

How Well Do Enterprise-Cash-Flow-Derived Fair Value Estimates Predict Future Stock Prices?

And Thoughts on Behavioral Valuation

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Abstract

This paper attempts to solidify the efficacy of the predictive power of fair value estimates for stocks, as derived by the discounted enterprise cash flow (free cash flow to the firm) process. The piece emphasizes the difference between share prices and estimated fair (intrinsic) values and offers an overview of the discounted enterprise cash flow model, what causes fair value estimates to change, and what drivers may be most important within the context of the discounted enterprise cash flow model. The work examines the importance of both art and science in discounted enterprise cash flow valuation, and introduces the topic of behavioral valuation. An explanation of the methods used in the study include the creation of price-to-fair value comparisons and subsequent share-price performance of companies relative to their respective price-to-fair value ratios. The study in this work measures the predictive power of fair value estimates through eight subsequent time periods, or approximately 3 years. The subsets of data are broken into “undervalued” and “overvalued” stock groupings, and the predictive power of fair value estimates is then evaluated for each category.

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I. Introduction

A stock is unique. Unlike other investments such as classical art, fine wine, or vintage baseball cards, for example, stocks represent a claim on a veritable cash-flow generating enterprise.

Whereas the prices of a rare Picasso, the best Bordeaux money can buy, or an authentic, gem-mint Cracker Jack “Shoeless” Joe Jackson may be almost entirely based on what someone else will pay for them, stocks are different, and it is in this difference that the financial discipline is distinguished from speculative, illogical frenzy. Stocks can actually have intrinsic *monetary* value.

Now that is not to say that intrinsic value estimation is not part art and part science--both arguably of equal importance--but it is the very idea that a share of stock is not just a piece of canvas or cardboard or a fermented grape that very much matters. For one, a fine Picasso cannot intrinsically generate cash, a Bordeaux cannot either, nor can one of the most sought-after treasures of the 1914/1915 Cracker Jack baseball card collection. Because a stock is an ownership claim on a company’s assets (and, by definition, those very assets’ future free cash flow stream), a stock actually has tangible *monetary* value. Warren Buffett may address this familiar theme as he builds his case against gold as an investment class:

The major asset in this category is gold, currently a huge favorite of investors who fear almost all other assets, especially paper money (of whose value, as noted, they are right to be fearful). Gold, however, has two significant shortcomings, being neither of much use nor procreative. True, gold has some industrial and decorative utility, but the demand for these purposes is both limited and incapable of soaking up new production. Meanwhile, if you own one ounce of gold for an eternity, you will still own one ounce at its end.

What motivates most gold purchasers is their belief that the ranks of the fearful will grow. During the past decade that belief has proved correct. Beyond that, the rising price has on its own generated additional buying enthusiasm, attracting purchasers who see the rise as validating an investment thesis. As “bandwagon” investors join any party, they create their own truth – for a while.

Today the world’s gold stock is about 170,000 metric tons. If all of this gold were melded together, it would form a cube of about 68 feet per side. (Picture it fitting comfortably within a baseball infield.) At \$1,750 per ounce – gold’s price as I write this – its value would be \$9.6 trillion. Call this cube pile A.

Let’s now create a pile B costing an equal amount. For that, we could buy all U.S. cropland (400 million acres with output of about \$200 billion annually), plus 16 Exxon Mobils (the world’s most profitable company, one earning more than \$40 billion annually). After these purchases, we would have about \$1 trillion left over for walking-

around money (no sense feeling strapped after this buying binge). Can you imagine an investor with \$9.6 trillion selecting pile A over pile B?

Beyond the staggering valuation given the existing stock of gold, current prices make today's annual production of gold command about \$160 billion. Buyers – whether jewelry and industrial users, frightened individuals, or speculators – must continually absorb this additional supply to merely maintain an equilibrium at present prices.

A century from now the 400 million acres of farmland will have produced staggering amounts of corn, wheat, cotton, and other crops – and will continue to produce that valuable bounty, whatever the currency may be. Exxon Mobil will probably have delivered trillions of dollars in dividends to its owners and will also hold assets worth many more trillions (and, remember, you get 16 Exxons). The 170,000 tons of gold will be unchanged in size and still incapable of producing anything. You can fondle the cube, but it will not respond (Buffett 2011).

In the case of stocks, intrinsic value--not to be confused with price--is not, and generally cannot, *always* be in the eye of the beholder. A dollar of free cash flow generated by the company rightly belongs to the shareholders, and it is because of this fact, that stock prices are not, in substance just pieces of paper, even as this truism may be obscured during manias or in times of panic, when ranks of the greedy or fearful grow, respectively. Rather, stocks have intrinsic, monetary and foundational worth. Certainly, both gold and stocks can be sold for cash, but unlike gold, stocks (as pieces of a company) generate cash, too (i.e. free cash flow), as Buffett so eloquently explains. Surely no logical being would say that a dollar is not worth a dollar either. After all, a dollar is what it is, a dollar. Where there exists a disconnect in translating what a Picasso, or Bordeaux, “Shoeless Joe,” or even what the price of gold is ‘worth’ in terms of dollars, however, there is not one in the case of stocks, which are conveniently priced in dollars and generate cash-flow in dollars (or the currency of your choice, of course – “whatever the currency may be”).

Investing and valuation are delicate combinations of art and science...

There can be, or should be, little possibility of misunderstanding: A stock's estimated intrinsic value, not to be confused with its price, will (must) always be a function of the present value of all future free cash flows the company will generate for shareholders, including those cash flows emanating from the balance sheet, such as a large net cash position or arising from the monetization of “hidden assets” (e.g. an overfunded pension or a stake in another entity where its holding value is less than its market capitalization, for example). It is only in the cerebral struggle in “correctly” estimating the magnitude and duration of future free cash flows, and commensurately the “proper” rate to discount such future free cash flows, where art (subjective forecasting) collides with science (financial statement analysis) within the valuation context, and the uncertainty of whether price actually differs from estimated intrinsic value surfaces.

