I. Money Flow History

Market Technicians have forever attempted to blend price and volume together as a single stand-alone indicator to help determine if a stock was undergoing accumulation or distribution. Technicians were certain that each stock's daily price and volume series were somehow linked and contained valuable information to the stock's future price direction, without much success. Research was limited, as technicians performed the manual and tedious task of analyzing each stock's daily trade, tick by tick, with volume to determine the net dollar flow into and out of each stock. Consensus eventually developed that buying and selling for any given stock was simply each securities' daily closing price multiplied by each day's total daily volume and netted against the previous day's net cumulative total. Net dollar change would provide the technician an approximation as to the money flow value for each day's trading.[1]

When researching this paper, the Author read Buff Dormeier's white paper **Price & Volume, Digging Deeper**, published in the **Journal of Technical Analysis** in 2008 Summer/Fall issue. In this paper, Mr. Dormeier raised a theoretical question central to what this paper is exploring:

> What if there was a way to look deep inside price and volume trends? What if this look could be used to determine if current prices were supported by volume? What if volume *is the* force that drives the market-exerted against support or resistance? In physics, force is a vector quantity that tends to produce acceleration. The same is true of market volume. Volume substantiates, energizes, and empowers price. When volume increases, it confirms price direction. When volume decreases, it contradicts price direction. In theory, increases in volume generally precede significant price movements.[2]

Over the past eight decades, there have been a number of price and volume studies published by prominent technicians including: L. M. Lowrey, H. M. Gartley, Edwards and McGee, Joe Granville, Larry Williams, David Bostian, Marc Chaikin, Richard Arms, Paul Desmond, Laslo Birinyi, and others.

In 1938, L. M. Lowrey was the first to begin compiling upside and downside volume statistics with his proprietary Buying and Selling Pressure Index. In 1968, Joe Granville introduced a fresh look at price and volume in his original indicator called **On Balance Volume Indicator**. His OBV indicator was basically a cumulative moving average of the daily net up volume/down volume decline line. Several years later, Williams, Bostian, and Chaikin offered significant modifications to Granville's up/down volume concept. With the arrival of mainframe computers, Laslo Birinyi began monitoring daily trade by trade, up-tick, down-tick, and price/volume metrics on individual listed stocks. For the first time, Portfolio Managers (PM) could create a picture of the daily flow of money into and out of a number of individual large capital listed stocks.

[1] Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Money_flow (January 21, 2010).
[2] Dormeier, Buff, 2008 Summer / Fall Issue 65, Price & Volume, Digging Deeper, *Journal of Technical Analysis*.

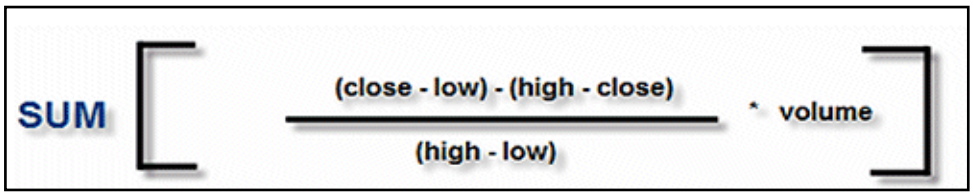
A. Larry Williams and Marc Chaikin

In the mid-80's Larry Williams arrived on the scene as a world class Futures trading champion and publisher of a number of best-selling trading books. His 1986 book, **Secret of Selecting Stocks**, Williams introduced the Accumulation/Distribution Index (A/D Index). Recently, the author of this paper corresponded with Mr. Williams:

> "In 1966 while in Monterey California, I was exposed to Granville's **On Balance Volume Indicator** but I had some frustrations with it. I was bothered to see all the volume for the day given to a stock, even if the stock was only up one tick for the day, was added to the cumulative total that really mattered in my calculation was the change from the Open of the day to the Close of the same day. With that notion, I devised a formula of ((close – open) * 2) (daily range * volume) thus giving us a percentage of each day's volume to put into a cumulative line. That worked better than all the other approaches tried." [3]

In his research, Williams treated volume and price equally. His Accumulation/Distribution Index Line was a momentum indicator concerned with the location of daily closing price, relative to its mean average daily price, then applying that ratio against each day's total trading volume. His A/D Index indicator was based on the premise that only a certain percentage of each day's total volume should be considered positive volume or Money Flow. The percentage determined by how high in the day's trading range the stock closed, in relationship to its mean average price. The stock's day-to-day net price change was **not** taken into consideration in the construction of his daily technical indicator.[4]

Williams created his A/D Index for short term trading only with the intention to isolate those stocks that were recording positive and negative money flow volume days.



Equation 1 - Williams A/D Index Formula

[3] Williams, Larry, Sept. 7, 2008, e-mail interview.
[4] Williams, Larry, 1986, The Secret of Selecting Stocks for Immediate and Substantial Gains, Second Edition, (Brightwaters, NY: Windsor Books) 32-35, 96-99.

Technicians generally embraced the concept that expanding volume is the fuel that powers rallies and contracting/diminishing volume is a sign that traders are hesitant or reluctant to commit additional investment dollars. In order to test this concept, overlays of Williams' Daily Net cumulative A/D Index Line were run parallel with daily stock prices to see if these independent factors correlated (trended in the same direction). Apple Inc.'s daily multi-year chart demonstrated a strong relationship between rising cumulative daily A/D Index Line and price dating back to April 2002. Apple's cumulative daily A/D Index Line began a strong positive rising trend as early as May 2003 when the stocks was trading at a (price split-adjusted) $7.00 per share. The A/D Index Line began to accelerate never breaking its rising trend line even during the 2007 - 2009 Cyclical Bear Market, as price closed persistently above its mean average price into 2010 (positive divergence versus price). Divergences, either positive (declining price/rising A/D Index) or negative (rising price/declining A/D Index) were discovered to be a key feature of this indicator that can alert the trader of potential price trend change.

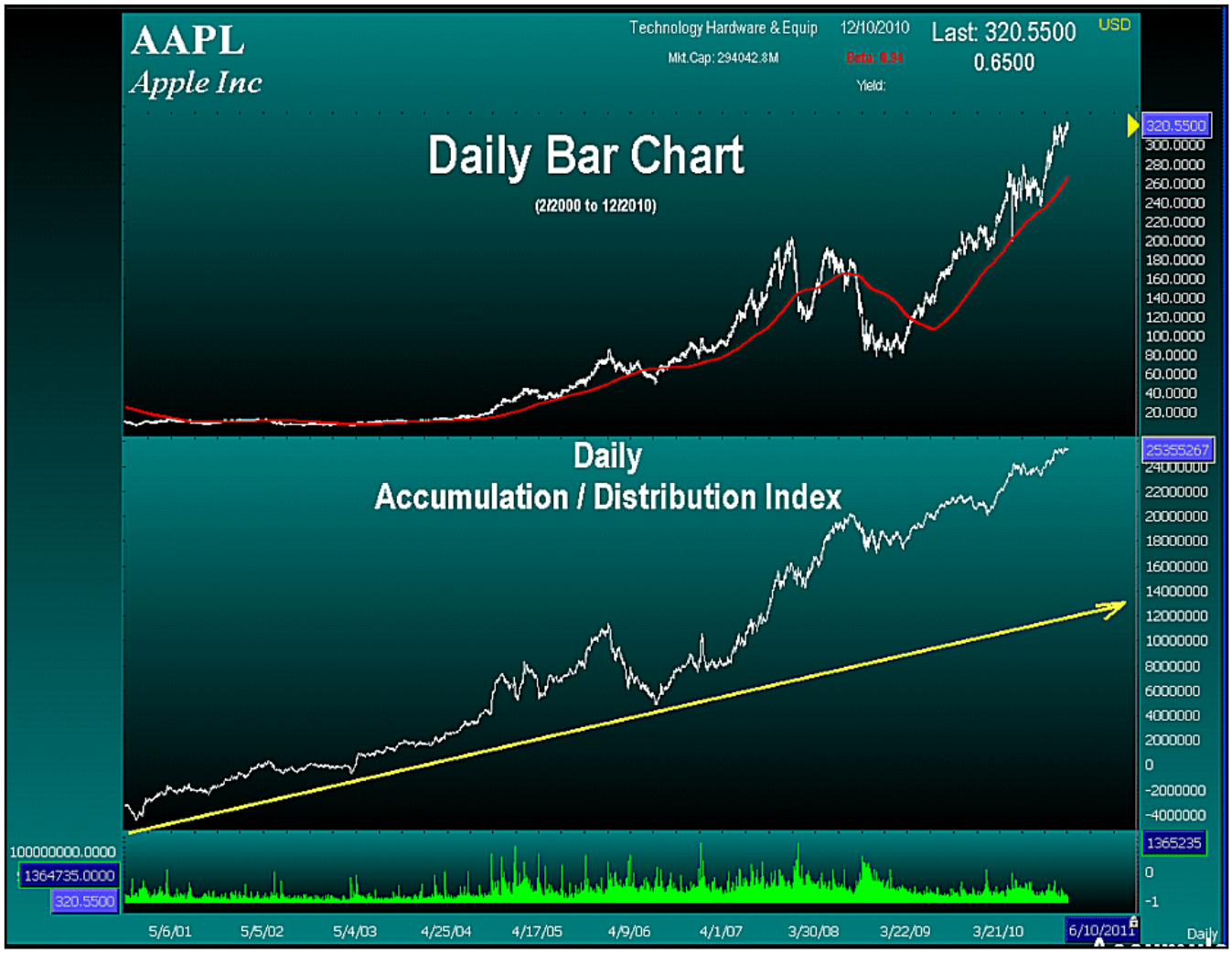


Figure 1 - Apple Daily Price with Daily Accumulation/Distribution Index (A/D Index) 2001 to 2010

