

# Aiding in Misbehaving

Notes on Inefficient Markets and Backward-Looking-Derived Factors

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## Key takeaways

### On the Price-to-Fair-Value test of efficient markets...

We believe the only “true” way to test for market/information efficiency rests in what is called the “Price-to-Fair-Value” model, as even completely irrational, “bubble” prices can theoretically be “explained away” as a function of future expectations in efficient markets theory.

In the Price-to-Fair-Value test, the idea is not whether a deviation from price and “true” intrinsic value exists, as the latter cannot be calculated with precision, but rather the Price-to-Fair-Value test determines whether there may be a divergence from a) price, as a function of future expectations and b) an estimate of intrinsic value, which is also a function of future expectations.

The Price-to-Fair-Value test may more appropriately measure expectations “errors” in the price, a rather important point of emphasis as it relates to efficient markets, distinct from measures of price versus “true” intrinsic value, the latter only estimated as a range of probable fair-value outcomes.

The Price-to-Fair-Value test may not resolve the joint hypothesis problem (and is far from a perfect model of market equilibrium), as the enterprise discounted cash flow model is, itself, an asset pricing model. However, we think the idea that prices are a function of future expectations is better captured in models where future expectations are attempted to be captured and not generally to just be assumed to be represented in prices.

Whether stock prices are “correct,” and whether investors can outperform are two separate questions. However, can conclusions be drawn about active management or efficient markets on mutual-fund data alone? We suspect no, and the idea of underperformance by active fund management may potentially imply outperformance in other areas, including households, which represent the largest component of the marketplace at 36%.

### On the inconsistency of backward-looking-derived factors in predicting stock returns...

If the very idea that the support for efficient markets theory, as in the case of “bubbles,” rests on the basis that price is adjusting to new future expectations, which we may generally agree with, it brings up a very damaging consideration as it relates to backward-looking-derived factors as drivers/explainers of stock-price movements, as in factor-based models.

For starters, if prices are based on future expectations, how can backward-looking factors be explanatory drivers of stock prices? They can’t, in our view, and the idea that backward-looking-derived factors aren’t necessarily measuring what they think they are, too, as in book-to-market ratios--in categorizing growth versus value stocks--makes backward-looking-derived factor’s logical efficacy at predicting future stock returns even more questionable.

That the general approach of quantitative backward-looking-derived factor analysis is not only largely based on historical data (e.g. t-1, the book-to-market ratio from last year), but also that it is based on realized data, which may or may not be tied to prices, as prices are driven by expected data (realized or not), are huge theoretical inconsistencies.

We believe the theoretical underpinnings of finance continue to be developed, and a Copernican shift from backward-looking approaches to forward-looking approaches should not be ruled out in the coming decades.

*The following are notes on inefficient markets and backward-looking-derived factors. Readers should expect further edits and revisions to this working piece. June 24, 2018.*

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***“Not everything that counts can be counted, and not everything that can be counted counts.” -- quote generally attributed to Albert Einstein, though also William Bruce Cameron (1963).***

### **What Matters in Testing for Efficiency?**

In a world of three types of stocks--those that are undervalued, fairly valued and overvalued, on the basis of a comparison between price and estimated fair value--the distribution of undervalued, fairly valued and overvalued stocks on the global marketplace is likely to be undefined at any time, as both price and estimated fair value are non-static variables, both moving in successive time periods. Models that test for market efficiency or inefficiency must consider this notion.

That the distribution of price returns of undervalued, fairly valued, and overvalued stocks may be independent, identically distributed in successive forward one-time periods ( $t+1$ ), as in Fama 1970<sup>1</sup>, may not take into account the core component of long-term investing. That is, it may take each stock uniquely more than one period--not successive days or weeks or months, but rather sometimes years--to be categorically reclassified as a result of both price and fair-value-estimate movements (i.e. an undervalued stock's price advances to become fairly valued).

That price returns may be independent, identically distributed in successive one-time periods across undefined sets of undervalued, fairly valued or overvalued stocks may not or rather should not translate into the view markets are efficient or “fully reflect” information. The time for a stock to theoretically move from undervalued to fairly valued or from fairly valued to overvalued, as examples, is and will always be undefined.

