sdmimd
JOURNAL OF MANAGEMENT

DOI:10.18311/sdmimd/2022/29270

Forecasting Stock Prices of Select Indian Private Sector Banks – A Time Series Approach

Rajveer S. Rawlin[1] and Satya Surya Narayana Raju Pakalapati[2]*

[1]Assistant Professor, M. S. Ramaiah Institute of Management, Bangalore – 560054, Karnataka, India
[2]Graduate Student, M. S. Ramaiah Institute of Management, Bangalore – 560054, Karnataka, India

Abstract

Forecasting stock markets and individual stocks has been a well-researched area in the world of finance. Fundamental and technical analysis is widely used by investors in analysing stock prices. Researchers have used various methods to predict stock prices such as Hidden Markov models, genetic algorithms and neural networks (Enke, Grauer, and Mehdiyev, 2011; Hassan, Nath, and Kirley 2007). Time series analysis is used in forecasting asset prices (Long et al, 2021; Eita, 2012). Indian private sector banks are among the best-performing stocks on the Indian stock exchanges over the last decade, as they have consistently captured market share from their public sector counterparts. ARIMA is a useful technique to forecast stock and stock index prices (Box and Jenkins, 1970). This study aimed to evaluate the effectiveness of the ARIMA model in forecasting private bank stock prices in India. Forecasted values differed from actual prices, suggesting markets may be efficient and other variables may also prove to be influential in forecasting Indian private bank stock prices.

Keywords: ARIMA, Banking, Forecasting, Stationarity, Time Series Analysis

1. Introduction

Indian banking stocks have rebounded sharply hitting new highs, following a major sell-off during the COVID-19 crisis. This is on the heels of severely deteriorating asset quality in the Indian banking landscape over the past decade. The deteriorating asset quality which has been more pronounced in public sector banks has also impacted private sector banks.

The Indian banking system comprises of public sector banks, private sector banks, foreign banks, small finance banks, payment banks and regional rural banks. While public sector banks are majority-owned by the government and cater to vast segments of the society that includes marginalized and priority segments, private sector banks tend to be more focused on targeting fewer segments, focusing more on asset quality and profitability.

Given that private sector banks in India play an influential role in the economy and tend to be owned by large investment funds, it would be useful to obtain forecasts of the stock prices of these banks. This in turn can provide fund managers and investors with useful estimates, which can be used to benchmark performance.

Bank stock prices globally are influenced by several key factors. These comprise micro determinants such as profitability (Kazi, 2009), asset quality (D'Apolito and Pacelli, 2017), technical efficiencies (Pasiouras, Liadaki, and Zopounidis, 2008), management quality

*Email: surya.pssn@gmail.com

(Rjoub, Civcir, and Resatoglu, 2017) and macro variables such as interest rates (English, Van den Heuvel, and Zakrajšek, 2018) and exchange rates (Eita, 2012).

In this study, we forecast stock prices of some major listed private sector banks in India. The Autoregressive Integrated Moving Average (ARIMA) technique is used to obtain forecasts using a time series approach. The paper is organized as follows following the introduction a literature review is presented that covers key aspects of forecasting, this is followed by a discussion of the research methodology employed, next the results are presented and discussed which is finally followed by the conclusion.

2. Literature Review

Globally, bank stock prices have been influenced by several key factors. These include technical efficiencies as observed in the case of Greek banks (Pasiouras, Liadaki and Zopounidis, 2008), micro variables and macroeconomic variables such as money supply and interest rates, asset quality, management quality, earnings and size as seen in the case of Turkish banks (Rjoub, Civcir and Resatoglu, 2017).

According to the Fisher effect stock prices and inflation move in the same direction. Thus, as inflation rises, stock prices will also rise and hence act as a hedge against inflation (Fisher, 1930). The proxy hypothesis on the other hand suggests that there may be a negative relationship between stock prices and inflation is driven by changes in real economic activity. If economic activity were to rise but the money supply didn't, then inflation would remain subdued and would not accompany rising stock prices (Fama, 1981).