In Figure 2, NutriSystem Inc. (NTRI) recorded positive daily price and A/D Index performance from January 2004 until July 2006, as price advanced +184.5% ($72.00 from $3.70). NTRI's cumulative daily A/D Index reflected strong persistent buying pressure (rising accumulation) until January 29, 2007 (at $57.84), when the daily A/D Index Line was suddenly broken and the daily index values began to turn negative. The Index remained persistently negative into March 8, 2008, as the price dropped -79.2% ($57.84 to $12).

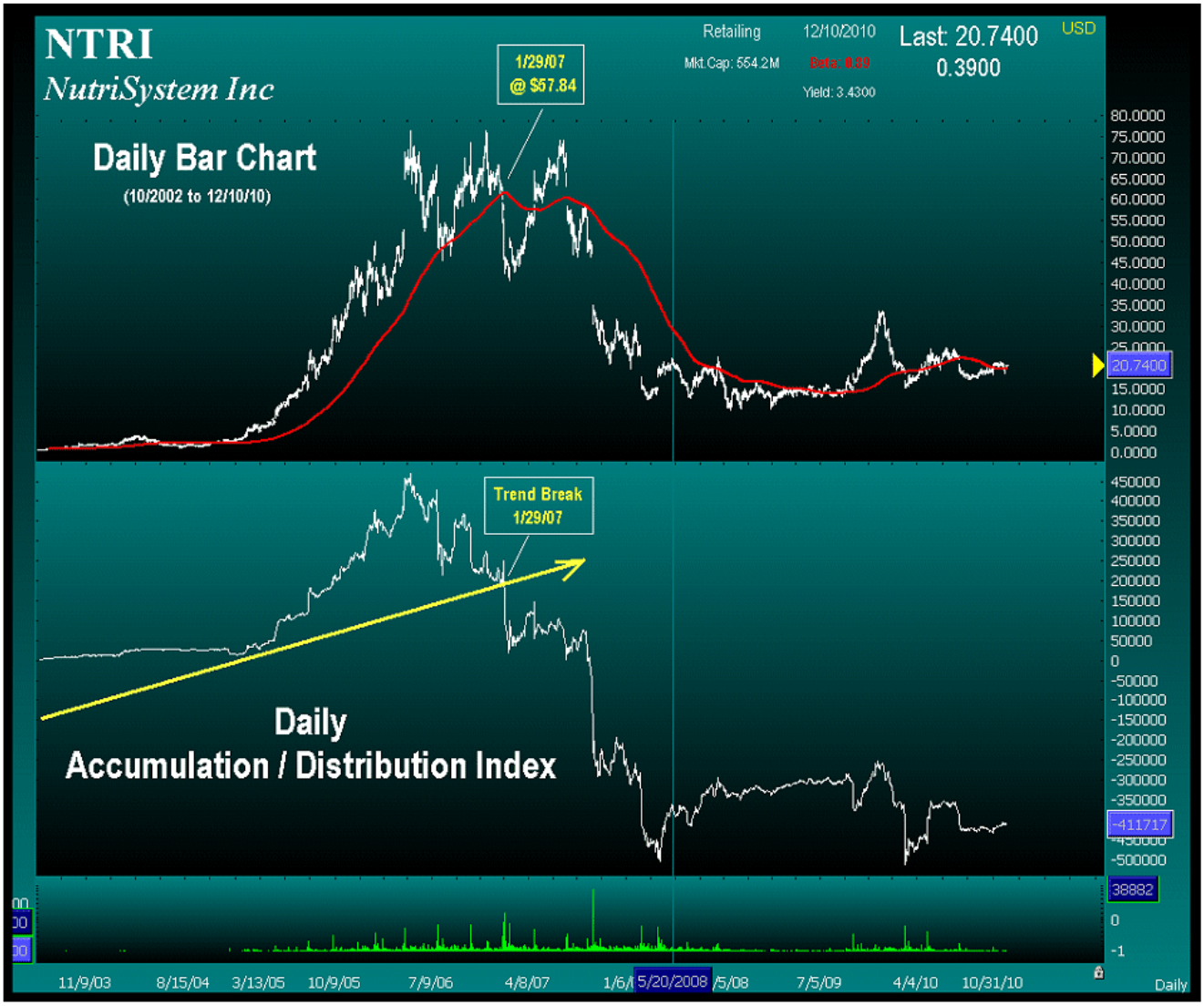


Figure 2 - NTRI and its Daily Cumulative A/D Index 2005-2008

B. Chaikin Money Flow

Inspired by William's discoveries, Marc Chaikin created a number of price/volume indicators for short-term trading. Several were modifications of the original A/D Index volume studies. Chaikin's real contribution was in de-trending the daily A/D Index Line into a daily oscillator which indexed the value of each stock's daily A/D Index, summed over the previous 21 trading days into one daily cumulative data point. The number was then divided by the sum of the volume for the same 21-day period.

$$\text{SUM}\left[\frac{(\text{close} - \text{low}) - (\text{high} - \text{close})}{(\text{high} - \text{low})} * \text{volume}\right]_{\text{Sum(Vol, 21)}}$$

Equation 2 - Chaikin Money Flow Formula

Chaikin Money Flow oscillator permitted the Portfolio Managers to rank, screen, and analyze each stock's oscillator from best to worst (daily and weekly), multiple stocks with disparate market capitalization, and daily trading activity. Daily net Money Flow Oscillator metrics of 20 days and longer provided an effective technical/quantitative method of ranking and screening short term buying and selling pressure on any listed security. The timely arrival of the personal computer allowed for rigorous technical/quantitative ranking and screening analysis of a large equity database in just minutes. [5]

Figure 3 - Strayer Education Inc. with Williams A/D Index and Chaikin Money Flow Oscillator
Teaming the Daily A/D Index with the daily Chaikin Money Flow Oscillator successfully captures important intermediate term trend change in price.

[5] Wilkinson, Chris, 1997, Technically Speaking (Traders Press, Inc., Greenville, SC).

II. Money Flow - New Research - Long term Investment Application

In 1988, the author formed a sell-side technical research boutique with Marc Chaikin to design and market personal computer technical trading systems for institutional portfolio managers and trading departments. This technical trading platform was called the Bomar system and featured the Williams Cumulative A/D Index and the Chaikin 21-unit Money Flow Oscillator. Computer software programs assigned numerical values to the daily money flow oscillator for every stock in the database. Real-time observations from 1988 to 1992 clearly demonstrated that in trending markets, the best price performance (one to three months) came from those stocks recording persistently positive daily Money Flow Oscillator. Equally important, stocks with little or no positive daily Money Flow Oscillator days (below 0%) for 21 days and longer produced negative price performance. During September 2007 - March 2009 Bear Market, Financial Service companies dominated the bottom ranked money flow stocks in the S&P 500. Figure 4 is a snap shot of the bottom ranked (negative) money flow stocks from the S&P 500 (Fannie Mae- FNM: $43), Ford Motor (F: $6.97), General Motors (GM: $27.68), Torchmark (TMK: 60.99), and Wells Fargo (WFC: $31.76), etc.,

