

# Rational Approach to Noise Trader Approach in Asset Pricing: A Review

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**Abstract**—Neoclassical finance assumes investors are rational and the markets reflect the fundamental value of its assets. Behavioural finance assumes there are noise traders in the market and their sentiment effect asset prices. However investor sentiment is an elusive concept [1]. Therefore this study explores the concept of investor sentiment through the noise trader approach in asset pricing. It identifies investor sentiment as the irrational investors' erroneous beliefs about future cash flow relative to the intrinsic value of the underlying asset. It considers how an exogenous shock in investor sentiment effect investors' beliefs and how it is captured through survey measures. Further it reviews the behavioural argument underlying closed end fund puzzle, liquidity, new issue puzzle and dividend premium as measures of investor sentiment. Finally it lays groundwork for a composite sentiment index for the frontier market Sri Lanka.

**Index Terms**—Asset pricing, noise traders, investor sentiment.

## I. INTRODUCTION

According to neoclassical finance value of an asset in a capital market equals to the present value of its expected future cash flows. The theory is built upon three central assumptions; investors are rational, markets are highly efficient and investors exploit potential arbitrage opportunities [2]. Therefore even if prices deviate from its intrinsic value, the rational arbitrageurs immediately correct the mispricing to its fundamental value. In the neoclassical framework, decision makers possess Von Neumann Morgenstern utility over uncertain wealth distributions, and use Bayesian techniques to make appropriate statistical judgments. Neoclassical finance is compelling because it uses a minimum of tools to build a unified theory intended to answer all the questions of finance [3].

Era of neoclassical finance initiates with the portfolio optimisation theory of Markowitz. The pioneering asset pricing model, Capital Asset Pricing Model (CAPM) [4] [5][6] (SLB) relates the stock return to a measure of its systematic risk, beta. According to the model market betas suffice to describe the cross section of expected security returns. Fama [7] sets out the conditions for various forms of market efficiency and develops the Efficient Market Hypothesis (EMH). Then models such as Intertemporal Capital Asset Pricing model (ICAPM), Consumption CAPM followed suit.

Even though earlier studies supported standard models subsequent empirical evidence found anomalies; size [8], value [9], earning price [10], momentum [11], profitability

[12] to the standard models. Further studies uncover puzzles such as volatility puzzle [13], return reversal [14] and predictability [15] which are not explained through rational theory. According to [16] EMH lost ground rapidly following the tests of market volatility. [17] states though traditional models are appealingly simple, after years of effort it is clear that basic facts about the aggregate stock market, the cross section of return and individual trading behaviour are not easily understood in this framework.

Behavioural finance tries to explain market anomalies through human psychology. It bases on prospect theory of Kahneman and Tversky [18] and uses human heuristics and biases to explain behaviour. According to the paradigm not only rational investors, a market accommodates irrational investors. Noise trader theory identifies these irrational investors as noise traders [19]. According to the theory some investors trade on noisy signals that are unrelated to fundamentals, thus make security prices deviate from its intrinsic value. In such markets, it is risky and costly to bet against irrational investors. As a result, the rational investors are not aggressive in forcing prices to fundamentals as standard models would suggest thus there are limits to arbitrage [20].

Theoretical behavioural models such as; Daniel, Hirshleifer and Subrahmanyam (DHS) [21], Barberis, Shleifer and Vishny (BSV) [22] attempt to explain stock prices through specific human behaviour. Further there are behavioural literature that study various psychological biases; overreaction, optimism, availability heuristic, regret aversion, ambiguity aversion and anchoring heuristic, people are faced with in their decision making [23]. When studies use biases in individual investors psychology to explain how they underreact or overreact to past returns or fundamentals they are employing a bottom up approach of investor behaviour.

Subsequent behavioural literature uses a top down investor sentiment approach to measure noise [24], [25], [26]. The focus of these studies is to measure investor sentiment at an aggregate level and then to trace its effect to market and individual stocks. Proponents of this approach argue that bottom up models tries to capture a reduced form of mass psychology but real investors and markets are too complicated to be neatly summarised by a few selected biases and trading frictions. Therefore they try to measure investor sentiment in aggregate form over specific investor biases.