The goods and market theory (Dornbusch and Fischer, 1980) suggests that the effect of exchange rates on stock prices would depend on whether the economy is export or import dependent. For an export-dependent economy, an appreciating currency would make its exports less competitive and thereby make companies less profitable. An import-based economy on the other hand would benefit from a strong local currency as raw material costs and other production costs would reduce. Thus, an inverse relationship between exchange rates and stock prices is likely in an export-based economy while the reverse is true in an import driven economy. However, a depreciating local currency would make foreign assets more attractive relative to local assets resulting in sell-offs in domestic share prices suggesting a direct relationship between exchange rates and stock prices are driven by capital and money flows as suggested in the portfolio balance approach (Tobin, 1969).

English, Van den Heuvel and Zakrajšek (2018) suggested that a suddenly steepening yield curve negatively impacted bank stock prices in the US. Kazi (2009) found that micro factors such as corporate profitability and dividend yield and macro factors such as the level of interest rates, industrial activity and performance of other global markets impacted Australian stock market returns.

Eita (2012) looked at the influence of key macroeconomic factors on stock market prices in Namibia, using the Vector Error Correction (VECM) approach. It was observed that stock prices in Namibia were impacted by interest rates, economic activity, inflation, the money supply and exchange rates. Increasing economic growth and money supply impacted stock price performance positively. Increases in inflation and higher interest rates resulted in lower stock price performance.

Kazi (2009) found that macro factors such as the level of interest rates, industrial activity and performance of other global markets impacted Australian stock market returns. Rjoub, Civcir and Resatoglu (2017) looked at the impact of key macro variables on the share prices of a sample of Turkish banks. The macroeconomic variables money supply and interest rates significantly impacted bank stock prices in Turkey. A similar result was observed by Lucky, Akani and Chukwuemeka (2015) in their study covering 15 listed commercial banks in Nigeria.

D'Apolito and Pacelli, (2017) studied the impact of key balance sheet ratios and macroeconomic factors on

the stock prices of European banks. It was found that European banks stock prices were influenced positively by asset quality, liquidity, and capital ratios of banks. Inflation rates and public borrowing influenced bank stock prices negatively.

Studies looking at the effect of earnings and earnings releases on the stock price performance of banks has been carried out on leasing and insurance companies in Bangladesh (Uddin, 2009), 14 Jordanian Banks (Al-Shubiri, F N, 2010), Malaysian bank (Seetharaman and Raj, 2011), Indian Commercial Banking sector (Srinivasan, 2012), Jordanian Banks listed in Amman Stock exchange (Almumani, 2014), Listed banks in Nigeria (Lucky, Akani and Chukwuemeka, 2015) and a sample of Turkish banks (Rjoub, Civcir and Resatoglu, 2017). They found that earnings, dividend yield, Return on Assets (ROA), Earnings Per Share (EPS) and Price-Earnings (P/E) ratio had a strong impact on the stock prices. Kazi (2009) found that micro factors such as corporate profitability and dividend impacted Australian stock market returns.

On the other hand, Ali and Chowdhury, (2010), found no major impact of dividend declaration on the share prices of a sample of listed Private Commercial Banks (PCBs) in Bangladesh. Menaje (2012) studied the impact of micro variables such as the EPS, cash flow per share, and dividend per share on the share prices of 10 listed banks on the Philippine stock exchange, through a multiple regression framework. This study also found that these variables did not influence bank share prices. Naveed and Ramzan (2013) investigated the micro variables of dividend yield, ROA, asset growth of fifteen banks listed on the Karachi Stock Exchange and found that these variables had an insignificant relationship with share prices. Ghauri (2014) whose study focused on 15 listed banks on the Karachi stock exchange found that key micro variables such as dividend yield and ROA did not have a significant relationship with bank share prices.

Lucky, Akani and Chukwuemeka (2015) examined the impact of varied macro variables such as exchange rate, Real Gross Domestic Product etc. on stock prices of Commercial banks in Nigeria and found a positive and significant relationship between the variables and stock prices. Ibrahim, (2000) looked at the influence of exchange rates on the Malaysian Stock Index. They found virtually no co-integration between the Malaysian stock index benchmark and exchange rates. However, when money supply and reserves were additionally included as variables in multivariate models some co-integration was observed between stock index performance and movement in exchange rates. Uddin (2009) examined the influence of macro-economic variables on the share price performance of leasing and insurance companies in Bangladesh, using a multiple regression framework. The study observed that there was no relationship between share returns and the macroeconomic factors chosen.