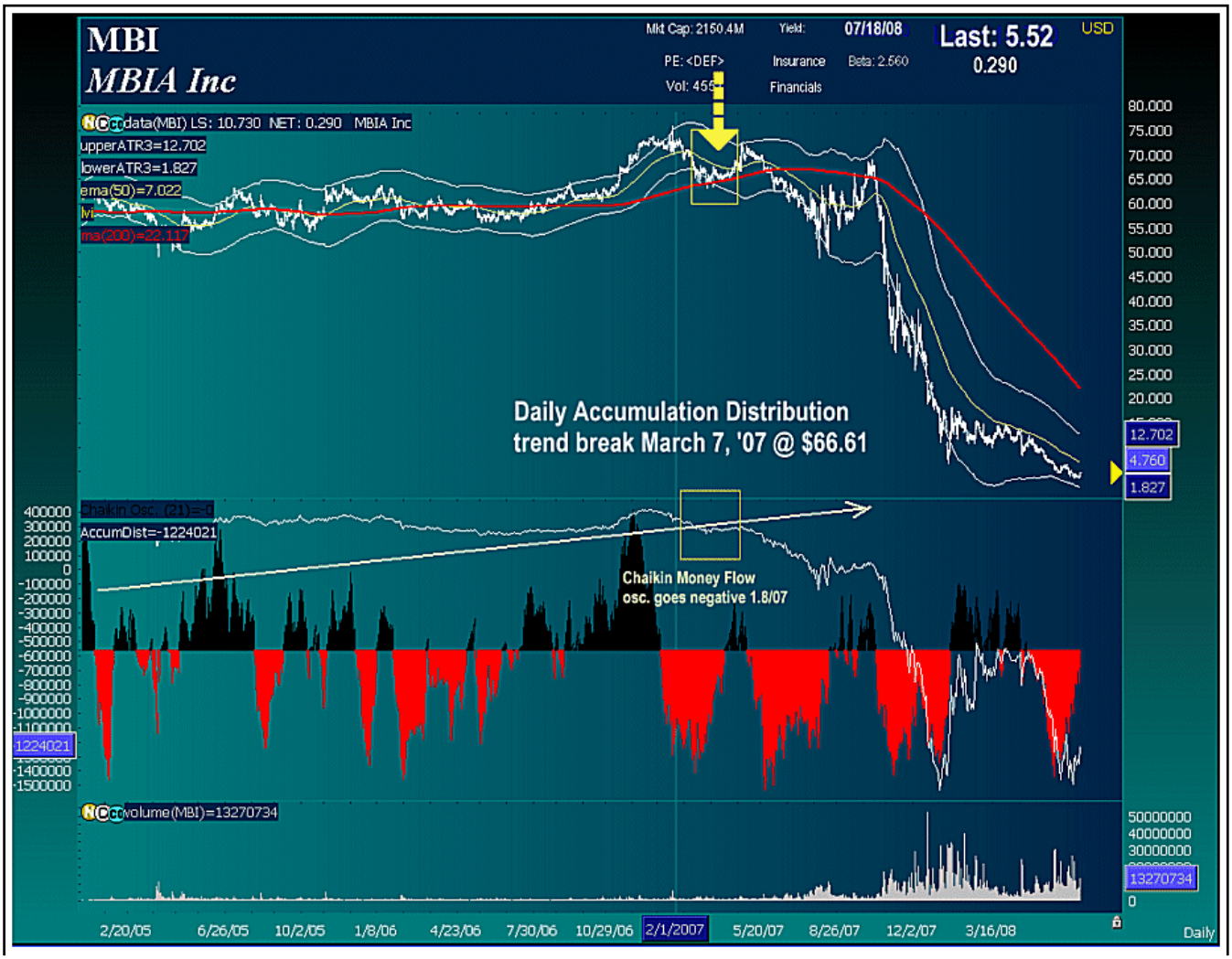


Figure 4 - MBI - Daily Cumulative A/D Index Line and Chaikin money flow Oscillator 2005-2008

MBIA Inc. (MBI) was yet another large capitalization financial service company that recorded persistently negative daily Money Flow Oscillator (below 0%) from March 7, 2007 until July 2008. During this 16 month time frame, MBIA's closed persistently below its mean average price with the closing price collapsed at -96.2% (from $66.61/share) and bottoming Feb. 28, 2009 ($2.51/share).

The working premise of this paper is persistently positive Money Flow Oscillator ranked stocks will outperform their peer universe when in definable, up trending market, and persistently negative money flow ranked stocks will under-perform. A very effective method in identifying positive price performance stocks early in the stock's price advance is to use both the daily A/D Index and Money Flow Oscillator for mutual confirmation. This can be seen in the Figure 5 for Synnex Corp (SNX), where both daily cumulative A/D Index and Money Flow Oscillator were collectively positive from December 15, 2008 until October 6, 2009. During this 10 month period, the stock price appreciated +237% (from $8.86/share to $29.89) recording persistently positive daily money flow oscillator.

Figure 5 - SNX - Cumulative A/D Index Line and Chaikin Oscillator Daily Chart 2007-2008

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A. Money Flow Persistency - New Discoveries

While the Chaikin Oscillator was valuable for short-term multi-stock comparison purposes, the 21-unit-oscillator produced excessive volatility and high turnover. In order to reduce volatility for the Institution Investor, the daily Money Flow Oscillator needed to be optimized (lengthened) from 21 (default setting) to a longer look-back period and still retain its predictive price forecasting value (positive Information Coefficient (I. C.) scores.[6]

The author ran a number of optimization simulations ranging from 30 - 125 trading days and found the 90-unit Money Flow Oscillator produced the lowest volatility yet retained the best Information Coefficient (I. C.) scores.

$$E = 90 \text{ unit } \left[\frac{(CLOSE-LOW) - (HIGH - LOW)}{(HIGH - LOW)} * Volume \right] \text{ (Esq. 3)}$$

$$\frac{}{E \text{ SUM (Volume 90)}}$$

Equation 3- Revised Money Flow Formula

[6] Investopedia explains Information Coefficient - I.C. The information coefficient follows the same measurement rules of correlation. Scoring ranges on a scale from 0 to +1, where the latter shows a strong linear relationship between the predicted and actual values. Analysts with an IC score near +1 exhibit great skill in forecasting. A score close to 0 reveals that the analyst is a poor forecaster.

B. Performance of Top Ranked Persistently Positive Money Flow (90-unit) Stocks:

The next step was to determine the ideal or best **Persistency Factor** - the number of trading days the 90 unit Money Flow Oscillator remained positive. Five separate investment simulations were run utilizing the 90-unit Money Flow Oscillator to determine the ideal number of positive oscillator days would produce the most attractive investment returns. Six money flow persistency simulations were run based upon 7, 21, 60, 90, 130, and 220 trading days. The actual number of days 90 unit Money Flow Oscillator remained positive. Six Portfolios were created from the S&P500 universe, any stock that persistently scored 90-unit Oscillator every day (+80% or greater) for a number of days tested. Each portfolio was created from these top ranked names and re-balanced each week for 17 years (1992 - 2009). Stocks that dropped below the +80% threshold were sold with the proceeds reinvested into the remaining top quintile stocks. Market timing was not employed during these simulations and yearly investment returns were calculated and compared against the unmanaged, capitalization weighted S&P 500, thereby following a traditional long term, institutional buy and hold investment strategy.

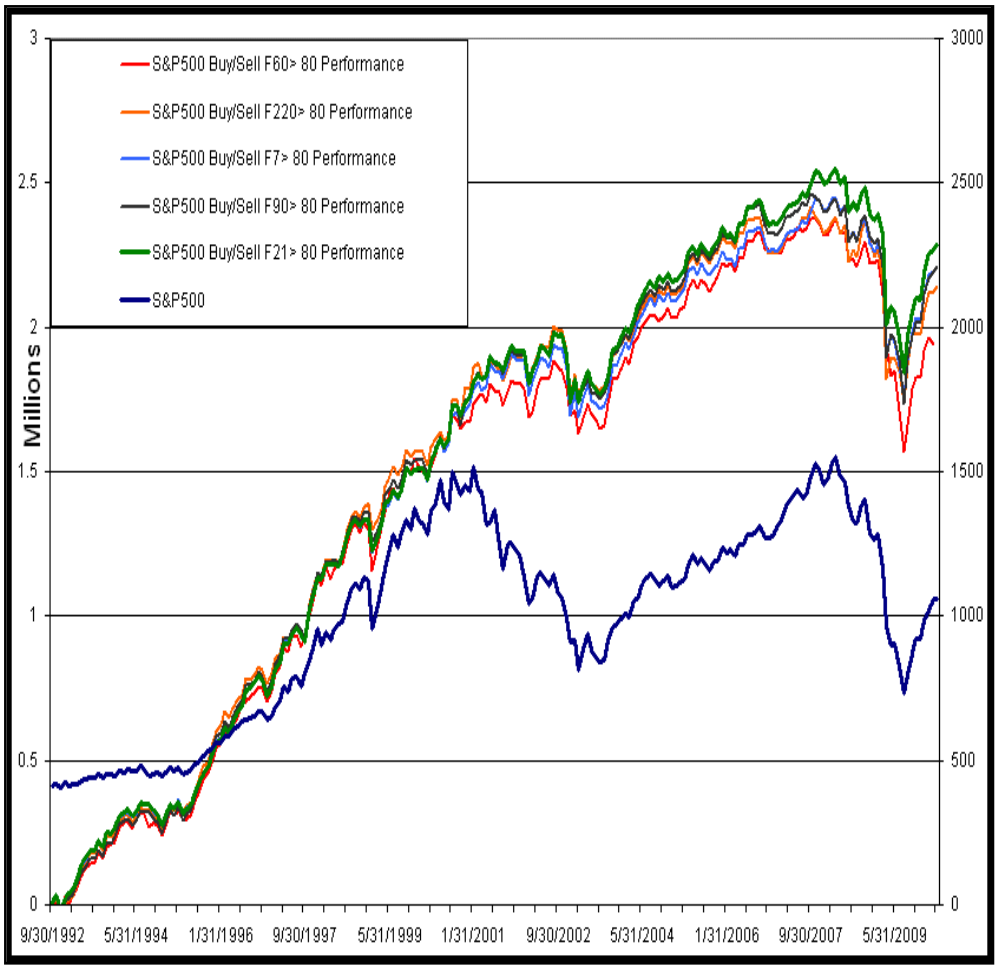

Figure 6 - Investment Simulations of Top Quintile Money Flow Stocks from S&P 500 from 1992 to 2009

