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A novel equity valuation and capital allocation model for use by long-term value-investors

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ABSTRACT

We present a novel asset pricing model that captures the investment wisdom and stock-selection approach of the long-term value-investors Benjamin Graham and Warren Buffett. Taking a longer term view of business prospects and business risks, we explicitly consider the time period in which a business enjoys a competitive advantage over its peers as the central tenet of our model and capture the eventual demise of this competitive advantage in a probabilistic manner. Assuming that our investor has log utility, our model answers the question of capital allocation in a two-asset scenario. The model does not enforce the Efficient Market Hypothesis and is shown to explain some well-known empirical studies on stock returns.

1. Introduction

In a rational world, like the one described in the Efficient Market Hypothesis (EMH) of Fama (1970), well-informed and competitive market participants ensure that all assets are priced appropriately and that any opportunity for outperformance is quickly arbitraged away. Yet a certain group of investors, collectively known as value-investors, have consistently outperformed the market by making contrarian stock selections against the perceived wisdom of the market, whilst assuming comparably lower or similar risk to the market. In spite of their notable financial success, the principles of value-investing have not made great strides in conventional academic literature. This paper proposes an equity valuation and capital allocation model that explicitly incorporates the principles of value-investing.

The two most famous proponents of value-investing are Benjamin Graham and Warren Buffet. In his classic treatise on value-investing, Graham (1949) introduces his "emotional" friend, Mr. Market, a useful construct in describing an irrational stock market driven by fear and greed. His student, Warren Buffett elaborates further on Graham's concepts in his many letters to shareholders (Buffett, 1977–present): "*Price* is what you pay [to Mr. Market] and *value* is what you get [from Mr. Market]". Price is defined as the prevailing stock market price and value is defined as the present value of future free cash flows that can be extracted from the business (Buffett, 1989, 1992, 1994). Value-investors are largely stock-selectors who consider the *price* vs. *value* relationship to be supremely important when judging which stocks to purchase. Mr. Buffett elaborates on value-investing concepts such as "Margin of Safety" – the idea of paying a price well below the value you receive (Buffett, 1990) – and "Business Moat" – the concept that a good business earns a superior return on its assets by building an economic moat, generally in the form of a brand identity/franchise, around its business model to protect it from competitive threats (Buffett, 1987, 1996). From early on, Mr. Buffett takes issue with the EMH: "Observing correctly that the market was *frequently* efficient, they went on to conclude incorrectly that that it was *always* efficient. The difference between these propositions is night and day." (Buffett, 1988, p. 20).

Value-investors in the mold of Graham and Buffet generally disagree with the conventional application of the Capital Asset Pricing

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Model (CAPM) of Sharpe (1964) and Lintner (1965). In a letter to shareholders, Mr. Buffett observes: "...academics compute with precision the "beta" of a stock – its relative volatility in the past – and then build arcane investment and capital-allocation theories around this calculation. In their hunger for a single statistic to measure risk, however, they forget a fundamental principle: It is better to be approximately right than precisely wrong" (Buffett, 1993, p. 13).

The academic world has also been engaged in a robust debate on the empirical validity of the CAPM. Recent work in support of the CAPM over various time horizons include Ang and Chen (2007) and Bandi et al. (2012). An arithmetic consequence of the CAPM framework is that the ex ante (expected) rate of return must equal the ex post (average) realized rate of return. There are a number of works that show that the ex post empirical record of the CAPM model is poor and that factors not explicitly considered within the CAPM framework (such as size and book-to-price factors) can explain ex post returns better than Beta, the CAPM risk factor (see Fama and French, 1992, 1993, 1995, 1996). Fama and French (2004) serves as a useful literature survey on various other contributions debating CAPM's empirical validity. As Fama and French assert in the same paper, the dissenters to the CAPM model loosely fall into two camps: the rational risk-based explanation (factor-based efficient-market) camp and the behavioral camp. See Tversky and Kahneman (1974), Thaler (1993), Shleifer (2000) and Akerlof and Shiller (2009) for more on finance-related human behavioral fallibility. Both camps appear hesitant to accept the other's view in its full form even though there is clear academic merit in both. It is noteworthy that the 2013 Nobel laureates Fama and Shiller fall in the two different camps. A very illuminating recent work in the factor-based camp is that by Frazzini et al. (2012) who decompose Mr. Buffett's outstanding returns into the use of 'safe' leverage (predominantly insurance float and float like derivative structures) combined with three risk-factors: 'safe', 'quality' and 'value'. They also show that Mr. Buffett comes up favorably under traditional risk-return measures (with a realized Sharpe ratio of 0.76 – higher than any mutual fund with a 30 year history).