Narayan, Narayan and Singh (2014) examined the influence of macroeconomic determinants on Indian bank stock performance through a Panel data model. They found economic activity and currency depreciation resulted in rises in share prices, interest rate increases negatively impacted bank share prices. Ali et al. (2019) used panel data to study the determinants of bank stock prices in Pakistan in the period between January 2005 and December 2013. It was found that share prices rose during booms in economic activity and declined during periods of currency depreciation and interest rate increases.

Arfaoui and Rejeb (2017) studied the interdependencies between oil, gold, US dollar and stock prices using global data for the period 1995-2015 and found that there were significant relationships between the four markets. The US Dollar (USD) and Oil negatively impacted stock returns while oil positively influenced gold and the USD. Coronado, Jimenez-Rodriguez and Rojas (2018) used the Non-linear Granger Causality and examined the interrelationship between Oil, Gold and US stock market returns. The study found that all three markets were interrelated with a change in one market affecting the other two.

Shabbir et al. (2020) investigated the impact of gold and oil prices on stock markets in Pakistan for the period 1991 to 2016. They found gold and oil prices have a significant impact on stock markets and conclude Gold

may serve as a good hedge against inflation. Sheikh et al (2020) looked at the asymmetrical relationship between oil prices, gold prices, exchange rate and stock prices in Pakistan. The study covered the pre (2004-2007) and post-periods (2008-2018) of the global economic crisis in 2008. It suggests that after the global financial crisis, investors reacted mainly to positive shocks in gold prices, interest rates and exchange rates, in the long run, reflecting an asymmetric relationship.

Long et al. (2021) studied the effects of exchange rates and global commodity prices on China's stock prices during the period 2005 to 2020 to identify whether the effect is symmetric or asymmetric. They found that a co-integration relationship exists amongst the variables and global commodity prices have an asymmetric effect on China's stock prices in the long run with stock prices being more sensitive to increases in commodity prices rather than decreases in commodity prices.

Chisti, Shakeel and Ganai (2020) found a significant relationship between the Indian stock market Nifty Index and exchange rates using the co-integration and causality approach. Kafila and Srinivas, (2019) have found long term co-integration between the BSE Sensex and exchange rates. Misra (2018) have demonstrated a long-run causality between the BSE Sensex index in India and interest rates.

Natarajan, Ul Laq, Akram and Sankar (2021) have established a short-run causal relationship between gold and the Indian stock market Nifty index between 2014 and 2016. Kumar, Biswal and Swain (2019) similarly find a short-run causal relationship between gold and the Indian stock market Sensex index. Coronado, Jimenez-Rodriguez and Rojas (2018) used non-linear Granger Causality to establish interrelationships between Gold and US stock market returns.

3. Objectives of the Study

Following a review of existing literature, this study sought to forecast stock prices of listed private sector banks in India. The study has the following objectives:

- To understand the underlying trend of private bank stock prices in India.
- To forecast future values of selected Indian private bank stock prices.

4. Research Methodology

For this study, weekly data of selected bank stock prices for the ten years from January 2011 to December 2020 is considered. This covers 520 different observations for each bank. The data is checked for stationarity using the Augmented Dickey-Fuller test (Dickey and Fuller, 1979). Autoregressive Integrated Moving Average (ARIMA) models (Box and Jenkins, 1970) were used to forecast stock prices. ARIMA models have 3 components p, d and q, where:

p = the no. of autoregressive terms

d = the level of differencing required to make the series stationary and

q = the no of lagged forecast errors

The ARIMA model is given by:

$$\hat{y}t = \mu + \phi_1 y_{t-1} + \ldots + \phi_p y_{t-p} - \theta_1 e_{t-1} - \ldots - \theta_q e_{t-q}$$

Where μ is a constant, ϕ and θ are coefficients of the autoregressive and lagged forecast error components.

The initial values of p and q are obtained by looking at Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) plots. The value of d is obtained from the Augmented Dickey-Fuller test (ADF). Models developed were used to forecast private bank stock prices for 2021. Forecasted values were compared to actual values.

5. Results

This study looked at forecasting stock prices of 5 listed private sector banks in India. Some key metrics of these banks are shown below in Table 1.

