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Value Investing: Bridging Theory and Practice*

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Introduction

Value investing refers to the buying or selling of stocks on the basis of a perceived gap between their current market price and their fundamental value – commonly defined as the present value of the expected future payoffs to shareholders. This style of investing is predicated upon two observations about publicly listed companies and their stock prices: (1) a share of stock is merely a fractional claim on the futures cash flows of an operating business, and that claim is the basis of its long-run value; (2) over shorter horizons, prices can deviate substantially from the long-run value of the stock. Value investors buy stocks that appear to be cheap relative to their intrinsic value and sell (even sell short) stocks that seem expensive.

One of the most remarkable regularities in the empirical asset pricing literature has been the fact that value investing is consistently associated with positive abnormal returns. Both empirical academic studies and the evidence from a host of professional asset managers seem to confirm this. Over many studies, we see time and again that firms trading at lower pricing multiples, with stronger balance sheets, more sustainable cash flows, higher profitability, lower volatility, lower Beta, and lower distress risk actually earn *higher*, not lower, future stock returns. This pattern in cross-sectional returns, which I refer to collectively as the "value effect", was first recognised by famed Columbia University professor Benjamin Graham and documented as early as 1934. Various elements of this effect have been confirmed (and rediscovered) by a host of academic studies in the ensuing 80 years.

In this article, I revisit the theoretical underpinnings of the value effect and summarise what is now an extensive body of evidence in support of its existence. I review some basic insights gleaned from accounting-based valuation theory and use these

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insights as an organising framework to discuss the essence of value investing. I hope to show that what we are learning about value investing in recent academic studies in fact dovetails nicely with the strategies being used by such legendary investors as Ben Graham, Warren Buffett, and Joel Greenblatt.

Smart value investors are not merely looking for "cheap" stocks: they are looking to find "quality" stocks (firms with strong fundamentals) trading at reasonable prices. I will provide some examples of how accounting numbers can be used, and are indeed being used, by successful professional investors to find quality stocks. In fact, I believe many recent results from academic research are extremely useful to value investors in their search for quality companies trading at reasonable prices.

A significant subplot throughout these remarks is the importance of human cognitive constraints (behavioural factors, or investor sentiment) in the price formation process. The success of value investing is predicated on the fact that stock prices can, and often do, diverge from their long-term fundamental value. A key intellectual hurdle for many academics is how such phenomena might exist, and indeed can survive over decades, given the rational arbitrage forces at work in financial markets. It is to this more basic question that I will first turn my attention. Only after we have established the plausibility that prices can and indeed do diverge from value will I then turn to the practical business of measuring firm value and exploiting apparent market mispricings.

I. Market Efficiency Revisited

Assumptions matter. They confine the flexibility that we believe is available to us as researchers, and they define the topics we deem worthy of study. Perhaps more insidiously, once we have lived with them long enough, they can disappear entirely from our consciousness.

In my mind, one of the most frequently invoked, yet least supported assumptions in the capital market area is the "price equals value" assumption. Simply stated, it is the belief that a firm's stock price is equivalent to its fundamental value, that is, the present value of its expected future payoff to shareholders. This assumption has its roots in the market efficiency literature, but it has taken on a whole life of its own. In the context of fundamental investing, I believe it is essential to review the conceptual underpinnings of this assumption and the serious problems that it has engendered in academia.[2]

1.1 Does price equal value?

In its original incarnation, the efficient market hypothesis (EMH) is the simple proposition that market prices incorporate all available information. The original EMH literature is careful to condition this statement on a particular set of available information (e.g. Fama, 1965, 1991). Different forms of the EMH (strong, semi-strong, and weak) are then defined in terms of the rapidity and accuracy of price adjustment to news within different information sets. Early applications of the EMH in accounting also acknowledged that the speed and accuracy of price adjustment to new information is a continuous process and does not occur instantaneously (e.g. Dyckman and Morse, 1986, page 2).

As capital market research has evolved over time, a stronger form of the EMH has gained currency. It is what I refer to as the "**price is right**" hypothesis. Applied to equity markets, this view of market efficiency asserts that a company's stock price is an optimal

[2] See Lee (2001) for an early discussion on the impact of the market efficiency hypothesis on capital market research.

forecast of the present value of its expected future dividends ($P_t = V_t, \forall t$). Notationally, this view is often expressed in the following form:

$$P_t = V_t \equiv \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r)^i}, \tag{1}$$

where V_t is defined as the stock's fundamental value at time t, $E_t(D_{t+i})$ is the expected future dividend for period t+i based on information available at time t, and r is the appropriate risk-adjusted discount rate for the expected dividend stream. Equation (1) asserts that P_t, the stock price at time t, is equivalent to the present value of expected future dividends, V_t.

Over time, the price is right view of markets has acquired the status of an operating assumption. This assumption appears explicitly in "valuation" studies, typically as the first assumption in the papers (e.g. Feltham and Ohlson, 1999; Zhang, 2000). It is central to the information content literature (short-window event studies and long-window association tests) in which price is viewed as a *de facto* proxy for the expected value of future cash flows and stock returns are deemed to reflect changes in the present value of these cash flows. Similarly, in the value relevance literature (see Holthausen and Watts, 2001; Barth *et al*., 2001), a firm's stock price is the normative benchmark for fundamental value and the value relevance of accounting-based metrics is judged on the basis of their ability to explain either cross-sectional stock prices or contemporaneous returns.

This assumption also features prominently in the empirical asset pricing literature. Most asset pricing studies invoke this assumption when using a firm's *ex post* realised returns as a proxy for its *ex ante* expected returns.[3] It is used in return decomposition studies, such as Campbell (1991) and Vuolteenaho (2002), where a firm's realised returns are decomposed under the assumption that movements in price exactly mirror the movements in value. In the same spirit, the implied cost of capital literature in accounting invokes this assumption in computing a market-implied discount rate using current stock prices.[4] In short, although we recognise the conceptual impossibility of instantaneous price adjustments, much of the capital market literature over the past 50 years has assumed that the adjustment process is trivial. This basic assumption has had an enormous influence on the way we select research topics, design empirical tests, and interpret research findings.

Interestingly, most empirical tests of market efficiency do not in fact test price-value equivalency. Instead, they have focused on the predictability of returns. The idea is that if current market prices incorporate all available information, then future returns should be largely unpredictable, or at least any patterns of predictability that we observe in future returns should not be easily exploited after transaction costs. This version of the EMH has been variously referred to as the "competitively efficient markets" (CEM) hypothesis

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[3] See Cochrane (2011) and the references therein.

[4] See, for example, Gebhardt *et al.* (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). To be fair, Gebhardt *et al*. (2001) view the market implied discount rate as the "actual yield", which might be subject to market mispricing. They then compute a "warranted yield" on the basis of firm characteristics that seem correlated with the implied discount rate in the cross section. Their tests show that the warranted yield instrument has strong predictive power for future implied rates of return, suggesting a way to tease out an expected return measure without relying on current market prices.

or the "no arbitrage conditions". An even more descriptive moniker, I think, is the "**no free lunch**" assumption: Markets that are in equilibrium should rarely, if ever, offer a free lunch.

The problem is that no free lunch does not in fact imply the price is right. In his seminal study on the role of mass psychology in markets, Robert Shiller (1984) made the following observation:[5]

> Returns on speculative assets are nearly unforecastable; this fact is the basis of the most important argument in the oral tradition against a role for mass psychology in speculative markets. One form of this argument claims that because real returns are nearly unforecastable, the real prices of stocks is close to the intrinsic value, that is, the present value with constant discount rate of optimally forecasted future real dividends. *This argument for the efficient market hypothesis represents one of the most remarkable errors in the history of economic thought. It is remarkable in the immediacy of its logical error and in the sweep and implications of its conclusion*. [Emphasis added].

With a little thought, Shiller's point becomes obvious: If price is equal to value at all times, then indeed returns will be unforecastable. In other words, if the price is always right ("A"), then there will indeed be no free lunch ("B"). However, the reverse does not follow – it is possible for prices to vary far from fundamental values without presenting any easy money (that is, although "A" implies "B", "B" does not imply "A").[6] The mere fact that returns are difficult to forecast does not at all imply that price is equal to intrinsic value. As noted below, much of the mess in empirical asset pricing today comes from a failure to heed Shiller's warning.