For example, that it took two years instead of two months for price-to-fair value convergence to occur should not make the original mispricing/inefficiency any less of one. Furthermore, the idea of the market needing to be both inefficient and efficient for price-to-fair value convergence to occur, as rational investors bid up undervalued stocks to intrinsic value, is not a necessity, as models can target the movement of inefficiency-to-inefficiency (undervalued to overvalued, as in the Valuentum Buying Index)<sup>2</sup>.

Movements of stock prices based on new “news” should not be a consideration as to whether stocks are priced “appropriately” or reflect all information. Theoretically, a mispriced equity can move on new “news” and reflect a further mispricing as much as an equity that may be more fairly priced move to better “accurately” reflect its “true” intrinsic value. The idea of efficient markets should be evaluated on the difference between price versus estimated fair value, namely a measure of the difference in expectations (expectations “errors”), irrespective of market-moving information, which may augment or mitigate expectations “errors.”

It follows then that perhaps the better way to test for whether stocks are priced “correctly,” is the Price-to-Fair-Value test, where the test measures whether the price at time  $t$  eventually at some point in the future (time  $\Phi$ ) eventually converges to estimated fair value at time  $t$ :

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<sup>1</sup> Fama, Eugene F., The Journal of Finance, Vol. 25, No. 2, Papers and Proceedings of the Twenty-Eighth Annual Meeting of the American Finance Association New York, N.Y. December, 28-30, 1969 (May, 1970), pp. 383-417.

<sup>2</sup> Nelson, Brian, Tatiana Dmitrieva, and Kris Rosemann (2017), “Value and Momentum Within Stocks, Too.” Study of Individual Time Series of 20,000+ Valuentum Buying Ratings. [https://www.valuentum.com/articles/Value\\_and\\_Momentum\\_Within\\_Stocks\\_Too](https://www.valuentum.com/articles/Value_and_Momentum_Within_Stocks_Too)

**Figure 1**

$$\text{Fair Value Estimate} = \lim_{t \rightarrow \phi} \text{Price}(t)$$

*Notes:* The limit of function "Price" of t (time) as t approaches  $\Phi$  is expected to be the fair value estimate. This represents a singular representation of price-to-fair value convergence, as the fair value estimate is also dynamic over time. Figure 1 explains that it is not price movement itself over successive time periods that may matter in evaluating efficient markets or inefficient markets but rather it is whether over an undefined time period for each company that price-to-fair-value convergence eventually occurs more often than not.

Said differently, is there an elevated percentage of instances of price-to-fair value convergence on the market over various time periods, including multiple instances of price-to-fair value convergence even with the same stocks over time (as fair value estimates change over time, too), implying "inefficiency?" For example, it should not necessarily be whether prices reflect a "random walk" or "random walk with drift" in t+1 but rather whether prices reach an estimated fair value at some point at undefined time  $\Phi$ . For example, the limit of a firm's stock price as t (time) approaches undefined time  $\Phi$  should be the fair value estimate in more cases than not, in what might be called an "inefficient" market. Though there have been studies on the predictive power of fair value estimates<sup>3</sup>, there are few studies that actually test price to systematic fair-value-estimate convergence.

But what is the correct model for any test of efficient markets? After all, there is a subjective element to estimating fair values, and prices are objective and could capture expectations "best," assuming a frictionless environment where capital is readily-available to the best and brightest to "set" prices. But importantly, does the objectivity of prices make them any more "correct," or just objective data points that can be counted? We propose the concept of the Price-to-Fair-Value test solely on a theoretical basis, and we believe efforts to value future fundamental expectations within an enterprise discounted cash flow model may, in some cases, generate a better theoretical model than models embracing successive one-period martingale or submartingale views on security prices. In any case, the idea of a submartingale for security prices is not inconsistent with the value composition of the enterprise free cash flow model, where value estimates advance over time as "time passes" and "cash is collected."