Performance returns were calculated based upon the use of six persistency look-back periods. The 17-year simulations produced investment returns that ranged from +12.7% to +13.48% average annual returns. The 21-day look back produced the best yearly investment return of +13.48% per year versus the unmanaged SP 500 at +8.77% per year. Investment results for each of the seven simulations were termed the persistency factor. The 21-unit persistency factor of a 90-unit Money Flow Oscillator out-performed the unmanaged S&P 500 Index by an average +**471 basis points** per year (+13.48% vs. +8.77%).

Because of survivorship bias, investment returns from bottom ranked money stocks were not included in this study due to a significant number of bankruptcies and mergers that occurred over this 17-year study.

C. Money Flow Persistency Studies

In 2009, the 90-unit Money Flow persistency studies were presented to several quantitative investment managers. Their prime interest was knowing at what point in a typical stock market cycle, top quintile Money Flow persistency rankings had a positive correlation with the overall equity markets and when and what point did the persistency factor inversely correlate with positive investment returns. In response, the Spearman Ranking Correlation study was utilized using the 21-day persistency ranking of the 90-day Oscillator from the S&P 500 on a weekly basis for the past 17 years (1992 - 2009). The study found Money Flow persistency ranked scores from 80% to 100% were positively correlated to weekly closing prices when the equity market was in a rising, intermediate, and long-term advance with the S&P 500 index trading greater than its own 200-day simple moving average. The model inverted when the markets were late in a cyclical advance in the early broadening, topping phase, and especially when the S&P 500 index crossed below its own 200-day simple moving average.

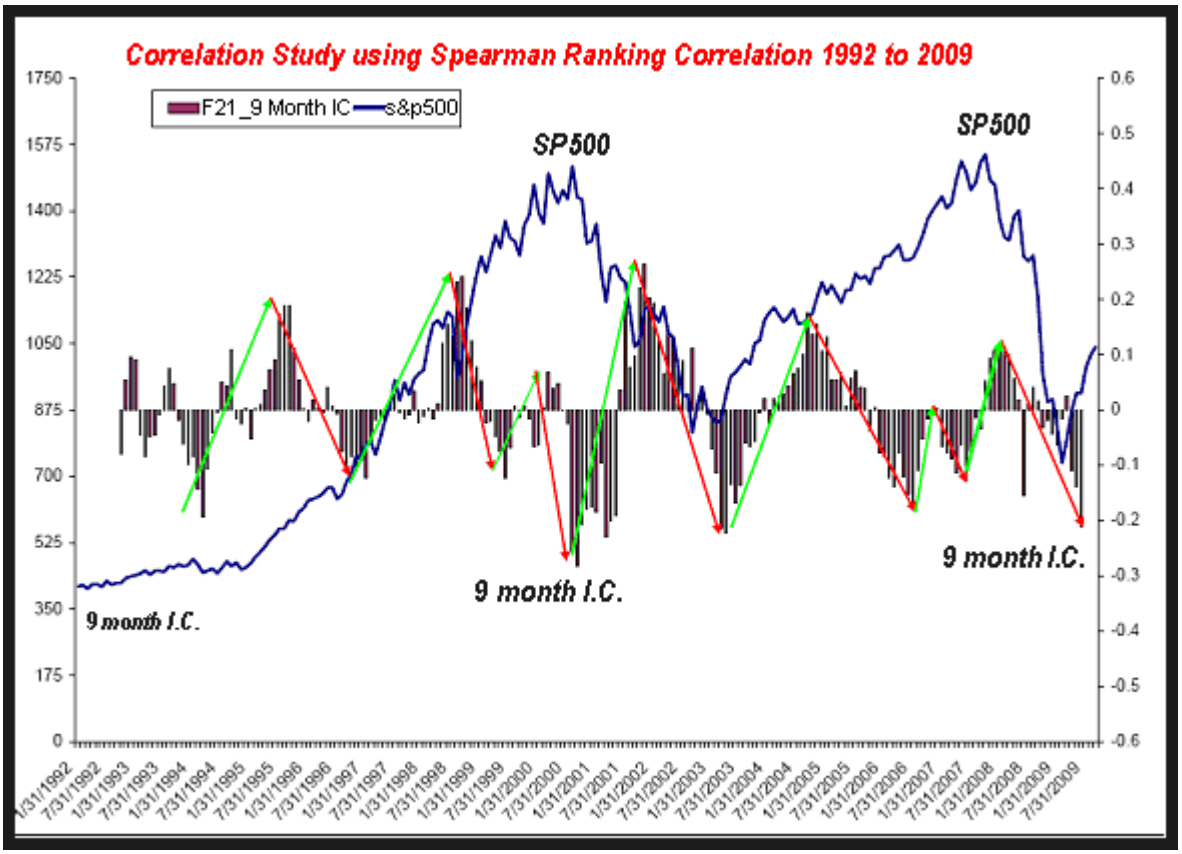

Figure 7 - Correlation Study Using Spearman Ranking Correlation, 1992 - 2009

Figure 7 shows the histogram plotting of the 21-day persistency ranking of the 90 day Money Flow with a 9-month cross-sectional Spearman Rank Correlation with an overlay of the weekly S&P 500. When the histogram is positive, the top quintile money flow stocks recorded positive correlations to future positive investment returns with a 9-month forward holding period. When the histogram turned negative, positive investment returns were coming from the bottom quintile ranking scores. This meant the Money Flow model had inverted with bottom quintile ranked stocks producing the best relative price performance and the top quintile ranked stocks producing inferior price performance. When analyzing these correlation studies, the portfolio manager s should look to identify when the money flow histogram reaches extremes, in order to anticipate potential model turning points, and to identify when the model

turns negative and inverts. Investors can promptly adjust their portfolios defensibly by significantly reducing all long exposure in the top quintile ranked names and hedging volatility with increased cash.

The top quintile ranked stocks in this model will record positive correlation to future positive investment returns when:

- ✓ The I. C. values reach trough levels and turn up, which occurs early in a cyclical rising Bull Market advance - January 1994 - July 1995; January 1997 - August 1998; September 2000 - December 2001; and March 2003 - October 2004.

- ✓ The market is nearing the end of the market cycle advance and I. C. values are positive but beginning to contract - July 1999 - March 2000 and July 2006 - February 2008.

- ✓ **When the model inverts**, top quintile persistently positive Money Flow stocks begin to record negative I. C. values (below 0.10).

- ✓ Late in the economic cycle and at the end of a cyclical Stock Market advance positive I. C. values begin to contract (below 0.10) November 1995 - September 1996; September 1998 - August 2000; and November 2004 - July 2006.

- ✓ In a protracted market decline, expanding negative I. C. Values: January 2002 - February 2003 and March 2008 - November 2009. The key to this analysis is for the Portfolio Manager to correctly identify the Money Flow histogram extremes.

This Money Flow persistency model can be positively or negatively correlated to future investment returns. The Portfolio Manager must determine when the 9-month information coefficient is recording peak or trough readings and when these values are contracting or expanding, thereby taking appropriate defensive action. Top quintile Money Flow ranked equities will typically afford the best price performance early and mid-cycle in a typical cyclical stock market advance.

Over the seventeen-year study (1992 - 2009), the Spearman Correlation study correctly identified inflection points and dates when the Money Flow model produced positive investment returns, the dates when the model inverted, and when the top quintile Money Flow stocks began to record negative investment returns. During the model inversion, the PM should look to increase cash holdings while at the same time scaling back exposure by eliminating those top quintile ranked names. During cyclical market declines, bottom quintile stocks should record positive relative performance versus the entire equity universe, including the top two quartiles.

Over time, the Money Flow persistency model has proved to be an effective, disciplined method that can assist Portfolio Managers identify at what stage and cycle the stock market is in. It can also help optimize the best and worst possible stocks to utilize in a given universe. Lastly, this model can be used tactically to allocate the portfolio assets in order to generate excess alpha.

