

A Review of Fundamental and Technical Stock Analysis Techniques

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Abstract

“Never fall in love with a stock, because it will never love you back.” The objective of this technical paper is to present the leading fundamental analysis and stock valuation techniques used by daily equity traders in the selection of stocks in actively traded equity portfolios. Daily equities traders use mostly technical charts and other instruments to recognize patterns that can advocate perspective activity without measuring a stock’s intrinsic value to make trading decisions. Chart analysis is devised to detect trades with highly expected probability outcomes by setting exact price targets. The purpose of this technical paper is to advocate the importance of fundamental analysis in the investment decisions of daily traders. Fundamental analysis is based on the critical comparisons of a stock’s intrinsic value to the prevailing market price. If the stock’s intrinsic value exceeds the market price, it makes sense for a fundamental investor/trader to buy the stock. This paper supports the idea that utilization of both investment techniques would lead into more successful investing decisions for equities traders.

Keywords: Stock analysis; Stock valuation; Market price; Traders

Fundamental Stock Analysis

Fundamental analysis is the cornerstone of investing. The biggest part of fundamental analysis involves delving into the financial statements and performing a quantitative analysis, this involves looking at revenue, expenses, assets, liabilities and all the other financial aspects of a company to gain insight on a company’s future performance. When talking about stocks, fundamental analysis is a technique that attempts to determine a security’s value by focusing on underlying factors that affect a company’s actual business and its future prospects. On a broader scope, fundamental analysis can be performed on industries or the economy as a whole. One of the primary assumptions of fundamental analysis is that the price on the stock market does not fully reflect a stock’s “real” value but in the long run, the stock market will reflect the fundamentals. The biggest criticisms of fundamental analysis come primarily from two groups the proponents of technical analysis and believers of the “efficient market hypothesis” [1].

Fundamental valuation

Fundamental analysts support that the individual equity securities and the stock market in its entirety have a fundamental “intrinsic value” that is concluded by analyzing present and prospective “earnings, cash flows, interest rates and risk variables” [2]. A company’s fundamental analysis determines a stock’s intrinsic value, the stock’s actual value contrary to the price it is traded in the stock market. Fundamental analysts buy overvalued stocks with an “intrinsic value” higher than the trading market value, cause fundamental analysis shows that the stock is valued higher than its traded price making it more pragmatic to buy the stock. Granted that there are various methods of pronouncing the intrinsic value, the supposition of all these methods relies on the belief that “a company is worth the sum of its discounted cash flows meaning that a company is worth all of its future profits added together”. Furthermore, these perspective gains must be discounted to account for the time value of money, that is, that present value of money available now is more worthwhile than the same amount in the future, due to its probable earning capability [3]

Qualitative Analysis -EIC Analysis

EIC analysis is an established approach to decide on which stocks to buy and it is the abbreviation for “economic, industry, and company analysis”. Complementing the economic analysis, all common stocks issued are subject to market uncertainty risks. Stock prices respond favorably to earnings growth, low inflation, increasing gross domestic products (GDP), and a less volatile market. Also, major sources of

uncertainty such as accounting frauds, the threat of war in the Middle East, economic crisis, and political scandals can force the market down. Also, the Standard & Poor 500 stock index is one of the U.S. Commerce department’s leading indicators of the U.S. economy that would assist policy advisors to make better judgements about monetary and fiscal policy since the stock market responds in precedence to a recession or economic growth [4].

Industry analysis provides pivotal conclusions about which industries will survive the anticipated economic situation. Porter suggested the competitive strategy analysis framework a standard approach to industry analysis. His five components of industry structure pertain (1) “the threat of new entrants”, (2) “the rivalry among existing competitors”, and (3) “the substantial threat of substitutes”, (4) “the buyer’s bargaining power and supplier’s bargaining power. A financial analyst by considering each one of the five-mentioned elements can appraise more efficiently the industries responses to the prospective economic environment. After deciding which industries currently appear appealing, the subsequent act is proposing specific firms within the industry.

Quantitative analysis

In the United States, companies publicly offering securities for investment dollars need to file with the Securities and Exchange Commission (SEC) the following documents: (1) The 10-K annual report, which includes the audited financial statements, management discussion and analysis (MD&A) and schedules filed with the SEC within 90 days of fiscal year end, (2) The 10-Q quarterly report, which pertains the unaudited financial statement and MD&A filed with the SEC within 45 days of fiscal quarter, (3) The 14A proxy statement which includes the proposed actions taken to a shareholder vote, company ownership, executive compensation and performance versus peers (4) Registration statements for newly-offered securities,

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(5) Documents concerning tender offers (a tender offer is an offer to buy a large number of shares of a corporation, usually at a premium above the current market price) and (6) Filings related to mergers and acquisitions.