Table 1. Private Sector Banks in India considered in the study

Bank	Stock Price	52 Week High	52 Week Low	Market Capitalization
HDFC Bank	1525.95	1725	1342	845,522
ICICI Bank	751.05	867	465.80	521,235
Kotak Mahindra Bank	2035.10	2253	1626	403,613
Axis Bank	679.90	866.90	568.40	208,538
Federal Bank	92.90	107.65	57.30	19,526

Source: Moneyontrol.com, as on: 25.11.2021, Annual Values in 10M Rupees.

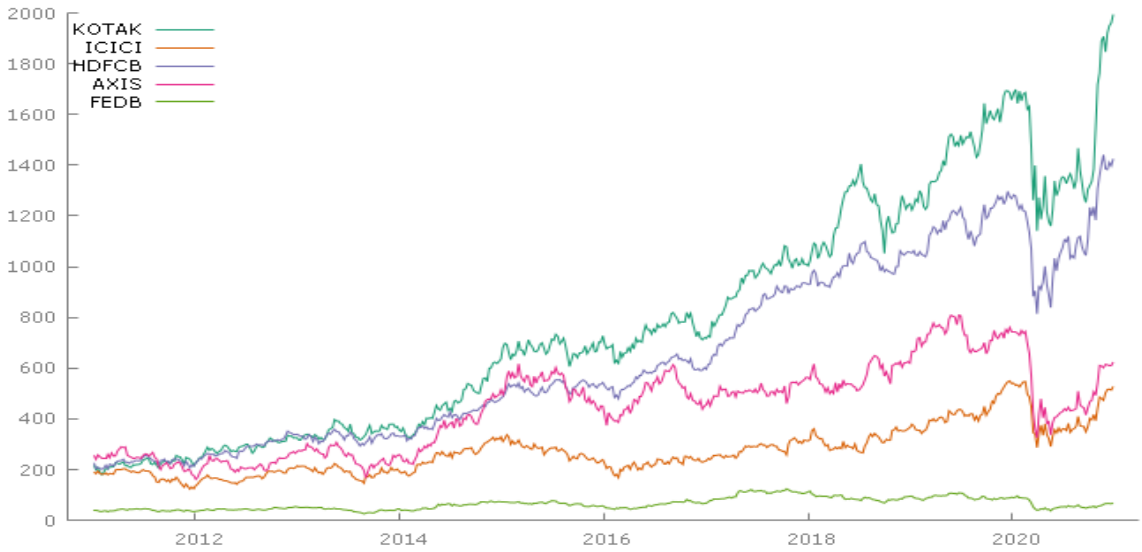

Figure 1. Time series plots of stock prices.
Source: Authors' calculation.

Table 2. Results of the Augmented Dickey-Fuller Test for stationarity

Bank Stock Prices	Test Statistic Chi^2	P Value	Inference
Kotak	0.4823	0.9862	Non-Stationary
ΔKotak	-5.4025	0.0000	Stationary
ICICI	-0.6945	0.8464	Non-Stationary
Δ ICICI	-15.4846	0.0000	Stationary
HDFC	0.3436	0.9805	Non-Stationary
Δ HDFC	-7.2746	0.0000	Stationary
Axis	-1.4838	0.5421	Non-Stationary
Δ Axis	-22.8088	0.0000	Stationary
Federal	-2.0205	0.2781	Non-Stationary
Δ Federal	-13.9641	0.0000	Stationary

Δ = first difference of bank stock price
Source: Authors' calculation.