### **Introducing the Price-to-Fair-Value Test**

Recent studies have shown the possibility of a high rate of price-to-fair value convergence for both undervalued and overvalued stocks, in aggregate, of ~59%, a higher incidence rate than what otherwise might have been expected under efficient markets theory, but still likely consistent with random walk successive price observations, as prices took multiple periods to eventually achieve price-to-fair value convergence<sup>4</sup>. *Does this imply consistent behavior in theoretical efficient markets and potentially "true" inefficient markets?* The idea is not to market the enterprise discounted cash flow model as a superior method of valuation, but rather the idea of the Price-to-Fair-Value test is to move the discussion away from the behavior of prices and more to the behavior of price-to-fair value ratios over longer duration time periods as tests for market and information efficiency.

The analysis, in our view, of the distribution of successive price changes in one-period returns does not, or rather should not, form the foundation of measures of information efficiency or information inefficiency. It may be the case, as questioned above, that the evidence of independent, identically distributed returns in successive price movements is as consistent with the view of an efficient market as an inefficient market. Quite simply, if efficient markets have independent, identically-distributed successive one-period returns

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<sup>3</sup> Miller, Warren, James Xiong, and Thomas Idzorek, "The Predictive Power of Fair Value Estimates," Morningstar Advisor, October/November 2013.

<sup>4</sup> Nelson, Brian, Tatiana Dmitrieva, and Kris Rosemann (Oct 2017), "How Well Do Enterprise-Cash-Flow-Derived Fair Value Estimates Predict Future Stock Prices?"

[https://www.valuentum.com/articles/How\\_Well\\_Do\\_Enterprise\\_Cash\\_Flow\\_Derived\\_Fair\\_Value\\_Estimates\\_Predict\\_Future\\_Stock\\_Prices\\_And\\_Thoughts\\_on\\_Behavioral\\_Valuation](https://www.valuentum.com/articles/How_Well_Do_Enterprise_Cash_Flow_Derived_Fair_Value_Estimates_Predict_Future_Stock_Prices_And_Thoughts_on_Behavioral_Valuation)

that are believed to be random, or “random with drift,” then what might inefficient markets have? *Would they be statistically significantly different? How could this be measured?* Without knowledge of a company’s estimated fair value, can a connection between successive returns and efficient markets “truly” be made?

It is on this basis that we believe the only “true” way to test for market efficiency rests in what is the Price-to-Fair-Value test, as even completely irrational, “bubble” prices can theoretically be “explained away” as a function of future expectations in efficient markets theory. The question is whether prices, themselves, are the best way to capture future expectations within a theoretical model, or if there is a better way to capture future expectations to then compare to prices. The enterprise discounted cash-flow model, for example, is the most robust method of pricing in future expectations to arrive at a value output, and therefore, may represent the most robust method in testing information efficiency. But it is important to define what exactly is being measured in a Price-to-Fair-Value test.

The idea is not whether there exists a deviation from price and “true” intrinsic value, as the latter cannot be calculated with precision, but rather the Price-to-Fair-Value test determines whether there may be a divergence from a) price as a means of discounting future expectations and b) an estimate of intrinsic value, which is also a function of future expectations. The idea is then answering whether future expectations are mispriced, and therefore whether there exists information inefficiency, not whether prices truly reflect intrinsic values, which may be subject to hindsight 20/20 bias. The Price-to-Fair-Value test may not resolve the joint hypothesis problem (and is far from a perfect model of market equilibrium<sup>5</sup>), as the enterprise discounted cash flow model is, itself, an asset pricing model, but we think the idea that prices are a function of future expectations is better captured in models where future expectations are attempted to be captured and not generally to just be assumed to be represented in prices.