The average 10-K annual report is overfed with numerous footnotes, disclosures and adjusted numbers offered as alternatives to the recognized numbers contained in the body of the income statement and balance sheet requiring a really sophisticated reader to interpret them. Harper [5] in his article emphasized on the red flags aimed to isolate the fundamental operating performance of the business when analyzing financial statements. He affirmed the reader to remove two types of gains that may not be sustained. One type of gains not sustained include the non-recurring gains - these include gains due to the sale of a business, one-time gains due to acquisitions, gains due to liquidation of older inventory (that is, liquidation of the LIFO layer), and temporary gains due to harvesting old fixed assets, where lack of new investment saves depreciation expense.

The other type not sustained is gains due to financing - these are important because, while they are real gains, they are often random variables that depend on market conditions and they may be reversed in future years. The sources of financing gains include special one-time dividends or returns on investments, early retirement of debt, hedge or derivative investments, abnormally high pension plan returns (including an upward revision to expected return on plan assets, which automatically reduces pension cost) and increases to earnings or EPS simply due to a change in the capital structure, for example, an increase in EPS due to an equity-for-debt swap.

In regard to Harper's green flags, the key principle as far as financial statements are concerned is that it is important to see conservative reporting practices. In regard to the two most popular financial statements, the following implies conservatism: In the Income Statement: Conservative revenue recognition is shown by things like no barter arrangements, no front-loaded recognition for long-term contracts, a sufficient allowance for doubtful accounts (that is, it is growing with sales), the choice of LIFO rather than FIFO inventory costing method and the expensing of rather than capitalizing of R&D expenditures.

In the Balance Sheet conservative reporting practices include sufficient cash balances; modest use of derivative instruments that are deployed only to hedge specific risks such as interest rate or foreign currency exchange; a capital structure that is clean and understandable so those analyzing the statements don't have to sort through multiple layers of common stock, preferred stock and several complex debt instruments; and a debt burden that is manageable in size, not overly exposed to interest rate changes, and not overly burdened with covenants that jeopardize the common shareholders.

The Value Approach to Investing

There is a plethora of valuation techniques that fall into two general approaches reflecting the complexity and importance of valuing stocks, (1) "the discounted cash flow valuation techniques, where the value of the stock is estimated based upon the present value of some measure of cash flow, including dividends, operating cash flow, and free cash flow"; and (2) "the relative valuation techniques, where the value of a stock is estimated based upon its current price relative to variables considered to be significant valuation, such as earnings, cash flow, book value, or sales". Both of these approaches have several common factors such as

the (a) "the investor's required rate of return on the stock because this rate becomes the discount rate or is a major component of the discount rate", (b) "all valuation approaches are affected by the estimated growth rate of the variable used in the valuation technique such as dividends, earnings, cash flows, or sales and based on the efficient market hypothesis these variables must be estimated forcing analysts to derive to different stock valuations because they have different estimates for these critical variable inputs".

These two approaches of equity valuation should be used as appreciative, not competitive since they both depict "the present values of expected cash flows". The main diversity among the referenced techniques is how they measure the cash flow used. The easier measure of cash flow is dividends since these are evidently cash flows paid directly to the investor signifying that "the cost of equity should be used as the discount rate". The dividend technique is useful when considering valuation for a stable, mature business entity with an expected constant long-term growth. On the contrary, the dividend technique is laborious to execute to corporations that do not remit dividends throughout times of elevated growth, or that presently reward very limited dividends because they have high rate of return investments preferences attainable.

An alternative description of cash flow is the "operating free cash flow", which are cash flows after direct costs such as cost of goods sold, general and administrative expenses, working capital disbursements and capital expenditures needed for perspective growth. Since we are discussing the cash flows available for all capital provisions, the discount rate employed is the firm's weighted average cost of capital (WACC), a remarkably effective model when comparing firms with diverse capital structures because WACC's formula arrives at the firm's equity value after subtracting the value of the firm's debt obligations from the value of the total firm. The third cash flow measure is free cash flow available to equity owners, which is similar to the operating free cash flow but after payments to debt holders. Therefore, the appropriate discount rate is the firm's cost of equity. A possible challenge of these cash flow techniques is that they are very reliant on the significant inputs, which are (a) "the growth rates of cash flows" and (b) "the estimate of the discount rate". A trivial modification in either of these values can have consequential effect on the appraised value [6].

The Growth Approach to Investing

Growth stocks are not necessarily shares in growth companies. Growth stocks are stocks envisioned to transpire a higher rate of return than other stocks in the market with indistinguishable risk characteristics. The higher rate of return of growth stocks results because at some point in time the market undervalued it in correlation to other stocks. Although, the stock market corresponds to stock prices quickly to depict latest information, attainable information is not always perfect or precise. Accordingly, the use of faulty or incomplete information by most analysts may cause a given stock to be undervalued or overvalued at a point in time.

If a stock is undervalued when the accurate information becomes attainable, its price subsequently should increase to portray its true fundamental value. During the price adjustment period, the stock will be considered a growth stock since its realized return will surpass the required rate of return. A future growth stock can be the stock of any type of company, and not necessarily limited to growth companies since the stock need solely to be undervalued by the market.