In the study of the behavior of assets, those whose prices are set via market-clearing activity, bubbles--or that as defined as a scenario where the price of an asset becomes illogically and materially detached from the cash-flow-based estimated intrinsic value of such an asset--arise when 'investors' (or perhaps more aptly named speculators) purchase a stock on hopes that such a stock can be sold at a higher price, instead of on the view that the company's cash-flow-derived value is greater than the price at which it is bought. The speculator in this sense relies on the "Greater Fool Theory¹," whereas an authentic, true investor may only be interested in stocks, or assets, that can be acquired at a price that is less than their cash-flow-based intrinsic worth, or perhaps best defined in the Firm Foundation Theory:

The firm-foundation theory argues that each investment instrument, be it a common stock or a piece of real estate, has a firm anchor of something called intrinsic value, which can be determined by careful analysis of present conditions and future prospects. When market prices fall below (rise above) this firm foundation of intrinsic value, a buying (selling) opportunity arises, because this fluctuation will eventually be corrected or so the theory goes. Investing then becomes a dull but straight-forward matter of comparing something's actual price with its firm foundation of value (Malkiel 2003).

The Firm Foundation Theory may be the age-old traditional definition of investing, and therefore, by extension, why the endeavor to identify assets that are mispriced, and the combination of art and science within discounted enterprise cash flow valuation approach, is significantly important. The schools of investing that center on Firm Foundation Theory may fully accept the critical importance of the price-to-fair value investing paradigm and discounted enterprise cash flow valuation without batting an eye. If so, it may then be believed that other seemingly-opposing schools of thought, including the emerging field of behavioral sciences, must thereby reject the importance of what could be considered, in their view, such a "trivial" notion as estimating future enterprise cash flows. The definition of the Castle-in-the-Air Theory seems, after all, to fly in the face of the importance of intrinsic value estimation, under any approach--whether traditional multiple analysis, discounted cash-flow approaches, or other:

The castle-in-the-air theory of investing concentrates on psychic values. John Maynard Keynes, a famous economist and successful investor, enunciated the theory most lucidly in 1936. It was his opinion that professional investors prefer to devote their energies not to estimating intrinsic values, but rather to analyzing how the crowd of investors is likely to behave in the future and how during periods of optimism they tend to build their hopes into castles in the air. The successful investor tries to beat the gun by estimating what investment situations are most susceptible to public castle-building and then buying before the crowd.

¹ "Puts forth the view that any price, as unrealistic as it might be, is warranted if one buyer believes that another buyer will pay an even higher price for the same item. This line of thinking drives stock market and commodity market booms and manias. Busts and paranoias jump in when the bubble pops." – Black's Law Dictionary

According to Keynes, the firm-foundation theory involves too much work and is of doubtful value...

With regard to stocks, Keynes noted that no one knows for sure what will influence future earnings prospects and dividend payments. As a result, Keynes said, most persons are "largely concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the conventional basis of valuation a short time ahead of the general public." Keynes, in other words, applied psychological principles rather than financial evaluation to the study of the stock market. He wrote, "It is not sensible to pay 25 for an investment of which you believe the prospective yield to justify a value of 30, if you also believe that the market will value it at 20 three months hence. (Keynes 1936) (Malkiel 2003)."

As Keynes may agree, in assigning a fair value estimate or point-estimate-of-value to a stock, an analyst may never know, or rather can never know, with precision the exact intrinsic value of such a stock--because of the forward-looking nature of estimation and the subjective substance of estimating discount rates. This is certainly true, but we also would emphasize that he or she may not have to with precision. The goal of discounted enterprise cash flow valuation in stock analysis, or valuation approaches in equity investing, more generally, is not to pinpoint precisely what a company's stock is worth, but rather to tilt the odds in the investors' favor by identifying big price-to-fair-value outliers via fair-value-range analysis. Said differently, it is not the goal or even the endeavor of an analyst to stake one's reputation on precise value estimation, as it is unreasonable to believe that even the most talented analysts can get every future assumption "correct" within the discounted cash-flow framework.

Without exception, the future free cash flows of an entity will always be unpredictable to varying degrees, but unpredictable nonetheless. For example, the future free cash flows of consumer-staple entities such as Coca-Cola (KO) or Kimberly-Clark (KMB) may be steadily growing, and analysts may be able to estimate such future free cash flows with only a very slight margin of error when they are reported. On the other hand, the future free cash flows of a fast-growing Internet-darling such as Facebook (FB) or Alphabet (GOOG, GOOGL) may result in a much larger disparity between future projections and actual results when they come in. Therefore, it is only reasonable to assume that the "intelligent" investor may require a much larger share-price discount to estimated intrinsic value in the cases of Facebook or Alphabet than for Coca-Cola or Kimberly-Clark. The takeaway remains, however: precision with respect to future value estimation cannot be attained in any case, nor should that be the aim of valuation.

Momentum investors, technicians and behavioralists are inextricably tied to fundamental-based investing...

With the understanding that pinpoint accuracy is neither the goal, nor is it achievable in valuation, the paramount objective of enterprise discounted cash flow valuation rests on

identifying gaps between price and estimated value that are so large that even after considering a margin of safety² the analyst can still reasonably and comfortably say with a rather high degree of confidence that there is a price-to-value disconnect in the equity of question, and therefore its stock is either overvalued (price > value) or undervalued (price < value). A stock trading at \$50 per share, for example, but estimated to be worth \$100 per share may offer the investor an adequate margin of safety because even if the “true value” of the stock is \$75, the large difference between price and the initial estimated fair value offers the investor a very important safety-net against losses.

I can't begin to tell you how surprising it is to hear even well-seasoned analysts say a company's shares are worth precisely \$25 each or a firm's stock is worth exactly \$100. The reality is that, in the first case, the company's shares are probably worth somewhere between \$20 and \$30, and in the latter case, the stock is probably worth somewhere between \$75 and \$125. Value is not a precise point estimate, but a range of probable outcomes. Why? Because all of the value of a company is generated in the future (future earnings and free cash flow), and the future is inherently unpredictable (unknowable).

If you or I could predict the future with absolute certainty, then we can say a company's shares are worth precisely this, or that a firm's stock is worth precisely that. But the truth is that nobody knows the future, and we can only estimate what a company's future free cash flow stream will look like. Certain factors will hurt that free cash flow stream relative to forecasts, while other factors will boost performance. That's how a downside fair value estimate and an upside fair value estimate is generated, or in the words of Warren Buffett and Benjamin Graham a "margin of safety." We call the "margin of safety" a fair value range at Valuentum. Only the most likely scenario represents a point fair value estimate (Nelson 2013a).