The point that the Price-to-Fair-Value test measures varying expectations, or expectations “errors” in the price, is a rather important point of emphasis, distinct from measures of price versus “true” intrinsic value, the latter only estimated as a range of probable fair-value outcomes. It does not logically hold, in our view, that investors with the same information will arrive at the same fair value estimate for the same company, an idealistic representation of equity analysis given the wide dispersion of price targets and earnings estimates on Wall Street, for example. How could prices truly reflect “correct” values then, given varying philosophical methods of valuation on Wall Street, and possible capital restraints limiting price discovery? Are the best and brightest truly “setting” prices? It would seem based on such parameters that prices, based on future expectations, can deviate from estimates of intrinsic value (not “true” value, itself), both a function of expectations, given varying analytical outcomes and capital-allocation restraints.

The distinction between estimated intrinsic value and “true” intrinsic value is important. The Price-to-Fair Value test does not assume that estimated intrinsic value is the “true” intrinsic value, but rather it is the most likely intrinsic value estimate on the basis of future expectations. Under this definition, an efficient market would have zero expectations “errors,” while an inefficient market would have non-zero expectations “errors.” The idea of a test may not require knowledge of the “true” intrinsic value, but rather the test would evaluate whether price diverges from estimated intrinsic value in creating expectations “errors,” as in the case of an abnormally-high level of price-to-fair value convergence over time. If markets are “efficient,” stocks wouldn’t converge to an estimated fair value, as they would already be trading at estimated fair value, adjusted for the time value of money, and elevated levels of price-to-fair value convergence would not occur.

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<sup>5</sup> Clement, Douglas (2007). “Interview with Eugene Fama. Federal Reserve Bank of Minneapolis. <https://www.minneapolisfed.org/publications/the-region/interview-with-eugene-fama>

## The Logical Inconsistencies of Efficient Markets Theory and Backward-Looking-Derived Factors

There are a few other curiosities worth mentioning. The anecdotes of Palm and 3Com<sup>6</sup> and that of closed end fund named CUBA<sup>7</sup> (see footnotes for further reading) are two largely accepted price-to-fair value market anomalies, and the view that if these are two that we can measure, what else is the market getting “wrong” that we *can't* technically measure? But the idea of prices being based on future expectations, or expectations theory remains an important one with considerable implications. For starters, the belief, for example, that many investors may have been pricing in an impending recession prior to the Crash of 1987, which in turn, may have impacted future fundamental expectations to actually cause the Crash of 1987, as opposed to the view that the value of the market did not change 20% overnight<sup>8</sup> is a very important observation of random walk theorists. Also important is the view that prices of tech stocks in the dot-com bubble were reasonable because “most people were saying the Internet was going to revolutionize business, so companies that had a leg up on the Internet were going to be very successful.”<sup>9</sup>

On the point of “bubbles” also factoring in future expectations, our point is neither to agree or disagree, but rather to highlight a large inconsistency. If the very idea that the support for efficient markets theory, in the case of “bubbles,” rests on the basis of future expectations, which we may generally agree with, it brings up a very damaging consideration as it relates to backward-looking-derived factors as drivers/explainers of stock-price movements, as in factor-based models. If prices are based on future expectations and all information is supposedly factored into the prices, as in efficient-markets theory (and arguably the most critical information in setting prices is forward-looking in nature), how can backward-looking factors be considered explanatory drivers behind stock prices? They can't, in our view, and the very idea that backward-looking-derived factors aren't necessarily capturing what they are intending, as in book-to-market ratios, for example--when it comes to separating growth versus value stocks--only adds a greater degree of skepticism regarding their logical efficacy at predicting future stock returns.<sup>10</sup> Value is relative and can only be assessed by comparing price to estimated fair value.

To reiterate, the idea that prices are a function of the future is an important building block of finance, with wide-reaching ramifications on backward-looking-based financial research to date. The concept also reverts back to the Price-to-Fair-Value test, which doesn't necessarily mean it is a test of price versus “true” intrinsic value, but rather it is a theoretical test of the magnitude of expectations “errors,” and whether they are “resolved” in time more often than not, irrespective of time *t*. In any case, the idea of the price-setting mechanism for efficient market theorists to be based on future expectations of fundamental data is consistent with the view that prices are a function of future data, *realized or not* (*not as in the case of “bubbles”*). This is not to say that historical pricing data that forms “technical patterns” that influences future buyer behavior, however, cannot be an important factor of future price returns, even though such patterns are a function of historical pricing data.