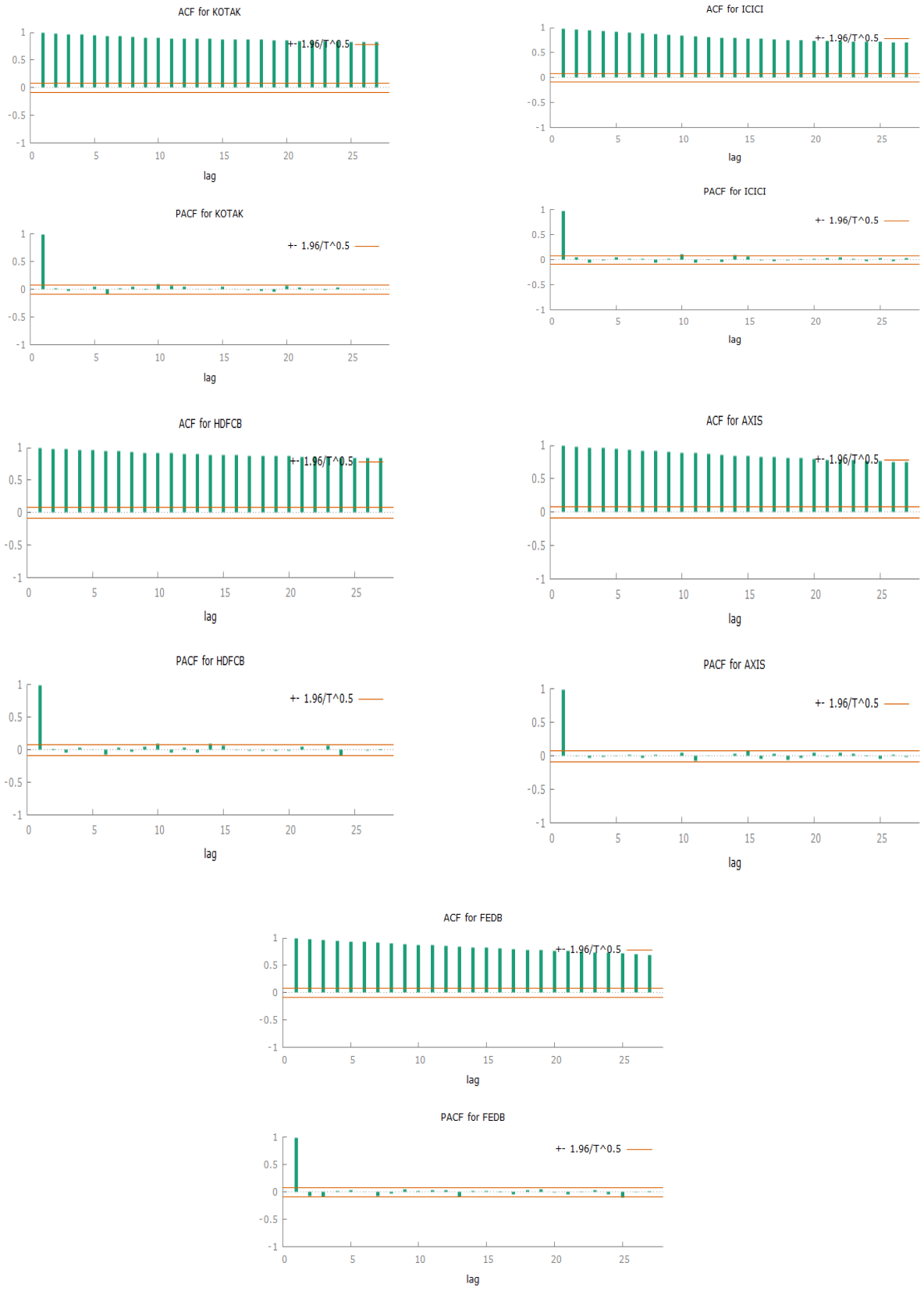

Figure 2. ACF and PACF Plots.
Source: Authors' calculation.

The time series plots of these banks are shown below in Figure 1. Most of the Indian private sector banks considered in the study shows a rising trend over the last 10 years.

The Augmented Dickey-Fuller (ADF) test indicated that stock prices were not stationary however their first differences were stationary. Thus at least an order of differencing is required and the starting value of d in the ARIMA models can be taken as 1.

ACF and PACF plots show a dissipating trend from the first lag observation itself in Figure 2. This suggests that the initial values of p and q may be taken as 1 to commence the ARIMA modelling.

ARIMA models were fit for all banks as shown in Table 3. Models fit were different for different banks. AIC values were used to arrive at the appropriate model. The R^2 values indicate that the models were good fits.

The above ARIMA models were used to forecast private bank stock prices. Forecasted values were compared to actual values in Table 4. The forecast errors namely the Root Mean Square Error (RMSE) and the Mean Absolute Percentage Error (MAPE) was used to validate forecasts.