1.2 The Shiller noise trader model

To drive home his point, Shiller (1984) presents a simple noise trader model. In many respects, the model is highly stylised and restrictive. Over the years, more sophisticated and complex models have sprung forth in this literature. Nevertheless, the original Shiller noise trader model remains my favourite, both for its extraordinary elegance and for the deep insights it brings to the real-life problems fundamental investors face each day. In this section, I provide a brief synopsis of the model and its key implications.

Shiller's model features two types of agents: smart-money investors and noise traders (whom Shiller refers to as "ordinary investors"). Smart-money investors trade on the basis of fundamental information, subject to wealth constraints. These investors respond to news about fundamental value quickly and in an unbiased manner. Noise traders, on the other hand, include everyone who does not trade on the basis of an optimal response to news about fundamentals.[7] Notationally, the demands of these two types of traders can be expressed as follows:

[5] Shiller (1984), 458-459.

[6] Consider the simple example where Price = Value + ε, and ε follows a random walk or long-term mean reverting process. If the relevant horizon of the rational investor is shorter than the time it takes for ε to make significant progress towards zero, then even smart money will not be able to profit from the mispricing.

[7] Shiller envisions traders who overreact to news or are vulnerable to fads. However, because the source of the noise trader demand is exogenous, the noise trader group is in fact much broader and includes those who trade for liquidity or consumption-based reasons.

<u>Noise Traders (Ordinary Investors)</u>

These investors have time-varying demands not based on expected returns optimally forecasted. Their demand is denoted as Y_t = total value of the stock (per share) demanded by ordinary investors.

<u>Information Traders (Smart Money Investors)</u>

The demand for shares by smart money investors at time t expressed as a portion of total shares outstanding (Q_t) is $Q_t = (E_t(R_t) - \rho) / \phi$, where ρ is the expected real return such that there is no demand for shares by smart money investors and ϕ is the risk premium that would induce smart money investors to hold all the shares.

In equilibrium, the market clears when total shares demanded equals total supplied (i.e. when $Q_t + Y_t / P_t = 1$). Solving the resulting rational expectation model yields the following market-clearing price:

$$P_t = \sum_{k=0}^{\infty} \frac{E_t(D_{t+k}) + \phi E_t(Y_{t+k})}{(1+\rho+\phi)^{k+1}} \qquad (2)$$

Expressed in this form, the market price is the present value, discounted at rate $\rho + \phi$, of the expected future dividend payments at time t ($E_t(D_{t+k})$) *plus* ϕ times the expected future demand by noise traders ($E_t(Y_{t+k})$). In other words, P_t is jointly determined by a firm's fundamental value (future dividends) and a more capricious factor (future noise trader demand). The relative importance of the two factors is determined by ϕ, which can reasonably be interpreted as the cost of arbitrage.

As ϕ approaches zero, price becomes a function of expected dividends and the efficient market model (Equation (1)) emerges as a special case. Thus, in markets where the costs of arbitrage are low, prices behave much as predicted by the efficient market hypothesis. However, as ϕ increases, so does the relative importance of noise trading. In the extreme, as ϕ approaches infinity, market price is determined solely by noise trader demand and fundamental valuation plays a trivial role in setting prices.

What factors affect ϕ? Clearly, the characteristics of smart money investors, such as their risk aversion and wealth constraints, are important. More generally, arbitrage costs involve the following: (1) *Trading costs*: costs associated with establishing and closing the position, including brokerage fees, price slippage, bid-ask spreads, and so on; (2) *Holding costs*: costs associated with sustaining a position; these costs are affected by such factors as the duration of the arbitrage position and the incremental cost of short-selling a stock; and (3) *Information costs*: costs associated with information acquisition, analysis and monitoring.

Of these three costs, I personally believe that the most costly and economically significant element is information costs. Information is needed to estimate firm value and assess the riskiness of a position. Given the fact that there are multiple sophisticated players in the information game, any single rational arbitrageur cannot know with certainty the quality of his/her information.[8] Notice that ϕ also appears in the denominator in Equation (2). This means that to the extent information costs are associated with cross-sectional firm characteristics, they will impact a firm's cost of capital (i.e. the return

[8] Shleifer and Vishny (1997) model the limits of arbitrage. Stein (2010) models the information uncertainty problem faced by even sophisticated investors.

investors require from their investment in the firm). This suggests a direct link between information costs and the cost of capital, and, in particular, to the extent that accounting rules and regulations reduce information costs, they can also reduce the cost of capital in equity markets.

Markets in which these three types of costs are low will feature prices close to fundamentals. For example, the markets for equity options, index futures, and closed-end funds are all characterised by relatively low transaction and information costs. In these markets, valuation is relatively straightforward, transaction costs are minimal, and the traded assets often have close substitutes. As might be expected, the prices for these assets are closely tied to their fundamental values.

In other markets, however, arbitrage costs (ϕ) can be potentially large, so noise traders dominate. For example, the capital markets of many emerging economies feature relatively few fundamental investors, little market depth, and therefore higher arbitrage costs. Even in the US, smaller firms, less closely followed and less actively traded stocks, and growth stocks that are difficult to value (including Internet, biotech, and so-called "cloud-based" stocks) will likely have higher arbitrage costs. The noise trader model predicts that security prices in these markets will display more volatility and will often seem to bear little relation to their fundamental values.

The main message from this model is that market prices are a product of the interplay between noise traders and rational arbitrageurs operating under cost constraints. Once we introduce noise traders and costly arbitrage, price is no longer simply a function of future expected dividends. Unless the arbitrage cost is zero, P_t will not generally equal V_t. The magnitude of the mispricing is a function of noise trader demand and arbitrage costs. More generally, when arbitrage costs are non-zero, we can expect mispricing to be an equilibrium phenomenon.[9]

1.3 The role of investor sentiment

Unlike Keynes' animal spirits, Shiller's noise traders are not driven primarily by idiosyncratic impulses or "a spontaneous urge to action" (Keynes, 1936, page 161). Instead, the mistakes in investor expectations are correlated across traders. Thus, Shiller does not model individual irrationality so much as mass psychology or clientele effects. A common preference or belief, which we might call investor sentiment, affects large groups of investors at the same time.

What gives rise to these common sentiments (i.e. what affects Y_t)? Shiller suggests that sentiments arise when investors trade on pseudo-signals, such as price and volume patterns, popular models, or the forecasts of Wall Street gurus (Black, 1986). More generally, Y_t captures any price effect other than those arising from the optimal use of dividend-related information. In this sense, noise trader demand can be due either to sub-optimal use of available information, over- and under-reactions to legitimate information signals, or responses to other exogenous liquidity shocks.[10] For example, it

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[9] Notice that in this model, the unpredictability of returns (a "no free lunch" version of the efficient market hypothesis) does not guarantee price equals value (a "the price is right" version of the efficient market hypothesis). For example, if arbitrage is costly ($\phi \neq 0$) and noise trader demand (Y_t) follows a random walk, the second term in the numerator can be large, but stock returns are unpredictable.

[10] In a behavioural context, investor sentiment could be due to suboptimal use of information, as described by Griffin and Tversky (1992). However, the observation that financial markets can be impacted by liquidity shocks is not limited to the behavioural literature. In the noisy rational expectation literature, the noise introduced by exogenous liquidity shocks is crucial in inducing trading and in limiting the extent to which price reveals full information. For an example of this type

has been our observation at Nipun Capital, LLC that stock prices in Asian markets are strongly influenced by fund flows from different investor constituents, including foreign investors. Such flows may be precipitated by liquidity issues that bear little relation to the actual fundamentals of Asian equities.

Note also that these noise traders are not necessarily "dumber", nor are they "doomed to extinction". In the intergenerational model of DeLong *et al.* (1990), for example, noise traders with erroneous stochastic beliefs both affect prices and earn higher expected returns. These traders bear a disproportionate amount of risk and in turn actually earn higher returns than rational investors. More generally, in a market continuously buffeted by rumours and innuendoes disguised as news, it is difficult for anyone to know whether (s)he is engaged in noise trading. As Stein (2009) observed, even sophisticated arbitrageurs cannot know how many of their peers are simultaneously entering the same trade. Therefore, all investors will in fact engage in some degree of noise trading. To the extent that information is costly, these trades will have an impact on price.