Historical pricing/fundamental data, by itself, if not logically connected to future buying/selling decisions, cannot reasonably be considered to be explanatory factors of stock returns, unless such historical data properly matches expected data, realized or not (i.e. in the case of a “bubble”). By extension, that the general approach of quantitative backward-looking-derived factor analysis is not only based on historical data (e.g. *t*-1, the book-to-market ratio from last year), but that it is based on realized data, which may or may not be tied to prices--as prices are driven by expected data (realized or not)--are huge theoretical

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<sup>6</sup> Thaler, Richard H. and Owen A. Lamont. Anomalies: The Law of One Price in Financial Markets. *Journal of Economic Perspectives*—Volume 17, Number 4—Fall 2003—Pages 191–202.

<sup>7</sup> Garcia, Cardiff (2017), “Thaler, the CUBA fund and efficient markets hypothesis (plus a roundup.” *Financial Times*. <https://ftalphaville.ft.com/2017/10/09/2194613/thaler-the-cuba-fund-and-the-emerging-markets-hypothesis-plus-a-roundup/>

<sup>8</sup> “Are Markets Efficient? (2016),” Chicago Booth Review, YouTube. <https://www.youtube.com/watch?v=bM9bYOBuKF4>

<sup>9</sup> Clement, Douglas (2007). “Interview with Eugene Fama. Federal Reserve Bank of Minneapolis. <https://www.minneapolisfed.org/publications/the-region/interview-with-eugene-fama>

<sup>10</sup> Nelson, Brian (March 2018), “The Tragedy of Quantitative Finance.” <https://www.valuentum.com/downloads/20180304/download>

inconsistencies, in our view. Our efforts at Valuentum are focused on deriving forward-looking factors based on future expectations, which we believe are consistent with the drivers of stock prices.<sup>11</sup>

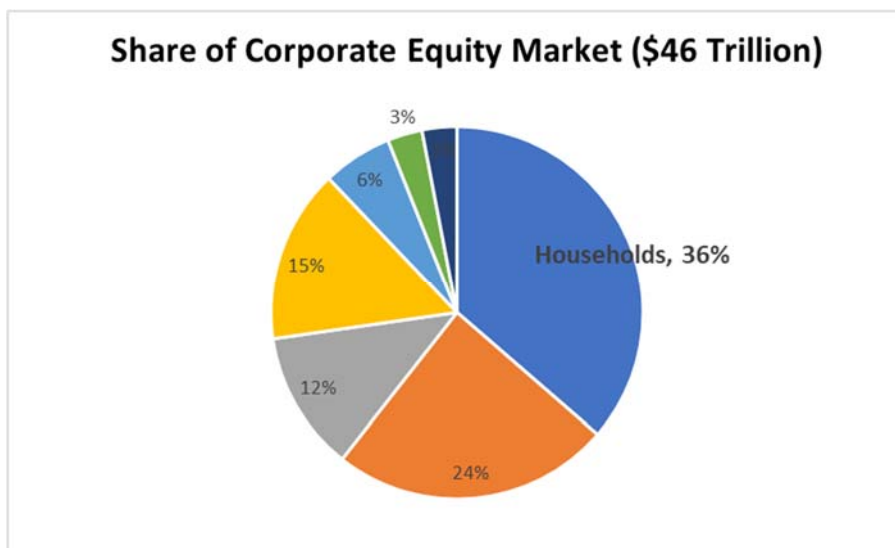
### Finance Does Not Have the Complete Picture of Outperformance and Underperformance

Furthermore, it is vitally important to separate the idea of whether stock prices are priced “correctly” on the basis of future expectations, as in the Price-to-Fair-Value test, from the idea of whether investors can outperform their respective benchmarks. These are not the same idea, are two different things, and have likely only been confused in past decades as research on efficient markets has proliferated. In this second respect, there seems to be an over-reliance on mutual fund data in showing manager underperformance, or an inability for investors to outperform the market, after fees and expenses. For example, in Malkiel 2005<sup>12</sup>, we have the following abstract:

In recent years financial economists have increasingly questioned the efficient market hypothesis. But surely if market prices were often irrational and if market returns were as predictable as some critics have claimed, then professionally managed investment funds should easily be able to outdistance a passive index fund. This paper shows that professional investment managers, both in The U.S. and abroad, do not outperform their index benchmarks and provides evidence that by and large market prices do seem to reflect all available information (Malkiel 2005).

