



Innovative Applications of O.R.

Forecasting the value effect of seasoned equity offering announcements [☆]Konstantinos Bozos ^a, Konstantinos Nikolopoulos ^{b,*}^a Leeds University Business School, University of Leeds, Leeds LS2 9JT, UK^b Bangor Business School, Bangor University, Bangor, Gwynedd LL57 2DG, UK

ARTICLE INFO

Article history:

Received 13 October 2010

Accepted 11 April 2011

Available online 30 April 2011

Keywords:

Financial forecasting

Forecasting competitions

Econometric models

Artificial neural networks

Judgment

ABSTRACT

Seasoned Equity Offers (SEOs) by publicly listed firms generally result in unexpected negative share price returns, being often perceived as a signal of overvalued share prices and information asymmetries. Hence, forecasting the value effect of such announcements is of crucial importance for issuers, who wish to avoid share price dilution, but also for professional fund managers and individual investors alike. This study adopts the OR forecasting paradigm, where the latest part of the data is used as a holdout, on which a competition is performed unveiling the most effective forecasting techniques for the matter in question. We employ data from a European Market raising in total €8 billion through 149 SEOs. We compare economic and econometric models to forecasting techniques mostly applied in the OR literature such as Nearest Neighbour approaches, Artificial Neural Networks as well as human Judgment. Evaluation in terms of statistical accuracy metrics indicates the superiority of the econometric models, while economic evaluation based on trading strategies and simulated profits attests expert judgement and nearest-neighbour approaches as top performers.

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1. Introduction

Seasoned Equity Offers (SEOs) by publicly listed companies involve the issue and sale of new equity to the public in return for cash. Empirical research has supported that SEO announcements are generally followed by unexpected (abnormal) negative share price returns, since capital market participants generally perceive the decision of a firm to sell equity as a signal that the quoted share price is, under the existence of *information asymmetries*, overvalued (Mikkelson and Partch, 1986). In an early empirical investigation of the US capital market Asquith and Mullins (1986) report the mean “offering dilution” of SEOs to be around 31%: for every \$1 billion raised in proceeds, there is a loss of \$310 million in market value. As a result, the management of a company may often pass up promising investment opportunities, for fear that the market will react negatively (Myers and Majluf, 1984).

Meanwhile, the occurrence of a number of positive returns, often observed, suggests that the *negative signalling* hypothesis fails to fully explain the phenomenon, while, according to the *Efficient Market Hypothesis (EMH)*, there should be no abnormal returns at

all (Mikkelson and Partch, 1986). Evidently, the ability to predict the exact value effect of a SEO announcement, and accordingly schedule equity offerings to protect shareholder value, presents with chief benefits for the issuing firm. The problem is, however, equally important for the institutional and individual investors, who seek to secure portfolio returns and trading liquidity.

While the finance literature has investigated SEOs in several occasions, no forecasting attempts have been reported, despite the practical and academic importance of the topic. To address the above gap, this study evaluates the performance of 28 alternative forecasting approaches. With the use of data from 149 SEO announcements in the Athens Exchange, we generate forecasts through a range of naïve economic and econometric models, nearest neighbour approaches, artificial neural networks and human judges to estimate the sign and exact size of abnormal returns. As forecasting techniques are not always equally effective, while simpler approaches may often generate more accurate forecasts (Nikolopoulos et al., 2007b), such a comprehensive competition ensures that the best technique for the problem will emerge. Nikolopoulos et al. (2007b) have applied the OR forecasting paradigm in the context of Marketing – where the impact of special events on time series was forecasted. According to that paradigm the latest part of the data is used as a holdout, on which a competition is performed unveiling the most effective forecasting techniques for the matter under investigation – in that case the impact of major sport events in TV viewership. In the present study, we apply the OR forecasting paradigm in a financial forecasting application, namely

[☆] An early version of this paper was presented at the 2008 International Symposium of Forecasters, Nice France. We thank two anonymous reviewers for their comments. All errors are our responsibility.

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the extraordinary change in stock prices due to the announcement of a SEO. A range of economic, econometric, OR/MS and behavioural forecasting techniques is tested extensively.

The study additionally contributes to the existing body of literature, by examining the economic significance of the generated forecasts alongside their statistical significance. According to Timmermann and Granger (2004) the *EMH*, and the unpredictability of stock returns, cannot be ruled out, unless predictable patterns are large enough to allow positive payoffs after transaction costs. Granger (1992) also postulated that along with out-of-sample forecastability and transaction costs, trading rules need to be corrected for risk levels. We therefore devise a professional trading strategy, which accounts for realistic transaction expenses and the associated risk of each forecasting approach.