The main argument against behavioural finance is that it does not present unified theory unlike expected utility maximization using rational beliefs [27]. The adhoc collection of behavioural models lack mutual consistency and a unifying structure. The noise trader approach is prone

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to similar arguments. According to studies investor sentiment is derived through the noise trader theory of Black and it assumes investors' sentiment reflect noise traders. However it is still an on-going debate whether investor sentiment reflects noise traders [28]. Further there has been no commonly accepted definition of investor sentiment since the term has been used in different ways depending on the context. [29] in developing a composite sentiment index state, since there are no perfect proxies for investor sentiment they consider proxies suggested by recent work on sentiment. However there are wide array of investor sentiment measures and it leads to the question which measure best mirrors actual market movement.

Noise trader approach in asset pricing is an undisputable necessity though the approach may lack a unified theory, clear definition or unique measurement. Therefore the first objective of this study is to develop a literature review on noise trader theory and the price formation through noise traders. In the process the study explore different definitions of investor sentiment, proxies for investor sentiment and the theoretical argument underlying these proxies. The study encompasses a secondary objective. The noise trader theory, measurement and quantification of investor sentiment originated in developed markets. It is rare to find studies of this nature in smaller markets, specifically in frontier markets. According to [30] the characteristics of different markets might lead to a different reaction of stock returns to investor sentiment. Therefore the study attempts to identify viable sentiment proxies of investor sentiment for the frontier market Sri Lanka. Thus it will lay a base for future studies on the development of a composite sentiment index to the Colombo Stock Exchange (CSE) Sri Lanka.

This study is in the nature of a literature review on noise trader approach to asset pricing. The remainder of this paper is structured as follows: Section II focus on noise trader theory, defining noise traders and the noise trader risk. Section III focuses on defining investor sentiment and identifying proxies of investor sentiment. Section IV focuses on understanding investor sentiment in the context of the frontier market Sri Lanka.

## II. NOISE TRADER APPROACH TO ASSET PRICING

The paradigms of market efficiency and the CAPM fail because they do not incorporate the actions of noise traders [31]. Noise trader theory suggests that in a market if some investor trade on noisy signals that are unrelated to fundamentals the asset prices will deviate from their intrinsic value. If the market is efficient the rational arbitrageurs will act aggressively to drive the prices to its intrinsic value. However in such markets betting against noisy investors are costly and risky thus rational arbitrageurs may not want to expose themselves too much undiversifiable risk [20]. Noise trading is not rationally based on arrival of information as EMH predicts. Further the risk created by irrational investors becomes a systematic risk because they act coherently on noisy signals [26].

Therefore noise trader theory suggests that there are two categories of traders in a market; information traders and

noise traders. According to [32] information traders act based on fundamental information and process information rationally while noise traders' trade on noise as if it was information. [28] explains noise traders as market participants who make investment decisions without the use of fundamentals, exhibit poor market timing, follow trends and tend to overreact or underreact to good or bad news. According to [33] noise traders', trade on bad information or no information at all. Further they argue that under certain conditions noise traders may earn more than rational traders, this may not be due to the skills of irrational investors but most likely because they assume greater risk exposure. However [19] argue that noise traders cannot earn profit from noise but noise trading is essential to the existence of a liquid market.

According to noise trader theory the noise trader risk is defined as the excess volatility created by noise. [17] define it as, the risk that the mispricing being exploited by the arbitrageur, worsens in the short run. Thus noise trader risk is when there is a possibility of security prices being different from its fundamental value in the future, and there is further possibility that future price movement will increase the divergence. According to [34] the risk that noise traders put into stock prices will be cumulative. [19] states noise in the sense of a large number of small events is often a causal factor much more powerful than a small number of large events in asset pricing. Thus the noise trader risk is a priced factor in asset value.

## III. DEFINING AND MEASURING INVESTOR SENTIMENT

Investor sentiment is rather elusive concept, which is difficult to define and measure. However recent behavioural literature proves investor sentiment effect asset prices. Therefore studies of investor sentiment needs to evolve to identify clear definition and measures of sentiment. Thus this study explores definitions of investor sentiment in literature. Further there are different measures of investor sentiment applied in empirical studies. Therefore this study comparatively analyse existing measures of investor sentiment and their theoretical arguments.

