

Non-Technical Summary

Is the Spread between E/P Ratio and Interest Rate Informative for Future Movement of Indian Stock Market?

1. Introduction

The issue of whether the spread between Earning/Price (E/P) ratio (also known as earnings yield) and interest rate contains useful information about the movement of stock market is a matter of empirical investigation in recent years (Rolph and Shen, 1999). As the information on both E/P ratio and the prevailing market rate of interest are publicly available, apparently the spread between two variables as defined above could not be an important indicator of market movements in an efficient market. Empirical literature, however, does not provide conclusive answer to the validity of market efficiency (Lo, 1996; Campbell et al, 1997). In practice, generally movements of a few influential variables are closely monitored by market practitioners for assessing the market condition with a view to predict the future direction of stock prices. Along with different indicators, market practitioners often use different measures of spread to analyze and predict market movements. A number of business publications like Wall Street Journal, Barrons, Business Week etc., in developed countries also give importance to spread in their discussions of overall market conditions and outlooks (Rolph and Shen, 1999). Though a number of research papers attempted to explain/predict future stock return by considering some of the regressors among E/P ratio, yields, interest rate, etc., (Cutler et al, 1991; Lander et al, 1997; Pesaran and Timmermann, 1995) the literature on direct evaluation of the usefulness of spread between E/P ratio and interest rate as an indicator for overall market outlook is at a nascent state.

In this study, an attempt is made to assess the usefulness of spread between E/P ratio and interest rate in the context of Indian stock market. For analyzing the relationship between spread and return, a number of analytical tools, viz., correlation analysis, regression analysis, Granger's causality test and measures of out-of-sample forecast performance have been employed. Thereafter, we explore the possibility of formulating profitable business/trading strategy using spread.

2. Why Spread May Contain Information About Future Return?

An intuitive explanation on why spread may contain information about future stock market return is discussed by Rolph and Shen (1999). The information content follows from the notion that relative to the interest rate (say, i_t) there is an equilibrium level of spread. Under the assumption that expected future growth rate of P/E ratio is positively related to the current spread $[(E/P)_t - i_t]$, a higher spread leads to higher expected growth for the P/E ratio, which in turn gives higher expected market return. In other words, when the spread is higher than its equilibrium level, the P/E ratio is

more likely to grow faster, thus reducing the E/P ratio and spread towards its equilibrium levels and vice-versa.

In a subsequent study, Shen (2000) has given another simple argument on why the spread between earning yield (i.e. E/P ratio) and interest rate may be looked at for making futuristic assessment of stock market return. In this view, there are two good reasons in focusing on spread for assessing the short-term outlook for stock prices. First, a low spread may be indicative of more expensiveness of stocks in relation to alternative investments such as treasury securities or money market funds. In such situation, investors may switch over from stocks to other assets, causing the stock prices either to fall or to decelerate. Similarly, high spread may trigger faster rise of stock prices and hence higher return. The second reason is that researchers have found that in predicting monthly stock market returns, a combination of the earnings yield and market interest rates usually performs better than either the earnings yield or interest rates alone. By considering spread, both E/P ratio and interest rates are taken care of, though in some restricted way.

3. Methodologies

Information content of spread about future stock market return is assessed by following analyses;

- (i) correlation analysis;
- (ii) regression analysis;
- (iii) causal models/Granger's causality test; and
- (iv) measures of accuracy in out-of-sample forecasts.

Practical usefulness of spread in business is examined by assessing the profitability of two spread-based/forecast-based trading strategies vis-à-vis a simple buy-and-hold strategy for varying extent of transaction costs.

3.1 Strategy 1: A Spread-Based Switching Trading Strategy

In this strategy (Rolph and Shen, 1999), it is assumed that an extreme low value of spread relative to its historical range is an indication of unusual vulnerability of overall stock market condition. Thus an extreme low spread is considered as a signal to exit the stock market temporarily. For judging the extremeness of the spread, various percentile points of the statistical distribution of historical data on spread are considered. When observed spread exceeds the chosen threshold, the spread is considered not low and the investment is held/switched over to stock market. Otherwise, portfolio is invested/held in money/other market. After each transaction, the value of the portfolio is adjusted for transaction costs when needed.

3.2 Strategy 2: A Forecast-Based Trading Strategy Using Causal Models

In this strategy, return is forecasted using estimated causal models involving spread. If expected stock market return is positive, portfolio is invested or is held in the stock market. Otherwise, portfolio is switched-over or held in money/other market. Here also, portfolio value may be adjusted for transaction costs if needed.

4. Database and Related Issues

In this study, stock market return is calculated from BSE-100 index and the E/P ratio pertains to the BSE-100 portfolio. For measuring interest rate, both 'call money rate' and 'bank rate' are used. Three alternative scenario of transaction costs, viz., 0.0 per cent, 0.5 per cent and 1.0 per cent are considered for adjusting portfolio value for transaction costs.

For checking the robustness of empirical results on data frequency, both weekly and monthly information on various variables are employed. The weekly database covered the period from the week ended January 6, 1996 to December 30, 2000. The monthly database also covers the same five years period, from January 1996 to December 2000.

