 28,375	$ 28,275	$ 10,570	$ 10,470
150-15%	$ 47,057	$ 47,017	$ 8,071	$ 8,011
200-0%	$ 15,543	$ 14,423	$ 7,140	$ 5,840
200-2%	$ 23,512	$ 23,192	$ 6,558	$ 6,138
200-5%	$ 25,341	$ 25,181	$ 6,391	$ 6,151
200-10%	$ 36,338	$ 36,278	$ 12,919	$ 12,839
200-15%	$ 41,922	$ 41,882	$ 15,043	$ 15,003

	MRK-Merck		MSFT-Microsoft	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 14,900	$ 14,880	$ 25,214	$ 25,194
5 x 20	$ 12,266	$ 10,806	$ 22,452	$ 20,932
20 x 200	$ 15,235	$ 15,075	$ 11,725	$ 11,425
100-0%	$ 12,610	$ 10,990	$ 9,379	$ 8,019
100-2%	$ 12,210	$ 11,670	$ 10,275	$ 9,715
100-5%	$ 13,906	$ 13,646	$ 9,470	$ 9,130
100-10%	$ 16,436	$ 16,316	$ 15,631	$ 15,491
100-15%	$ 13,259	$ 13,159	$ 18,663	$ 18,583
150-0%	$ 11,442	$ 10,442	$ 15,601	$ 14,381
150-2%	$ 13,028	$ 12,708	$ 13,367	$ 12,927
150-5%	$ 13,791	$ 13,591	$ 11,807	$ 11,547
150-10%	$ 13,202	$ 13,082	$ 15,962	$ 15,842
150-15%	$ 13,523	$ 13,443	$ 17,240	$ 17,160
200-0%	$ 10,544	$ 9,544	$ 19,514	$ 18,574
200-2%	$ 13,235	$ 12,895	$ 17,235	$ 16,895
200-5%	$ 16,694	$ 16,554	$ 18,451	$ 18,271
200-10%	$ 14,013	$ 13,913	$ 24,382	$ 24,302
200-15%	$ 12,628	$ 12,548	$ 14,941	$ 14,861

	PFE-Pfizer		PG-Proctor & Gamble	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 11,109	$ 11,089	$ 21,628	$ 21,608
5 x 20	$ 9,101	$ 7,541	$ 11,656	$ 10,056
20 x 200	$ 7,529	$ 7,249	$ 14,542	$ 14,322
100-0%	$ 5,582	$ 4,022	$ 18,682	$ 17,302
100-2%	$ 7,588	$ 7,008	$ 21,311	$ 21,011
100-5%	$ 6,276	$ 5,956	$ 17,979	$ 17,799
100-10%	$ 6,902	$ 6,762	$ 11,835	$ 11,735
100-15%	$ 4,798	$ 4,698	$ 7,119	$ 7,059
150-0%	$ 3,898	$ 2,418	$ 16,534	$ 15,494
150-2%	$ 5,076	$ 4,516	$ 18,808	$ 18,528
150-5%	$ 5,784	$ 5,524	$ 14,498	$ 14,338
150-10%	$ 6,544	$ 6,424	$ 14,169	$ 14,069
150-15%	$ 7,185	$ 7,105	$ 12,106	$ 12,026
200-0%	$ 8,708	$ 7,408	$ 13,288	$ 12,368
200-2%	$ 7,973	$ 7,553	$ 13,667	$ 13,407
200-5%	$ 6,558	$ 6,338	$ 14,310	$ 14,170
200-10%	$ 9,334	$ 9,234	$ 14,205	$ 14,125
200-15%	$ 7,898	$ 7,818	$ 7,943	$ 7,863