6. Discussion

In this paper, time series analysis was used to forecast the stock prices of India's leading private sector banks (Table 1). The stock prices of all private banks considered have been trending up over the last 10 years, despite a brief dip during the onset of the COVID-19 pandemic (Figure 1). Time series models require the series analysed to be stationary. This implies that their statistical properties such as the mean and standard deviation must be constant over time. However, Stock prices as checked by the ADF test were not stationary (Table 2). Thus, raw stock price data had to be differenced to make it stationary.

Uni-variate ARIMA models were used to forecast stock prices. These models assume that future prices can be forecast from past data. The appropriate starting values for p and q in the ARIMA models were arrived at by looking at ACF and PACF plots (Figure 2). While ACF plots indicate how well the present values of the series are related to past values, PACF plots focus on the residuals and can help in avoiding multicollinearity issues. The models were further refined by observing AIC values (Table 3).

The models fit varied across banks (Table 3). Forecasts of stock prices were compared to actual values (Table 4). The forecasts generated varied from actual values. The forecast errors RMSE and MAPE confirmed the deviation. Given ARIMA models usually generate trend forecasts any large deviations from the trend as seen in the last week of January 2021 (Table 4) may not be accurately captured in these models.

Interestingly the failure of ARIMA models to accurately forecast future prices could be attributable to market efficiency (Fama, 1970). Forecasting stock prices in efficient markets could rather prove difficult. Additionally, factors other than past prices have been shown to influence stock prices. These include micro factors such as balance sheet ratios (D'Apolito and Pacelli, 2017 and macro-economic variables such as commodity prices (Arfaoui and Rejeb (2017), interest rates (English, Van den Heuvel and Zakrajšek, 2018;

Table 3. Results from ARIMA Modelling

Bank	ARIMA Model (p, d, q)	R^2	AIC
Kotak	2,1,2	0.99	5150
ICICI	2, 1, 2	0.98	4213
HDFC	1, 1, 1	0.99	4745
Axis	1, 1, 1	0.98	4700
Federal	3, 2, 2	0.98	2691

Source: Authors' calculation.

Table 4. Forecasted vs. Actual Values

Bank	Date	Forecast	Actual	Forecast Errors RMSE/MAPE
Kotak	3-01-21	1985.30	1970.70	33.64 / 2.79
Kotak	10-01-21	2005.68	1863.90	
Kotak	17-01-21	1997.96	1828.00	
Kotak	24-01-21	2001.11	1712.95	
Kotak	31-01-21	2014.14	1982.70	
ICICI	3-01-21	535.40	542.05	13.63 / 3.51
ICICI	10-01-21	532.09	543.00	
ICICI	17-01-21	530.70	533.80	
ICICI	24-01-21	537.67	537.00	
ICICI	31-01-21	532.50	614.15	
HDFC	3-01-21	1425.17	1431.65	22.91 / 2.21
HDFC	10-01-21	1428.64	1466.65	
HDFC	17-01-21	1430.31	1443.55	
HDFC	24-01-21	1432.95	1390.50	
HDFC	31-01-21	1435.07	1597.60	
Axis	3-01-21	624.04	672.70	21.83 / 3.68
Axis	10-01-21	625.16	674.85	
Axis	17-01-21	625.50	644.50	
Axis	24-01-21	626.53	662.90	
Axis	31-01-21	626.94	719.60	
Federal	3-01-21	68.02	75.75	3.15 / 3.76
Federal	10-01-21	68.30	73.35	
Federal	17-01-21	68.09	73.30	
Federal	24-01-21	67.99	72.30	
Federal	31-01-21	67.85	83.20	

Source: Authors' calculation.

Narayan, Narayan and Singh, 2014), and exchange rates (Sheikh et al, 2020).

Future studies can be directed in developing multivariate models to improve forecast accuracy. A broad choice of both micro and macro variables that impact stock prices must be considered in these models. This along with past prices, investor behaviour, and sentiment could make forecasting models more robust.

Stock price forecasts can prove beneficial to several key stakeholders of banks. Bank managers can use stock price forecasts to plan any future fundraising requirements via equity issuance. Lenders to banks can use bank stock price forecasts to gauge the financial health of banks. Investors and fund managers can use bank stock price forecasts to aid their investing decisions.