Note also that accounting research on value measurement is intricately linked to the sentiment literature. The most salient feature of noise trader demand is that it drives price away from fundamental value. Therefore, as we refine our valuation tools, we simultaneously generate better metrics for measuring noise trader demand. As information economists, accountants can help to identify signals (or pseudo-signals) that affect noise trader demand. In fact, prior studies in accounting that have investigated the under-utilisation of information in financial reports can be viewed as efforts to identify noise trader preferences. Once we recognise that noise traders are not a breed apart (i.e. that we are all noise traders), the reconciliation with current accounting research is not difficult.

1.4 How do we know price $\neq$ value?

What evidence do we have that price is not equal to value? In other words, how bad is this problem? While a detailed survey of the literature is beyond the scope of this paper, I will here outline a few highlights from the stylised facts.

<u>Non-fundamental Price Pressures</u>

Surveying the evidence, academics have been singularly unsuccessful at explaining what actually moves stock prices.[11] Even with the most powerful econometric models, under the most generous definitions of what constitutes fundamental news, our studies have only been able to explain a fraction (much less than half) of the observed volatility in market prices.[12] Increasingly, what we are learning today is that stock returns are driven by many forces unrelated to fundaments – investor sentiment, moods or emotions as well as market-wide fund flows and other things that bear no relation to the present value of future cash flows.[13] Market prices are constantly buffeted by waves of noise

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of model, see Grossman and Stiglitz (1980) or Diamond and Verrecchia (1981).

[11] Many studies document the fact that stock returns move for reasons other than fundamental news. For example, see Richard Roll's (1984) classic analysis of orange juice futures.

[12] See, for example, Cutler *et al*. (1989), Shiller (1981, 1984), Campbell and Shiller (1988), Lee, Shleifer, and Thaler (1991), and Summers (1986). In Cutler *et al.* (1989), annual aggregate market returns are regressed against a large array of fundamental metrics in a VAR system of equations. Even though the authors included measures of fundamental news from past, current, and future periods, they were able to explain less than half of the observed variance in market returns. These results are based on market aggregates; efforts at explaining firm-level returns are met with even less success.

[13] See Hirshleifer (2001) for an earlier summary of how psychology can affect prices. Many more recent studies have appeared since that article. Some representative studies include Baker and Wurgler

trader sentiment, and the effect of these noise traders can only be partially mitigated by rational arbitrageurs because the smart money is operating under various limitations, including cost and risk constraints.[14]

Fischer Black (1986) had in mind something quite similar to Shiller's model when he made his presidential address to the AFA on the subject of "Noise". Noting that the further the price of a stock moves away from value, the faster it will tend to move back, Black observed that since all estimates of value are noisy, we can never know how far away price is from value. He then famously quipped:

> However, we might define an efficient market as one in which price is within a factor of 2 of value, i.e., the price is more than half of value and less than twice value. The factor of 2 is arbitrary, of course. Intuitively, though, it seems reasonable to me, in the light of sources of uncertainty about value and the strength of the forces tending to cause price to return to value. By this definition, I think almost all markets are efficient almost all the time. "Almost all" means at least 90%. (Black, 1986, page 533)

Because value is not observable, it is difficult to test this proposition. However, the evidence on closed-end funds lends strong support to Black's conjecture (e.g. see Lee, Shleifer, and Thaler, 1991). Closed-end funds are publicly traded firms whose sole assets consist of a portfolio of other publicly traded securities. The net asset value (NAV) of this portfolio is computed weekly on the basis of the closing stock prices of the securities held by the fund. The closed-end fund puzzle is the empirical observation that the NAV of these funds typically does not equal their stock price (SP). Most closed-end funds trade at a discount to their NAV, although sometimes they can trade at a premium. As Lee *et al.* (1991) and many other studies show, it is not unusual to observe closed-end funds trading at discounts of up to -30 to -40% relative to their NAV or premiums of +10 to 15% or more. This is true even for diversified funds that hold extremely liquid securities – the difference between SP and NAV is often much larger for funds that hold restricted securities or are themselves less frequently traded. By any measure, closed-end funds are transparent and relatively easy-to-value entities (they are the "one-cell amoebas of accounting" in which fair value accounting is carried to the extreme). If arbitrage corridors are this wide for closed-end funds, what should our priors be about the magnitude of typical price deviations from firm value for more complex firms?

As I write, the winners of the 2013 Nobel Memorial Prize in Economics were just announced a few weeks ago. This year the prize was shared by three Americans – Eugene Fama, Lars Peter Hansen, and Robert Shiller. For many of us who have followed the market efficiency debate over the years, the decision to honour Fama and Shiller together is not without irony given the radical differences in their views on the subject. Fama is being honoured for his work in the 1960s showing that market prices are accurate reflections of available information. Shiller is being honoured largely for circumscribing that theory in the 1980s by showing that prices can deviate from rationality. In awarding

(2007), Coval and Stafford (2007), Richardson, Sloan, and You (2012), Kumar and Lee (2006), and Arif and Lee (2013). In most of these studies, measures of investor sentiment are first "orthogonalised" (pre-whitened) relative to a host of fundamental news variables. Nevertheless, these studies show that investor sentiment explains, and in some cases even predicts, stock returns.

[14] There is now a large literature on the limits of arbitrage. Some representative studies include Shleifer and Vishny (1997), Mitchell *et al.* (2002), Brunnermeier and Nagel (2004), and Hirsheliefer *et al.* (2009).

them the prize, the Royal Swedish Academy of Sciences notes that collectively the three professors' work "laid the foundation for the current understanding of asset prices." In characterising this contribution, the committee said their findings "showed that markets were moved by a mix of rational calculus and human behavior." (Appelbaum (2013))

The markets are moved by a mix of rational calculus and human behaviour. We have certainly come a long way since the heyday of the efficient market hypothesis! As Michael Jensen (1978) predicted, financial economists have not abandoned rational calculus or the concept of "efficiency". We understand and still appreciate the power of equilibrium thinking. At the same time, however, 35 years later, we have also come to better appreciate the importance of human behaviour and arbitrage costs in asset pricing. As a profession, many more financial economists are now willing to entertain, and wrestle with, the limitations and problems of an imperfect market. It would be most unfortunate if at this juncture in the evolution of finance as a science, accountants decided that it is better to embrace fair value accounting and simply rely on the markets to tell us how to measure performance.

In sum, I have made an argument for the claim that, both conceptually and empirically, price should not be expected to equal value. In the next section of this paper, I will provide specific examples of how historical accounting numbers have been used by professional investors to assess firm value and predict returns. This is the essence of what we call "fundamental analysis" or value investing.

II. Fundamental Analysis Using Accounting Numbers

In this section, I will discuss how historical-based accounting numbers *can* be used (and *are being used*) to make investment decisions. We will get to the theory part shortly, but let me begin with an illustration taken from the writings of Benjamin Graham. Professor Graham started life as a financial analyst and later was part of an investment partnership on Wall Street. While he was successful in both endeavours, his true legacy was made in the classroom. For more than three decades, he taught at Columbia University and the New York Institute of Finance. Among his students were some of the most successful investors of the last century, including Warren Buffett.

2.1 Benjamin Graham as a quant

In one of the earliest editions of *Security Analysis*, which he co-authored with David Dodd in 1934, Graham proposed a simple stock screen. While the numbers in the screen have varied slightly from edition to edition, the original form of this screen is preserved. The original screen is shown below.[15] Any stock that possesses all 10 of the following characteristics would, according to Graham, be a worthwhile investment:

1. Earnings to price ratio that is double the AAA bond yield
2. PE of the stock has less than 40% of the average PE for all stocks over the last 5 years
3. Dividend Yield > Two thirds of the AAA Corporate Bond Yield
4. Price < Two thirds of Tangible Book Value
5. Price < Two thirds of Net Current Asset Value (NCAV), where net current asset value is defined as liquid current assets including cash minus current liabilities

[15] I am indebted to Professor Aswath Damodaran for bringing this screen to my attention. See Damodaran (2012) for an excellent historical perspective on value investing. See Cottle *et al.* (1988) for a current version of the Graham and Dodd classic.

6. Debt-Equity Ratio (Book Value) has to be less than one
7. Current Assets > Twice Current Liabilities
8. Debt < Twice Net Current Assets
9. Historical growth in EPS (over last 10 years) > 7%
10. No more than two years of declining earnings over the previous 10 years

When presenting this screen to my class, I ask students to try and group these 10 factors into two general categories (that is, find five factors that have more in common with each other than with the other five factors). If you stare at this screen for just a few moments, you will notice that there are in fact two natural groupings. The first five factors are more genetically linked to each other than they are to the five factors that follow.

