Investor Sentiment and Asset Pricing: A Review

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Abstract

This paper reviews literature on asset pricing and investor sentiment. It provides a fair accumulation of evidence with an objective of showing how productive has been the effort of modelling market sentiment in pricing assets. Research efforts in modelling non-standard investor behaviour have been successful in explaining aggregate predictability. However, despite the financial innovations and discussions on investor sentiment that happened in US markets, empirical work in emerging markets is still preliminary. The paper inquires the extent that the existing asset pricing models price the assets in the economy.

Keywords

Investor, Pricing, Returns, Sentiment

Introduction

This paper surveys literature on investor sentiment, risk factors, and asset pricing with an objective of showing how productive has been the recent sentiment and asset pricing research. Any attempt of this nature must necessarily have limitations, as the field is large and active over several decades. I do not survey the efficiency of pricing models, instead concentrating on the sentiment embedded pricing models that have been

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found successful in different markets. In particular, behavioural research is at its infancy in the Sri Lankan capital market, and there is no substantial empirical work on sentiment to the best of the author's knowledge. This effort may be of importance to the future of related research in shifting the body of knowledge.

Risk Factors

Research seeks for a Stochastic Discount Factor that prices all assets in the economy (Campbel, 2000). For roughly the last five decades, asset pricing has been an active area of research in financial economics. The Capital Assets Pricing Model (CAPM) (Sharpe, 1964) and Arbitrage Pricing Theory (Ross, 1976) do represent the prominent mainstream pricing models, however, empirical evidence contradicts with central explanations of them. A potential reason claimed for the inconsistency is investor heterogeneity and irrationality. The hypothesis that there are fully rational participants in the market (Fama, 1976) expects an asset's price at fundamental value. As long as investors are rational and markets are perfect, there can be less possibility of mispricing (Hirshleifer, 2001). CAPM has no concern for the prior thoughts that the individual psychology affects prices (Hirshleifer, 2001).Fama and French (1992) find that the cross section of average equity returns shows only a marginal relationship to the beta of CAPM. In response, Fama and French (1993) use effects of size and value in a three-factor model. However, firms with similar size and book-to-market tend to perform better (or not) together because their exposure is similar (Daniel & Titman, 1997). Fama and French (2015) show that size and value leave a substantial unexplained component in returns in cross section.

In search for risk factors, research documents predictability of stock returns through market anomalies. These include the effects of value (Resenberg et al., 1985), size (Banz, 1981), momentum (Jagadeesh & Titman, 1993), and illiquidity (Amihud & Mendoloson, 1986). While CAPM explains the variation by market risk, evidence shows a better performance of the Fama and French (1993) model, which uses size and value risk factors. However, its supremacy among other pricing suggestions in general is inconclusive (Rahim & Nor, 2006). For instance, Jensen et al. (1997) argue that size and value effects depend largely on the monetary environment and they are significant only in expansive monetary policy periods. Laubscher (2002), in

his review paper, warns investors on application of CAPM in evaluating investment performance because many other factors influence return of stocks. However, authors also warn that unconditional empirical tests on CAPM may reject CAPM even if it holds perfectly (Lewellen & Nagel, 2006). They test conditional CAPM with Momentum and Value, and argue that variation in the equity premium would have to be implausibly large to explain anomalies. Jagannathan and Wang (1996) use yield spread between low and high quality bonds. However, this proxy has not received subsequent empirical support. Among the many efforts, the Carhart (1997) model that extends the Fama French Three factor model with momentum effect (Jegadeesh & Titman, 1993) has received a wider support.