### A. *Defining Investor Sentiment*

Definitions of investor sentiment range from vague statements about investor's mistakes to specific psychological biases that are model specific. [35] state sentiment impacts the prices of all assets and it drives the difference between what behavioural and neoclassical finance tell us about the relationship between risk and return. They define investor sentiment as investor error, which originates at the level of the individual and manifest at the level of the market. According to [36] sentiment is investors' erroneous stochastic beliefs in the form of excessive optimism or pessimism. Similarly [37] defines investor sentiment as erroneous beliefs about future cash flows and risks. According to [25] Investor sentiments represent the expectations of market participants relative to a norm: a bullish (bearish) investor expects returns to be above (below) average, whatever average may be. [16] defines investor sentiment as heuristic behavioural based

belief or rules of thumb rather than Bayesian rationality in making investments.

Based on the literature it is evident investor sentiment is the erroneous beliefs of investors. According to neoclassical theory rational investor has well defined preferences and form correct beliefs through Bayesian updating. Therefore it is the irrational investor who forms erroneous beliefs. [25] explain that erroneous beliefs are made relative to a norm. According to rational theory the norm in an efficient market is the intrinsic value of the asset or the present value of its future cash flows. Therefore investor sentiment represents the irrational investors' erroneous beliefs about future cash flow relative to a norm, the intrinsic value of the underlying asset.

### B. Measuring Investor Sentiment

Exogenous shock in investor sentiment can lead to a chain of events, and the shock itself could in principle be observed as any or part of this chain [29]. Shock might first show up in investor beliefs then translate to observable patterns of security trades, which are recorded. This argument gives rise to two types of sentiment measures; direct and indirect. The investor beliefs that originate with an exogenous shock can be directly measured through investor surveys. The observable patterns of investor sentiment are then captured through indirect measures. [36] suggest a similar classification for measures of investor sentiment; explicit and implicit. Explicit survey based measures that try to capture the mood of the market directly and implicit measures being constructed from objectively observable financial data. [26], [29], [38] use indirect measures of investor sentiment whilst, [25] use both indirect and direct measures.

However [25] highlight that measure of investor sentiment are subject to confounding influences. An inherent limitation in direct surveys is that there will be a gap between how investors respond to a survey and how they actually behave. Market prices of securities normally reflect fundamentals, where sentiment plays a lesser role. Therefore the indirect measures will have the difficulty of identifying effect of sentiment separately from fundamentals. Therefore they develop the argument that practical approach to measure investor sentiment is to combine several imperfect proxies of investor sentiment which may capture different variations of it. This paved the way for the development of investor sentiment indices in studies such as [25] and [29]

### C. Direct Measures

According to sentiment literature surveys can be used to measure investor beliefs thus sentiment. These survey based measures are developed through opinions or perceptions of individual investors or financial experts on a regular basis. Survey measures are not one time cross sectional surveys, rather longitudinal surveys which are done weekly or monthly. The surveys focus on respondents' belief on economy, personal financial situations or predictions of the movement of stock market. Table 1 shows direct measures of investor sentiment employed in literature.

When survey measures in Table I are considered it is noteworthy that AAI and II directly measure sentiment of investors while latter measures have a broader perspective. ICS survey considers household confidence while UBS/Gallup considers the sentiment of wealthy investors. Further these measures are used in the context of investor sentiment in the US market. Therefore when measuring investor sentiment in non-US markets the studies use alternate proxies. [30] use Gesellschaft fur Konsumforschung (GfK) consumer confidence index to the German Market.

TABLE I: SURVEY MEASURES OF INVESTOR SENTIMENT

Direct Measure	Description	Studies
American Association of Individual Investors (AAII) survey	Target group- individual investors Frequency - weekly Method – Ask each participant where they think the stock market will be in six months; up, down or neutral. Based on the response market is considered bullish, bearish or neutral Inception -1987	Shiller (2000) Brown & Cliff (2004) Ho & Hung (2009)
Investor Intelligence (II) survey	Target group - Market analysts Frequency - weekly Method – Compile a weekly bull-bear spread by categorizing approximately hundred and fifty market newsletters. This is a proxy for institutional sentiment. Inception - 1963	Shiller (2000) Brown & Cliff (2004) Ho & Hung (2009)
University of Michigan Consumer Sentiment Index (ICS)	Target group - Households (500) Frequency - Monthly Method – The respondents assess their financial situation and the economic situation in the next year as well as in the next five years. Inception -1978	Shiller (2000) Fisher & Statman (2003)
UBS/Gallup Index of Investor Optimism	Target group - Randomly chosen wealthy investors Frequency - Monthly Method - Conducts 1000 interviews of investors and report on the last Monday of the month. The overall Index covers the personal financial dimension and the macroeconomic dimension of investments. Inception - 1996	Ho & Hung (2009)

### D. Indirect Measures

Indirect sentiment measures use financial variables to measure investor sentiment. Comparatively more studies employ indirect measure as they can be easily constructed based on historical financial data. Closed end fund discount (CEFD); share turnover; the equity shares in new issues; the dividend premium and the number and average first day returns on IPOs are popular measures of investor sentiment.