If investors identify a growth company and discount its future earnings or cash flows correctly, the current market price of the growth

¹For the definitions of mixing and martingale, see Chapter 3 of White.

company's stock will reflect its future earnings or cash flows. Investors who purchase a growth company's stock at this correct market price will gain a rate of return coherent with the risk of the stock, even when the superior earnings growth is achieved. In several occasions, investors overvalue the estimated growth rate of earnings or mislead the growth period for the growth company and as a result over appraising the intrinsic value of a growth company's stock. Investors who pay the inflated stock price for a growth company will earn a rate of return subordinate to the risk-adjusted required rate of return, despite the fact that the growth company experiences above-average growth of sales and earnings. An analyst can adapt the Greenspan model for use with individual equity securities. The Greenspan stock value computes the ratio of a company's estimated earnings per share for the next 12 months to the current yield on a 1-year Treasury security. If this ratio is less than the current stock price, the security is overvalued. If it is more, the stock is undervalued.

Growth at a reasonable price (GARP) investing

Growth at Reasonable Price (GARP) is precisely a compound stock investment strategy that emphasizes the assortment of undervalued investments with anticipated continuous income growth in the forthcoming years. GARP investors integrate value metrics and individual judgment to decide on stock choices. GARP investors chase stocks of companies with estimated profits or income in the 10-20% range. Furthermore, Growth and GARP investors analyze the financial of corporations with predictable imminent-term growth and accord concentration to growth forecasts of corporations inside the same line of business.

GARP investors given that they are concerned about growth, apply the "P/E ratio valuation metric" as it allocates how income correlates to stock share prices. The P/E ratio can be assessed by "dividing the current share price by the earnings per share (EPS) price (P/E Ratio = Current Share Price / Earnings per Share)". A "P/E ratio in the 10-20% range provides more unbiased information for a GARP investor as it is less pricey and, less riskier than a stock with a P/E ratio of 25 or above which indicates an overvalued stock". Chasing stocks with lesser P/E ratios is also a stratagem of value investors. On the contrary, Growth investors choose stocks with higher P/E ratios because there are high anticipations the company will feature momentous growth.

GARP and growth investors also are concerned for corporations with a lower price to book (P/B) ratio. "The P/B ratio is used to gauge how much value the market actually places on the book value of the business in question and it is computed by dividing the current share price by the book value per share (P/B Ratio = Current Share Price / Book Value per Share), where Book Value per Share = Book Value (Assets - Liabilities) / Outstanding Shares". GARP investors look for a lower P/B ratio as it is inclined to reveal larger values. GARP investors specifically pursue corporations with a P/B ratio that is lesser than the standard for the industry since it designates a greater prospective for profit when the market rectifies itself and values the stock correctly.

While the P/B ratio is used to gauge the respective value of a corporation and assist conclude if its stock is under or overvalued the PEG ratio is another favorite valuation metric used by GARP investors to assess growth potential in relation to the value of the company. "It is calculated by dividing the P/E ratio by the projected growth in earnings of the company (PEG Ratio = P/E ratio / Projected Growth in Earnings). For the GARP investor, a PEG ratio of 1 or less is a good indicator that the company warrants additional examination. For example, a company with a P/E ratio of 15 and a projected growth in earnings of 25%, or 15/25 equals a PEG ratio of 0.6 and, would be considered a

good investment by most GARP investors. While a 1 or less is desired, companies with a PEG ratio of around 0.5 are considered better as they have good growth potential but, are also slightly undervalued - Growth at a Reasonable Price" [7].

Income Investing

Income investing is likely one of the simplest stock-picking accesses as it primarily centers on companies that give a fixed income. When investors think of fixed income they prevalently think of fixed-income securities such as bonds and, stocks of substantiated firms, which have attained an assured magnitude and are no longer competent to extend higher levels of expansion. These companies usually no longer are in rapidly ontogeny industries and so as a recourse of reinvesting retained earnings, mature firms cultivate to pay out retained earnings as dividends as a way to supply an income to their shareholders.

According to Doan [8] preferred stocks are appointed as fixed income securities. Fixed income preferred stocks pay out fixed yearly quotas as dividends in quarterly, monthly or semi-annual outflows and these fixed settlements generally do not deviate over the life-span of the securities. Preferred stocks reward an exact fixed amount that is clarified in the Prospectus consented to the inaugural buyers in the security's original public offering (IPO) when the security was first offered to investors. The perennial amount of the preferred dividend is characteristically declared as a percentage (the coupon rate) of the liquidation preference, which in general matches the initial price to the public. The formula for preferred dividend premiums is that the yearly dividend payment is uniform to the coupon rate multiplied by the liquidation preference amount. For example, "a preferred with a \$25.00 liquidation preference per share and an 8.25% coupon rate will pay \$2.0625 per share per year (\$25.00 times 8.25 divided by 100 equals \$2.0625). If the dividend is paid quarterly, the preferred will pay \$2.0625 divided by four or \$0.515625 per quarter per share. If you own 100 shares of the preferred, you will receive a quarterly dividend of \$0.515625 multiplied by 100 shares or \$51.5625 per quarter; or \$2.0625 multiplied by 100 shares or \$206.25 per year".