You will probably recognise that the first five factors are all measures of "**cheapness**". The first two factors compare a company's stock price to its reported earnings and encourage us to buy stocks whose P/E ratio is below a certain threshold. The next three compare a stock's price to its dividends, book value, and NCAV, respectively. Taken together, these first five factors are all instructing us to buy companies whose prices are cheap relative to reference measures extracted from historical financial statements.

The next five factors differ from the first five in that they do not involve the stock price. As a group, we might refer to these five factors as measures of a firm's **quality**. Notice that these factors are pure accounting constructs: financial ratios or growth rates; "accounting numbers over accounting numbers". Factors 6 through 8 measure debt (or leverage) as well as short-term liquidity (or solvency). Factors 9 and 10 are measures of a company's historical earnings growth rate and the consistency of that growth. In short, Graham wants to buy firms with low leverage, high solvency, and a high and consistent rate of earnings growth sustained over a period of time. Quality firms, according to Ben Graham, are those with high and steady growth, low leverage, and good liquidity.

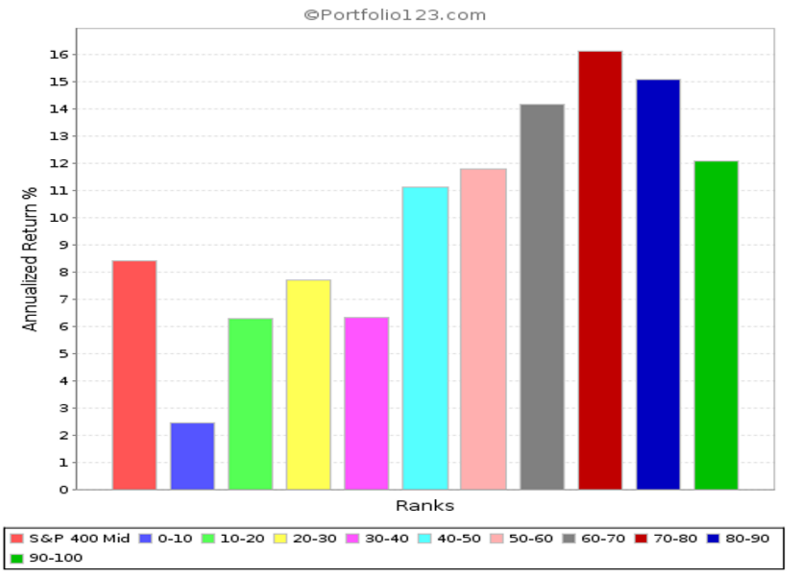
Does this strategy work? A few years ago, one of my MBA students, Becca Levin, designed a slightly updated version of this screen. Becca used the same basic formulation as Graham but updated a couple of the constructs (for example, substituting free-cash-flow yield in place of dividend yield and requiring just 5 years of past earnings growth rather than 10 years). I recently conducted a test of this strategy using a dataset of US companies over the most recent 14 years (1/2/1999 to 11/9/2013).

The Levin-Graham strategy is quite simple to implement: I assign a +1 score if a firm meets each condition; top firms can receive a maximum score of 10, bottom firms can score as low as 0. At the beginning of each quarter, all firms are sorted into 10 portfolios according to their Levin-Graham score. I then compute the equal-weighted return for each of these 10 portfolios over the next 3 months. The test is performed using "as reported" Compustat data with no survivorship or restatement issues. All variables are computed using publicly available data as of the date of portfolio formation (no "peek ahead"). To avoid illiquid stocks, I include only firms with a price of $3 or more. The results are reported in Figure 1.

Figure 1 Portfolio Returns for the Levin-Graham Stock Screen – Test Period 01/02/1999 to 11/13/2013

This figure depicts the results of a back test conducted using a sample of US companies over the period 1/2/1999 to 11/9/2013. At the beginning of each quarter, firms are sorted into 10 portfolios according to their Levin-Graham score (based on the original

Ben Graham stock screen described in the text). A firm is assign a +1 score if it meets each condition in the screen; top firms can receive a maximum score of 10, and bottom firms can score as low as 0. This figure depicts the equal-weighted return to each of these 10 portfolios over the next 3 months (annualised, assuming quarterly rebalancing). The left-most column is the return to the S&P400 Midcap (value-weighted) index over the same time period. All variables are computed using publicly available data as of portfolio formation, and all firms with available Compustat and CRSP data and a stock price of $3 or more are included.



This figure reports the equal-weighted return on each of these 10 portfolios over the next 3 months (annualised, assuming quarterly rebalancing). The right-most column represents equal-weighted returns on a portfolio of firms with the highest score and so on. The eleventh (left-most) column is the return on the S&P 400 Midcap (value-weighted) index over the same time period, included for comparison.

Remarkably, this 80-year-old screen continues to predict stock returns in the 21st century! In general, cheaper and higher quality stocks earn higher returns over the next 3 months. On an annualised basis, firms in the top two deciles of the screen averaged around 14% per year, while firms in the bottom two deciles averaged around 5%. The difference between these stocks is 9% per year (or equivalently, around 2.25% per quarterly rebalancing period). For comparison, the value-weighted S&P 400 Midcap index returned 8.5% over the same time period. The decile results are not monotonic, but by and large, we see that cheaper and higher-quality stocks do earn higher returns, even in the most recent 14-year period, in what is arguably the most efficient stock market in the world.

2.2 A bit of theory might help

What might account for this performance? Was this an unusual time period in US history? To proceed further, we need to introduce a bit of valuation theory.

<u>The Residual Income Model (RIM)</u>

In the early to mid 1990s, Professor James Ohlson wrote a series of influential studies on valuation featuring what became known as the residual income model (RIM).[16] The RIM had its origin in the early work of financial economists.[17] Although the original model pre-dates his work by several decades, Ohlson helped many academics to refocus on the importance of the RIM as a means to understanding the relation between accounting data and firm value.[18]

The most common form of the RIM in the academic literature expresses a firm's value in terms of its current book value and future expected abnormal accounting rates of return:

$$P_t^* = B_t + \sum_{i=1}^{\infty} \frac{E_t[NI_{t+i} - (r_e * B_{t+i-1})]}{(1+r_e)^i}$$

$$= B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e) * B_{t+i-1}]}{(1+r_e)^i}, \quad (3)$$

where B_t = book value at time t, $E_t[.]$ = expectation based on information available at time *t*, NI_{t+i} = net income for period *t+I*, r_e = cost of equity capital, and ROE_{t+i} = the after-tax return on book equity for period *t+i.* In this formula, the residual income (RI) for period t is defined in terms of period t earnings minus a normal rate of return on the beginning capital base. Notationally, $RI_t = NI_t - (r * B_{r-1})$.

An attractive aspect of the RIM is that it allows us to express firm value (i.e. the present value of a firm's future cash flows) in terms of variables that appear in financial statements. In fact, with a sharp pencil and some high school algebra, it is easy to show that Equation (3) is simply a mathematical re-expression of the dividend discount model (DDM) with the addition of the clean surplus relation (CSR).[19]

Setting aside the details on the right-hand side of equation (3) for a moment, notice that this equation has decomposed firm value into two components:

$$Firm\ Value_t = Capital_t + PVRI_t, \quad (4)$$

where the book value at period t is $Capital_t$, or the initial invested capital base, and the rest of the right-hand side is the present value of future residual income, or $PVRI_t$.

Equation (4) highlights the fact that firm value (what a firm is worth today) is always a function of two things: invested capital (the asset base we start with today) and present value of future residual income (where this asset base is going; in other words, our projection of the future value-enhancing growth in the capital base).

As it turns out, what we use as our starting capital base ($Capital_t$) really does not

[16] Ohlson (1990, 1991, 1995); Feltham and Ohlson (1995).

[17] See, for example, Preinreich (1938), Edwards and Bell (1961), Peasnell (1982), and Lehman (1993).

[18] Bernard (1995), Lundholm (1995), and Lee (1999) offer less technical discussions on the implications of Ohlson's work. Many excellent books, including Healy *et al.* (2012), Penman (2010, 2012), and Whalen *et al.* (2010), discuss implementation details.