Human Capital: A further critique of CAPM is that it does not correct the effect of non-tradable human capital. Human capital is an important component of wealth (Yuan, 2012) of, say an individual. Jagannathan and Wang (1996) find that growth rate of aggregate labour income successfully proxy serves human capital return. Economists identify two benefits of human capital, marketed and non-marketed. 'Non-marketed' include benefits of activities like exercising, and resting. As the consumption is influenced by (at least) marketed benefits, it is unreasonable to ignore human capital's influence on investment. Yuan (2012) models human wealth with aggregate labour income, and discovers a theoretical linkage between asset pricing and unemployment rate. In his five-factor model, Campbell (1996) argues that expected return of an asset depends on future labour income. Kim, Kim, and Shin (2012) construct a labour factor, the 'difference in returns' between high and low labour beta stock portfolios. Jagannathan et al. (1998) find that the market risk of CAPM and labour beta together explain about 3/4th of return variations. They further explain that the labour beta has the power of driving out the size effect.

Illiquidity: Among the others, liquidity has been of interest for recent asset pricing studies. If the liquidity hypothesis holds, low liquidity should offer high returns. Naturally, the liquidity effect may be more worth studying in emerging markets, due to relative illiquidity. Lam and Tam (2011) suggest a four-factor model with liquidity, a best-use model in Hong Kong. This issue is important since a vast literature exists in the area of market microstructure, they argue that liquidity has a first-order effect upon asset returns (Marcelo

& Miralles, 2006). Amihud (2002) find that stock returns are negatively related to contemporaneous unexpected illiquidity. Narayan and Zheng (2010) conclude that aggregate illiquidity factor is a key ingredient in asset pricing, improving the Fama and French (1993) three-factor model. (Nguyen & Lo, 2013) who claim that empirical evidence on the liquidity–return relation mainly centres on US markets, report significantly lower returns in illiquid than liquid stocks, a liquidity discount in New Zealand.

Profitability and Investment Patterns: Fama and French (2015) present two new risk factors. The difference between the returns on diversified portfolios of stocks with robust and weak profitability (Robust Minus Weak: RMW), and the difference between the returns on diversified portfolios of the stocks of low and high investment firms (Conservative Minus Aggressive: CMA). However, with introduction of these factors in the five factor model, the value factor (High Minus Low: HML) becomes redundant (Fama & French, 2015). HML has no information than what is explained by other four factors on average returns. This might support the critique that asset-pricing models suffer from data snooping, manipulation and methodology issues. On the other hand, a common source might be left unexplained, for instance, HML might show the link to illiquidity (Jais & Gunathilaka, 2016). Nevertheless, RMW and CMA factors have not received support from subsequent studies, Jio and Lilti (2017) find no significant explanatory power in Chinese market. Nguyen et al. (2015) observe literature that these two factors merely do not exist in Japan and Asia Pacific portfolios, yet they find evidence from Vietnam that the five-factor model explains more anomalies.

Investor Sentiment

Standard finance theory has its base on the theoretical work of a few pioneering scholars. It follows portfolio principles of Markowitz (1952), Arbitrage principles (Miller & Modigliani, 1958), Capital asset pricing theory (Sharpe, 1964; Lintner & Black, 1965), and the Option pricing theory (Black & Scholes, 1973; Merton, 1976). They assume rational markets, and the decisions comply with the axiom of Expected Utility Theory. Thus, their forecasts are unbiased, an individual is generally risk averse, and has a decreasing marginal utility of wealth. Nevertheless, Shiller (1981) shows that stock prices are responsive to many reasons than new information, and excessive volatility has roots to investors' sentiment. Investor sentiment is

investor opinion, usually influenced by emotions, about future cash flows and investment risk (Chang et al., 2009). Empirical findings on sentiment impact (Brown & Cliff, 2004) have created a challenge to the Efficient Market Hypothesis. Therefore, identification of sentiment based predictable variation in returns is a considerable debate in modern financial economics (Brown et al., 2005). Fama (1998) agrees that overreactions to past information could be a prediction of a behavioural finance alternative to market efficiency.