A good income investment on preferred stocks pertains familiarity with (a) "Credit Ratings, a factor to be considered when buying income securities is the Moody's and S&P credit ratings of the firm", (b) "Call Dates, an income investor should select securities with call dates that are three to five years in the future", (c) "Distribution Dates, select securities that pay on distribution dates that fit the income investor's schedule", (e) "Current Yield, only when potential income investments meet the above criteria should the income investor select income securities for the highest available current yield", and (f) "The IPO Prospectus, the prospectus, issued at the initial public offering (IPO), is essentially the legal contract between the investor and the issuer of the security. The prospectuses are online at the SEC EDGAR website".

CAN SLIM Investing

CANSLIM is a philosophy of screening, purchasing and selling common stock developed by William O'Neil, the co-founder of Investor's Business Daily. CAN SLIM is Investor Business Daily's (IBD) acronym for the seven common characteristics all great performing stocks have before they make their biggest gains. As described in Investors.com, each letter represented in the CAN SLIM acronym includes: "C = Current earnings per share should be up 25% or more and in many cases accelerating in recent quarters. Quarterly sales should also be up 25% or more or accelerating over prior quarters, A = Annual earnings should be up 25% or more in each of the last three years. Annual return on equity should be 17% or more, N = A

company should have a new product or service that's fueling earnings growth. The stock should be emerging from a proper chart pattern and about to make a new high in price, S = supply and demand. Shares outstanding can be large or small, but trading volume should be big as the stock price increases, L = Leader or laggard? Buy the leading stock in a leading industry. A stock's Relative Price Strength Rating should be 80 or higher, I = Institutional sponsorship should be increasing. Invest in stocks showing increasing ownership by mutual funds in recent quarters, M = The market indexes, the Dow, S&P 500 and Nasdaq, should be in a confirmed up trend since three out of four stocks follow the market's overall trend" [9].

CANSLIM's affluent investment strategy derives from its concentration to tangibles such as gains, as well as intangibles like a corporation's comprehensive determination and ideas. O'Neil accents the significance of selecting stocks whose earnings per share (EPS) in the latest quarter have increased on an annual basis. A corporation's EPS indicates a questionable percentage growth, but the CANSLIM system proposes no less than 18-20% growth recommending that fundamentally all of the high performance stocks indicate remarkable quarterly increases. Although, the 18-20% growth is a common practice, the genuinely staggering corporations generally exhibit growth of 50% or more. The "CANSLIM system robustly emphasizes to investors to recognize low-quality earnings figures that are not precise representations of company performance since companies are enticed to manipulate earnings and immediate superficial numbers as earnings figures". O'Neil claims that, once you verify that a company's earnings are of moderately good quality, it's wise for an investor to compare them with other companies' earnings in the same industry. Stable earnings growth in the industry supports the industry is prospering and the company is prepared to breakout.

Dogs of the Dow

The Dogs of the Dow is an investment strategy concerning weak stocks or low-priced stocks called the "dogs". This strategy does not necessitate technical analysis of former stock prices and volume of trading or fundamental analysis of financial statements, valuation of cash flows, and assessment of prospective growth rates for the assortment of securities.

The Dogs of the Dow strategy obliges the investor to classify from the highest to the lowest the dividend yields (dividends divided by the price of the stock) of the thirty stocks comprising the Dow Jones Industrial Average. The investor invests in the ten stocks with the highest dividend yields alternatively acquires the five lowest-priced "small dogs" of the ten highest-yielding dividend stocks. After one year, the 30 Dow stocks are rated anew, and the stocks with the ten highest dividend yields are retained. If a stock is no longer among the ten, it is sold and superseded by a new Dow dog that is one of the ten stocks with the highest dividend yield [10].

Technical Stock Analysis

Technical analysis appraises equity securities by evaluating the statistics of preceding stock prices and volume caused by market activity. Technical analysts do not measure a stock's intrinsic value but alternatively use charts and other instruments to recognize patterns that can advocate perspective activity. Exactly, as there are many investment techniques on the fundamental analysis, there are as well many various types of technical traders. Technicians can depend on chart patterns, technical indicators and oscillators. Moreover, technical analysts' exclusive use of historical price and volume data is what separates them from fundamental analysts. The field of technical

analysis is based on the three suppositions: (1) "the market discounts everything," (2) "stock prices move in trends," and (3) "history of stocks tends to repeat itself" [11,12]

Moving Averages

Moving averages are primarily the most recognized technical indicators used to decide the direction of trading stocks. Every moving average model is the consequence of a statistical computation of an averaging number of preceding information plotted into a chart enabling traders to watch at smoothed data rather than focusing on daily price movements inherited in all financial markets. The employment of moving averages is to recognize trends and reversals, measure the durability of a stock's momentum and distinguish varied time periods to observe momentum, substantiate a stock's possible support and resistance levels and determine beneficial stop-losses settings [13].