D. Ranking and Screening S&P 500 by Positive Money Flow Persistency

In order to analyze daily Money Flows for each stock in an extensive investment universe, separate spreadsheets were created. One spreadsheet contained the entire S&P 500 stock component universe, ranked in descending order of attractiveness - positive Money Flows (+80% to +100% = best) and (0% to 20% = worst). Look-back cells were created and labeled across the top of the spreadsheet to express, in percentage terms, the frequency each stock recorded positive Money Flows. The persistency periods ranged from 7 to 320 trading days. By counting the total number of trading days, the 90-day Oscillator remained positive (in percentage terms). The model could establish Money Flow persistency ranking factor for each stock, over six separate look-back periods. High benchmark requirements of +80% or greater allowed the investor to test the investment performance achieved from the top ranked names from 7-trading days to 320-trading days.

In Figure 8, the top quintile ranked S&P 500 is presented in descending order of a positive 90-unit Money Flow Oscillator. These stocks displayed persistently positive Money Flow scores based on a 7 to 60-day look-back. The list is led by Newmont Mining Corp (NEM) and Automation Inc. (AN). All stocks that score greater than positive plus 80% in all six columns were positioned at the top Money Flow-ranking list. As of June 30, 2009, the equal dollar universe of all S&P 500 stock components was up +5.3% year to date. The top quintile positive Money Flow stocks were up +17.44% equal dollar value in the same period. Bottom quintile ranked Money Flow stocks produced a negative -5.3% equal dollar weighted returns in the same six months.

S&P500 ~ Top List ~ June 30, 2009 — **17.44% Ave Gain Year to Date Top Quintile**

Symbol	Name	Close	F320	F180	F60	F45	F21	F7	OB/OS	Yr%09
NEM	Newmont Mining Corp	41.1	35	56	100	100	100	100	45	0.98
AN	Autonation Inc	17.4	46	49	100	100	100	100	56	76.11
OXY	Occidental Petroleum C	64.51	68	78	78	84	100	100	51	7.53
GPS	Gap Inc	16.41	37	40	100	100	100	100	53	22.55
PX	Praxair Inc	71.61	68	50	92	89	76	57	50	20.64
CSC	Computer Sciences Cor	43.94	74	76	100	100	100	100	60	25.04
AMZN	Amazon.com Inc	83.88	71	74	100	100	100	100	55	63.57
DRI	Darden Restaurants Inc	33.21	78	99	98	98	95	86	47	17.85
PBG	Pepsi Bottling Group In	33.67	44	77	100	100	100	100	63	49.58
HSP	Hospira Inc	38.45	66	71	100	100	100	100	66	43.36
RRC	Range Resources Corp	41.41	76	92	100	100	100	100	46	20.41
TJX	TJX Companies Inc	31.55	64	52	100	100	100	100	60	53.38
GR	Goodrich Corp	50.23	65	89	100	100	100	100	55	35.68

Figure 8 - Quintile Money Flow Persistency Top List Only

Historically, in up-trending markets, equal-dollar weighted list of persistently positive, top quintile positive ranked Money Flow stocks will out-perform the equal dollar weighted average from the same or similar stock universe. In cresting or cyclically declining markets, the actual number of top quintile ranked stocks will significantly contract and begin to record under-performance relative to its equal dollar weighted average.

E. Bottom Quintile Persistency Money Flow Stocks

Bottom quintile ranked Money Flow stocks score 0% to 20%, based upon each stock's 90-unit Money Flow Oscillator for the previous 21 days. These companies were expected to under-perform the equal dollar stock universe. This ranking list can be utilized by the Portfolio Manager to identify and eliminate low score Money Flow companies in order to evaluate and strengthen the overall health of the portfolio. Are the persistently positive Money Flow stocks expanding or contracting in percentage terms versus the overall investment universe? To what extent are the top quintile ranked stocks contracting and bottom quintile names expanding? This week to week ranking/screening analysis can provide the PMs with valuable and actionable information as to the well-being of the overall portfolio.

S&P500 ~ Bottom List ~ June 30, 2009 — **-5.17% Ave Loss Year to Date Bottom Quintile**

Symbol	Name	Close	F320	F180	F60	F45	F21	F7	OB/OS	Yr%09
WYE	WYETH	45.2	39	2	5	7	14	29	57	20.5
TGT	Target Corporation	39.34	25	5	7	7	0	0	50	13.93
CCE	Coca Cola Enterprises Inc	16.34	7	9	15	16	0	0	48	35.83
CF	CF Industries Holdings In	74.6	49	9	3	4	10	29	48	51.75
RSH	RadioShack Corp	13.92	13	16	18	13	5	0	54	16.58
CNX	CONSOL Energy Inc	34.15	37	21	3	4	10	0	46	19.49
BSX	Boston Scientific Corp	10.33	22	22	40	20	0	0	64	33.46
NE	Noble Corp	30.64	46	39	2	2	5	0	47	38.71
ODP	Office Depot Inc	4.57	3	0	0	0	0	0	57	53.36
FLR	Fluor Corp	50.93	41	5	15	20	43	57	56	13.51
THC	Tenet Healthcare Corp	2.76	0	0	0	0	0	0	50	140
ESV	ENSCO International Inc	34.91	49	26	17	11	24	0	49	22.97
FITB	Fifth Third Bancorp	6.9	10	16	12	16	33	57	53	-16.46
BTU	Peabody Energy Corp	30.04	37	20	18	11	0	0	48	32.04
SLM	SLM Corp	10.16	59	49	3	4	10	29	66	14.16

Figure 9 - Top Quintile Money Flow Persistency Bottom List Only

Quantitative managers frequently dismiss stocks that record extreme positive/negative ranking scores in multi-factor models as outliers (or "tails"). The author has strenuously argued that on the contrary, extreme top and bottom ranked Money Flow stocks are conveying significant fundamental investment information that the professional manager may not be aware. Armed with weekly money flow summaries, the manager can actively avoid negative bottom quintile ranked and dollar-cost average rising top ranked money flow names. Managers who have trepidation of buying late into a maturing up-trend can maintain a reasonably positive conviction level by monitoring these persistency studies for any signs of possible rank deterioration.

Citigroup Inc. (C) is a good example of how a Portfolio Manager could have avoided this stock in May 2007 ($54.20) and would have ultimately sold this stock outright by October 27, 2007 ($45.30) when the stock's A/D Index Line broke below its own rising cyclical up-trend line. The 90-unit Money Flow Oscillator remained negative for 21 months (May 2007 to February 2009) as the stock's price collapsed -93.4% (from $54.09 to $3.06).

Figure 10 - Citigroup's Negative Money Flow Line and Oscillator, 2007-2009

Contrast Citigroup's persistently negative Money Flow metrics (2007 - 2009) with Citrix Systems (CTXS) which began recording persistently positive daily and weekly money flows January November 2008 ($21.79).