The question whether investor sentiment has an impact on stock prices is of foremost importance because investor sentiment can lead to market bubbles followed by massive devaluations (Finter et al., 2011). Sentiment has consequences on wealth allocation between low to high-risk firms. Chung et al. (2012) report sentiment's sensitivity to stocks with low Book to Market ratios. Stocks do not uniformly sensitive to market patterns, and firms with opaque characteristics exhibit high exposure (Berger & Turtle, 2012). Assets may overprice in response for good news (Daniel et al., 1998). It creates a problem that the rational investors cannot profit using noise trader mistakes. This risk can force arbitrageurs to liquidate their positions, causing them potentially huge losses (Shleifer & Vishny, 1997). Research reveals that arbitrage is riskier for young stocks (Baker & Wurgler, 2006). Small, distressed or extreme growth stocks are more sensitive to investor sentiment and consequently, difficult to arbitrage. Securities those that are difficult to arbitrage, are also tend to be more difficult to value. Baker and Wurgler (2007) state that sentiment's role is significant in market volatility.

The prospect theory of Kahneman and Tversky (1979) is a prominent theory of decision-making under uncertainty. Investors evaluate outcomes according to their perception on gains and losses relative to a reference point, typically the purchase price. They do not concern final wealth levels; investors are more sensitive to losses than to gains of the same magnitude (loss aversion); and investors are risk-averse for gains and risk seeking for losses. Explanations of Baker et al. (2007) on managers' behaviour are consistent with prospect theory. Shefrin and Statman (1985) argue that individuals are more emotional than professional investors are. They are likely to sell winning stocks too early in order to postpone the regret associated with realizing a loss. Studies also reveal that momentum profits are significantly larger when investor sentiment is optimistic (Cooper et al.,

2004). Hence, sentiment is important, at least for momentum buy-side transactions. Cooper et al. (2004) further report that loser portfolios in down markets experience large positive returns (reversals), even though the winner-loser differential is insignificant.

Measuring Investor Sentiment

Sentiment has no straightforward measure (Baker & Wurgler, 2007), and both explicit and implicit approaches have been used in prior studies. Brown and Cliff (2004) measure investor sentiment using investor intelligence survey, this explicit approach attempts to explain how individual investors underreact or overreact to past returns or fundamentals through an assessment of the level of cognitive biases in individual investor psychology. Investor bias, including frame dependence, mental accounting, representativeness, and conservatism forms market sentiment. Therefore, this bottom-up approach uses some realized biases in describing sentiment. Cognitive bias explains how individual investors under or over react to past returns or fundamentals (Barberis et al., 1998). Institutional investors use more technical information and they do fundamental analysis, hence institutional investor sentiments are more rational than individuals (Verma & Verma, 2008). Some studies therefore use direct surveys from professional market analysts or fund managers to measure sentiment. Fisher and Statman (2000) use the Merrill Lynch Global Fund Managers Survey as a proxy for institutional investor sentiment. Economists always use surveys with caution as individual investor opinions would ideally be different from institutional investors. Retail investor's confidence on the market is also related to the consumption, for this reason, Benrephael, Kandel, and Wohl (2012) use the consumer sentiment index of the University of Michigan in explaining investor sentiment.

One limitation of the bottom-up approach to sentiment in asset pricing research is the unavailability of time series of sentiment indicators. Capital markets in emerging economies feel this absence severely, for instance, Sri Lanka has no such an indicator. Another critique is that these realized biases do not reflect the whole market sentiment. Top-down approach is the alternative, which argues that the real investor characteristics are too complicated to be described by a few realized biases (Baker & Wurgler, 2007). Market wide variables could better describe the change of investor

sentiment. This approach is essentially a reduced form of aggregate sentiment, and attempts to generate indicators using market wide proxies. In doing this, implicit empirical studies use different proxies and methods. Bandopadhyaya and Jones (2006) use a risk appetite index, which is the Spearman Rank Correlation of daily returns and volatility of historical returns of a security. Baker and Wurgler (2006, 2007) generate an index using six proxies: Closed-End Fund Discount (CEFD), Turnover (TURN), Number of IPOs (NIPO), First-day IPO return (RIPO), Premium for dividend paying stocks (PDPD), and Equity share in new issues (S).