5. Empirical Results on Investigating Relationship Between Spread and Return

Based on correlation analysis, it is found that return is reasonably strongly correlated with past values of spread. The associated time lags, as estimated separately for weekly and monthly data, are more or less consistent – it is 11 weeks or more in case of weekly data and 3-months or more for monthly data.

Based on regression analysis and causality tests, it is also seen that spread has causal influence on return. In terms of various regression diagnostics it is found that causal models are superior to simple regression equations, which use only lagged-spread as regressor. These results are robust on data frequency.

The estimated errors in out-of-sample forecasts of return also reveal that irrespective of data frequency, causal models generally outperform both random walk and simple regression models.

6. Empirical Results on Exploring the Profitability Trading Strategies

As the results on relationship between return and spread based on weekly and the monthly data are broadly similar, the empirical investigation on comparison of profitability of two alternative trading strategies (as discussed above) with a simple buy-and-hold strategy is performed using weekly data only.

As the profitability could vary from time to time, the implications for three sets of trading periods – the duration of each being 104 weeks (i.e., two years) – after the first 50th, 100th and 150th

weeks are examined. For Strategy 1, four cut-off points based on the 5th, 10th, 15th, and the 20th percentiles of the distribution of spread are considered as threshold.

It is assumed that initially trading commences with an investment of Rs.100. Then the value of portfolio after 104-weeks of trading under different trading strategies are computed for all chosen transaction costs. It may be noted that the practical relevance of spread would be established if the final value of the portfolio under any spread-based strategy exceeds that corresponding to the buy-and-hold strategy.

The results on comparison of spread-based strategies are not robust across definitions of spread or across strategies. While increase in transaction cost clearly reduces profitability vis-à-vis the buy-and-hold strategy, the extent of profitability seems to depend on the starting point of trading period. However, it is interesting to note that spread-based strategies in many occasions yielded higher returns than that of the buy-and-hold strategy, especially for low transaction cost.

7. Conclusion

Whether the spread between E/P ratio and interest rate is helpful for predicting future return/movement of stock price index is a debatable issue. However, in practice, spread is frequently used by market practitioners. So far empirical evidence for the developed economies suggests that the information on spread could be useful. In case of emerging markets including India, the issue has not received adequate attention.

The present study employs various statistical and econometric tools for rigorously assessing the usefulness of spread in explaining stock market return. Empirical results, at this stage, however, are not conclusive. Though spread seems to have reasonably strong causal influence on return and the causal model helps achieving forecasts better than the random walk model, the usefulness of spread in formulating a profitable business strategy is not clear. Empirical work in the paper reveals that the performances of different strategies vis-à-vis a simple buy-and-hold strategy crucially depend on several factors like the choice of interest rate, choice of trading period and choice of threshold for determining 'extreme' values of spread. Our study also reveals that the profitability of a spread based trading strategy would crucially depend on the extent of transaction cost. In this context, however, it is interesting to note that spread based strategies in many occasions yielded returns higher than that of the buy-and-hold strategy, especially when transaction cost was low.

The empirical results presented here are tentative and further research is needed to address the issue. Particularly, there is a need to put concerted efforts to construct alternative measures of 'spread' based on different interest rates and compare their usefulness empirically in explaining and predicting future movement of stock market return in India.

Select References

Brooks, Chris and Gita Persaud (2001), "The Trading Profitability of Forecasts of the Gilt-Equity Yield Ratio", *International Journal of Forecasting*, Vol. 17, No. 1, January-March, pp. 11-29.

Campbell, John Y., Andrew W. Lo and A. Craig MacKinlay (1997), *The Econometrics of Financial Markets*, Princeton University Press, Princeton, New Jersey.

Cutler, David M., James M. Poterba and Lawrence H. Summers (1991), "Speculative Dynamics", *Review of Economic Studies*, Vol. 58, pp. 529-546.

Lander, Joel, Athanasios Orphanides and Martha Dourogiannis (1997), "Earnings Forecasts and the Predictability of Stock Returns: Evidence from Trading the S&P", *Journal of Portfolio Management*, Vol. 23, No. 4, pp. 24-35.

Lo, A. [Ed.], (1996), *Market Efficiency: Stock Market Behaviour in Theory and Practice*, Edward Elgar Publishing Ltd., London.

Pesaran, M. Hashem and Allan Timmermann (1995), "Predictability of Stock Returns: Robustness and Economic Significance.", *The Journal of Finance*, Vol. L, No. 4 (September), pp. 1201-28.

Rolph, Douglas and Pu Shen (1999), "Do The Spreads Between the E/P Ratio and Interest Rates Contain Information on Future Equity Market Movements?", *Research Working Paper, Federal Reserve Bank of Kansas City*, RWP 99-03 (March).

Shen, Pu (2000), "The P/E Ratio and Stock Market Performance", *Economic Review, Federal Reserve Bank of Kansas City*, Vol. 85, No. 4, Fourth Quarter, pp. 23-36.