1.1. The financial forecasting literature

In modelling normal and abnormal price vibrations, the finance literature has often used a regular Brownian motion with jumps. In an early adaptation of the Black and Scholes (1973) option pricing formula, Merton (1976) developed a formula where underlying stock returns are generated through a mixture of both continuous and jump stochastic processes; jump processes reflected the arrival of new information (as in an announcement), which often causes abnormal vibrations in stock prices. Employing an option pricing model with jump-diffusion processes, Bates (1991) also observed that during the period preceding the stock market crash of 1987, expectations of predominantly negative jumps in option prices revealed strong crash fears up to one year prior to the crash.

The (*EMH*), supporting that in a market, efficient to an information set Θ_t , economic profits cannot be attained based on this information set (Jensen, 1978), has been a persistent challenger for forecasters attempting to predict security price returns (Timmermann and Granger, 2004). Empirical finance indeed employed a variety of forecasting applications to predict security returns and other financial time series. Fama and French (1988) investigated the case of dividend yields, to reveal that their forecastability on security returns increases with the increase of the forecasting horizon. Furthermore, Lo and MacKinlay (1988) employed a variance ratio specification test to support that weekly share prices are not random walks and can therefore be predicted. Several other studies (Pesaran and Timmermann, 1995; Leung et al., 2000; Laws and Thompson, 2004) have examined the predictability of daily and monthly returns, using a variety of approaches: time series and cross-sectional models, regime switching models, technical trading, futures contracts, cointegration etc.¹

Central to the premise that the *EMH* is resilient to any forecasting model that attempts, or even temporarily manages, to reject it is the argument that from the moment the possibility of realising net-of-transaction, risk-adjusted profits based on a forecasting process becomes public, the predictability of the process evaporates, since its adoption by traders will lead to the so called “self-destruction of predictability” (Granger, 1992; Timmermann and Granger, 2004). However, since the development of the *EMH* numerous attempts, employing novel and advanced forecasting strategies, have been reported both in the financial and the forecasting literature, effectively identifying cases where the *EMH*, especially in its weak form, does not hold; firm effects, such as small capitalisation and high book to market values, as well as seasonality effects, like the “January” or the “day of the week” effect, are indicative cases where systematic variations in security returns, allowing a certain

degree of predictability, have been identified (Jarrett and Kyper, 2006).

1.2. Stock market reactions to SEO announcements

Negative market reactions to SEOs were first observed in the US (Asquith and Mullins, 1986; Mikkelson and Partch, 1986). Masulis and Korwar (1986) confirmed that abnormal security returns present a negative relationship with past stock price performance and a positive one with decreases in managerial shareholdings, thus giving support to the *asymmetric information hypothesis* (Myers and Majluf, 1984). In similar studies in Europe, Slovin et al. (2000) reported a negative (−3.09%) two-day value effect in the London Stock Exchange, Gajewski and Ginglinger (2002) also revealed negative value effects in the Paris Exchange, while positive effects were observed for stock issues in the Oslo Stock Exchange (Bohren et al., 1997) and the Athens Exchange (Tsangarakis, 1996). Corby and Stohs (1998) in their investigation of Irish equity offers, found no significant abnormal returns.

All the above studies made attempts to investigate the determinants of share price reactions, however without much consensus: The pre-announcement share price performance (Tsangarakis, 1996; Bohren et al., 1997), the variance of past returns (Masulis and Korwar, 1986), the firm and the SEO size (Asquith and Mullins, 1986; Tsangarakis, 1996; Bohren et al., 1997; Slovin et al., 2000) are among the most commonly reported drivers of abnormal returns, however their influence usually differs from one study to another both in sign and magnitude.

The following section describes the empirical data used in the study and the employed explanatory variables as these were drawn from the above literatures. Section three presents all the competing forecasting methods and section four discusses the empirical results, namely the performance of the competing methods both in statistical and economic terms, and the potential causes for the performance of the various approaches. Finally, sections five and six present an overview and critical evaluation of the findings and identify avenues for future research.

2. The empirical data

The data employed in the study relate to 149 SEO announcements in the ATHEX during the period 2000–2006, aiming at raising €8 billion in total. The value effect of each announcement is measured by the share price abnormal returns after the announcement, estimated by the market model of unsystematic returns (Sharpe, 1964) as supported by the relevant empirical literature (Masulis and Korwar, 1986; Strong, 1992; Bohren et al., 1997). The use of abnormal returns, instead of actual share price returns, is best suited for the purpose of the study for a number of reasons: abnormal returns are net of market-wide influences, hence more appropriate for capturing the net change in market value due to the specific event. Furthermore, as actual returns incorporate a systematic element, one would first have to generate forecasts about the market return, before feeding any forecast process with independent variables; the accuracy of the final forecasts would then be conditional upon the accuracy of the predicted market returns. However, for any market participant, who can easily replicate the market portfolio, by trading on derivative securities or simply investing in an index fund, only abnormal returns are of forecasting interest.

With regards to the estimation of abnormal returns, alternative methods, such as the market adjusted or mean adjusted returns, resulted in statistically insignificant differences; hence the estimates from the market model of unsystematic returns were preferred as being superior in capturing the net effect of

¹ For a taxonomical review see Granger (1992).

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