

Cash flow forecast for South African firms

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Abstract

This paper applies models in the extant literature that have been used to forecast operating cash flows to predict the cash flows of South African firms listed on the Johannesburg Stock Exchange. Out-of-sample performance is examined for each model and compared between them. The reported results show that some accrual terms, i.e. depreciation and changes in inventory do not enhance cash flow prediction for the average South African firm in contrast to the reported results of studies in USA and Australia. Inclusion of more explanatory variables does not necessarily improve the models, according to the out-of-sample results. The paper proposes the application of moving average model in panel data, and vector regressive model for multi-period-ahead prediction of cash flows for South Africa firms.

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JEL classification: G300; M410; M490

Keywords: Cash flow; Moving average; Predictive models; Accruals; Vector autoregressive model; Depreciation

1. Introduction

Given that cash flow is the life-blood of a firm, accurate determination of cash flows enables firms to make important financial decisions that relate to whether the firm survives or goes bankrupt. As a measure of a firm's profitability and financial health, cash flows could provide potential clues about the source company's ability to pay dividend and thus attract investors' interest too. There are three categories of cash flows recorded in statement of cash flow, i.e. cash flows from operation, financing and investment, of which operating cash flow, reflecting the ability of the firm to engage in day-to-day operations and its continuity in business, is of the most importance. For the managers of firms, investors or analysts,

prediction of future cash flows are of extreme usefulness and value.

There are two issues to be considered when attempting to predict a firm's cash flows. First, the variables those are useful and informative to cash forecast need to be identified and incorporated into the forecast model. Secondly, the type and structure of models to be employed in the forecast should be carefully chosen to provide a more accurate prediction. This study shed light on both issues, intending to demonstrate the procedure of choosing variables and models for more accurate prediction. There are a number of difficulties with cash flow prediction. Generally speaking, cash flow is more volatile than earnings and thus harder to predict. There is no uniform cash flow generating process for the whole business world and different companies provide distinct patterns of cash flows. Besides, due to the popularity of credit trade, a firm's revenue and expenses are not equal to cash inflow and outflow and this compounds the problem of accurate cash flow prediction. Academic studies on cash flow prediction rely on public information as reflected in a firm's financial statement for cash flow data. Among the variables that have been found usefulness in cash flow

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Peer review under responsibility of Africagrowth Institute.

prediction include earnings, accrual terms such as changes in account receivable and payable and disaggregated cash components. Empirical studies suggest that these variables are useful and informative in predicting cash flows. In this paper, a comparison is made between different sets of variables as predictors. It is expected that the more predictors that are included, the better a model will perform because more inclusion of variables often means richer exploitation of information. A second comparison is made between models which include explanatory variables with different lags. It is expected that models with more lagged explanatory variables could provide more accurate prediction whereas the reported results in this paper suggest otherwise. This paper proposes two types of cash flow modeling, i.e. moving average model and vector autoregressive (VAR) model for cash flow prediction. Moving average model also makes economic sense as it measures how an unexpected cash flow shock could influence people making future prediction. The moving average model is applied to one-period-ahead prediction and VAR model is proposed for multi-period-ahead prediction. For this purpose VAR is more powerful and relies less on data availability than linear regression. These models are applied empirically on data of South Africa firms.

This paper is organized as follows: Section 1 provides the introduction to this paper. Section 2 reviews the literature and discusses factors that influence the prediction of cash flows and the prediction models utilized in the study. Section 3 describes the data for South African firms. Section 4 reports the results of the empirical analysis and the conclusion of the study is provided in Section 5.

2. Literature review

Cash flow forecast is of interest to investors, creditors, employees and rating agencies among others. Investors are interested in cash flows as input into their investment models to enable them to decide on payoff relating to dividends and capital appreciation of their investments. Creditors are interested in solvency decisions relating to the firms they transact business with and employees are interested in job security and going-concern issues relating to firms they work for. Rating agencies are also interested in going-concern and a firm's ability to pay its debts when they are due.

Cash flow can be considered as complimentary information to earnings since combinative analysis of both quantities might bring better results than analyzing earnings on its own. Earnings, also sometimes referred to as net income, are the summation of net cash income and net credit income, the latter of which is based on credit trades with customers and is not yet but expected to be settled by cash in a later period. The amount of credit given to customers could potentially be overlooked without cash flow information and this may mislead investors about the risk relating to shortage of cash in the firm. In addition, cash flow directly measures the operational ability of the firm to meet its day-to-day financial commitments. In conventional finance theory, the worth of a firm is theoretically equal to the discounted value of all cash flows generated during the firm's life assuming that all

the cash flows are paid out as dividend. As a result, news about cash flow can potentially have significant impact on a firm's market price. Along with earnings forecast, analysts are increasingly including cash flow forecast into their analysis and reports. Dechow, Kothari, and Watts (1998) [DWK], proposed a model of cash flow which they derived from sales and reached a conclusion that current earnings are the best forecast of future cash flow. Earnings equal to cash flow plus accruals that include changes in account payable, changes in account receivable, changes in inventory, depreciation and amortization and others. In the DKW model, accruals, for simplicity, include only changes in account receivable, changes in inventory and changes in account payable, which are equivalent to changes in working capital while long term accruals such as depreciation are not considered. The DKW model makes several strict assumptions about sales process and working capital components and their derived model relies heavily on those assumptions. Barth, Cram, and Nelson (2001) [BCN], proposed a modified version of the DKW model. They disaggregate the accruals into components, anticipating them to have different persistence in predicting future cash flow. Lorek and Willinger (2010) compared the predictive accuracy of the BCN model, in time-series and cross-sectional analysis respectively, and found that time-series model generates more accurate result. This result is not surprising since cross-sectional estimation treats all firms as homogeneous, which is hardly true in reality. The DKW and BCN models use the indirect method to measure cash flow, i.e. they calculate cash flow component from net income and adjust the results with accrual terms. In the USA, statement of Financial Accounting Standards (SFAS) No. 95 issued in 1988 allowed the disclosure of direct method cash flow statement. Therefore, cash flows after 1988 are directly available from the cash flow statement. Cheng and Hollie (2008) partition cash flow components into core and non-core ones, and analyzed their persistence for future cash flow determination. The study defines core cash flow components as cash flows from: sales, cost of goods sold, and operating and administrative expenses. The non-core cash flow components are interest, taxes, and others. When these regressors are applied in a prediction model, the adjusted R^2 is slightly greater than the BCN version. Similarly, in Orpurt and Zang (2009), the issue of whether direct method cash flow statement enhances cash flow modeling is examined. Their reported cash flow forecast model had adjusted R^2 of 43%, although their sample was smaller (compared to pre-1989 studies when SFAS No.95 had not been published). Orpurt and Zang's paper examined whether it makes a difference in estimating cash components using indirect method compared to using disclosed items directly from the statement of cash flow. They do not directly compare the accuracy of forecast models. Instead, they examine the statistical significance of articulation error that is defined as the difference between estimated cash components and disclosed ones in their regression model. Their reported results suggest that the coefficients of articulation error terms are statistically significant and thus that articulation errors have incremental information for cash flow forecast. It hence implies that the direct method for cash flows disclosure is more informative in predicting future cash flow than indirect method

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