However, what may not be more broadly known is that mutual fund data is but a very small part of the entire corporate equity market. According to MarketWatch, citing data from Goldman Sachs, “households directly own 36% of the \$46 trillion U.S. equity market.<sup>13</sup>” This may not seem like a lot, but mutual funds own just 24% of stocks, while ETFs own just 6%. Retail investors may own small parts of the market individually, but in aggregate, they’re share is 50% larger than mutual-fund share. Can conclusions be drawn about active management or efficient markets on mutual-fund data alone? We suspect no, and the idea of underperformance by active fund management<sup>14</sup> may actually imply outperformance in other areas, including households, under the broader assumption that underperformance is generally offset by outperformance elsewhere, all else equal.

Figure 2



Data Source: Federal Reserve Board, Goldman Sachs Investment Research, MarketWatch (see footnote 13).

<sup>11</sup> Nelson, Brian, Kris Rosemann and Tatiana Dmetrieva (2017). “Study: Valuentum Best Ideas Newsletter Portfolio.” <https://www.valuentum.com/downloads/20180530/download>

<sup>12</sup> Malkiel, Burton G. “Reflections on the Efficient Market Hypothesis: 30 Years Later. The Financial Review 40 (2005) 1-9.

<sup>13</sup> Vlastelica, Ryan (2018). “Goldman blames mom-and-pop investors for volatility in stocks.” <https://www.marketwatch.com/amp/story/guid/76120B14-52F3-11E8-8AA1-3C71A5012970>

<sup>14</sup> Soe, Aye M. and Ryan Poirier, FRM (2017), “SPIVA US Scorecard.” S&P Dow Jones Indices. [http://us.spindices.com/documents/spiva/spiva-us-year-end-2016.pdf?force\\_download=true](http://us.spindices.com/documents/spiva/spiva-us-year-end-2016.pdf?force_download=true)



*Notes:* Figure 2 shows the distribution of share of the corporate equity market, where households own 36% share. Mutual funds and ETFs own 24% and 6%, respectively. The idea is that support for efficient markets theory by evaluating the underperformance of mutual funds may not hold given that mutual funds account for less than a quarter of the \$46 trillion corporate equity market.

Said differently, it is quite possible that a percentage of investors, as in Nelson's Syllogism of the Market<sup>15</sup>, are outperforming, after fees and expenses, despite active fund management underperformance. Though Nelson's Syllogism is constructed as it relates to fund data and the percentage of investors within the funds, themselves, the syllogism can be expanded to the broader corporate equity market, too. For example, theoretically, the number of individual household investors that comprise 36% share of the market and those investors in mutual funds with 24% share is undefined each and every year, and each individual's outperformance or underperformance, after fees and expenses, is also undefined. The underlying point is that the application of mutual fund data alone is insufficient to arrive at any conclusions regarding efficient markets, whether investors are outperforming, after fees and expenses, or the benefits of indexing, itself, relative to traditional buy-and-hold investing, for example.

## Conclusion

Efficient markets theory is a hypothesis that suggests "security prices at any point in time 'fully reflect' all available information (Fama 1970, page 388)<sup>16</sup>." But do they? Is studying the movement of prices and not the movement of price-to-fair values the "correct" way of building the case for the view of information efficiency, or zero expectations "errors?" Wouldn't the *only* way to perceive movements of stock prices to be random if one is not calculating a corresponding intrinsic value estimate, an equilibrium model, albeit an imperfect one? How can one know if such a move is random or not, or that in multiple time periods  $t$ , it may just form the movement of stock category reclassification, as in the case of a stock moving from being undervalued to fairly valued, for example?