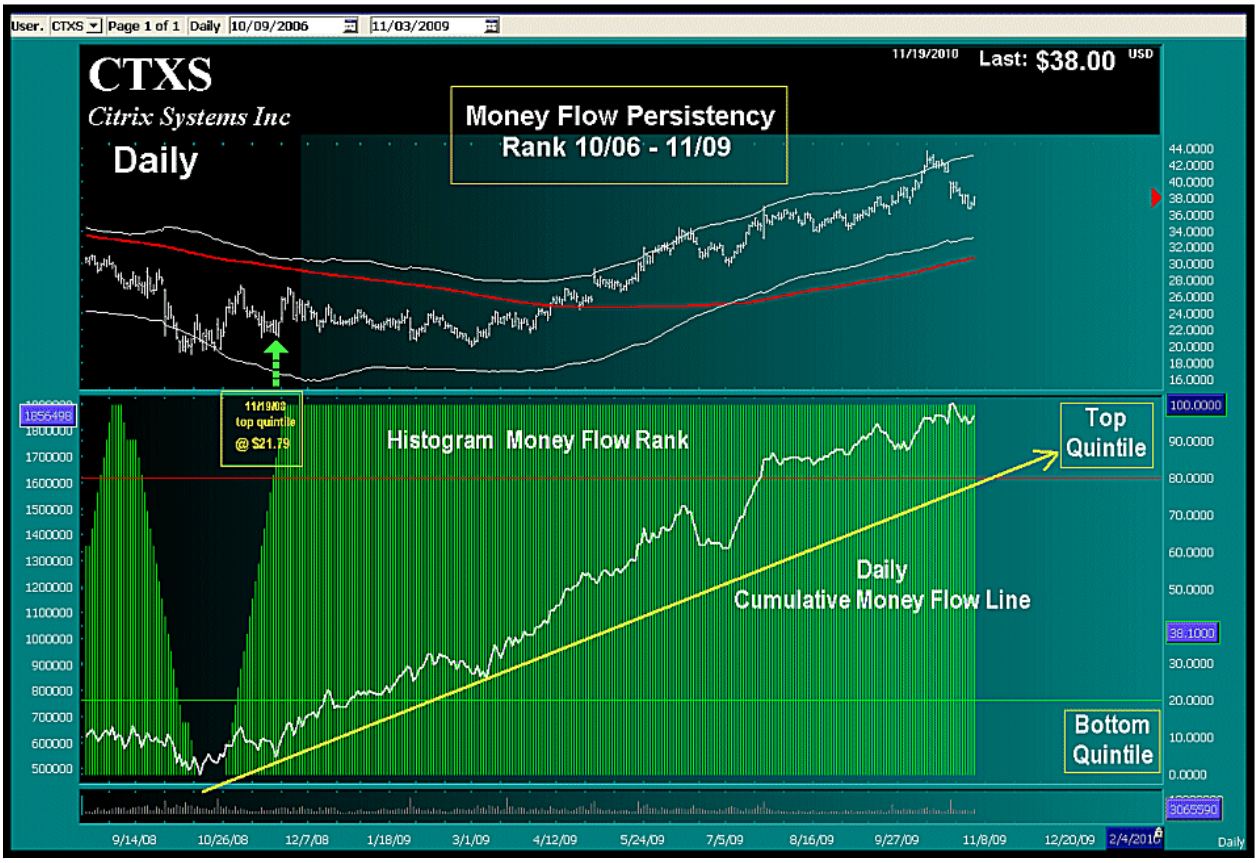

Figure 11 - Citxix System Inc. A/D index & Money Flow Persistency Rank, 2008-2009

Shown above is Citrix's histogram of number of trading days CTXS's 90-unit Money Flow Oscillator was greater than +80% positive), with its rising daily A/D Index Line. CTXS's oscillator scored perfect score (+100%) for 220 trading days while CTXS advanced +97.2% (from $21.79 per share November 2008 to $43.10 per share by October 2009). CTXS was clearly an outlier and gave PMs ample notice and enough time to accumulate (dollar-cost-average) the stock.

In Figure 12, the daily histogram of Priceline.com (PCLN) achieved top quintile ranking status on January 27, 2009 at $67.25 per share. PCLN remained in the top quintile Money Flow rank until October 2009. During that nine month period PCLN appreciated in value +166% when it closed at $179 per share on October 26, 2009.

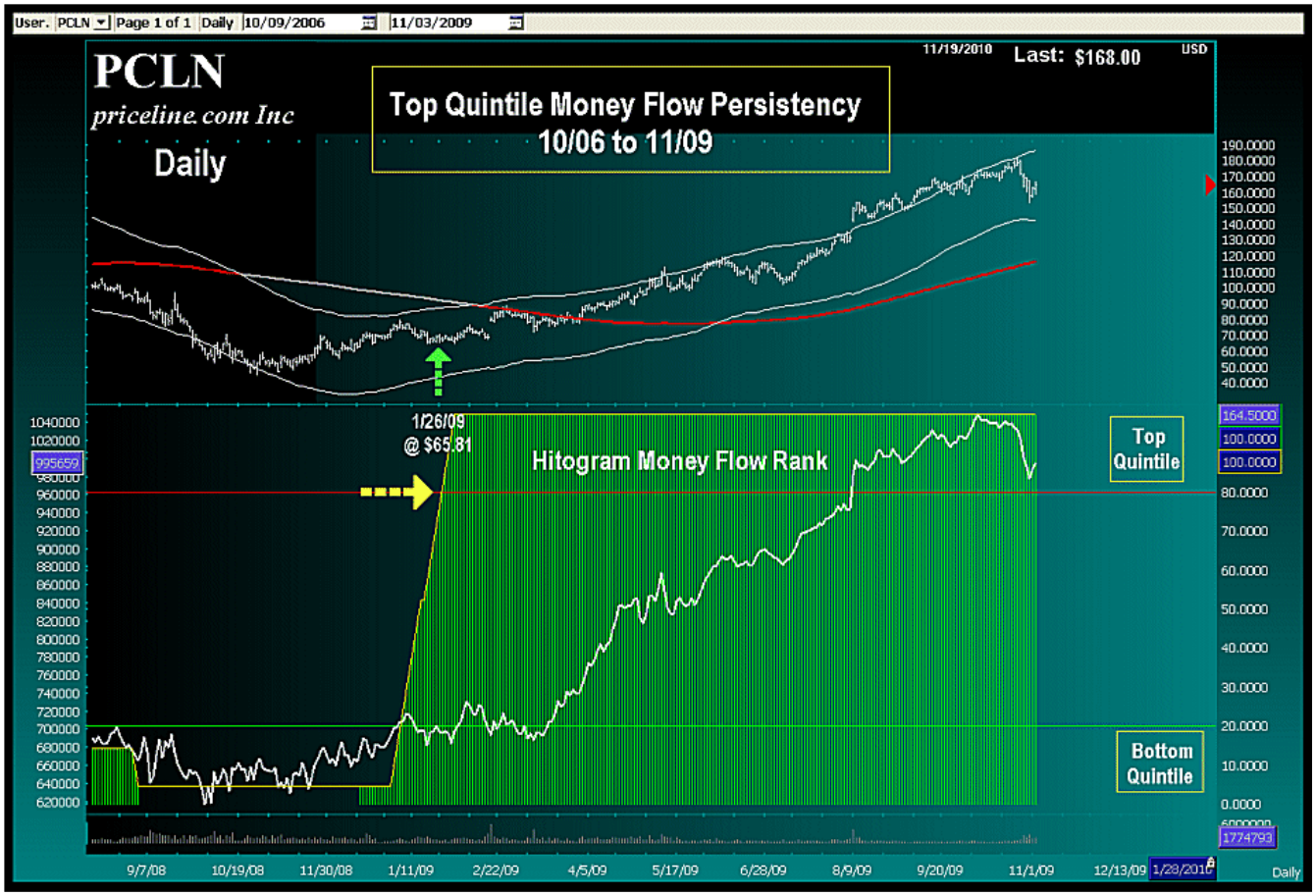

Figure 12 - Priceline.com and Top Quintile Money Flow Persistency Rank

IV. Money Flow Diffusion Index

A. Developing the Money Flow Persistency Diffusion Index

In late 1999, the percentage of stocks components that comprise the S&P 500 and Nasdaq 100 recording top quintile (> +80%), persistently positive Money Flows for 21-trading days and longer, began to dramatically contract. By March 2000, the percentage of top quintile ranked stocks dropped below 10%. During this same period, the percentage of Nasdaq 100 that ranked in the top quintile positive money flow dropped to zero. Clearly, the absence of strong Money Flow stocks was a red flag that the markets had developed a leadership vacuum from strong, top ranked Money Flow names, while the number bottom quintile negative Money Flow stocks was rapidly expanding

B. Comparative Study of the Money Flow Persistency Diffusion Index to the S&P 500

Figure 13 displays the Money Flow Diffusion study that plots the weekly percentage of stocks that comprise the S&P 500 that are recording positive 21-unit persistency of their positive 90-unit Money Flow Oscillator. At important market bottoms, such as October 2002 and March 2003, the weekly diffusion indexes declined below 30% and then turned back above 30%. In both instances, the diffusion recorded a series of positive divergences which were marked with a lower low in market price and a higher low in the diffusion index. March 2003 was the final market low in the 2000 - 2003 Bear Market and the beginning of the 2003 - 2007 Bull Market. During July - September 2007, the percentage of top quintile stocks also contracted to less than 10% for both the S&P 500 and Nasdaq 100. This contraction of top ranked money flow stocks and the expansion of bottom quintile names was again a clear warning that overall market risks were increasing. Armed with this information, Managers can adopt a more defensive investment posture for the investment climate that was soon to come. Managers can find valuable strategic and tactical information from these daily/weekly Money Flow Persistency screening metrics and the weekly Diffusion Index Studies.