Moving averages as lagging indicators

Moving averages they do not foresee new trends but as lagging indicators validate trends once they have been recognized. A stock's price can only be trending up, trending down and trading in a range. A stock is up trending when the price is above a moving average and the average is slopping upwards. Conversely, a down trending stock is portending with a down slopping average. Frequently, traders hold a long position (buy) when the price of a stock is trading above the moving average and a short position (sell) when the stock price trades below the moving average [14].

Momentum trading with moving averages

The momentum trading strategy responds to the short-term stock price fluctuations rather than the fundamental information of a company. Momentum traders' quest advancements in stock prices, earnings, or revenues and they take a long or short position ardent that a stock's momentum will protract an upward or downward trend when the stock is moving notably in one direction on high volume. The momentum indicator is the accumulated net change of a stock's closing prices over a specified period creating a momentum line plotted to the price chart, and it parades an axis of zero, with positive prices manifesting a continuous upward stock movement and negative prices designating a continuous downward movement. That upward or downward momentum indicator generally instantly represents a breakout, which is a price movement through a recognized level of support or resistance usually accompanied by heavy volume and raised volatility for the stock, implying that even a period or two of prolonged momentum will force that stock in the direction of the breakout. Concomitantly, the technical trader watches the momentum chart and the Level 2 screen to look for verification of a breakout to execute a market order [15].

Murphy describes how to evaluate momentum by watching at moving averages of stock prices with several time periods. Moving averages of twenty days or less can gauge short-term momentum, while twenty to one hundred days moving averages are considered as a good standard of short-term momentum and conclusively 100 days moving averages or more can be used to rate long-term momentum. The author also proposes that one of the optimal approaches to determine the durability and direction of a stock's momentum is to position three moving averages onto a chart and watch for upward or downward momentums. A robust upward momentum can be identified when the shorter-term averages are preceding longer-term averages on the chart and the two averages are diverging providing a buy signal. On the contrary, when the shorter-term averages are located below the longer-

term averages on the chart, the momentum is in a downward trend and that's a good sell signal.

Support and Resistance levels with moving averages

Charting is a technical trading precept of visualizing the movement of a stock price between momentous support and resistance levels. A support level is a price level that a stock impedes to go below and is the price level where bull traders use to enter a trade. Likewise, resistance is price levels above which a stock has difficulty ascending and the buyers' sell their long positions take profits and enter short positions. Characteristically, a stock's price will range between the support and resistance levels until it "breaks out" or "breaks down" [16].

Another common application of moving averages is setting up intended price supports. Trading practice with moving average reveals that dropping stock prices "will often stop and reverse directions" at a support level, which is nothing more than a moving average. Commonly, traders will use the 100-day or 200-day moving average as a support level to verify anticipated movements of stock prices. On the adverse, technical traders use the 200-day moving average as a resistance level to prognosticate stock prices falling below a significant support level. Traders use the resistance level as a signal to obtain profits or to exit from any open long positions and also use this average as an entry point of a short position because the price often bounces off the resistance and downtrends.

Simple and exponential moving averages

The mathematical average of a stock price over a defined period of time forms a simple moving average. For instance, to calculate a 15-day moving average the open, close, low or high prices of the stock can be used to determine a moving average by adding the referenced stock prices for the last 15 days and then divide the result by 15. The resulting average integrates the past 15 data points to provide the trader a virtual of how the stock is priced the past 15 days [17,18].

Murphy interestingly remarks in his article that stock traders name this tool a moving average and not a typical mean considering that the most recent stock prices are superseded by the new prices as they become attainable imposing the data set to successively moving to account for the new available stock prices warranting the superiority of present prices. Once the values of the MA have been calculated, they are mapped onto the charts used by technical traders and then joined to formulate a moving average line.

Technical traders according to Murphy commit to the use exponential moving averages to diminish the impediment in simple moving averages by exerting more weight to the latest stock prices comparative to the older prices deeming on the specific period of the moving average. The shorter the EMA's period, the more weight will be addressed to the most recent price. Murphy states that the exponential moving average is more responsive to latest information since it delivers more weight to recent prices. The formula to evaluate the EMA equation is: $EMA = (P * a) + (Previous EMA * (1-a))$, where $P = \text{Current Price}$, $A = \text{Smoothing Factor} = 2 / (1+N)$ and $N = \text{Number of Time Periods}$.