Whether it was British economist John Maynard Keynes or British philosopher Carveth Read that said it first, we agree that “it is better to be roughly right than exactly wrong (Read 1878),” and it is in the spirit of this quote that valuation approaches, whether the discounted enterprise cash flow process or another, are attempted, or rather should be attempted, in earnest. But simply by the definition of the Castle-in-the-Air Theory, however, embracing the unpredictable, probabilistic nature of the valuation context may not be enough to justify the “worth” of valuation in the eyes of pure momentum investors, technicians, and behavioral “beauty-contest”³

² The originations of the concept of a margin of safety is credited to the works of Benjamin Graham, who dedicated an entire chapter to the topic in his text *The Intelligent Investor*. “Here the function of the margin of safety is, in essence, that of rendering unnecessary an accurate estimate of the future. If the margin is a large one, then it is enough to assume that future earnings will not fall far below those of the past in order for an investor to feel sufficiently protected against the vicissitudes of time (Graham 2003).”

³ This is a reference to John Maynard Keynes’ “beauty contest” analogy that he used to describe the behavior of stock market participants within his text *General Theory of Employment, Interest and Money*, p. 156.

enthusiasts, which may even go so far as to posit that all fundamental analysis (perhaps the field in its entirety, including valuation) is of doubtful importance.

The questions regarding the usefulness of valuation approaches in predicting future stock returns may be many, and many widely-disseminated, even as quantitative methods suggest value to be a well-documented compensated factor almost irrespective to how it is measured (Christensen 2015). As with technicians, which may rely solely on information in the charts to make decisions about what to buy or sell, even “random walk⁴” theorists may similarly believe: Is not everything of analytical importance already reflected in share prices if future prices are unpredictable in an efficient market? Keynesian followers may add: Aren’t investors just playing some game of “musical chairs⁵,” hoping to unload overpriced stock to the next bidder anyway? What may not be abundantly clear, however, is that therein lies the rub: who might be that next bidder?

He or she could be another Castle-in-the-Air “fool⁶,” or he or she may very well be a fundamental investor well-schooled in Firm Foundation Theory. That it could be either one matters. Neither the “behavioralist,” nor the technician and the momentum investor that rely on “information” in prices, can therefore fully cut ties, on a theoretical basis, to fundamental-based investing—even if they wanted to. For starters, behavioral investors know that pure value investors want to scoop up stocks that are perceived to be undervalued, so the “behavioralist” must theoretically, if not directly or willingly, embrace the concept of intrinsic value estimation for no other reason than because intrinsic value estimation is impacting the behavior of value investors, their investment-decision making process, and their resulting influence on market prices.

Likewise, if technicians and momentum investors, in conducting their trading activity, apply the “information” contained in prices, which are driven in part by the behavior of fundamental investors that apply valuation techniques, then they, too, must be bound in part to valuation principles. One may posit that behavioral economics doesn’t make value investing, or the enterprise discounted cash-flow process, or fundamental analysis less significant. In some ways, it can be argued that the very concept of behavioral economics makes the study of how investors use valuation to make investment decisions even more important:

⁴ This is a reference to efficient market theorists and those that believe future stock prices are unpredictable and exhibit signs of a “random walk,” a term made popular by Burton Malkiel’s text *A Random Walk Down Wall Street*.

⁵ Keynes’ *General Theory of Employment, Interest and Money* is known for likening the conditions of the stock market to that of British newspaper beauty contest, but he also offers the view of its similarities to a game of musical chairs. “Nor is it necessary that anyone should keep his simple faith in the conventional basis of valuation having any genuine long-term validity. For it is, so to speak, a game of Snap, of Old Maid, of Musical Chairs—a pastime in which he is victor who says *Snap* neither too soon nor too late, who passes the Old Maid to his neighbor before the game is over, who secures a chair for himself when the music stops. These games can be played with zest and enjoyment, though all players know that it is the Old Maid which is circulating, or that when the music stops some of the players will find themselves unseated (Keynes 1936).”

⁶ We use this term in the context of the “greater fool theory,” which is a theory that says an investor may pay an illogically high price for a stock with the expectation that it can be resold to a “greater fool” at a later date.

I cannot tell you how many times I have heard that technical analysis (chart reading) is a self-fulfilling prophecy because it is driven by the actions of buyers and sellers reacting to or anticipating patterns in a chart. Those same individuals then claim that value investing or growth investing is not a self-fulfilling prophecy...

...technical analysis works sometimes because people buy and sell based on technical analysis, driving a stock higher or lower respectively. Value investing works sometimes because people buy and sell based on value principles, driving a stock higher or lower respectively. The same can be said about growth investing or other widely-followed methodologies. The more people think that a firm is truly undervalued, the more it will be bought and its price will be driven to fair value. The more people think that a firm is truly overvalued, the more it will be sold and its price will be driven to fair value.

Stock prices converge to intrinsic value because investors collectively think the stock is worth its intrinsic value and vote with their capital to drive the stock price to its intrinsic value. If nobody thought a stock was worth its intrinsic value, it would never reach its intrinsic value. If everybody thought a stock was worth its intrinsic value, it would trade precisely at its intrinsic value. If you think a stock is worth intrinsic value, but nobody else does or ever will then I'm sorry you have an underperformer on your hands. It is this self-fulfilling mechanism that makes the stock market what it is (Nelson 2013a).

Furthermore, it can be reasonably assumed that “castles in the air” are no more likely to be built on unrealistic valuation assumptions within the context of forecasting models as they are on “greater fool” tendencies and behavior, as both may result in the irrational or exuberant buying and selling of equities at illogical prices. Academic research, for example, has indicated that the “low-P/E effect,” or what causes stocks to often have a low price-to-earnings ratio relative to others, may in part “be a result of a tendency of investors to over-extrapolate past problems into the future (Scott 1999).” The capital-intensity of the business and its implications on the cash-flow generating capacity of the entity, the business’ balance sheet health (net cash versus net debt) and varying estimates of the cost of capital (the discount rate) offer justifiable reasons for differences in P/E ratios between companies, as described in “The Price-to-Earnings Ratio Demystified (2013),” but the likelihood of an overextrapolation effect is nonetheless noted, as the opposite can also be true. Extrapolating unsustainable growth rates with ongoing unrealistic operating leverage--or even failing to capture the cyclicity of a company’s business in the forecasting period--can result in systematic intrinsic value overestimation.