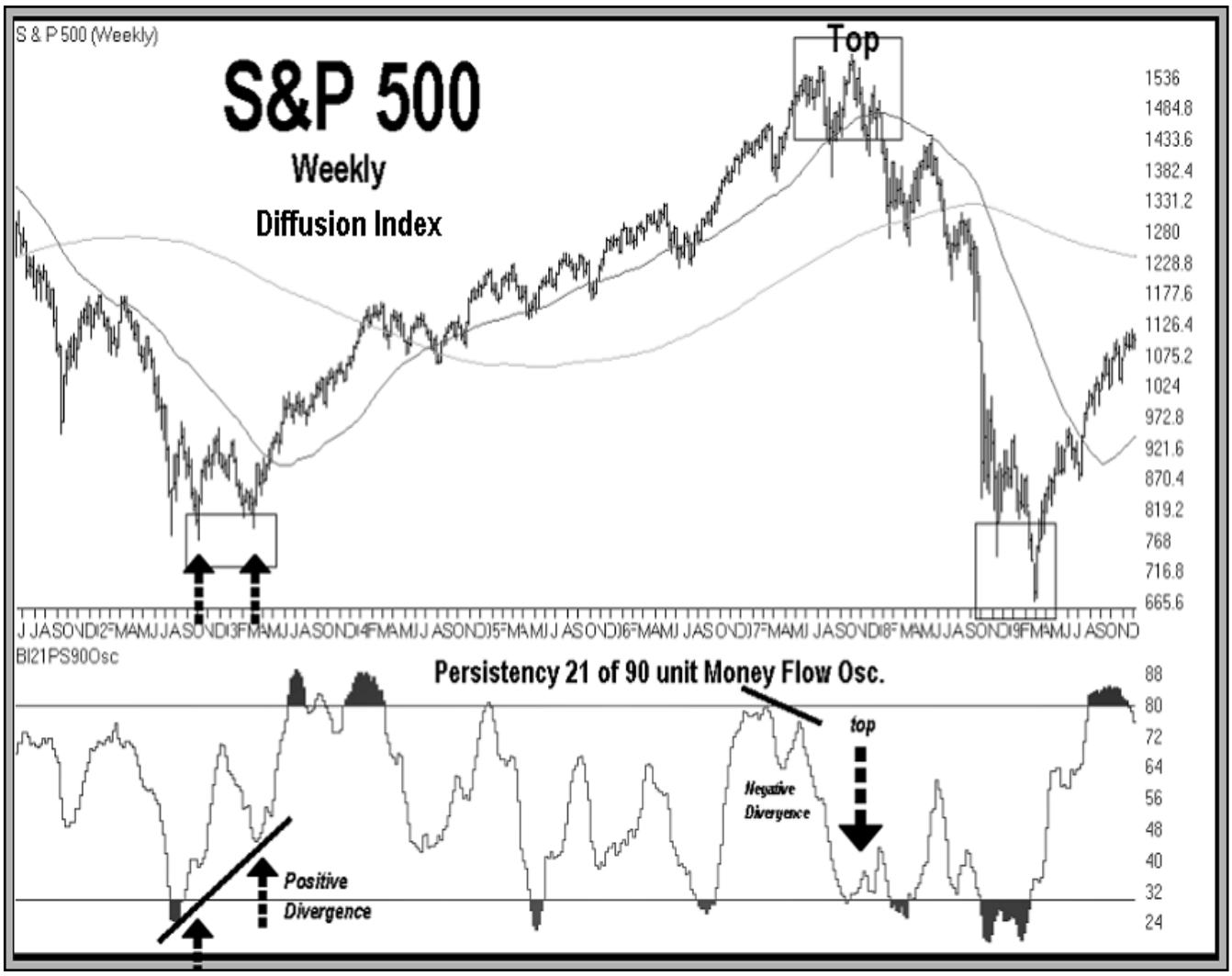

Figure 13 - S&P 500 Weekly Diffusion Index

Historically, the S&P 500 **Money Flow Diffusion** index tends to move in six definable stages. PM's can use these six index phases as a Strategic as well as Tactical investment guides.

1. **Accumulation Initial Thrust Phase** - (June 2003 - January 2004) occurs when after an extended market decline, top quintile ranked of a 90-unit Money Flow Oscillator on a 21 day look-back expands from a low level below +30% to +80% or higher. PM buys top quintile positive 90-unit Money Flow Oscillator stocks.

2. **Accumulation Expansion Phase** - (January 2004 - May 2006). The Money Flow persistency percentage number expands again to +80% or better and it is followed with a series of sequentially lower Money Flow persistency percentage peaks. Accumulate on weakness top quintile 90 unit Oscillator positive Money Flow stocks.

3. **Late Accumulation Expansion Phase** – (July 2006 - October 2007) Persistency score records last solitary expansion of 80%, followed with a sharp decline ranking scores with the overall market (S&P 500) closing sequentially higher. Scale back, underweight top quintile names, and increase cash.

4. **Final Topping Phase** – (December 1999 - March 2000 and July - October 2007). Market closes higher. Money Flow persistency diffusion index contracts (percentage-wise) with top quintile scores dropping below 70% total universe. Take profits, scale back top ranked names, and go to maximum defensive posture.

5. **Early Distribution Phase** - (March 2000 - May 2001 and January - March 2008) - actual percentage of top money flow persistency stocks contracts dramatically as market indices break their 200-day simple moving averages. Eliminate/underweight all top quintile Money Flow stocks. Go to maximum cash and hedge with inverse ETF's for maximum defense. Watch for bottom quintile ranked stocks to reach max negative percentage versus total universe.

6. **Late Distribution Phase** - (February - November 2002 and June - December 2008) Bottom quintile Money Flow ranked stocks slow their expansion and begin to bottom. Initiate nominal position in top Money Flow, relative performance ranked companies. Prepare to act on accumulation phase #l.

V. Conclusion

In researching Equity Money Flow, the author was actually surprised to find what little research had actually been written over the past seven decades on this important subject, but wanted at a minimum, give appropriate credit and kudos to the previous money flow findings from Granville, Williams, and Chaikin.

This paper wanted also to expand upon their findings and to optimize these metrics into a multi-factor model designed not for trading but for long-term ranking, screening, and stock selection (long and short). This paper created Money Flow diffusion studies from the weekly S&P500 stock component database to help the investor determine where he/she is at any given time in the overall stock market cycle. Diffusion studies were also employed to identify market extremes to determine the probability of the current price trend continuing or trend reversal. The predictive value of money flow persistency analysis was supported via our 17 year Spearman Ranking Correlation studies. In the hands of a disciplined Investment Manager, Money Flow Persistency Analysis can improve overall investment performance by providing actionable information, insight, and increased conviction which in turn, can empower the investor to make disciplined, sound and profitable investment decisions.

Appendix A – 17 Year Performance Look Back Period Studies

17-Year Performance - 90-Day Money Flow 7-Unit Look Back Period Summary				
Profit (Percent of Average Investment)		219.98%		
Average Profit per Period		1.05%		
Compound Average Profit per Period		0.93%		
Standard Deviation of Profit per Period		4.74		
Average Investment per Period		999992.71		
Final Equity		2208917.89		
Final Open Equity		999550.95		
Final Closed Equity		1209366.94		
Annualized Turnover		463.12%		
Total Number of Trades		227026		
Average Profit per Trade		9.73		
Maximum Drawdown		792563.97, March 2009		
Total Number of Shares Traded		949343		
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	157341.38	157341.38	962976.05	16.34%
1993	158479.89	315821.27	1000014.43	15.85%
1994	20482.68	336303.95	999995	2.05%
1995	330185.23	666489.19	1000001.47	33.02%
1996	244394.58	910883.76	1000008.57	24.44%
1997	259066.36	1169950.12	999991.46	25.91%
1998	222796.94	1392747.06	999984.32	22.28%
1999	213412.12	1606159.19	999997.03	21.34%
2000	265724.34	1871883.53	999994.12	26.57%
2001	24447.17	1896330.7	1000015.7	2.44%
2002	-150235.56	1746095.14	1000000.26	-15.02%
2003	300116.23	2046211.37	999982.05	30.01%
2004	165877.57	2212088.94	999918.42	16.59%
2005	60342.8	2272431.74	999998.47	6.03%
2006	61606.79	2334038.53	1000012.16	6.16%
2007	87808.53	2421847.06	999927.55	8.78%
2008	-475314.23	1946532.83	1000035.27	-47.53%
2009	262385.06	2208917.89	999982.51	26.24%

17-Year Performance - 90-Day Money Flow 21-Unit Look Back Period Summary				
Profit (Percent of Average Investment)			227.49%	
Average Profit per Period			1.08%	
Compound Average Profit per Period			0.96%	
Standard Deviation of Profit per Period			4.80	
Average Investment per Period			1000001.60	
Final Equity			2282339.67	
Final Open Equity			999886.21	
Final Closed Equity			1282453.45	
Annualized Turnover			345.24%	
Total Number of Trades			209879	
Average Profit per Trade			10.87	
Maximum Drawdown			807903.25, March 2009	
Total Number of Shares Traded			7521718	
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	160902.39	160902.39	962946.99	16.71%
1993	160236.25	321138.63	999999.9	16.02%
1994	13434.51	334573.14	999997.98	1.34%
1995	332722.12	667295.25	1000015.06	33.27%
1996	237542.38	904837.63	1000024.39	23.75%
1997	268962.58	1173800.22	1000011.56	26.90%
1998	231232.27	1405032.49	999980.48	23.12%
1999	208220.56	1613253.05	999989	20.82%
2000	289490.76	1902743.81	999996.83	28.95%
2001	33717.51	1936461.32	1000024.6	3.37%
2002	-134908.96	1801552.36	1000005.14	-13.49%
2003	304945.27	2106497.63	999974.4	30.50%
2004	174500.87	2280998.5	1000032.33	17.45%
2005	80207.94	2361206.44	999990.98	8.02%
2006	67436.7	2428643.14	999997.16	6.74%
2007	93233.25	2521876.39	999971.67	9.32%
2008	-474167.64	2047708.76	1000019.12	-47.42%
2009	234630.91	2282339.67	1000011.26	23.46%