The difference between EMA and SMA

The divergence between the EMA and SMA is the susceptibility each one displays to changes in the data used in its computation. Precisely, the exponential moving average (EMA) gives a higher weighting to current prices than the simple moving average (SMA) does, while the SMA accords the same weighting to all prices. The two

averages are analogous because they are expounded equivalently and used by technical traders to smooth out price fluctuations. Since EMAs stance a stronger weighting on recent data than on older data, they are more responsive to the newest price changes than SMAs are, which causes the effects from EMAs timelier and illustrates why the EMA is the favored average among many traders.

Investors' trading technique and investing choices are the determinants of which moving average to utilize. Daily traders appoint to benefit from the exponential moving average's ability to apprehend short-term price fluctuations essential to their trading needs. Long term investors and swing traders elect to use the simple moving averages to enchant long-term changes. The EMA is ordinarily more reactive to price changes than the SMA and initiates more signals resulting in prospective more wrong signals and whipsaws. The SMA normally has a slower motion and originates fewer signs that could attest to be more credible but concomitant to remissness profits.

Variable moving average

A variable moving average is an exponential moving average that based on the volatility of the data automatically modifies the smoothing constant. The smoothing constant used in the moving average calculation is larger when the data is more volatile giving more weight to the current data. Alternatively, the variable moving average uses a smoothing constant for less volatile data. Trader's belief that high volatility associates with strongly trending markets is erroneous. Strong trending markets are generally less volatile due to the uniformity of daily price fluctuations. Volatility intensifications appear in up-trending, down-trending, or sideways markets where stock prices follow unstable daily movements ("i.e., down a lot, up a little, up a little, up a lot, up a little, down a little, etc..").

Standard moving averages are not tolerant to changes in volatility suffering to predict correct trends during high volatile markets. On the contrary, variable moving averages by automatically adjusting the smoothing constant perform better in both high and low volatility markets. The formula to compute the variable moving average is " $VMA = (0.78 * (\text{volatility index}) * \text{stock's closing price}) + (1 - 0.078 * \text{volatility index}) * \text{yesterday's VMA}$," where the absolute value of a "9-period Chande Momentum Oscillator" is used for the volatility index. The higher the volatility index the more volatile the market is, increasing the sensitivity of the moving average (Paritech, 2004).

Parabolic SAR

The parabolic SAR is a technical indicator illustrated on a stock chart as a series of dots placed either above or below the stock price pivoting on the price momentum representing a shape of curve that resembles a parabola. The parabolic SAR is a functional indicator in trending periods and when the trend of the stock is upward a small dot is placed below the price while a dot is placed above the price when the trend is downward. Eminently, Parabolic stands for a curve that has the shape of a parabola and SAR is the abbreviation for "Stop-and-Reverse," meaning that the position is reversed when the protective stop is hit and it was first introduced by Wells Wilder in 1978 in his honored book the "New Concepts in Technical Trading Systems."

The Parabolic SAR is a "time/price reversal system" used in trending markets to enable traders to follow the upward or downward trend of the dots to appraise when to reverse a position and enter a trade in the opposed direction. The Parabolic SAR system responds highly in markets with a dominant trend and fails despondently in sideways or non-trending markets. Wilder created an acceleration element into the system. Every day the stop motions in the direction of the latest trend.

Initially, the repositioning of the stop is correspondingly slow to enable the trend time to substantiate. As the acceleration factor rises, the SAR starts to move quicker, subsequently catching up to the price action. A buy signal occurs when the most recent high price of a stock has been defied imposing the SAR to be positioned at the most recent low stock price. As the price of the stock rises, the dots will rise as well, first slowly and then picking up speed and accelerating with the trend. The SAR starts to move a little faster as the trend advances and the dots presently catch up to the price action of the stock.

The accelerating system of SAR is considerably profitable because it allows the investor to get into a trade position after the dots move closer to the price action, thus verifying that the trend is established. Technical traders can apply “stop-loss orders” using the evolution of the SAR to secure gains caught on in an upward trend and traders in a bear position can use this system to decide the time to cover their short positions. Also, another lead of the Parabolic SAR trading system is that it is radically automatic, and detaches all of the human sentiments from trading enabling investors to reach a better ordered and uniform trading pattern. The drawback to this system is that most stocks do not build uniform trends and as a result force the SAR to be moving into a spasmodic way preventing the trader to enter and exit with consistent profits [19].

Moving Average Convergence Divergence (MACD)

The Moving Average Convergence/Divergence (MACD) was developed by Gerald Appel and is one of the simplest and most reliable indicators available. MACD uses moving averages which are lagging indicators and converts them into momentum oscillators by subtracting the longer-period moving average from the shorter-period moving average. More specifically, the MACD uses the difference between a stock's 26-day and 12-day Exponential Moving Averages (EMA) closing prices converting these two lagging indicators into momentum oscillators appearing in a plot that forms a line that oscillates above and below zero. The 12-day EMA is the faster more responsive indicator while the 26-day EMA is the slower indicator less prone to whipsaws. Generally, technicians also plot a 9-day EMA of MACD together with the 12-day and 26-day EMAs to act as a bullish or bearish trigger line. A bullish crossing over takes place when MACD moves above its 9-day EMA, and a bearish crossing over emerges when MACD moves below its 9-day EMA.