The closed end fund puzzle is when the price of the closed end fund shares differs from its net asset value. Closed end funds are always priced at a discount and it is termed as closed end fund discount (CEFD). [39] argue that these shares are primarily held by individual investors and those fluctuations in closed end fund discounts is a proxy for changes in investor sentiment. They explain when small

investors' trade more on noise, the closed end fund become more risky which explains the discount compared to the replicated portfolios. According to [32] when noise traders are excessively bullish the discount should decline; the reverse is expected when noise traders are bearish.

Studies consider time varying market liquidity as a measure of sentiment to forecast changes in return [38]. They model a class of irrational overconfident investors, who underreact to the information contained in the order flow and thereby boost the liquidity. These investors tend to consider others to be less well informed than they are which lowers the price impact of trades, thus boost liquidity. Therefore according to the study with the presence of short sales constraints, high liquidity is a symptom that the market is dominated by irrational investor sentiment. Further they show that managers can time their seasonal equity offerings in such liquid time periods to succeed.

The new issues puzzle is when firms that issue equity have low stock returns in the subsequent few years [40]. [41] uncovers an analogous pattern in the aggregate data; if economy wide equity issuance is high in a given year, the market as a whole performs poorly in the next year. [37] describes this as; managers are more willing to issue equity in periods when the market for new offering is more liquid, in the sense of their being a reduced adverse price impact upon the announcement of a new issue.

The dividend premium; [24] elaborate dividend premium through catering theory of dividends. According to [42] in an efficient market dividend policy is irrelevant to its share value. However, according to catering theory of dividends [24]; investors have uninformed and perhaps time varying demand for dividend paying stocks. Therefore the theory proposes that the decision to pay dividends is driven by prevailing investor demand for dividend payers. Accordingly managers cater to investors by paying dividends when investors put a stock price premium on payers, and by not paying when investors prefer nonpayers.

Studies such as [25] use measures in technical analysis as proxies of investor sentiment. Advance decline ratio, standardised advance decline ratio and number of new highs lows ratio are technical ratios that are proxies for investor sentiment. Further studies employ measures based on type of trading activity such as; percentage change in margin borrowings, percentage change in short interest, specialist sale and odd lot sale to purchases. Derivative variables are considered as the ratio of equity put to call ratio. Even though comprehensive literature may not be built around these technical measures they are extracted based on practical usage of them as proxies of investor sentiment.

The measurement of investor sentiment is difficult thus literature proposes numerous sentiment proxies. [29] argues that exogenous shock in investor sentiment can lead to a chain of events and proxies are likely to capture some aspect of the sentiment shock. Since it is difficult to select the best proxies that measure investor sentiment [25] and [29] proposes composite sentiment indices that condense the information provided by different proxies. The composite sentiment index of [29] includes six underlying proxies of sentiment. They are: the closed end fund discount, share turnover, the number and average first day returns on IPO's,

the equity share in new issues and dividend premium. Composite index of [25] is based on eleven indirect measures of sentiment categorised into; market performance, trading activity, derivative market and other.

#### IV. MODELING INVESTOR SENTIMENT FOR A FRONTIER MARKET SRI LANKA

With the development of investor sentiment measures many markets tested the effect of investor sentiment on their security prices. [30], [43] and [44] develop composite sentiment indices for their respective markets; Germany, India and Pakistan. Further one cannot ignore the importance of frontier markets in global context. According to [45] frontier markets have low integration with the world market and thereby offer significant diversification benefits to international investors. However it is rare to find studies of investor sentiment in such markets. Therefore this study tries to identify direct and indirect measures of investor sentiment to the frontier market Sri Lanka. Further based on argument of [25] and [29] the study intends lay groundwork for a composite sentiment index to the CSE.