17-Year Performance - 90-Day Money Flow 60-Unit Look Back Period Summary				
Profit (Percent of Average Investment)			216.28%	
Average Profit per Period			1.03%	
Compound Average Profit per Period			0.9%	
Standard Deviation of Profit per Period			4.91	
Average Investment per Period			999991.44	
Final Equity			2169057.20	
Final Open Equity			999997.30	
Final Closed Equity			1169059.90	
Annualized Turnover			283.9%	
Total Number of Trades			184186	
Average Profit per Trade			11.78	
Maximum Drawdown			868235.49, March 2009	
Total Number of Shares Traded			6216651	
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	137541.9	137541.9	962951.78	14.28%
1993	167717.22	305259.11	999993.57	16.77%
1994	17431.14	322690.25	999987.25	1.74%
1995	354453.66	677143.92	999990.94	35.45%
1996	246282.6	923426.52	999985.65	24.63%
1997	253332.74	1176759.25	999984.75	25.33%
1998	260710.65	1437469.9	1000031.93	26.07%
1999	192127.58	1629597.49	999972.92	19.21%
2000	240529.95	1870127.43	1000038.01	24.05%
2001	45302.86	1915430.29	999977.19	4.53%
2002	-145231.9	1770198.4	999994.16	-14.52%
2003	307793.8	2077992.2	1000030.73	30.78%
2004	175194.53	2253186.73	1000047.51	17.52%
2005	82889.46	2336076.19	999980.39	8.29%
2006	59219.19	2395295.38	999951.51	5.92%
2007	15410.52	2410705.9	999959.56	1.54%
2008	-467587.18	1943118.72	999928.04	-46.76%
2009	225938.48	2169057.2	1000004.91	22.59%

17-Year Performance - 90-Day Money Flow 90-Unit Look Back Period Summary				
Profit (Percent of Average Investment)			220.61%	
Average Profit per Period			1.05%	
Compound Average Profit per Period			0.92%	
Standard Deviation of Profit per Period			4.92	
Average Investment per Period			1000001.58	
Final Equity			2209808.75	
Final Open Equity			999955.01	
Final Closed Equity			1209853.74	
Annualized Turnover			273.79%	
Total Number of Trades			170678	
Average Profit per Trade			12.95	
Maximum Drawdown			847265.24, March 2009	
Total Number of Shares Traded			589551	
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	132793.03	132793.03	962953.74	13.79%
1993	159435.68	292228.71	999999.85	15.94%
1994	21294.31	313523.02	999994.69	2.13%
1995	371263.57	684786.6	999988.64	37.13%
1996	237479.17	922265.76	1000002.17	23.75%
1997	258455.47	1180721.23	1000020.42	25.85%
1998	264469.85	1445191.08	1000025.13	26.45%
1999	175628.43	1620819.52	1000016.08	17.56%
2000	275726.41	1896545.93	1000012.4	27.57%
2001	37658.79	1934204.72	999995.17	3.77%
2002	-157576.41	1776628.31	1000004.42	-15.76%
2003	306014.4	2082642.71	999977.32	30.60%
2004	172664.13	2255306.84	999973.49	17.27%
2005	98219.14	2353525.98	999997.86	9.82%
2006	44075.57	2397601.56	1000006.83	4.41%
2007	22985.73	2420587.29	1000001.9	2.30%
2008	-462247.38	1958339.9	1000010.23	-46.22%
2009	251468.84	2209808.75	1000012.22	25.15%

17-Year Performance - 90-Day Money Flow 130-Unit Look Back Period Summary				
Profit (Percent of Average Investment)			229.93%	
Average Profit per Period			1.09%	
Compound Average Profit per Period			0.96%	
Standard Deviation of Profit per Period			5.00	
Average Investment per Period			1000002.36	
Final Equity			2304391.62	
Final Open Equity			1000371.76	
Final Closed Equity			1304019.86	
Annualized Turnover			244.64%	
Total Number of Trades			152839	
Average Profit per Trade			15.08	
Maximum Drawdown			805324.26, March 2009	
Total Number of Shares Traded			5200015	
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	135985.22	135985.22	962958.69	14.12%
1993	149861.03	285846.25	999997.34	14.99%
1994	35615.93	321462.18	999984.62	3.56%
1995	388727.39	710189.57	999989.34	38.87%
1996	228045.64	938235.21	1000033.99	22.80%
1997	270471.2	1208706.42	999991.11	27.05%
1998	294920.69	1503627.11	999987.68	29.49%
1999	180262.85	1683889.96	999997.58	18.03%
2000	314219.82	1998109.78	1000016.59	31.42%
2001	44950.67	2043060.45	1000006.7	4.50%
2002	-166329.52	1876730.93	999988.59	-16.63%
2003	295837.81	2172568.74	1000017.43	29.58%
2004	181014.55	2353583.29	999981.6	18.10%
2005	84728.91	2438312.2	1000005.48	8.47%
2006	24118.55	2462430.75	999986.82	2.41%
2007	40302.39	2502733.14	1000044.78	4.03%
2008	-477759.05	2024974.09	1000003.13	-47.78%
2009	279417.54	2304391.62	1000017.89	27.94%

17-Year Performance - 90-Day Money Flow 220-Unit Look Back Period Summary				
Profit (Percent of Average Investment)			213.57%	
Average Profit per Period			1.01%	
Compound Average Profit per Period			0.89%	
Standard Deviation of Profit per Period			4.86	
Average Investment per Period			1000001.26	
Final Equity			2138400.19	
Final Open Equity			1000338.64	
Final Closed Equity			1138061.56	
Annualized Turnover			214.29%	
Total Number of Trades			128210	
Average Profit per Trade			16.68	
Maximum Drawdown			774363.07, March 2009	
Total Number of Shares Traded			342903	
DATE	**P&L**	**EQUITY**	**INVESTMENT**	**RETURN**
1992	142863.63	142863.63	962966.41	14.84%
1993	161578.37	304442	999988.98	16.16%
1994	38799.29	343241.29	1000001.1	3.88%
1995	364982.8	708224.1	999991.82	36.50%
1996	215066.13	923290.22	999992.49	21.51%
1997	261124.47	1184414.69	1000011.98	26.11%
1998	297193.58	1481608.27	999977.33	29.72%
1999	154729.08	1636337.35	1000011.63	15.47%
2000	236825.32	1873162.67	1000002.87	23.68%
2001	66696.15	1939858.82	999984.27	6.67%
2002	-138339.66	1801519.16	1000029.03	-13.83%
2003	266365.28	2067884.44	1000022.04	26.64%
2004	178700.83	2246585.26	1000009.22	17.87%
2005	80765.81	2327351.08	999962.82	8.08%
2006	8427.27	2335778.35	1000010.44	0.84%
2007	20005.52	2355783.88	999997.69	2%
2008	-465229.47	1890554.4	1000022.18	-46.52%
2009	247845.79	2138400.19	1000001.69	24.78%

Appendix B - Limitations of Money Flow and Review of Obstacles for Analysis.

- ✓ Require daily high, low, close, and volume data for a minimum of 150-trading days for legitimate money flow and technical trend analysis.

- ✓ Money Flow can be positive/negative for extended periods without corresponding positive price appreciation or price contraction. Investors should always incorporate comparative relative performance ratio analysis on every stock for comprehensive technical evaluation.

- ✓ Investors should avoid Money Flow analysis on any/all equities or indices that do not have fully reported daily aggregate domestic trading volume or where the equity trades infrequently or sporadically (if daily trading volume is suspect, the Money Flows will be suspect).

- ✓ Avoid low priced stocks below $5/share or that trade infrequently as volume totals (Money Flow) can be distorted.

- ✓ All historical back-tested studies used in this report contain survivorship bias which tends to overstate returns. Every year there are a significant number of companies that cease to exist through exchange de-listing, mergers, acquisitions, going private, and bankruptcies.

- ✓ Avoid all American Depository Receipts (ADR), as the daily volume total is incomplete. Only a certain percentage of total global volume reported as domestic volume.

- ✓ Continuous (perpetual) futures contracts when used in money flow studies have only proxy volume figures, not actual daily contract volume.

- ✓ Not all market indices trade and therefore do not have volume (daily volume is required in order to compute daily money flow).