[19] Clean surplus accounting requires all gains and losses affecting the starting capital to flow through earnings. In short, any changes in the capital base must come either from earnings during the period or from net new capital flows. For example, if we define the starting capital base as the beginning-of-year book value, then the ending book value must equal the starting book value plus earnings minus net dividends: ($B_t = B_{t-1} + NI_t - D_t$).

matter (see Penman 1996, 1998). In Equation (1), the current book value is used as the starting capital, but we could have chosen virtually any number as a starting capital. So long as our forecasts obey two simple rules of internal consistency, the resulting firm value estimate will be equivalent to the present value of a firm's future dividends.[20]

Subsequent studies have featured several alternative measures of the invested capital base other than book value. For example, a firm's capitalised one-year-ahead earnings forecast or its current year sales revenue.[21] The general RIM formula tells us that for each invested capital choice, we can derive an equivalent expression for the present value of the corresponding residual income term. In other words, for each $Capital_t$ selected, we can compute a matching $PVRI_t$ such that the sum will always be mathematically equivalent to the present value of future payout to shareholders.[22]

How might the RIM help us to do fundamental analysis? For one thing, it gives us a much clearer view of the performance indicators that should drive market multiples. For example, dividing both sides of equation (1) by a company's book value, we can re-express the price-to-book ratio in terms of expected ROEs:

$$\frac{P_t^*}{B_t} = 1 + \sum_{i=1}^{\infty} \frac{E_t\left[\left(ROE_{t+i} - r_e\right) B_{t+i-1}\right]}{\left(1 + r_e\right)^i \qquad B_t} , \qquad (3)$$

where P_t^* is the present value of expected dividends at time t, B_t = book value at time t, $E_t[.]$ = expectation based on information available at time t, r_e = cost of equity capital, and ROE_{t+i} = the after-tax return on book equity for period $t+i$.

This equation shows that a firm's price-to-book ratio is a function of its expected ROEs (**ROE**), its cost of capital ($\mathbf{r_e}$), and its future growth rate in book value (which itself depends on future **ROEs** and **k**, the dividend payout ratio).[23] Firms that have similar price-to-book ratios should have present values of future residual income (the infinite sum in the right-hand side of equation (3)) that are close to each other.

Likewise, we can derive an expression for a firm's enterprise-value-to-sales (EV/S) ratio. Following Bhojraj and Lee (2002), if we model firm's growth in terms of an initial period (say n years) of high growth followed by a period of more stable growth in perpetuity, a firm's EV/S ratio can be expressed as

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[20] The two consistency requirements are as follows: First, the three elements of RI need to be consistently defined. Having specified the capital base (***Capital$_t$***), ***Earnings$_t$*** must be the income to that capital base in year t and ***r*** must be the cost of capital associated with this source of capital. Second, the evolution of the capital base in this model must follow the clean surplus relation (CSR).

[21] For example, Ohlson and Juettner-Nauroth (2005) and Easton (2004) use capitalised one-year-ahead earnings ($EARN_{t+1}$) as the starting capital base in developing the abnormal earnings growth model (AEGM). Bhojraj and Lee (2002) use the RIM formula to estimate a matching PVRI for each firm's enterprise-value-to-sales (EV/S) ratio.

[22] Although the arithmetic carries through, clearly not all measures of capital are equally sensible from an economic perspective. A full analysis of which capital-in-place measures might be more sensible is beyond the scope of the current discussion. However, it might be worth noting in passing that granting greater latitude to management in reappraising balance sheet items could have the unhappy side effect of producing less comparable accounting rates of return both for cross-sectional and time-series analyses.

[23] Recall from the CSR that $B_{t+1} = B_t + NI_t - DIV_t = B_t * (1 + (1-k)\ ROE_{t+1})$; therefore, the growth in book value is simply $B_{t+1} / B_t = 1 + (1-k)\ ROE_{t+1}$.

$$\frac{EV_t^*}{S_t} = E_t\left[PM\ x\ k\ x\left[\frac{(1+g_1)(1-((1+g_1)^n/(1+r)^n))}{r-g_1} + \frac{(1+g_1)^n(1+g_2)}{(1+r)^n(r-g_2)}\right]\right], \qquad (4)$$

where EV_t^* is the total enterprise value (debt plus equity) at time t; S_t = total sales at time t; $E_t[.]$ = expectation based on information available at time t; PM is operating profit margin; k is a constant payout ratio; r = cost of capital; g_1 is the initial earnings growth rate, which is applied for n years; and g_2 is the constant growth rate applicable from period n+1 onwards.

Equation (4) shows that a firm's EV/S ratio is a function of its expected operating profit margin (**PM**), payout ratio (**k**), expected growth rates ($\boldsymbol{g_1}$ and $\boldsymbol{g_2}$), and cost of capital ($\boldsymbol{r_e}$). This equation helps us answer the following question: which firms deserve a higher EV/S ratio? In short, the firms with higher expected profit margins, higher growth rates, higher payout ratios, and lower cost of capital.

2.3 The two sides of value investing

A key insight that falls directly from this analysis is that value companies are not just those that are cheap relative to capital in place but include those that are cheap relative to the present value of their future residual income. A common misperception about value investing is that it simply involves buying stocks that are cheap relative to measures of capital in place. For example, many academic studies (mostly from finance) define "value stocks" as firms that trade at lower market multiples of book value, earnings, or enterprise value (e.g. P/B, P/E, or EV/S). Accounting-based valuation demonstrates the seriousness of this error because cheapness (as expressed through lower market multiples) is only one (and arguably the much less interesting) part of value investing.

As the RIM framework makes transparent, a firm's true fundamental value is made up of two key elements: **Firm Value = Capital in place + Growth opportunities**. The problem with typical cheapness indicators is that they only compare the price of a stock to its capital in place (book value, capitalised earnings, or sales) and miss entirely the second element in equity valuation.

The most successful fundamental investors, beginning with Ben Graham, have always viewed value investing as consisting of two key elements: (1) finding quality companies and (2) buying them at "reasonable prices". In simple notation,

Value Investing = Cheapness + Quality

A firm's market multiple is a measure of cheapness relative to assets in place, but that is the easier and arguably the less interesting part of value investing. The more interesting part requires an investor to assess a firm's quality – that is, the present value of its expected future residual income (PVRI) – using various currently available performance indicators. That is, of course, the heart of what we call fundamental analysis. The best fundamental investors focus on buying quality firms for a given level of cheapness. It is in this spirit that Ben Graham built his original stock screen. Looking back at his quality factors (factors #6 to 10), Graham intuitively recognised that firms with lower leverage, higher liquidity, and a high rate of steady growth are those with the best chance of generating high rates of return in the future, or, in RIM parlance, he believed these are the high PVRI stocks.

2.4 Lessons from the field

This overarching theme of cheapness + quality is extremely helpful to bear in mind when trying to understand the investment approaches of investors such as Warren Buffett, Charlie Munger, Joel Greenblatt, Julian Robertson, and a host of others who grew up under their tutelage (e.g. the extremely successful "Tiger Cub" funds such as Lone Pine, Viking, and Maverick Capital, all of which had their roots in Julian Robertson's Tiger Fund (1980-2000)). Let us consider one such example.

Joel Greenblatt and the Magic Formula

Joel Greenblatt is an American academic, hedge fund manager, investor, and writer. Like Graham, Greenblatt's career straddled academia and Wall Street. In 1985, he founded a hedge fund, Gotham Capital, which focused on special situation investing. Greenblatt and his co-founder, Robert Goldstein, compounded Gotham's capital at a phenomenal 40% annually before fees for the 10 years from its formation in 1985 to its return of outside capital in 1995. After returning all outside capital, Greenblatt and Goldstein continued to invest their own capital in special situations. In 1999, Greenblatt wrote his first bestseller, *You Can Be a Stock Market Genius*, which describes the special situation investment strategy responsible for Gotham's success.

What Greenblatt is best known for, however, is his second book, *The Little Book that Beats the Market.* Published in 2005, the first edition sold over 300,000 copies and was translated into 16 languages, thus propelling Greenblatt to celebrity-investor status. As Greenblatt described it, this book was the product of an experiment in which he wanted to see whether Warren Buffett's investment strategy could be quantified. He knew that the subtle qualitative judgment of "the Sage from Omaha" was probably beyond the reach of machines. Still, he wondered whether some of Buffett's magic might be bottled.