Nonetheless, the psychological concepts that link fundamental and valuation approaches to technical, momentum and behavioral approaches, in part, form the backbone of the Valuentum Buying Index rating system, which focuses on what stocks we think the majority of investors (from value through momentum) might buy or sell in the future by analyzing the most widely-known tools available at such investors’ disposal: fundamental (enterprise discounted cash flow,

relative valuation) and behavioral (technical and momentum) dynamics, collectively the three pillars of the Valuentum Buying Index rating system:

“Methodology:” At Valuentum, we think some of the best opportunities arise from an understanding of a variety of investing disciplines in order to identify the most attractive stocks at any given time. Valuentum therefore analyzes each stock across a wide spectrum of philosophies, from deep value through momentum investing. We think companies that are attractive from a number of investment perspectives--whether it be growth, value, income, momentum, etc.--have the greatest probability of capital appreciation and relative outperformance. The more deep-pocketed institutional investors that are interested in the stock for reasons based on their respective investment mandates, we posit the more likely it will be bought and the more likely the price will move higher to converge to its "true" intrinsic value (buying a stock pushes its price higher). On the other hand, we think the worst stocks will be shunned by most investment disciplines and display expensive valuations, poor technicals and deteriorating momentum indicators (Nelson 2011).

...

“Steps:” The secret to successful stock selection is to have a complete understanding of all investment disciplines in order to find the best stocks at the best time to buy (Valuentum investing). After all, investors need deep-pocketed money managers to eventually agree with them for their stock calls to work out...and this requires a deep understanding of which stocks they will put their money into in the future. This doesn't mean we're trying to front-run others--but it does mean we do extensive discounted cash-flow analysis to derive an intrinsic value assessment, an extensive relative value assessment to understand what many traditional investors are thinking, and a technical momentum assessment to help identify where the fast-money may be looking to allocate capital. The Valuentum strategy is a comprehensive process that is focused on picking winners (Nelson 2013a).

The field of behavioral valuation defined...

The behavioral components of the Valuentum Buying Index rating system are so intertwined that one pillar is directly tied to what we describe as **behavioral valuation**. Valuentum defines behavioral valuation as the tendency for value investors to buy and sell stocks on the basis of valuation techniques that they believe are most-popularly used by other value investors.

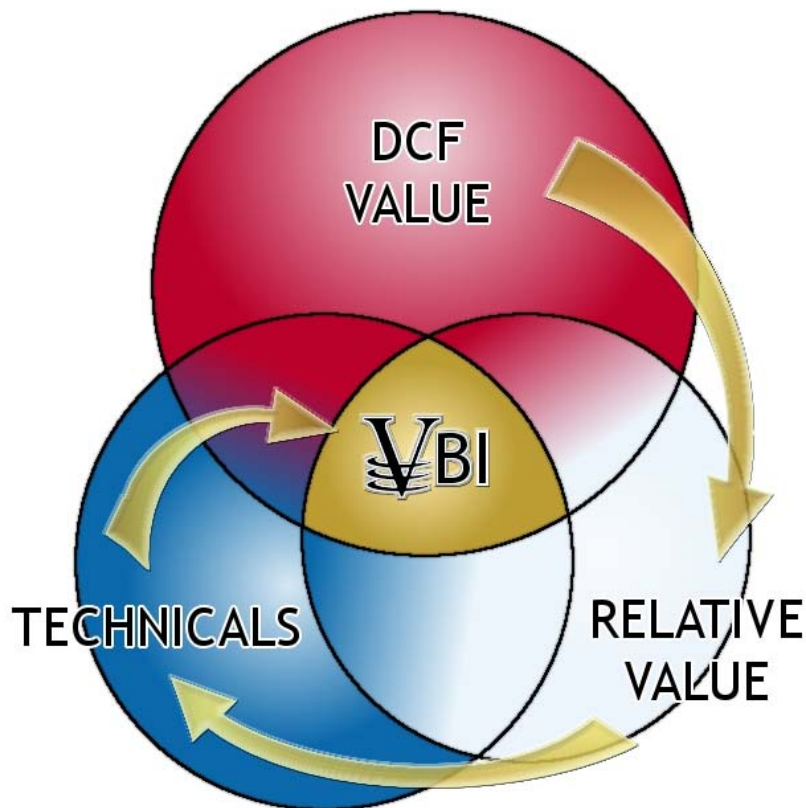
In the case of the Valuentum Buying Index, the price-to-earnings (P/E) ratio is one. In previous works, as in “The Price-to-Earnings Ratio Demystified (2013),” we have defined the price-to-earnings ratio as “short-form discounted cash-flow model,” where investors in assigning “an arbitrary price-to-earnings multiple to a company’s earnings (based on historical trends or

industry peers or the market multiple), they are essentially making estimates for all of the drivers behind a discounted cash-flow model in one fell swoop (and sometimes hastily).”

On the surface, adding the P/E ratio and a relative-value assessment to a process such as the Valuentum Buying Index that already employs the enterprise discounted cash flow model seems to make little sense, or at the very least seems redundant. However, there is something more psychological at play:

Our discounted cash-flow process allows us to arrive at an absolute view of the firm's intrinsic value. However, we also understand the critical importance of assessing firms on a relative value basis, versus both their industry and peers. Many institutional money-managers--those that drive stock prices--pay attention to a company's price-to-earnings (P/E) ratio and price-earning-to-growth (PEG) ratio in making buy/sell decisions. With this in mind, we have included a forward-looking relative value assessment in our process to further augment our rigorous discounted cash-flow process. If a company is undervalued on both a price-to-earnings ratio and a price-earnings-to-growth (PEG) ratio versus industry peers, we would consider the firm to be attractive from a relative value standpoint (Nelson 2011).

Figure 1: Relative Value in the Valuentum Buying Index Rating System Is a Behavioral Valuation Technique



Notes: The center of the Venn diagram above, the Valuentum Buying Index (VBI) combines rigorous financial and valuation analysis with an evaluation of a firm's technicals and momentum indicators. Because the process factors in a technical and momentum assessment after evaluating a firm's investment merits via a rigorous DCF and relative-value process, the VBI attempts to identify entry and exit points on what we consider to be the most undervalued stocks. In incorporating the second pillar of the process, relative value, the VBI embraces what we define as behavioral valuation: the tendency for value investors to buy and sell stocks on the basis of valuation techniques that they believe are most-popularly used by other value investors--in the case of the Valuentum Buying Index, the price-to-earnings (P / E) ratio is one.

It is not because the Valuentum Buying Index process is lacking a valuation consideration (it isn't as it has the discounted enterprise free cash flow framework) or that we find that the P/E ratio is as important as the discounted enterprise cash flow process, but it is because of the concept of behavioral valuation, and for no other reason, that any relative valuation approach, and the P/E ratio in particular, is included in the Valuentum Buying Index rating system. This is an important note--buying and selling still drives stock prices, and if buyers and sellers are using the P/E ratio to make investment decisions, the ratio can hardly be ignored. Behavioral valuation--as in the case of a relative-valuation assessment, as in the second pillar of Valuentum Buying Index rating system--is one area where psychological factors can offer a somewhat

counterintuitive substantiation for the use of arguably inferior fundamental-based tools within the investment-decision making process.