A positive MACD displays that the 12-day EMA is trading above the 26-day EMA. As the MACD begins to upsurge the gap between the 12-day EMA and the 26-day EMA broadens indicating that the positive momentum increases, in other words, the rate-of-change of the faster moving average is higher than the rate-of-change for the slower moving average indicating a bullish period. Alternatively, a negative MACD indicates that the 12-day EMA is trading below the 26-day EMA. If MACD is negative and declining further, then the negative gap between the faster moving average and the slower moving average is escalating. Downward momentum is accelerating, indicating a bearish period of trading. MACD centerline crossovers occur when the faster moving average crosses the slower moving average.

MACD bullish signals

As explained by Murphy, the MACD generates bullish signals from three main sources: (1) “Positive Divergence”, (2) “Bullish Moving Average Crossover”, and (3) “Bullish Centerline Crossover”. A Positive Divergence, although, it is the least common to transpire, it is the most dependable of the three signals and vanguards larger stock price moves. A positive divergence is reflected when the MACD instigates an

advancement and the security is still in a downtrend and falls below a lower stock price than the last low. MACD can either form as a series of “higher lows” or a “second low” that is higher than the previous low.

A Bullish Moving Average Crossover transpires when MACD migrates above its 9-day EMA, or trigger line. Bullish Moving Average Crossovers are probably the most common signals and the least dependable. These crossovers can lead to whipsaws and many deceitful indications if not used in simultaneity with other technical indicators. Bullish Moving Average Crossovers are used at times to validate a positive divergence such as the case where a Bullish Moving Average Crossover follows the second “low” or higher “low” of a positive divergence. A Bullish Centerline Crossover transpires when MACD moves above the zero line and into positive domain. This is an evident sign that momentum has converted from negative to positive or from bearish to bullish. After a Positive Divergence and Bullish Centerline Crossover occur, the Bullish Centerline Crossover can act as a verification signal. From the three signals, moving average crossovers are probably the second most common signals. Occasionally it is cautious to assign a price filter to the Bullish Moving Average Crossover to safeguard that it will maintain. An instance of a price filter would be to buy if MACD breaks above the 9-day EMA and remains above for three days. The buy signal would then originate at the end of the third day.

MACD bearish signals

MACD generates bearish signals from three main sources. These signals are mirror reflections of the bullish signals: (1) “Negative Divergence”, (2) “Bearish Moving Average Crossover”, and (3) “Bearish Centerline Crossover”, as explained by Murphy. Trading divergence is a popular method to use the MACD histogram but, unluckily, the divergence trade is not very precise since it fails more than it succeeds. One of the most collective settings is to locate chart points at which price performs a new high stock price swing or a new low stock price swing but the MACD histogram does not, revealing a divergence among price and momentum. A negative divergence forms when the security advances or moves sideways, and the MACD declines. Moreover, the MACD histogram is an effective visual image of the difference between MACD and its nine-day EMA. The histogram is positive when MACD is above its nine-day EMA forming a bullish moving average crossover and negative when MACD is below its nine-day EMA forming a bearish moving average crossover. If prices are rising, the histogram expands as the rate of the price movement accelerates, and contracts as price movement slows down. The same principle works in reverse as prices are falling.

One of the factors causing traders to enter bad positions with this technique is they enter a trade on a signal from the MACD indicator but exit it based on the move in price. Since the MACD histogram is a derivative of price and not the price itself, this approach is controversial. In other words, stock prices frequently explode up or down levering stops and pressuring traders out of position just before the move practically makes a prolonged turn and the trade becomes rewarding. To determine the incompatibility between entry and exit, a trader can use the MACD histogram for both trade entry and trade exit signals. To do so, the trader trading the negative divergence takes a partial short position at the initial point of divergence, but instead of setting the stop at the nearest swing high based on price, should stop the trade only if the high of the MACD histogram exceeds its previous swing high, indicating that momentum is actually accelerating and the trader is truly wrong on the trade. If, on the other hand, the MACD histogram does not generate a new swing high, the trader should add to the initial position, continually achieving a higher average price for the short [20].

MACD benefits

One of the primary benefits of MACD according to Murphy is that it incorporates aspects of both momentum and trend in one indicator. As a trend-following indicator, it will not be wrong for very long. The use of moving averages ensures that the indicator will eventually follow the movements of the underlying security. By using Exponential Moving Averages (EMAs), as opposed to Simple Moving Averages (SMAs), some of the lag has been taken out. As a momentum indicator, MACD has the ability to foreshadow moves in the underlying security. MACD divergences can be key factors in predicting a trend change. A Negative Divergence signals that bullish momentum is waning, and there could be a potential change in trend from bullish to bearish. This can serve as an alert for traders to take some profits in long positions, or for aggressive traders to consider initiating a short position. MACD can be applied to daily, weekly or monthly charts. MACD represents the convergence and divergence of two moving averages. The standard setting for MACD is the difference between the 12 and 26-period EMA. However, any combination of moving averages can be used. The set of moving averages used in MACD can be tailored for each individual security. For weekly charts, a faster set of moving averages may be appropriate. For volatile stocks, slower moving averages may be needed to help smooth the data. Given that level of flexibility, each individual should adjust the MACD to suit his or her own trading style, objectives and risk tolerance.