Sentiment Level = $-\beta 1CEFD + \beta 2TURN + \beta 3NIPO + \beta 4RIPO - \beta 5PDND + \beta 6S$

βi is the first principal component of ith proxy. Because these variables partially explain economic fundamentals, they argue that the portion explained by economic fundamentals is a rational component of total sentiment. Thus, they regress market proxies against six macroeconomic variables and isolate the irrational component. The sentiment level is the first principal component of the 'orthogonalized' series. However, their methodology has been observed with estimation errors, the index is likely to understate the predictive power because it is based on the first principal component of six proxies that may have a common noise component (Huang et al., 2013). While these proxies are likely to capture some aspect of sentiment, they also contain an idiosyncratic, non-sentiment related, component (see, e.g., Finter et al., 2011). One could find a better proxy, even though there is no best proxy. Thus, it is interesting to see the success of other proxies used in the related literature.

The number of news headlines (Cook et al., 2006) in financial or economic periodicals has the ability to capture market sentiment in US markets. Additionally, prices in the pre-IPO gray market (Cornelli et al., 2006), Common component among columnists (Bull-Bear spread: Brown & Cliff, 2005), and Trading volume (Baker & Stein, 2004) have been successful. Higher volume may show an optimistic level of investors' sentiment. Mahakud (2012) uses a liquidity proxy, turnover velocity. Another commonly used proxy for market liquidity is the share turnover velocity measured as the ratio between the electronic order book (EOB) turnover of domestic shares and their market capitalisation. This works as an indicator of the breadth and

depth of a market, thus a high ratio indicates better liquidity or bullish sentiment in the market. Ratio of 'net buy' volume to the total volume (Kumar & Lee, 2006), has been a better indicator of sentiment. Trading volumes of equity put options to call options (Brown & Cliff, 2004), put/call ratio, works as a directional bet in the market. Sentiment should be excessively bearish when the ratio is relatively high, and it should be excessively bullish at low levels. Brown and Cliff (2004) use ADR calculated as the ratio between the number of advancing and declining stocks. The rising (declining) values of the ADR can be used to confirm the upward (downward) trend of the market (Mahakud, 2012). In markets where short sales are active, investors' opinion could be seen through margin finance levels. Therefore, a change in margin borrowing position serves proxy for bullish sentiment (Brown & Cliff, 2004). Hirose et al. (2009) find a significant cross-sectional relationship between margin buying and stock returns in Japan. This indicator has also been successful in Indian market (Mahakud, 2012). Hirose et al. (2009) observe that margin traders' herding behaviour seems to influence stock prices in the following week. Number of IPOs (NIPO) has been used to proxy sentiment by many studies including Brown and Cliff (2005). More IPO period reflect a period of demand for new equities and hence an upward sentiment. This assumption is necessarily a reflection of managers' confidence over the market; the issuers take the advantage of market's confidence over the upcoming period. Hence, the number of IPOs indicates the judgment of the managers over investors' sentiment and the managers' assessments on movement of market. Subsequent research (Finter et al., 2011) proposes NIPO to be one of the better indicator. Furthermore, Changsheng and Yongfeng (2012) find their NIPO included sentiment model with incremental explanatory ability for both hot stocks and value stocks in Chinese market.

Following the market timing hypothesis (Baker & Wurgler, 2006) a high Equity Issuance to Total Issues of debt and equity ratio can be considered as a bullish market sentiment. Lee et al. (1991) have used dividend premium, the difference in average market-to-book ratios of dividend payers and non-payers. In periods of bullish market sentiment, investors do not look at the dividend payers. However, they demand dividend payers in negative sentiment. Theoretically, increasing open interest in equity derivatives rising market (and decreasing in a falling market) is a bullish condition. Similarly, decreasing open interest in a rising market (and increasing in a falling market)

is a bearish condition. Hong and Yogo (2012) argue open interest to be more informative than futures prices in the presence of hedging demand and limited risk absorption capacity in futures markets. They report furthermore, that movements in open interest predict returns in stock markets.