No matter the schools of thought, however, valuation theory will always be as much art as it is science, and the lines between fundamental analysis and behavioral investing are at worst blurred, and at best one and the same. The process behind discounted enterprise cash flow valuation, where an analyst's "skill" is not, or rather cannot be, based on his or her ability to precisely calculate the "true" intrinsic value of a company, but rather in his or her stock "handicapping" abilities via probabilistic estimation to tilt the odds in investors' favor. In the first pillar of the process, the Valuentum Buying Index utilizes the intricacies of discounted enterprise cash-flow valuation and couples that approach with the margin-of-safety concept. The findings of the predictive nature of the Valuentum Buying Index ratings system have been groundbreaking in many respects (Nelson 2017). This piece addresses the efficacy of fair value estimates, as derived by the discounted enterprise cash flow process, the first pillar of the Valuentum Buying Index.

II. The Discounted Enterprise Cash Flow (Free Cash Flow to the Firm) Model

Previous research on the "predictive power of fair value estimates," or price-to-fair value ratios, is rather scarce, and at best only in its infancy, as most brokerage houses generally calculate price targets, or the price at which an analyst expects a stock price to converge to, rather than estimates of what they believe a stock may be worth, or a fair value estimate. Early studies of the efficacy of fair value estimates have been very encouraging, nonetheless.

Morningstar, for one, conducted a study on the fair value estimates of approximately 930 stocks in its coverage from January 2002 through March 2013. Stocks that were undervalued based on the research firm's fair value estimates outperformed other stocks significantly on a risk-adjusted basis." Morningstar also found that fair value estimates had "significant forecasting capability" and estimated the predictive power was statistically significant at the 1% level (Miller 2013).

The discounted enterprise cash flow (free cash flow to the firm) model, which considers a company's net balance sheet position and estimates of future enterprise free cash flows, may be one of the most useful measures in estimating the intrinsic worth of operating, non-financial equities. In this paper, we strive to build on previous academic literature and further examine how well discounted enterprise-cash-flow-derived fair value estimates may be in predicting future stock prices.

The discounted enterprise cash flow model is generally defined as follows:

Figure 2. The Discounted Enterprise Free Cash Flow (Free Cash Flow to the Firm) Model

$$\text{Fair Value} = \left[\sum_{t=0}^{\infty} \frac{A(t)}{(1+d)^t} - B(0) - C(0) + D(0) \right]$$

where A (t) is an Enterprise Free Cash Flow (1) at year t,

B (0) is a Total Debt at time 0,

C (0) is a Preferred Stock at time 0,

D (0) is a Total Cash at time 0,

d is Weighted Average Cost of Capital (WACC).

Notes: This figure defines the basic structure of the enterprise free cash flow model in deriving enterprise value, which is then divided by shares outstanding, to arrive at a fair value estimate per share. The company's share price is then compared to a fair value estimate to determine a price-to-fair value (P/FV) ratio. A price-to-fair value ratio, which includes enterprise valuation, differs from other valuation multiples, including enterprise value-to-EBITDA (EV/EBITDA), or EBITDA to total enterprise value (EBITDA/TEV), which do not directly compare a company's share price with estimates of its intrinsic value, and therefore are not "true" measures of price versus value. The price-to-fair value ratio, augmented by a margin of safety, is the first component of the Valuentum Buying Index.

Though there may be an infinite number of variables to consider in assessing qualitative aspects of an investment opportunity, there are generally three primary cash-based sources of intrinsic value of a company, or that which makes stocks different than most other assets classes. First, the company's operating activities have value, as measured by the present value of all future enterprise free cash flows that are generated for all stakeholders of the business (debt holders, equity holders, etc), to the entire enterprise (A). Second, the company's balance sheet can have value (D - B - C, in image above).

For example, if a company has \$1 billion in total cash and \$500 million in total debt and no preferred stock outstanding, if the board should decide to shut down today, shareholders would be entitled to the net cash position, or \$500 million (\$1 billion less \$500 million), adjusted for closing/unwinding expenses. Third, a company's "hidden" assets such as an overfunded pension or an equity stake in another company that may not be accurately reflected in GAAP accounting statements can have value (this aspect is not included in formula above, but an expanded definition might include it).

With perhaps a few exceptions, most everything else "cash-based" is already captured within the intrinsic value calculation in Figure 2 (dividends are paid out of cash from the balance sheet, including newly-raised debt, or future enterprise free-cash-flow generation, for example). As for competitive considerations such as a company's low-cost position, its network effect, its brand strength, or any intangible asset (management, culture, and the like), such items can effectively

be valued by summing up the company's ability to translate those strengths into future enterprise free cash flows.

It can be reasoned that if such competitive advantages cannot translate into future value, as measured by future enterprise free cash flows, then they might not be valuable competitive advantages, or be competitive advantages at all. There are always exceptions to any generalizations, of course, as a company's buying back stock at attractive prices and pursuing value-creating acquisitions can augment intrinsic worth, but the discounted enterprise cash flow valuation model is one of the best tools to help quantify the qualitative subjective context.

*"Long ago, Ben Graham taught me that "Price is what you pay; value is what you get." Whether we're talking about socks or stocks, I like buying quality merchandise when it is marked down."
– Warren Buffett (Buffett 2008)*

The difference between price and estimated value may be one of the most important concepts for any investor to understand. Price and estimated value are almost never the same, and both are moving targets over time. Price is what an investor pays for something (a stock quote); value is what the investor gets (a claim on the business' assets, including its future enterprise free cash flows and dividends). Of note, a company, for example, is not more or less valuable because it pays a higher dividend to shareholders or has a higher yield on the market, even if shares may be bid up by the market as a result of the higher dividend or higher yield.

A dividend is paid out of the cash coffers of the company (cash on the balance sheet), and while a discussion of how dividends impact valuation, as in "Understanding How Dividends Impact Intrinsic Value Estimation (2014)", is beyond the scope of this paper, suffice it to say that a company's value is reduced by the amount the company pays to its shareholders as a dividend. Value is not enhanced in this case, and a higher share price, all else equal, means that shares are pricier or more expensive, not more valuable. An analysis of the shortcomings of the dividend discount model is beyond the scope of this paper, but can be read in "Value and Momentum Within Stocks, Too (Nelson 2017)."