7. Conclusion

This study used time series analysis to forecast the stock prices of listed private sector banks in India. Uni-variate ARIMA models were fit to forecast bank stock prices. Forecasts deviated from actual prices suggesting that factors other than past prices may also influence bank stock prices in relatively efficient markets. Given stock price forecasts can benefit several key stakeholders of banks, it would prove useful to develop models that provide reasonably accurate forecasts. Future studies will be directed at developing multivariate models that include other variables such as bank-specific micro variables and macro variables. This could prove beneficial to several key stakeholders of banks.

8. References

Ali, S, Bashir, T, Ahmed, T, Ishaq, A, and Shahzad, S. J. H. (2018). The Determinants of Bank Stock Prices: A Panel Approach. South Asian Journal of Management Sciences. 12(2):116–29. https://doi.org/10.21621/sajms.2018122.01.

Ali, M.B. and Chowdhury, T.A. (2010). Effect of dividend on stock price in emerging stock market: A study on the listed Private Commercial Banks in DSE. International Journal of Economics and Finance. 2(4):52–64. https://doi.org/10.5539/ijef.v2n4p52.

Al-Shubiri, F. N. (2010). Analysis the determinants of Market price movements: An Empirical study of Jordanian Commercial Banks. International Journal of Business and Management. 5(10):137–47. https://doi.org/10.5539/ijbm.v5n10p137.

Almumani, M. A. (2014). Determinants of Equity share prices of the Listed banks in Amman Stock Exchange: Quantitative Approach. International Journal of Business and Social Science. 5(1):91–104.

Arfaoui, M, and Ben Rejeb, A. (2017). Oil, gold, US dollar and stock market interdependencies: A global analytical insight. European Journal of Management and Business Economics. 26(3):278–93. https://doi.org/10.1108/EJMBE-10-2017-016.

Box, G.E.P, and G. M. Jenkins (1970). Time Series Analysis, Forecasting, and Control. Holden-Day.

Chisti, K. A, Shakeel, S, and Ganai, K. A. (2020). An Analysis of Interaction among Macroeconomic Variables through Cointegration and Causality Approach. Journal of Economics and Business. 3(2):811–24. https://doi.org/10.31014/aior.1992.03.02.239.

Coronado, S, Jimenez-Rodríguez, R, and Rojas, O. (2018). An empirical analysis of the relationships between crude oil, gold and stock markets. Energy Journal. 39:193–207. https://doi.org/10.5547/01956574.39.SI1.scor.

D'Apolito, E, and Pacelli, V. (2017). What influences bank stock prices in times of crisis? An International Survey. International Journal of Economics and Finance. 9(6):1. https://doi.org/10.5539/ijef.v9n6p1.

Dickey, D. A, and Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association. 74:427–31. https://doi.org/10.1080/01621459.1979.10482531.

Dornbusch, R, and S. Fischer. (1980). Exchange rate and the current account. American Economic Review. 70(5):960–71.

Eita, J. H. (2012). Modelling macroeconomic determinants of stock market prices: Evidence from Namibia. Journal of Applied Business Research. 28(5): 871–84. https://doi.org/10.19030/jabr.v28i5.7230.

English, W. B, Van den Heuvel, S. J, and Zakrajšek, E. (2018). Interest rate risk and bank equity valuations. Journal of Monetary Economics. 98:80–97. https://doi.org/10.1016/j.jmoneco.2018.04.010.

Enke, D, Grauer, M, and Mehdiyev, N. (2011). Stock market prediction with Multiple Regression, Fuzzy type-2 clustering and neural networks. Procedia Computer Science. 6:201–6. https://doi.org/10.1016/j.procs.2011.08.038.

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. Journal of Finance. 25(2):383–417. https://doi.org/10.2307/2325486.

Fama, E. F. (1981). Stock returns, real activity, inflation and money. American Economic Review. 71(4):545–565.

Fisher, I. (1930). The theory of interest. New York: Macmillan. p. 21–7.

Ghauri, S. M. K. (2014). Determinants of changes in share prices in banking sector of Pakistan. Journal of Economic and Administrative Sciences. 30(2):121–30. https://doi.org/10.1108/JEAS-05-2013-0014.

Hassan, M. R, Nath, B, and Kirley, M. (2007). A fusion model of HMM, ANN and GA for stock market forecasting. Expert Systems with Applications. 33(1):171–80. https://doi.org/10.1016/j.eswa.2006.04.007.