The flow of funds for equity mutual fund investments has been considered as an implicit proxy for investor sentiment (Brown & Cliff, 2004). This indicator would perform better in a market where equity funds are fully active. The institutional churn rate for a stock has also been used as a negative proxy for the degree of investor irrationality for the stock (Chae & Yang, 2006). The argument is that the more trading from institutions, the less trading from individuals, and the less influence of investor irrationality. This argument is consistent with prior research that the irrationality persists mostly among less sophisticated investors, individuals.

Nayak (2010) documents that the bond yield spreads co-vary with sentiment, and sentiment-driven mispricing and systematic reversal trends are very similar to those for stocks. This suggests that investors decide wealth allocations and trade between debt and equity based on their current and future expectations about the economy's status. This could perhaps be due to integrated debt and equity markets where the shifting cost is minimal. Chae et al. (2006) confirm that transaction costs and investor irrationality are correlated negatively with performance of asset pricing models.

However, some of these proxies do not make sense in emerging markets, as the markets are different in size, volume, and operations. Feldman (2010) suggests a new sentiment measure, Perceived Loss Index, appropriate in detecting bubbles and financial crises in financial markets. The measure first assumes loss-averse investors (Kahneman & Tversky, 1979). Loss aversion means investors are more affected by losses than by gains. Loss aversion kicks in when investors are hit by losses, so they become more pessimistic about the reward/risk prospects. Loss aversion subsides when investors experience gains. Secondly, it assumes that investors place greater weight on the most current performance. Investors remember the most current loss and forget losses far in the past. This study is based on mutual fund data recorded at Center for Research in Security Prices, using over 14,000 US mutual funds. Thus is a limited application in small markets like Sri Lanka, yet a stimulating

study that would guide behavioural studies exploring psychology of investors.

Jiang et al. (2013) calculate Google Search Volume Index (SVI) as used by Da et al. (2011) who showed that this aggregate Google search measure is a direct measure of (retail) investor attention. Jiang et al. (2013) calculate abnormal Google Search Volume Index (ASVI), defined as difference between search volume during book-building week and its median in previous eight weeks.

It is also important to note that some of the variables used in developed markets may be impractical in emerging markets. For instance, 'Closed End Fund Discount' (Baker & Wurgler, 2007) is inappropriate in Malaysian market (Gunathilaka et al., 2016) and Sri Lankan market due to limited number of closed end funds and their market activity. Furthermore, application of total debt issues relative to the equity issues, may produce insignificant results in markets where debt market is relatively under-developed. Similarly, put/call ratio is inappropriate in Sri Lanka due to the equity market's limited activity. Additionally, the IPO market is inactive in Sri Lanka, and the indicators from this market would unlikely capture the market sentiment.

Conclusion

Asset pricing literature suggests numerous risk factors explaining many market anomalies. However, empirical efforts find mixed results and asset pricing remains active and relevant for financial economics. Behavioural finance attempts to bridge the gap between finance and psychology. In recent years, studies have shown that the investor sentiment has a significant impact on asset prices. Authors suggest sentiment as a factor in multifactor APT models. The body of work, including that of Baker and Wurgler (2007), Finter et al. (2011), Mahakud (2012), and Hilliard and Narayanasamy (2016), shows that the extended model of Carhart (1997) with sentiment factor produce significant results. However, these sentiment asset pricing models do consist of many shortcomings, hence do not possess the generality of analysis. Knowing the fact that these pricing models are bound imperfect, there is no fundamental reason why further studies cannot find more generalizable

sentiment model. In particular, empirical efforts in an emerging context, given the limitations discussed in this paper, would be of more significance.

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