The Colombo Stock Exchange (CSE), Sri Lanka is ranked as a frontier market by Morgan Stanley Capital International (MSCI) and Standard and Poor's (S&P). Established in 1985 it has a market capitalisation around US\$ 20 billion with about 300 listed companies as of June 2017. This study investigates viable direct and indirect measures of investor sentiment in the Sri Lankan Market. As in the US market Sri Lanka does not have a survey that directly measure individual investor sentiment. However there are few proxies that can be used to identify the sentiment in the security market and economy as a whole. The Central Bank of Sri Lanka (CBSL) develops a Business Sentiment index (BSI) to understand the business condition by conducting a survey on perception of entrepreneurs. It is a quarterly index which was initiated in year 2014. The BSI covers business conditions, profitability, skilled labour availability, sales, demand and capacity utilization.

Nielsen Pvt Limited develops the LMD- Nielsen Business Confidence Index (BCI). It is compiled based on a survey of 100 senior executives or above in the city of Colombo through series of questions on business conditions and expectations. The survey is done every month to obtain immediate trends. The Nielsen Consumer Confidence Index (CCI) is conducted monthly for a sample of 300 respondents per quarter. The index is developed based on consumers' confidence in the job market, their personal finances and readiness to spend. Therefore these three indices Business Sentiment Index, LMD- Nielsen Business Confidence Index and The Nielsen Consumer Confidence Index can be used as proxies for direct investor sentiment in the Sri Lankan context.

When the indirect measure closed end fund discount is considered it is not a probable measure of investor sentiment in Sri Lanka. During the period 2009 to date number of closed end funds listed in CSE is one. When numbers of IPO's are considered from the year 2005 to date average number of IPO's in Sri Lanka are four. Whereas

according Baker and Wurgler sentiment index database, from year 1960 to 2010 the average number of IPO's in USA is 350. However liquidity, equity share in new issues and dividend premium are measurable in Sri Lanka using publicly available data of the CSE. Further when technical measures are considered advance decline ratio, standardised advance decline ratio and number of new highs to new lows can be used to measure investor sentiment in CSE. However measures based on trading data such as change in margin borrowings, change in short interest are not viable since such data are not publicly available in Sri Lanka. Further [25] employ measures based on derivatives market which are not applicable in Sri Lankan context since it does not have a developed derivative market. Therefore as depicted in Table II this study suggest the development of a composite sentiment index in the CSE based on six indirect proxies of investor sentiment; namely liquidity, equity share in new issues, dividend premium advance decline ratio, standardised advance decline ratio and number of new highs to new lows.

TABLE II: COMPONENTS FOR A COMPOSITE SENTIMENT INDEX FOR COLOMBO STOCK EXCHANGE, SRI LANKA

Sentiment Proxy and the Measure	Studies that employ the measure
Liquidity TURN=Reported share volume/ Average shares listed	Baker & Stein (2004) Baker & Wurgler (2000)
Equity share in new issues S= Gross equity issuance/ (Gross equity issue + Gross LT debt issue)	Baker & Wurgler (2000) Neal and Weatley (1998)
Dividend premium $P^{D-ND} = (\text{Market value}/\text{Book value})_{\text{stocks that pay dividends}} - (\text{Market value}/\text{Book value})_{\text{stocks that do not pay dividends}}$	Baker & Wurgler (2004)
Technical Measures and Measures Based on Trading activity	
Advance Decline Ratio = Number of advancing issues/Number of declining issues	Brown and Cliff (2004)
Standardised Advance Decline Ratio (ARMS) =[Number of advancing issues/Volume of advancing issues]/[Number of declining issues / Volume of declining issues]	
Number of new highs to new lows =High/Low	

## V. CONCLUSION

Neoclassical finance makes no room for presence of noise trader sentiment. Therefore trading on investor sentiment will be quickly eliminated by aggressive arbitrageurs. Behavioural finance assumes that there are limits to arbitrage thus price deviation due to investor sentiment prevail in the market. Therefore this study reviews investor sentiment through the noise trader approach in asset pricing. It defines investor sentiment as irrational investors' erroneous beliefs about future cash flow relative to a norm, the intrinsic value of the underlying asset. Further it reviews how exogenous shock in investor sentiment can lead to a

chain of events, and how it is captured through direct and indirect measures of investor sentiment. It reviews the indirect measures through underlying behavioural argument. Finally it identifies liquidity, equity share in new issues, dividend premium advance decline ratio, standardised advance decline ratio and number of new highs to new lows as viable investor sentiment measures in the frontier market Sri Lanka.

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