In this paper, we have introduced the idea that measuring price returns may not be the way to explain efficiency or inefficiency. We introduced the Price-to-Fair-Value test, on the basis of enterprise discounted cash flow models, which measures the concept of expectations "errors" in security pricing, not necessarily the difference between price and "true" intrinsic value, which is a range of future fundamental outcomes and cannot be precisely calculated. Though several anecdotes exist regarding documented price-to-fair-value anomalies, recent data indicates a tendency for enterprise discounted cash-flow models to be predictive of prices in forward time periods at a pace that may be higher than what would be expected under efficient markets theory, suggesting non-zero expectations "errors."

The paper also points to the idea that mutual fund data alone may not be sufficient to conclude whether the percentage of individuals are actually underperforming or outperforming the market return, after fees and expenses. Households, for example, own 50% more of the corporate equity market than mutual funds, where most support for the efficient markets hypothesis seems to rest. Finally, the work suggests that, for efficient markets theory to hold on the basis of prices being expectations, that backward-looking-derived factor analysis may have logical inconsistencies, as an explanatory mechanism of future price returns. It is possible that either efficient markets theory doesn't hold, or most backward-looking-derived factors may not hold, or perhaps both do not hold. We believe the theoretical underpinnings of finance continue to be developed, and a Copernican shift from backward-looking approaches to forward-looking approaches should not be ruled out in the coming decades.

*Tatiana Dmitrieva, Ph.D, Data Analyst at Valuentum, contributed to this work.*

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<sup>15</sup> Nelson, Brian, Tatiana Dmitrieva, and Kris Rosemann (2017), "Value and Momentum Within Stocks, Too." Study of Individual Time Series of 20,000+ Valuentum Buying Ratings. [https://www.valuentum.com/articles/Value\\_and\\_Momentum\\_Within\\_Stocks\\_Too](https://www.valuentum.com/articles/Value_and_Momentum_Within_Stocks_Too)

<sup>16</sup> Fama, Eugene F., The Journal of Finance, Vol. 25, No. 2, Papers and Proceedings of the Twenty-Eighth Annual Meeting of the American Finance Association New York, N.Y. December, 28-30, 1969 (May, 1970), pp. 383-417.

## **About Valuentum**

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## About the Author



Brian Nelson is the president of equity research and ETF analysis at Valuentum Securities. He is the architect behind the company's research methodology and processes, developing the Valuentum Buying Index rating system, the Economic Castle rating, and the Dividend Cushion ratio. Mr. Nelson has acted as editor-in-chief of the firm's Best Ideas Newsletter and Dividend Growth Newsletter since their inception.

Before founding Valuentum Securities in early 2011, Brian

worked as a director at Morningstar, where he was primarily responsible for training and methodology development within the firm's equity and credit research department. Prior to that position, he served as a senior industrials securities analyst covering aerospace, airlines, construction, and environmental services companies.

Before joining Morningstar, Mr. Nelson worked for a small capitalization fund covering a variety of sectors for an aggressive growth investment management firm in Chicago. He holds a Bachelor's degree in finance and a minor in mathematics, magna cum laude, from Benedictine University. Brian has an MBA from the University of Chicago Booth School of Business and also holds the Chartered Financial Analyst (CFA) designation.

## Highlights:

Brian is frequently quoted in the media and has been a frequent guest on Nightly Business Report, Bloomberg TV, CNBC, and the MoneyShow.

Mr. Nelson is very experienced valuing equities, developing discounted cash-flow models used to derive the fair value estimates for companies in the equity coverage universes of two independent investment research firms, including Valuentum.

Brian worked on a small cap fund and a micro-cap fund that were ranked within the top 10th percentile and top 1st percentile within the Small Cap Lipper Growth Universe, respectively, in 2005.

Mr. Nelson led the charge in developing Morningstar's issuer credit ratings, creating and rolling-out one of the firm's proprietary credit metrics, the Cash Flow Cushion.

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**There is risk of substantial loss associated with investing in financial instruments.**

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