In some cases, for example, a stock's higher yield may even reflect greater risk with respect to the company's business model, which may warrant a higher discount rate and possibly make the company less valuable. The enterprise free cash flow valuation model is a tool that estimates intrinsic value, which often differs (and sometimes greatly) from a company's share price. Price and value are not interchangeable terms, though they are often used as such.

What causes fair value estimates to change?

Share prices, which are driven by the buying and selling of stock, are not static, and neither are fair value estimates. When important drivers within the discounted enterprise cash flow model change or when new information comes to light, fair value estimates can and should change. Though there are perhaps an infinite number of reasons why a fair value estimate can change,

there are two primary reasons that account for the vast majority of revisions: 1) “rolling the model forward,” and 2) significant changes in expectations or transformative acquisitions.

The biggest fair value estimate revision may occur when we “roll a company’s model” forward one year. This is “analyst speak” for when Year 1 of the model changes from, say, 2015 to 2016, or in the case of what will happen next year, from 2017 to 2018. The timing of this revision occurs after a firm issues its fiscal annual report (form 10-K or form 20-F). For most companies, this occurs late in the first quarter, and our updating proceeds through the second calendar quarter. Once we receive the audited new information for the last fiscal year (which is released in the form 10-K or form 20-F), the new data is entered into the model.

Generally speaking, if our forecasts have been accurate, a company’s fair value estimate should theoretically increase by its discount rate less the dividend yield each year, all else equal. However, this increase almost never happens in practice, as the trajectory of the firm’s future free cash flow stream and its capital structure are refined with the new information in the 10-K or 20-F. For example, if a company has engaged in value-destructive activities during the previous year (e.g. it has overpaid for acquisitions or bought back its own stock at egregious prices), this would show up in the new fair value estimate. On the other hand, if a firm is a wise capital allocator, the firm’s balance sheet and future cash flow trajectory will have been enhanced from the previous year. This would cause an upward revision in the fair value estimate (sometimes by 10% or more), all else equal.

When “rolling the model forward,” there are a near-infinite number of drivers that could influence a fair value estimate of a stock, though we point to changes in the balance sheet (specifically the net cash/debt position) and changes in the future free cash flow stream (revenue, earnings before interest, capital spending, working capital and other components) as being the biggest factors. Most of the drivers behind a change in a fair value estimate, resulting from when we “roll the model,” will be operational (e.g. updating the cash flow trajectory and accounting for cash generated during the previous year as reflected in the updated balance sheet and/or lower share count)⁷. We tend not to adjust a firm’s cost of equity, nor do we adjust the risk-free rate frequently, though this may happen in some cases.

Valuentum’s fair value estimates, and by extension, the Valuentum Buying Index ratings are forward looking. That means when expectations of a company’s future free cash flow stream are revised as a result of forward guidance revisions (or incremental insight from our analyst team), or when a company pursues a transformative acquisition that will materially change its capital structure in the future, the fair value estimate changes accordingly.

⁷ Valuentum’s discounted enterprise cash flow model does not account for cash generated during the fiscal year on an interim basis. For simplicity, we account for cash generated during the fiscal year once, at the time we “roll the model” after fiscal year end -- not continuously.

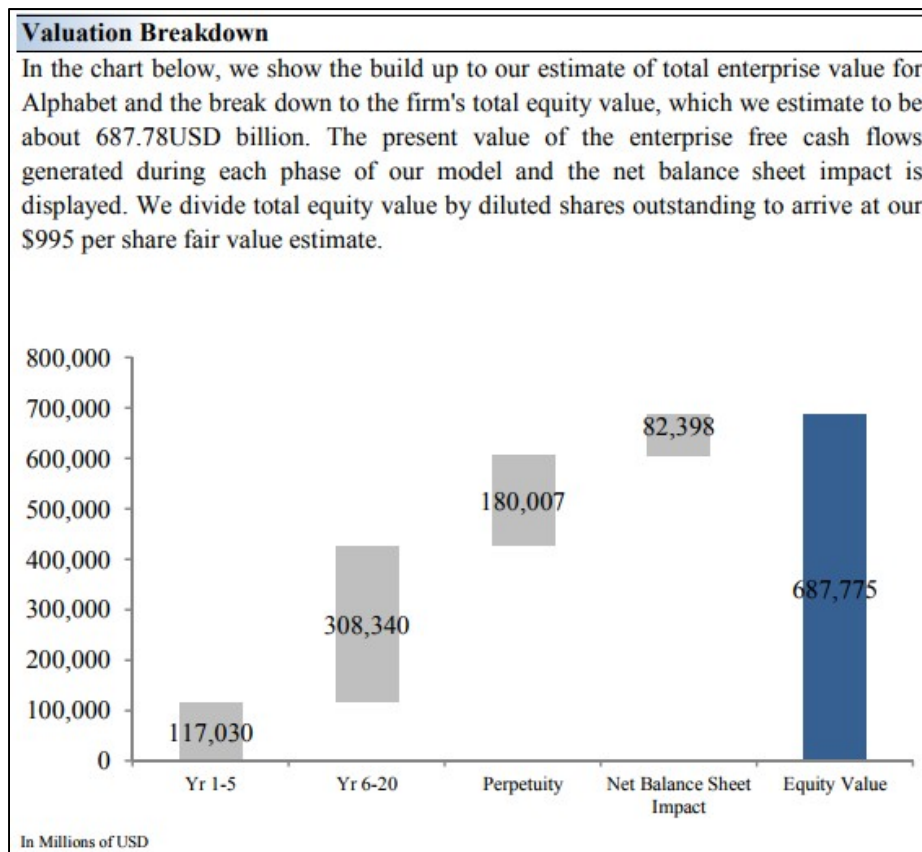
The variables that cause the biggest changes in the fair value estimate on an operating level are our forecasts of a company's mid-cycle operating margin (Year 5) expectations, mid-cycle (Year 5) revenue growth rate, and capital spending over the 5-year discrete forecast period (or phase I of the model). If a company, for example, comes out with substantially lower revenue and earnings guidance for Year 1 than what we and the Street had been modeling, there may be a downward revision in the company's fair value estimate, all else equal.

Though Year 1 (or even Year 2) in the model does not impact the fair value estimate materially in most cases, the information behind the revised guidance could influence the intermediate-term and even the long-term forecasts of the model (think "ripple effect"), and this would cause an even larger fair value estimate revision (in some cases). Whenever the trajectory of the future free cash flow stream changes, the fair value estimate, which is based on the future free cash flows, changes.