MACD drawbacks

One of the beneficial aspects of the MACD as explained by Murphy is also one of its drawbacks. Moving averages, be they simple, exponential or weighted, and are lagging indicators. Even though MACD represents the difference between two moving averages, there can still be some lag in the indicator itself. This is more likely to be the case with weekly charts than daily charts. One solution to this problem is the use of the MACD-Histogram. The MACD-Histogram represents the difference between the MACD and its trigger line, the 9-day EMA of MACD. The plot of this difference is presented as a histogram, making centerline crossovers and divergences easily identifiable. A centerline crossover for the MACD-Histogram is the same as a moving average crossover for MACD. If you will recall, a moving average crossover occurs when MACD moves above or below the trigger line. If the value of MACD is larger than the value of its 9-day EMA, then the value on the MACD-Histogram will be positive. Conversely, if the value of MACD is less than its 9-day EMA, then the value on the MACD-Histogram will be negative. Further increases or decreases in the gap between MACD and its trigger line will be reflected in the MACD-Histogram. Sharp increases in the MACD-Histogram indicate that MACD is rising faster than its 9-day EMA and bullish momentum is strengthening. Sharp declines in the MACD-Histogram indicate that MACD is falling faster than its 9-day EMA and bearish momentum is increasing.

MACD is not particularly good for identifying overbought and oversold levels. Even though it is possible to identify levels that historically represent overbought and oversold levels, MACD does not have any upper or lower limits to bind its movement. MACD can continue to overextend beyond historical extremes.

MACD calculates the absolute difference between two moving averages and not the percentage difference. MACD is calculated by subtracting one moving average from the other. As a security increases in price, the difference (both positive and negative) between the two moving averages is destined to grow. This makes it difficult to compare MACD levels over a long period of time, especially for stocks that have grown exponentially.

Relative Strength Index (RSI)

The relative strength index (RSI) is an illustrious momentum indicator in technical analysis showing “overbought” and “oversold” stock positions while momentum measures the rate of the rise or fall in stock prices. The indicator is plotted between a range of zero to 100 where 100 is the highest overbought condition and zero is the highest oversold condition. The RSI helps to measure the strength of a security’s recent up moves compared to the strength of its recent down moves. This helps to indicate whether a security has seen more buying or selling pressure over the trading period. The standard calculation uses 14 trading periods as the basis for the calculation, which can be adjusted to meet the needs of the user. If the trading periods used are lowered then the RSI will be more volatile and is used for shorter-term trades. The following formula is used to calculate the “ $RSI = 100 - 100 / (1 + RS)$, where $RS = (\text{Sum of the closing prices of up days}/n) / (\text{Sum of the closing prices of down days}/n)$ and $n = \text{trading periods}$ ”.

Like most indicators there are two general ways in which the indicator is used to generate signals - crossovers and divergence. In the case of the RSI, the indicator uses crossovers of its overbought, oversold and centerline. The first technique is to use overbought and sold lines to generate buy-and-sell signals. In the RSI, the overbought line is typically set at 70 and when the RSI is above this level the security is considered overbought. The security is seen as oversold when the RSI is below 30. These values can be adjusted to either increase or decrease the amount of signals that are formed by the RSI. A buy signal is generated when the RSI breaks the oversold line in an upward direction, which means that it goes from below the oversold line to moving above it. A sell signal is formed when the RSI breaks the overbought line in a downward direction crossing from above the line to below the line. Setting the overbought and oversold levels at 80 and 20, respectively, can use a more conservative approach.

Another crossover technique used in formulating signals is using the centerline (50). This technique is exactly the same as using the overbought and oversold lines to formulate signals. This technique will often form signals after a movement in the direction they are predicting but are used more as a confirmation than a signal compared to the other techniques. A downward trend is confirmed when the RSI crosses from above 50 to below 50. An upward trend is confirmed when the RSI crosses above 50.

Divergence can be used to form signals as well. If the RSI is moving in an upward direction and the security is moving in a downward direction it signals to technical traders that buying pressure is increasing and the downtrend may be coming to an end. Divergence can also be used to signal a reversal in an upward trend where the RSI is decreasing signaling increasing selling pressure in an upward trend. The RSI is a standard component on any basic technical chart. The relative strength indicator focuses on the momentum underlying the security and is a great secondary measure to be used by traders. It is important to note that the RSI is often not used as the sole generation of buy-and-sell signals but used in conjunction with other indicators and chart patterns [21].

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