Studying Buffett's public pronouncements, most of which came in the form of Chairman's letters from Berkshire Hathaway, Inc., Greenblatt discerned a recurrent theme. As Buffett often quipped, "It is far better to buy a wonderful company at a fair price than a fair company at a wonderful price."[24] Buffett was not just buying cheap companies, Greenblatt observed, he was looking for quality companies at reasonable prices. What would happen if we tried to create a mechanical stock screen that bought shares in wonderful businesses at reasonable prices?[25]

The results were so impressive that in *The Little Book that Beats the Market,* Greenblatt called this strategy the *Magic Formula.* The details of the formula are laid out in Appendix A. As you will see from this Appendix, it is a remarkably simple strategy. Greenblatt ranked companies on the basis of just two factors: return on capital (ROC) and earnings yield (EY). The Magic Formula, in a nutshell, looks for companies with a history of consistently high past ROC (5 years of at least 20% annually) and buys the ones currently trading at the lowest earnings yield: that's it!

Several points are worth noting. First, the formula works (or more precisely, it *has* worked for a long time). This basic formula has been thoroughly tested using US data both by Greenblatt and by others. Firms ranked at the top of this screen have outperformed their peers by a wide margin over the past 50 years.[26] Second, it is really

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[24] From the Chairman's Letter, Berkshire Hathaway, Inc., Annual Report, 1989.

[25] At least one other accounting academic came to the same conclusion about Buffett's investment strategy. In his 2010 book, *Buffett beyond Value*, Professor Prem Jain studied over 30 years of Buffett pronouncements and also came to the same conclusion: Buffett favoured quality growth (or in RIM parlance, high PVRI firms) over cheapness.

[26] See, for example, Gray and Carlisle (2013, Chapter 2) for a detailed replication of the formula using US data from 1964-2011.

very similar to what Ben Graham was doing many years earlier. Five years of high and consistent growth… low P/E ratios… sounds familiar? The more things change, the more they stay the same.

But of course, in the context of the RIM, all this makes sense. Ben Graham, Warren Buffett, and Joel Greenblatt are all trying to do the same thing – find firms with high expected PVRI trading at reasonable market multiples. Consider Buffett's most often repeated four-fold dictum: (1) Only invest in a business you can understand, (2) Look for companies with a sustainable competitive advantage, (3) Bet on companies with high-quality management teams, and (4) Buy with a good "margin of safety". The last point is easiest to understand and implement – buy firms with an attractive valuation relative to their capital base. What do the first three principles tell us? Are they not simply pointing us towards firms with a greater likelihood of high sustainable ROEs in the future? The verdict from the field is clear: quality pays.

2.5 Empirical evidence from academic studies

Once we have the overarching valuation framework firmly in place, it is remarkable how well the evidence from empirical studies lines up with the theory and with the field evidence from investors. Let us now turn to this evidence.

Cheapness

An enormous body of literature in accounting and finance documents the value effect, which is the tendency of value stocks (stocks with low prices relative to their fundamentals) to outperform glamour stocks (stocks with high prices relative to their fundamentals). Common measures of value are the book-to-market ratio (Stattman,1980; Rosenberg *et al*., 1985; Fama and French, 1992), the earnings-to-price ratio (Basu, 1977; Reinganum, 1981), the cashflow-to-price ratio (Lakonishok *et al*., 1994; Desai *et al*., 2004), and the sales-to-enterprise-value ratio (O'Shaughnessy, 2011). The strength of the value effect varies over time and across stocks, but the broad tendency of value stocks to outperform glamour stocks is quite a robust finding in the academic literature.

While academics generally agree on the empirical facts, there is much less consensus on the reason behind these findings. Some feel the evidence clearly indicates that value stocks are underpriced (they are "bargains"); others believe value stocks are cheap for a reason and that common measures of value are also indicators of some sort of risk. For example, Fama and French (1992) suggest that low P/B stocks are more vulnerable to distress risk, and Zhang (2005) argues that these stocks have more "trapped assets" and are thus more susceptible to economic downturns.[27]

Quality

The academic evidence in favour of quality investing has perhaps been a bit more difficult to recognise. Up to now, academics have not always agreed on what a quality firm might look like. Many papers have examined the persistence of earnings, for example, or the ability of accounting-based variables to predict future returns, but most have not done so under the quality rubric. Yet once we begin to piece together the evidence and the composite sketch begins to fill in, the picture that emerges bears a remarkable resemblance to quality as first expressed by Ben Graham in his original screen. Delightfully, the evidence also concurs extremely well with what we might expect from valuation theory.

Holding a company's market multiple (e.g. its price-to-book ratio) constant, what

[27] For a much more detailed review of this debate, see Zacks (2011, Chapter 10).

kind of firm *should* an investor pay more for? If we define quality firms as those that *deserve* a higher multiple, then valuation theory gives us the answer. According to the RIM, quality firms are those with a high present value of future residual income (high PVRI). The task of the empiricist is to examine which company characteristics, or perhaps performance metrics, might serve as useful indicators of future PVRI.

What are the key components of a company's PVRI? Of first-order importance would be measures of future **profitability** and **growth** since these elements are the primary drivers of firms' future ROE. Measures of **safety** would also be important. To the extent that safer firms deserve a lower cost of capital (r_e), and holding future expected cash flows constant, safer firms will deserve a higher PVRI. Finally, the expected rate of **payout** should play a role. Firms that maintain the same profitability and growth rates while paying back more capital to investors are, all else being equal, deserving of a higher PVRI.

Prior evidence is largely consistent with these observations. In general, stable, safe, profitable firms with solid growth, good cash flows, lower risk, and higher payouts do in fact earn higher future returns.

Profitability and Growth

Piotroski (2000) shows that firms earning higher ROAs and having higher operating cash flows, better profit margins, and higher asset turnovers consistently earn higher returns. Using eight fundamental indicators of firm performance and general health, he created a composite "F-Score". His evidence shows that the F-Score is able to separate winners from losers from among stocks in the lowest P/B quintile (value stocks). Mohanram (2005) performs a similar exercise among high P/B firms ("growth" stocks) and finds that growing firms outperform firms with poor growth. Piotroski and So (2013) use the F-Score to show that the value/glamour effect is attributable to errors in market expectation about future fundamentals. Using I/B/E/S analysts' forecasts, Frankel and Lee (1998) show that holding P/B constant, firms with higher forecasted earnings earn higher returns, particularly when correcting for predictable errors in the analysts' consensus estimates. Overall, the evidence suggests that firms with higher profitability (past or forecasted) earn higher subsequent returns.

Earnings Quality

It is not simply the *quantity* of earnings that matters: the *quality* (the expected sustainability or persistence) of earnings also matters. For example, Sloan (1996) and Richardson *et al.* (2005) show that the cash flow component of earnings is more persistent than the accrual component. Novy-Marx (2013) shows that gross margin (Sales – Cost of Goods Sold) is an even better measure of core profits than bottom-line earnings. In this study, profitable firms generated significantly higher returns than unprofitable firms despite having significantly higher valuation ratios.

Another line of research explores the usefulness of accounting numbers in identifying financial shenanigans. Beneish (1999) estimates an earning manipulation detection model based entirely on the reported numbers from the period of alleged manipulation. In out-of-sample tests, Beneish, Lee, and Nichols (BLN, 2013) show this model correctly identified, in advance of public disclosure, a large majority (71%) of the most famous accounting fraud cases that surfaced after the model's estimation period. Perhaps even more significantly, BLN show that the "probability of manipulation" (M-score) from the original Beneish model is a powerful predictor of out-of-sample stock returns (i.e. firms that share traits with past earnings manipulators earn lower subsequent returns after controlling for multiple other factors, including accounting accruals).

Overall, these studies show that profitability measures based on cash flows or gross margin are even better predictors of future returns than simple earnings measures.

Safety

Safer stocks earn higher returns: This finding is remarkably robust across many measures of safety. *Lower volatility* firms, for example, actually earn higher, not lower, returns (Falkenstein, 2012; Ang et *al.*, 2006). *Lower Beta* firms (Black *et al*., 1972; Frazzini and Pedersen, 2014), firms with *lower leverage* (George and Hwang, 2010; Penman *et al.*, 2007), and, most strikingly, firms with *lower levels of financial distress* (Altman, 1968; Ohlson, 1980; Dichev, 1998; Campbell, Hilscher, and Szilagyi, 2008) earn higher returns.[28] In short, firms that are safer, by many measures of safety, actually earn higher returns.