III. The Composition of Intrinsic Value

Within Valuentum's discounted enterprise cash flow valuation model, the top- and bottom-line forecasts for the next two forward years generally do not vary much from consensus estimates or management's provided guidance. The long-duration composition of intrinsic value is the primary reason why we are comfortable with this. However, where we do tend to find more differentiation in our forecasts, and for good reason, is in the intermediate- and long-term horizon, which we think is more important to the derivation and substance of a fair value estimate. The distribution of a sample company's equity value, per Valuentum's 16-page stock report of Alphabet (GOOG, GOOGL), dated May 2017, is provided in Figure 3.

Figure 3: Most Value is Attributed to Long-Duration Cash Flows



Notes: This figure shows the composition of a sample company's equity value. The vast majority of value is ascribed to a period beyond Year 5, making an evaluation of mid-cycle revenue and mid-cycle margin assessments generally more important than near-term forecasts within the discounted enterprise cash flow process. Source: Alphabet's 16-page equity report, 5/13/2017.

In the sample company's equity breakdown in Figure 3, roughly \$117 billion (17%) of the company's value comes from value ascribed over the next five years, \$308.3 billion (45%) from years 6-20, \$77.2 billion (26%) from perpetuity (year 20 into infinity), and the remainder from the company's balance sheet position (namely net cash). For a company such as Alphabet, one that generates copious amounts of free cash flow annually, an intense focus on the drivers behind long-term enterprise free cash flow generation, or mid-cycle operating assumptions, is much more important than an assessment of how fundamentals may perform next quarter or even next year.

Said differently, the value ascribed to the sample company beyond five years in this sample is critical to an estimate of the intrinsic worth of the entity. We'd view this sample of Alphabet as largely representative of composition of value for most free-cash-flow-generating companies in our coverage. As such, we generally don't care to differ much from consensus estimates or management guidance during the first couple years of the forecast period--it's not where most of

the value composition is generated--but we care very dearly about, and are laser-focused on striving to get, mid-cycle and corresponding long-term assumptions "correct" -- a time frame that has more influence in determining a company's fair value estimate and a duration that some market participants may not be evaluating closely (given the emphasis on quarterly earnings results and revisions).

Within Valuentum's 16-page stock and dividend reports, the fair value estimates for companies reflect what we would describe to be the base-case scenario of our expectations for the company. The assumptions do not represent an optimistic case or a pessimistic case, in our view, but rather the scenario that we think has the highest probability of occurring. Valuation, however, because it is forward-looking in nature, and therefore not a precise exercise, the theoretical upside and downside cases of our forecasts result in a fair value range for each company (encapsulating the concept of a margin of safety). The intrinsic value of a company will always be a function of the probabilities of its potential fair value outcomes.

IV: The Study: The Efficacy of Discounted Enterprise Cash-Flow-Derived Fair Value Estimates

In the following analysis of Valuentum's fair value estimates, we ask: what percentage of share prices converged to their corresponding fair value estimates within eight time periods⁸ or less? Given the longer-term focus of intrinsic value analysis and value investing, in general, we think eight periods, or what we estimate to be approximately 3 years, on average, is of sufficient length to measure the efficacy of a fair value estimate and price-to-fair value convergence.

We consider price-to-fair value convergence to have occurred if, and only if, the share price for a given stock reaches the corresponding fair value estimate within 8 time periods -- that is, when a share price becomes greater than or equal to the fair value estimate if it had previously been less than the fair value estimate, or when a share price becomes less than or equal to the fair value estimate if it had previously been greater than the fair value estimate.

A database of 1,194 stocks covered by Valuentum were used in the study. The number of stocks included all of those that Valuentum covered via an extensive valuation approach (nearly all of them on a discounted enterprise cash flow basis), and the time period studied ranged from early 2012 through mid-June 2017. Most stocks in the database have 14 fair value estimate data points and 14 share price data points, but not every stock in the database has 14 data points for both measures due to the varying dates that companies were added to coverage and their respective frequency of updates.

⁸ In general, we believe 4.5 months is a good estimate for the average of a time period, but some fair-value-estimate updates could have been as frequent as one week, and some longer than a half year. This would imply that the eight-time-period study covers an average duration of 3 years.

Each stock’s fair value estimate in the database was compared to its share price recorded at the same time, as well as the share prices thereafter. If price-to-fair value convergence materialized, the number of time periods from the initial measurement to the point in time at which the convergence was completed was recorded. Fair value estimates recorded at time ‘-7’ and later were excluded from the study due an insufficient number of price intervals thereafter in which to measure price-to-fair value estimate convergence. Said differently, fair value estimates at time ‘-7’ only have seven future prices with which to evaluate the predictability of price movements by fair value estimates.

In addition to a confirmation of price-to-fair value estimate convergence, the percentage of change to convergence is calculated as $\left|1 - \frac{FV}{Price}\right|$. We calculate the average percentage change to convergence to assess the materiality of price moves at the incidence rate. It can be reasoned that price-to-fair value convergence of just a few percent, for example, may not be material in the eyes of investors (given “normal” market gyrations), but convergences of 10%, 15% or more, on average, could likely be viewed as particularly meaningful as it may imply that the price-to-fair value discrepancy effectively identified large mispricings on the marketplace, the prevailing goal of intrinsic value estimation.

Study Results: Efficacy of Fair Value Estimates in Predicting Prices Over Future Periods

As shown in Figure 4 below, in the instance of more than 59% of all fair value estimates, both of the undervalued and overvalued variety, price-to-fair value convergence was achieved within eight time periods or less, or within approximately 3 years (41% showed no convergence within eight time periods). The 59% convergence statistic includes both stocks that were undervalued and stocks that were overvalued in the study, and both sets of undervalued and overvalued stocks traded in the same market environment and general time duration. We find the aggregated results of both undervalued and overvalued stocks to be astounding as a measure far closer to 50% may have been expected under “random walk” or efficient market theory.

Figure 4: Near-60% Convergence Regardless of P/FV Relationship

	Time Intervals for Convergence								No Convergence in 8
	1	2	3	4	5	6	7	8	
Counts	1192	624	417	261	196	149	113	83	2079
Percent of Convergence	23.3%	12.2%	8.2%	5.1%	3.8%	2.9%	2.2%	1.6%	40.7%
Average Percent Change for Convergence	8.3%	14.2%	19.0%	20.7%	18.2%	16.9%	15.1%	17.0%	16.4%

Notes: The number of instances for which price-to-fair value convergence took place within eight time periods is shown in the table. The average percentage to convergence is calculated.

