Bankruptcy Modelling of Indian Public Sector Banks: Evidence from Neural Trace

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ABSTRACT

The paper estimates earnings per share (EPS) of top three Indian public sector banks on the basis of Ohlson O score, Zmijewski score and Graham Number, for a period of 12 years (2004-2015), with the help of the generalized method of moments (GMM), along with the use of an artificial neural network (ANN) algorithm. The time period has been carefully selected so that it could capture crash and consolidation phase, along with unprecedented bull rally too. It has been found that the fitment of ANN based model is accurate. Thus, using this model, their future EPS during distress could be predicted with a higher degree of precision. The authors believe this to illustrate a clear trace of the availability heuristic, timid choice, bold forecast and herding, as bulk deals by institutional investors decide the feat of a stock even on the futuristic possibility of bankruptcy.

KEYWORDS

Artificial Neural Network, Availability Heuristics, Bankruptcy, Behavioural Finance, Generalized Method of Moments, Graham Number, Herding, Ohlson Score, Zmijewski Score

1. INTRODUCTION

Bankruptcy is a puzzle which corporations try to avoid, analysts love to measure and find difficult to predict in general. The case of Indian Public Sector banks expands the puzzle due to a set of current developments. Firstly, the Indian central government has decided to infuse 22915 Crores in the economy for recapitalisation of 13 public sector banks. Among these beneficiaries, the State Bank of India (SBI) will receive a staggering amount of 7575 Crore, followed closely by Punjab National Bank (PNB) with 2816 Crore. The potential danger of such measures lays in aspects like the poor asset quality and weak capitalisation, proven in other historical occasions. Only in the latest Union budget, the central government has allocated 25000 Crore under this capital infusion scheme termed as “Indradhanush” (Bhowmik, 2015). Whenever the state-run banks are facing sharp rise in non-preforming assets and nearing possible bankruptcy, the centre comes out as a saviour to infuse cash. However, the justification remains vague and calls for further investigation. A noteworthy observation is that earnings per share of SBI have experienced an avalanche breakdown from March 2012 (Quarter ending) with 174.46 to March 2016 (Quarter ending) with 12.82. Whether technical or behavioural parameters are behind this fall is yet unclear. Both Bank of Baroda (BOB) and Punjab National Bank (PNB) faced similar fates, without any apparent plausible reasons. Thus, we postulate that an accurate
prediction of EPS holds the key for understanding such situations. This study attempt to provide a tailored explanation by using various bankruptcy and valuation variables in a unique fashion.

The context is set by different approaches indicating a clear behavioural effect in the bankruptcy puzzle (Nickles, 2006). Numerous behavioural scientists observed that investors tend to simplify their decisions with sophisticated heuristics (Haug & Taleb, 2011), but they are still prone to errors. Between the idea that a cognitive bias is stubborn in nature (Burke, 2006) and the link of these behavioural traces to the dynamic gradient of financial literacy, there is an important gap to be explored. According to a recent comparative research (Cole, Sampson, & Zia, 2009) it has been found that Indian financial literacy is substantially lower than Indonesia. This is complemented by the fact that the penetration level of banks and insurance companies is substantially lower as well. As an operational answer, Otuteye et al. (2015) developed a heuristic named OS-heuristic, including factors like profitability, financial stability, susceptibility to bankruptcy and margin of safety, based on the rationale before. Moreover, Coelho et al. (2010) discusses about the psyche of retail investors and the identified similarities to gambling profiles. They considered the price impact of this trader behaviour and document the instant and constant churning. Such securities lead, on an average, to a negative realized absolute return of in and around -28% during the 12-month post-announcement period. This is an outcome which is found to be inconsistent with traditional asset pricing models. These innovative findings open up a new question on the presence of gambler’s fallacy, strengthening the links between behaviourally informed traces and bankruptcy.

There is a significant stream of literature covering bankruptcy and either behavioural biases or with new-age algorithms. One such study was conducted by Fakhri Husein (2014), where the researcher tested precision of the models of Altman, Springate, Zmijewski, and Grover for predicting the financial distress on 132 companies which are listed on the list of Daftar Efek Syariah (DES) in 2009-2012. They employed a binary logistic regression and found the Zmijewski measure to be more accurate over other measures, but no clear quantification of behavioural biases. Another relevant case was build by Murari (2012) using Z scores and probabilistic methods on 80 Indian banks across three segments (public sector, private sector and foreign sector). According to their results, the probability of book value bankruptcy is lower for Indian public sector Banks, in comparison to the private and foreign banks. Campbell et al. (2011) measured financial distress by scrutinizing the performance of distressed stocks from 1981 to 2008. The researchers found distressed stocks with high returns are highly volatile in nature and high market betas as well. These stocks tend to generate negative beta over safe stocks most of the time. Investors, despite holding these stocks never got their due return. On the contrary, these stocks have low returns and low risk adjusted returns as well. Interestingly it has been found that the underperformance is lower for stocks with low analyst coverage and institutional holdings. This suggests that arbitrage-driven market inefficiency problem may be partially responsible for the consistent negative alpha generation of the distressed stocks. Though the paper has a clear trace of anchoring and herd behaviour from the investors, yet it was not linked with any behavioural economics/finance concepts.

Block-Lieb et al. (2006) during their in-depth behavioural analysis of borrowers and lenders observed certain interesting outcome. Their article provides an outline of certain implications that research based on behavioural decision is correct for existing models of third party borrowing and post-default behaviour. The study carried out multiple cognitive experiments suggesting in order recompensing for bounded rationality. Borrowers, as well as lenders, do consider decision-making heuristics that assist individuals in taking purchasing and borrowing decisions. These decisions either increase their risk appetite, and they start to buy or borrow more than above their capacity and requirement as well or make them falsely confident of the fact that they will be able to service it well. Individual or firms, bankruptcy generally depends on overleverage decisions to a great extent. If the
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