Put simply, firms with higher volatility, higher Beta, higher leverage, and higher bankruptcy risk actually earn lower returns. This finding does not make sense in an equilibrium asset pricing context – in equilibrium, firms with higher risk should be rewarded with higher future returns. However, the result makes perfect sense if we believe that these risk measures are associated with the discount rate markets use to compute a firm's PVRI. Viewed in this context, "safer" firms have lower cost of capital (r_e), and we would expect their PVRI (and thus their firm value) to be higher than the "riskier" firms, all else being equal. If the market underappreciates a firm's true PVRI (as we have seen in the case of firms' profitability and growth indicators), then safer firms will in fact earn higher future realised returns.[29]

Payout

Finally, companies who make higher payouts to shareholders and creditors also earn higher future returns. For example, companies that repurchase their shares tend to do well (Baker and Wurgler, 2002; Pontiff and Woodgate, 2008; McLean, Pontiff, and Watanabe, 2009), while firms that issue more shares tend to do worse (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995). A similar pattern is observed for debt issuances. Firms that issue more debt earn negative abnormal returns (Spiess and Affleck-Graves, 1999; Billett *et al*., 2006), while firms that retire their debt earn positive abnormal returns (Affleck-Graves and Miller, 2003). In fact, Bradshaw *et al.* (2006) show that it is possible to measure these effects using a measure of net external financing activities computed from companies' statement of cash flow. Taken together, these findings are quite consistent with the RIM framework: Firms that are returning capital at a faster rate (firms with a higher k) have more positive PVRI.

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[28] Both Dichev (1998) and Campbell *et al.* (2008) find strong evidence that distress risk is actually *negatively* associated with subsequent returns. Dichev used Altman's Z-score and Ohlson's O-Score and showed that going long in the 70% of firms with low bankruptcy risk and short in the remaining 30% yields *positive* returns in 12 out of 15 years (1981-1995). Campbell *et al.* (2008) sort stocks into value-weighted portfolios by failure probability and find that average excess returns are strongly, and almost monotonically, negatively related with the probability of failure. The safest 5% of stocks have an average excess yearly return of 3.4%, while the riskiest 1% of stocks have an average return of -17.0%.

[29] Consistent with this argument, Chava and Purnanadam (2010) show that although distress risk is *negatively* correlated with future realised returns, it is *positively* correlated with a firm's market-implied cost of capital. In other words, the market *does* use a higher implied discount rate when discounting the future earnings of high distress firms; however, because these firms are still overpriced on average, they still earn lower future realised returns.

In short, what types of firms might be deemed to be of higher quality? In other words, which firm characteristics are associated with higher future ROEs, lower cost of capital, and higher payouts? Prior studies suggest these are safe, profitable, growth firms that also happen to be returning more of their capital to investors. The empirical observation that higher quality firms earn higher future returns is exactly what we would expect if markets underappreciate fundamental value, as reflected in current financial statements. They are much more difficult to reconcile with popular explanations of the value effect as a risk premium as quality firms are more profitable, less volatile, and less prone to distress and have more persistent future cash flows and lower levels of operating leverage.

Asness, Frazzini, and Pedersen (2013)

In a fascinating new study, Asness, Frazzini, and Pedersen (2013) pull these disparate strands of quality investing together. In this study, the authors define quality firms as stocks that are "safe, profitable, growing, and well managed". They argue that all else being equal, investors should be willing to pay more for such firms. They show that the market does not in fact pay a high enough premium for these quality stocks. Sorting firms on the basis of their quality metric, they create a "quality minus junk" (QMJ) portfolio and find that this portfolio earns positive risk-adjusted returns in 22 out of 23 countries.

For their empirical tests, they compute a composite quality score for each firm based on the 21 performance indicators below grouped into four categories. Each variable is ranked and then normalised by subtracting its own mean and dividing by its own standard deviation.

I. Profitability (6 variables)
Bet in favour of firms with high earnings (ROA, ROE), high gross profit (GPOA, GMAR) and high operating cash flow (CFOA, ACC). The numerators are current year earnings, gross margin, or operating cash flows; the denominators are total assets, book equity, total sales, or (in the case of ACC) total earnings.

II. Growth (6 variables)
Bet in favour of firms with the most positive changes in these profitability variables over the past 5 years: for example, $\Delta GPOA = (GP_t - GP_{t-5}) / TA_{t-5}$, where GP = REV – COGS. In other words, Asness *et al.* (2013) define growth firms as those whose gross margin, or earnings, or cash flows have grown the most over the past 5 years relative to the year t-5 capital base.

III. Safety (6 variables)
Bet against Beta (BAB), against volatility in returns and in earnings (IVOL, EVOL), against high-levered firms (LEV), and against financially distressed firms (O-score, Z-score). For this composite, the authors consolidate six measures of safety on the basis of prior studies. In essence, safe firms are defined as those with low Beta, low volatility, low leverage, and low financial distress.

IV. Payout (3 variables)
Bet against firms with high net equity issuance (EISS), high net debt issuance (DISS), and low net payout ratio (NPOP) over the past 5 years. Again, consistent with prior studies, Asness *et al.* (2013) define high payout firms in terms of net new issuances plus dividends.

Notice how well these concepts map into the RIM framework. The first six indicators (past ROE, ROA, GPOA, GMAR, CFOA, and ACC) capture profitable firms that have a higher gross margin and a higher proportion of cash flow to accruals in their reported earnings. The next six indicators measure improvements in these variable dimensions of profitability. In the RIM framework, these 12 variables are all likely to be associated with higher future ROEs. Not surprisingly, Asness *et al.* (2013) find that these measures are strongly correlated with P/B ratios in the cross section.

More interestingly, this study shows that these variables also predict cross-sectional returns – that is, more profitable firms and firms with strong growth over the past 5 years consistently earn higher returns than firms with low profitability and low growth. To be fair, most of these variables have been reported by prior studies as being useful in returns prediction. Nevertheless, this study provides compelling evidence in support of the prediction from a simple RIM analysis – firms with high and persistent profits have high PVRI, and the market does not seem to fully price in this quality metric.

Interestingly, Asness *et al.* (2013) show that safer firms also earn higher future returns. They define "safe" firms as those with lower Beta, lower volatility (measured in terms of both idiosyncratic returns (IVOL) and past earnings (EVOL)), lower leverage (LEV), and lower financial distress (O-Score and Z-Score). While this result might be counter-intuitive for efficient market advocates, it is in fact quite easy to understand in terms of the RIM framework. Holding expected cash flows constant, safer firms are worth more (i.e. they should have lower discount rates). To the extent that markets underappreciate this dimension of firm valuation, the safer firms would yield higher future returns.

Finally, Asness *et al.* (2013) show that firms with high net payouts (i.e. those with low net equity issuances, low debt issuances, and high dividends) are also worth more. In the RIM framework, this is not surprising either. Firms which are able to produce the same level of growth as other firms while paying back more of their capital to investors are worth more. Again, when we measure the quality component of firm value (PVRI) more accurately, we are better able to identify firms that earn higher future returns.

III. Why Does Value Investing Continue to Work?

Two stylised facts emerge from the preceding literature survey: (1) smart value investing, which incorporates both cheapness and quality, is associated with higher future stock returns and (2) these strategies are being actively exploited by professional investors. These two findings naturally raise the issue of whether the value effect will persist in the future. Why haven't these effects been fully arbitraged away? Why does anyone continue to buy expensive, low-quality stocks (i.e. who buys "junk")?

Although a full treatment of this topic is probably beyond the scope of this article, the academic literature has proposed at least three sets of explanations for the persistence of the value effect: (a) risk-based explanations, (b) preference-based explanations, and (c) behavioural-based explanations. These are briefly reviewed below.

3.1 Risk-based explanations

The first, and longest-standing, set of explanations is that value stocks are simply riskier and their higher future returns are a compensation for bearing this risk (e.g. Fama and French, 1992). Surely we can agree that value investing involves some risk (i.e. it is not a simple money pump). This is particularly true for the naïve form of value investing commonly discussed in the academic literature. The standard academic approach to value investing is to focus on a stock's cheapness (as measured by its market multiples). But cheap stocks (high B/M, high E/P stocks for example) are typically priced that way for a reason (i.e. the population of cheap stocks contains a disproportionately large number of low-quality firms). In fact, as Piotroski (2000; Table 1) showed, the median firm in the highest B/M quintile underperforms the market by over 6% over the next year – even though the mean return to these stocks is higher than the market. Naïve value does involve some risk, and this is borne out in the data.