In the entire qualifying data set of both undervalued and overvalued stocks in Figure 4, just over 23% of fair value estimates resulted in price-to-fair value convergence within the first time period, approximately 12% of fair value estimates resulted in price-to-fair value convergence during the second time period, and roughly 8% of fair value estimates resulted in price-to-fair

value convergence during the third time period, and approximately 5% of fair value estimates resulted in price-to-fair value convergence during the fourth time period, with the cumulative balance accruing during time periods 5-8, to total 59%.

Figure 5: 80%+ Convergence of Undervalued Stocks (FV > Price)

	Time Intervals for Convergence								No Convergence in 8
	1	2	3	4	5	6	7	8	
Counts	829	452	295	151	79	42	31	30	475
Percent of Convergence	34.8%	19.0%	12.4%	6.3%	3.3%	1.8%	1.3%	1.3%	19.9%
Average Percent Change for Convergence	9.0%	16.2%	22.8%	27.3%	30.3%	27.0%	22.7%	25.3%	28.2%

Notes: This data set takes into account only the instances in which the fair value estimate at a given point in time was greater than the corresponding price. The number of instances is recorded in the table, as is the percentage of those instances in which price-to-fair value convergence took place within eight time intervals. The average percentage to price-to-fair value convergence is calculated.

In the sample of undervalued stocks in the study, more than 80% of fair value estimates resulted in price-to-fair value convergence within eight time periods or less, or within approximately 3 years (less than 20% showed no convergence within eight time periods). Though not all time periods in the data set correspond to the same point in time in market history, on the basis of the strong market backdrop that covered nearly the entire time period of the study, we would have expected very strong price-to-fair value convergence for undervalued entities (FV > P). The difference between 80% and what otherwise might have been expected under “random walk,” or 50%, is nonetheless statistically significant, supported by a z-test with a very high z-score and p-value very close to 0.

As shown in Figure 5 above, more specifically, nearly 35% of fair value estimates resulted in price-to-fair value convergence within the first time period, approximately 25% of fair value estimates resulted in price-to-fair value convergence during the second time period, just over 12% of fair value estimates resulted in price-to-fair value convergence during the third time period, and approximately 6% of fair value estimates resulted in price-to-fair value convergence during the fourth time period, with the cumulative balance accruing during time periods 5-8, to total 80%. The average percentage to price-to-fair value convergence is remarkable, with prices advancing 20% in some cases in 30% in others, on average, to converge to the fair value estimate.

Figure 6: 40%+ Convergence of Overvalued Stocks (FV < Price)

	Time Intervals for Convergence								No Convergence in 8
	1	2	3	4	5	6	7	8	
Counts	363	172	122	110	117	107	82	53	1604
Percent of Convergence	13.3%	6.3%	4.5%	4.0%	4.3%	3.9%	3.0%	1.9%	58.8%
Average Percent Change for Convergence	6.5%	9.0%	9.8%	11.6%	10.0%	12.9%	12.2%	12.4%	13.0%

Notes: This data set takes into account only the instances in which the fair value estimate at a given point in time was greater than the corresponding price. The number of instances is recorded in the table, as is the percentage of those instances in which price-to-fair value convergence took place within eight time intervals. The average percentage to price-to-fair value convergence is calculated.

In the sample of overvalued stocks in the study, approximately 41% of fair value estimates resulted in price-to-fair value convergence within eight time periods or less, or within approximately 3 years (59% showed no convergence within eight time periods). Whereas a lower incidence of price-to-fair value convergence occurred for overvalued stocks relative to undervalued stocks, we view the price-to-convergence rate for overvalued stocks as still rather high given the strong market environment that spanned the study period, where arguably a rising tide lifted all boats, including the overvalued variety. Such analysis implies, in our view, that a meaningfully large percentage of stocks whose prices we thought were too high relative to our estimate of their intrinsic value still converged to the lower fair value estimate, despite headwinds in the form of a very strong bull market.

In this sample of overvalued stocks in Figure 6 above, just over 13% of fair value estimates resulted in price-to-fair value convergence within the first time period, approximately 6% of fair value estimates resulted in price-to-fair value convergence during the second time period, more than 4% of fair value estimates resulted in price-to-fair value convergence during the third time period, and approximately 4% of fair value estimates resulted in price-to-fair value convergence during the fourth time period, with the cumulative balance accruing during time periods 5-8, to total 41%. The average percentage to price-to-fair value convergence for overvalued stocks is much smaller than that for undervalued stocks, and we attribute this condition again to the bull market that covered the study period. Those overvalued stocks whose prices did converge to the lower fair value estimate had to do so against the backdrop of a very strong market advance.

V. Conclusions

Valuation is both art and science, and the paramount objective of the valuation exercise is to tilt the odds in investors' favor, not to pursue the follies of point-estimate precision. The inextricable link between fundamental valuation analysis and behavioral economics is established in this paper, and the concept of behavioral valuation is introduced in the application of relative valuation measures, namely the P/E ratio, within the Valuentum Buying Index rating system.

Though academic research is scarce with respect to measuring the efficacy of discounted enterprise cash-flow-based fair value estimates due to the presence of price targets on Wall

Street, the usefulness of a systematically-applied free-cash-flow-to-the-firm method remains intriguing. The study in this paper reveals a higher rate of price-to-fair value convergence for both undervalued and overvalued stocks, in aggregate (59%), as defined by the discounted enterprise cash flow process, than what otherwise might have been expected under “random walk” or efficient market theory.

Over the time period studied in this paper, stock prices have experienced a strong advance, and such a dynamic may have been expected to drive a higher frequency of price-to-fair value convergence in undervalued stocks ($FV > P$) than in overvalued stocks ($FV < P$). Such an occurrence was evident in the results. However, a statistically significant difference appeared with respect to undervalued stocks versus “random walk” expectations, and that a 40%+ price-to-fair value convergence rate for overvalued stocks occurred in a rising-tide-lifts-all-boats market environment was highly encouraging, if not equally intriguing.

In the incidence of fair value estimates that signaled undervaluation, the share price converged to the fair value estimate within eight time periods, or approximately 3 years, in more than 80% of the instances. Share prices of undervalued stocks advanced as much as 20% or 30%, on average, to achieve price-to-fair value convergence at this elevated cumulative price-to-fair value convergence rate. We think these statistics with respect to the identification of materially underpriced equities is remarkable under any economic conditions or market environment.

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This study discusses backtested and/or “walk-forward” information regarding discounted cash-flow-derived fair value estimates. Actual results may differ from information, results, or performance presented in this paper. All results are hypothetical and do not represent actual trading. Hypothetical results are intended for illustrative purposes only. There is risk of substantial loss associated with investing in financial instruments.

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