	T-AT&T		UTX-United Tech	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 15,720	$ 15,700	$ 47,662	$ 47,642
5 x 20	$ 6,649	$ 4,949	$ 20,972	$ 19,472
20 x 200	$ 10,128	$ 9,888	$ 25,657	$ 25,477
100-0%	$ 5,437	$ 3,777	$ 16,901	$ 15,121
100-2%	$ 7,133	$ 6,553	$ 16,924	$ 16,364
100-5%	$ 6,162	$ 5,822	$ 22,342	$ 22,122
100-10%	$ 14,311	$ 14,191	$ 23,145	$ 23,025
100-15%	$ 15,525	$ 15,445	$ 13,853	$ 13,753
150-0%	$ 7,720	$ 6,340	$ 16,070	$ 14,530
150-2%	$ 7,882	$ 7,442	$ 18,645	$ 18,225
150-5%	$ 8,329	$ 8,069	$ 27,400	$ 27,200
150-10%	$ 14,948	$ 14,848	$ 26,250	$ 26,150
150-15%	$ 11,654	$ 11,574	$ 12,827	$ 12,727
200-0%	$ 15,051	$ 14,211	$ 19,754	$ 18,914
200-2%	$ 14,021	$ 13,741	$ 16,974	$ 16,614
200-5%	$ 9,370	$ 9,150	$ 18,938	$ 18,758
200-10%	$ 18,891	$ 18,811	$ 22,332	$ 22,232
200-15%	$ 17,528	$ 17,468	$ 10,633	$ 10,533

	VZ-Verizon		WMT-Wal Mart	
	Gross Balance	Net Balance	Gross Balance	Net Balance
Buy and Hold	$ 14,282	$ 14,262	$ 25,967	$ 25,947
5 x 20	$ 12,447	$ 10,947	$ 9,500	$ 7,800
20 x 200	$ 7,817	$ 7,597	$ 10,552	$ 10,212
100-0%	$ 9,239	$ 8,059	$ 5,399	$ 3,879
100-2%	$ 10,734	$ 10,314	$ 6,204	$ 5,544
100-5%	$ 10,933	$ 10,693	$ 5,382	$ 5,042
100-10%	$ 6,444	$ 6,264	$ 8,079	$ 7,919
100-15%	$ 10,704	$ 10,644	$ 19,580	$ 19,540
150-0%	$ 11,511	$ 10,591	$ 5,338	$ 3,818
150-2%	$ 7,447	$ 7,067	$ 5,678	$ 5,078
150-5%	$ 8,109	$ 7,869	$ 5,161	$ 4,821
150-10%	$ 10,452	$ 10,332	$ 7,878	$ 7,738
150-15%	$ 12,248	$ 12,188	$ 15,920	$ 15,880
200-0%	$ 10,285	$ 9,485	$ 5,002	$ 3,802
200-2%	$ 8,812	$ 8,492	$ 6,775	$ 6,215
200-5%	$ 7,053	$ 6,833	$ 7,062	$ 6,782
200-10%	$ 11,364	$ 11,264	$ 11,355	$ 11,235
200-15%	$ 12,750	$ 12,690	$ 18,031	$ 17,991

	XOM-Exxon	
	Gross Balance	Net Balance
Buy and Hold	$ 37,689	$ 37,669
5 x 20	$ 15,045	$ 13,425
20 x 200	$ 20,201	$ 19,861
100-0%	$ 10,415	$ 8,475
100-2%	$ 17,626	$ 17,186
100-5%	$ 13,343	$ 13,083
100-10%	$ 24,406	$ 24,346
100-15%	$ 17,836	$ 17,796
150-0%	$ 11,676	$ 10,236
150-2%	$ 15,878	$ 15,418
150-5%	$ 12,891	$ 12,671
150-10%	$ 25,322	$ 25,262
150-15%	$ 16,059	$ 16,019
200-0%	$ 13,861	$ 12,581
200-2%	$ 15,453	$ 15,033
200-5%	$ 15,506	$ 15,326
200-10%	$ 25,137	$ 25,077
200-15%	$ 18,537	$ 18,497