The problem with risk-based explanations is that, properly measured, value stocks are actually safer than the growth stocks. Once we incorporate measures of quality, it is clear that value investing does not generally incur higher risk on average, at least by most sensible measures of risk (e.g. Piotroski and So, 2012). The studies surveyed earlier strongly suggest, in fact, that stocks with more stable cash flows, lower financial distress, lower Beta, and lower volatility actually earn higher future realised returns. These findings are difficult to reconcile with risk-based explanations.

3.2 Preference-based explanations

According to these explanations, some investors have a preference for stocks with "lottery-like" payoffs (i.e. return distributions that are "right-skewed"). Stocks that have these features will therefore, all else being equal, appear "overpriced" in a mean-variance world (Brunnermeier and Parker, 2005; Brunnermeier, Gollier, and Parker, 2007). Bali, Cakici, and Whitelaw (2011) provide evidence consistent with this phenomenon, and Kumar (2005, 2009) shows that this effect applies particularly to retail traders.

It seems plausible that a subset of investors might have preferences beyond the mean-variance trade-off considered by standard asset pricing models. Given the Asian context of this conference, I note that many Asian investors do behave as if they prefer lottery-like payoffs. It might be difficult to empirically separate this explanation from some of the behavioural-based explanations below (in fact, the literature on information uncertainty (Jiang *et al*., 2005; Zhang, 2006) makes the same point in a behavioural context). But if investors do exhibit an innate preference for lottery-like stocks, the value effect will, of course, be likely to persist well into the future.

3.3 Behavioural-based explanations

The final, and in my view most intriguing, set of explanations for the value effect is rooted in human cognitive behaviour. While not mutually exclusive, I group these explanations into four subcategories.

A. <u>Saliency vs. Weight</u>

Human decision making under uncertainty involves assessing the probability of alternative outcomes. A recurrent theme in cognitive psychology is that human subjects consistently underweight the probability of certain types of events and overweight the probability of others. In their seminal study, Griffin and Tversky (1992) show that signals which have high statistical reliability (high "weight") but are not salient (low "saliency") are consistently underweighted. Conversely, highly salient signals with low statistical reliability are often overweighted. Apparently, Bayesian updating is a difficult cognitive task.

Applying this concept to value investing, firm attributes that are "boring" (non-salient) receive less-than-optimal weight and those that are "salient" (glamorous or sexy) receive more-than-optimal weight. The historical indicators of quality discussed earlier are weighty in terms of their statistical association with future residual income (i.e. sustainable cash flows), but they may not receive sufficient weight in the minds of investors. Value-based arbitrageurs help to reduce the mispricing, but new story stocks arise on a daily basis as markets seek to assimilate the constant flow of news items and/or pseudo-signals.

B. Momentum (Positive-feedback) Trading

All pure value investors face the risk that noise trading will push prices even further from fundamental value. Value stocks tend to be negative momentum stocks, and over at least mid-horizon (3 to 12 month) holding periods, value bets run into a "momentum headwind".

Strongly negative sentiment typically accompanies really attractive buys based on fundamentals (for recent examples, consider the risk associated with buying Greek assets, or debt instruments issued by US financial service firms, during the global crisis). Thus, value investors inherently face greater short- and mid-horizon risk from positive feedback trading. The extent to which this matters depends on the holding horizon and the stability and depth of their source of capital.

C. Liquidity-driven Price Pressures

Stock prices are constantly buffeted by non-fundamental price pressures. Sometimes, capital flows into or out of an asset simply "herd" in the same direction for liquidity reasons. These provide both opportunities and challenges for value investors.

Coval and Stafford (2007), for example, find that fire sales by mutual funds that face redemption pressure due to weak performance in prior quarters can depress the prices of the stocks they own and that these stocks subsequently rebound strongly. Non-fundamental flows should reverse over time and may not be driven by cognitive biases. However, they will contribute to a higher return-risk ratio for investors that trade on value indicators.

D. Over-confidence in High Information Uncertainty Settings

Finally, the evidence is clear that firms operating in high information uncertainty (IU) settings tend to earn lower subsequent returns. Jiang *et al.* (2005) define IU in terms of "value ambiguity", or the precision with which firm value can be estimated by knowledgeable investors at reasonable cost. In both Jiang *et al.* (2005) and Zhang (2006), high-IU firms earn lower future returns. In addition, high-IU firms exhibit stronger price as well as earnings momentum effects. Specifically, younger firms and firms with higher volatility, higher volume (i.e. turnover), greater expected growth, higher price-to-book, wider dispersion in analyst earnings forecasts, and longer implied duration in future cash flows all earn lower returns. In some sense, each of the above phenomena is related to firms' IU measure.

Jiang *et al.* (2005) argue that all these observations can be traced back to the same behavioural root: people are more overconfident in high-IU settings. Applied to value investing, investors tend to overweight elements of firm value that are further out in the future and underweight those that are nearer at hand (in other words, they use too low an implied discount rate when valuing firm future cash flows). This leads to a tendency to overprice story stocks whose cash flows are expected further out into the future.

The overconfidence hypothesis would help to explain why strategies such as the Frankel and Lee (1998) V/P metric (based on short-duration expected cash flows relative to stock prices) can generate higher returns. It would also suggest an explanation for why momentum effects are stronger in high-IU settings.

IV. Summary

Since the days of Benjamin Graham over 80 years ago, fundamental investors have served as a stabilising force in financial markets. In this article, I have reviewed the theoretical foundations of this style of investing, including (a) a noise trader framework for understanding this phenomenon and (b) an accounting-based valuation framework for reconciling the vast empirical evidence. I have also attempted to reconcile the investment approaches of some well-known fundamental investors with recent findings from academia.

A number of recent studies provide compelling evidence that historical accounting numbers are informative and are already playing a useful role in fundamental investing. None of the 21 indicators in the quality composite featured in Asness *et al.* (2013), for example, rely on a company's stock price; they are all variables constructed from historical GAAP-based financial statements. Yet together, these variables provide a good composite sketch of companies that tend to earn higher returns in the future.

The RIM helps us to understand why. Careful fundamental analysis can help us to derive performance measures that help predict the future profitability and growth of firms. It can also help us to assess the riskiness of a firm as well as its likely future payout to shareholders. In short, accounting information can help us to evaluate not only the first moment of a firm's future cash flows (i.e. the numerator of the future payoffs) but also its second moment (i.e. the riskiness of these payoffs). As valuation theory shows, both elements are useful in evaluating the present value of a firm's future growth opportunities. In fact, the key predictions from valuation theory dovetail nicely not only with recent empirical findings in academia but also with the age-old wisdom espoused by many savvy investors.

We might not be there yet, but we are a good way down the road mapped out for us by Ben Graham almost 80 years ago. The verdict from the field agrees with the verdict from the ivory tower. Buy quality firms at reasonable prices and use historical accounting numbers to help you achieve that task: It will give you an edge in your investing and help make markets more efficient as well.

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Appendix A

Joel Greenblatt's Magic Formula

The following basic instructions for the Magic Formula are extracted from *The Little Book that Still Beats the Market*, written by Joel Greenblatt and published in 2010. They are included here for illustrative purposes. Interested readers are encouraged to either buy the book or visit Greenblatt's website magicformulainvesting.com for more details.

Greenblatt's Basic Principles:

- Buy good businesses (high return on capital) at bargain prices (high earnings yield).
- Do this consistently by maintaining a portfolio of 20 to 30 stocks and spreading out the timing of your purchases (buy a few stocks each month throughout the year).
- Hold the winners for at least one year (for tax efficiency reasons).

Implementing Greenblatt's "Magic Formula"

- Look for companies with an average ROC of 20% or higher over the past 5 years (see below for details on ROC calculation).
- Among these, pick those ones with the highest earnings yield (EY).
- Limit stocks to those with at least $200m in Market Cap; exclude Utilities; Financials; ADRs; and firms that have reported earnings within the past week.
- Also consider excluding firms with an earnings yield in excess of 20% (which may indicate a data problem or an unusual situation).

Detailed Factor Definitions:

- ***Return on Capital (ROC) = EBIT / Capital*****,**

  where *EBIT* is earnings before interest and taxes, and *Capital* is defined as Net PP&E + Net Working Capital.

- ***Earnings Yield (EY) = EBIT / TEV*****,**

  where *EBIT* is earnings before interest and taxes, and *TEV* is defined as market capitalisation + total debt – excess cash + preferred stock + minority interests (excess cash = cash + current assets – current liabilities).