Ibrahim, M. H. (2000). Cointegration and granger causality tests of stock price and exchange rate interactions in Malaysia. Asian Economics Bulletin. 17(1):36–47. https://doi.org/10.1355/AE17-1D.

Kafila, and Vijaya Srinivas, R. (2019). Co-integration analysis between international macroeconomic factors and S and P sensex movements. International Journal of Innovative Technology and Exploring Engineering. 8(11):3849–59. https://doi.org/10.35940/ijitee.K2304.0981119.

Kazi, M. H. (2009). An application of co-integration technique for detecting influential risk factors of the Australian stock market. International Research Journal of Finance and Economics. 1(25):78–89.

Kumar, A, Biswal, S. K, and Swain, P. K. (2019). A dynamic association between stock markets. Forex, gold and oil prices in Indian context. Espacios. 40(6).

Long, S, Zhang, M, Li, K, and Wu, S. (2021). Do the RMB exchange rate and global commodity prices have asymmetric or symmetric effects on China's stock prices? Financial Innovation. 7:48. https://doi.org/10.1186/s40854-021-00262-0.

Lucky, A. L, Akani, H. W, and Chukwuemeka, A. (2015). Prudential determinants of stock prices of Commercial Banks in Nigeria: An application of fundamentalists and macroeconomic view. 1980-2014. ILARD International Journal of Banking and Finance Research. 1(8):84–109.

Menaje, P. M. (2012). Impact of selected financial variables on share price of publicly listed firms in the Philippines. American International Journal of Contemporary Research. 2(9):98–104.

Misra, P. (2018). An investigation of the macroeconomic factors affecting the Indian stock market. Australasian Accounting, Business and Finance Journal. 12(2):71–86. https://doi.org/10.14453/aabfj.v12i2.5.

Natarajan, V. K, UL Haq, M. A, Akram, F, and Sankar, J. P. (2021). Dynamic relationship between stock index and asset prices: A long-run analysis. Journal of Asian Finance, Economics and Business. 8(4):601–11.

Narayan, P. K, Narayan, S, and Singh, H. (2014). The determinants of stock prices: New evidence from the Indian Banking Sector. Emerging Markets Finance and Trade. 50(2):5–15. https://doi.org/10.2753/REE1540-496X500201.

Naveed, M.Y. and Ramzan, M. (2013). A view about the determinants of change in share prices: A case from Karachi stock exchange (Banking sector). Interdisciplinary Journal of Contemporary Research in Business. 4(12):41–57.

Pasiouras, F, Liadaki, A, and Zopounidis, C. (2008). Bank efficiency and share performance: Evidence from Greece. Applied Financial Economics. 18(14):1121–30. https://doi.org/10.1080/09603100701564346.

Rjoub, H, Civcir, I., and Resatoglu, N. G. (2017). Micro and macroeconomic determinants of stock prices: The case of Turkish banking sector. Romanian Journal of Economic Forecasting. 20(1):150–66.

Seetharaman, A, and Raj, J. R. (2011). An empirical study on the impact of earnings per share on stock prices of a listed bank in Malaysia. The International Journal of Applied Economics and Finance. 5(2):114–26. https://doi.org/10.3923/ijaef.2011.114.126.

Shabbir, A, Kousar, Sa, and Batool, S. A. (2020). Impact of gold and oil prices on the stock market in Pakistan. Journal of Economics, Finance and Administrative Science. 25(50):279–94. https://doi.org/10.1108/JEFAS-04-2019-0053.

Sheikh, U. A, Asad, M, Ahmed, Z, and Mukhtar, U. (2020). Asymmetrical relationship between oil prices, gold prices, exchange rate and stock prices during global financial crisis 2008: Evidence from Pakistan. Cogent Economics and Finance. 8(1):1757802. https://doi.org/10.1080/23322039.2020.1757802.

Srinivasan, P. (2012). Determinants of equity share prices in India: A panel data approach. The Romanian Economic Journal. 15(45):205–28.

Tobin, J. (1969). A general equilibrium approach to monetary theory. Journal of Money, Credit and Banking. 1(1):15–29. https://doi.org/10.2307/1991374.

Uddin, M. B. (2009). Determinants of market price of stock: A study on bank leasing and insurance companies of Bangladesh. Journal of Modern Accounting and Auditing. 5(7):1–7.