Value-investors generally fall into the behavioral camp and are somewhat hesitant to accept risk-based explanations in their full form. Like Mr. Buffett and other value-investors, we are more comfortable with the view that the market, driven by emotional beings trying to price the future rationally, is occasionally inefficient. We make a distinction between price and value and allow for the occasional possibility for prices to become dislocated from value.

One shortcoming of the conventional application of the CAPM is that it requires the existence of a stock market and frequent stock price quotations to derive Beta. Admittedly, the concept of the Accounting-Beta is useful for extending the CAPM model to scenarios where there are no stock markets. It is clear that businesses can exist in the absence of stock markets. It seems appropriate, therefore, to derive a valuation model for a business that is wholly independent of the stock market. This view is in line with long-term value-investors who are agnostic about the existence of a stock market when estimating business value (Graham, 1949).

The hypothetical absence of a stock market forces an investor to take a long-term investment approach. With such a long-term view, investors take a realistic, through-the-cycle view of business prospects. Due to the potential for asymmetry in returns, more downside than upside, long-term investors can no longer define risk as the near term relative volatility in price returns (as per conventional CAPM). Instead risk is defined as the likelihood of poor outcomes occurring in the future that can permanently impair the free cash flow potential of the business and thus lead to a permanent impairment of invested capital.

The Competitive Advantage Period (CAP) is defined as the period over which a business enjoys a competitive advantage over its peers. It is the period over which the business earns superior cash flows or equivalently earns a superior rate of return on its assets. When this competitive advantage is lost, the free cash flow potential of the business is impaired and the return on assets earned by the business falls to more mediocre levels.

This paper contributes to the literature in four respects. First, we present a rigorous mathematical framework, untethered from both the EMH and the CAPM, which can be used to apply the principles of value-investing and stock-selection as laid out by Graham and Buffett. Second, although the CAP is of great significance in the future economics of a business, current valuation methodologies at best capture its demise in a preordained or deterministic manner or at worst completely ignore it. A key contribution of our equity valuation model is that it is, as far as we are aware, the first amongst valuation models both to consider the CAP as its central tenet and capture its demise in a probabilistic manner. Our approach can better explain some empirical results for US markets found in well-known texts such as Siegel (2007) and Mauboussin (2008). Third, valuing negative cash flows have proven to be contentious in the literature especially within the CAPM framework (see Beedles (1978), Damodaran (2010, p. 56) and Ariel (1998) and the references therein for more on this). We contribute to the debate by showing how debt related cash flows should be handled from a shareholder point of view using a "replicating portfolio" approach. Fourth, assuming that a long-term value-investor is interested in maximizing the asymptotic long-run growth rate of her capital, we extend the Capital Growth Theory introduced by Kelly (1956) for the purposes of capital allocation by a long-term value-investor in a simple two-asset scenario.

2. Methods of risk-adjustment for variable future cash flows

When valuing risky or variable cash flows, an investor has a number of choices. A common method is the CAPM, where risk-adjustment is accomplished using discount rates greater than the risk-free rate in the present value calculation. A less popular approach is the Certainty Equivalent (CE) Method (see Stapleton (1971), Gregory (1978), Hillier (1963), Robichek and Myers (1966), Keeley and Westerfield (1972), Beedles (1978), Chen and Moore (1982) for more on CE). In the CE approach, variable cash flows are transformed into equivalent deterministic cash flows. Following Hillier (1963) and others mentioned above, we probabilistically decompose variable cash flows into mutually exclusive and exhaustive scenarios where the cash flow in each scenario is deterministic. Thereafter, we calculate the present-value of the deterministic cash flow in each scenario at the risk-free rate. This results in a probability distribution of present values. We define the risk-neutral expected value of this probability distribution as its *expected inherent-value*.

The traditional definition of a long-term value-investor is one who has an arbitrarily long investment time-horizon (e.g. a university endowment) and who is on the search for securities which are mispriced in the market. A more practicable time-horizon is probably in excess of four years. In this paper, we assume that value-investors search for securities that are trading at prices below their expected inherent-values. Indeed, value investing is a stock-selection skill. It is about judging which shares are being priced well below their expected inherent value and owning only those. Cash is the residual option when only a few opportunities are found. This naturally results in a concentrated portfolio.

A risk-averse, value-investor would not invest in a risky security priced at expected inherent-value in the market due to the potential for variability in the security's cash flow. She would rather choose the risk-free asset and receive the same expected cash flow but with zero variability. However, for a risky security trading at

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