INTERNATIONAL BLACK SEA UNIVVERSITY

FACULTY OF BUSINESS MANAGEMENT

COMBINING FORECASTING METHOD FOR ISTANBUL STOCK EXCHANGE NATIONAL 100 INDEX (XU100)

Ahmet Sekreter

Ph.D Dissertation in Business Administration

Tbilisi, 2014

Scientific Supervisory: Assoc.Prof.Dr. Giorgi Bagaturia……

Experts

1. Assoc.Prof.Dr. Victoria Baramidze……..

2. Assoc.Prof.Dr. Sophio Khundadze……..

3. Assoc.Prof.Dr. Tea Kbiltsetskhlasvili…….

Opponents

1. Prof.Dr. Maya Gonashvili…….

2. Prof.Dr. Kartlos Kachiashvili……

ABSTRACT

Forecasting is the process that helping management in risk and uncertainty for the statements which have not yet been observed. Forecasting is widely used in finance, business, and economics. Forecasting is also very important for stock markets since it defines the amount of the profit.

Traded annual value of Istanbul Stock Exchange was 6 US $ billion in 1990 and it reached the value of 300 US $ billion in 2010. The success of Istanbul Stock Exchange increases the importance of the forecasting techniques that produce more accurate forecasts.

The forecasting models are defined as quantitative and qualitative models. Qualitative forecasting methods are based on human judgment and opinions. Qualitative methods are preferable when there is insufficient data to make forecast. Qualitative forecasting methods can capture some nuances that very simple or very complex quantitative forecasting methods may not capture. These types of methods can improve forecasting accuracy by using the flexibility that owns in its nature. On the other hand these methods can bias the forecast and increase the forecast error. Time series forecasting models and associative (causal) forecasting models are two main types of the quantitative forecasting models. Time series forecasting models are more preferable for the forecasting of stock markets. There are more than 60 different techniques that can be considered as time series forecasting. The selection of the best model aims to increase the forecasting accuracy. Since there are many different individual forecasting methods, it is not easy to define and select the best model in advance. There is also ambiguity of the existence of the best separate model ambiguity of the existence of the best individual forecasting model.

Combining forecasting is another method to make forecast. It is based on the idea that combination of some individual forecasting methods may produce better forecasting accuracy. Research shows that combining forecasting has potential to increase the forecast accuracy. This study proves that combining forecasting method increases the forecast accuracy by applying some stages to the process of forecasting. It also shows the most effective way to combine the individual forecasting methods. The methodology is based on the mixed methods that quantitative and qualitative. Combining method is used to perform the daily Istanbul Stock Exchange National 100 index (ISE100) historical data between the time period of 2006 and 2012. Time series forecasting methods are used to make forecast after adjusting the sample size. Forecasting performance for each individual method is calculated by using error measurement techniques. The nine forecasting methods are chosen and ranked according to their forecasting performance. In the next stage these models are combined by choosing 2, 3, 4, 5, 6, 7, and 8 models. The number of combination is over 500. All these combinations are evaluated by using the error measurement that used for individual forecasting method. The combination of the models till this phase is based on only quantitative approach. The next phase includes qualitative approach. The opinions and judgment of the analyst is included into the combination process. These opinions and judgment are based on the observation and conclusion derived from the real data therefore combination process is modified by quantitative and qualitative methods. One

main objective of this study is to increase forecast accuracy for ISE100 daily index by combining individual forecasting methods and specify the appropriate way for effective combination.

The contribution of combining forecasting method for better forecasting accuracy has been shown by using the data of daily ISE100 index between the period of 2006 and 2012 in this study. Combining quantitative methods has decreased the forecast error however the best forecast accuracy has been achieved by involving judgmental forecast in the process of combination. However the study encountered a number of limitations that need to be considered. Combining forecasting method failed to gain accuracy in forecasting index movement direction. The forecast accuracy was not affected by the combining method. The results show that ARIMA models outperform all other individual forecasting methods in this study. The combinations which produce better forecasting results involve at least two ARIMA models. The empirical study clearly demonstrates the superiority of ARIMA models. Armstrong (1989) suggested using the methods that differ substantially from one another with respect to the data used and he suggested (2001) using at least five different individual forecasting methods, Makridakis and Winkler (1983) achieved the best forecasting accuracy by combining five methods. However combining different methods that are completely different type of forecasting methods failed in producing gains in accuracy in this study, furthermore combining four methods with adding judgmental forecast produced the best forecasting accuracy.

Evidence based study shows that the theory of this has three implications. First, since the real data are used findings have showed the practical importance of the theoretical part of the thesis. Second, this evidence based study also shows that there is a possibility of improving forecasting accuracy by combining forecasting method. Third, if quantitative approach of forecasting is modified by qualitative approach the chance of achieving better forecast accuracy increases. This study encourages the researchers to focus on combining forecasting method that includes quantitative and qualitative approach to make forecast not only stock indices but also stock prices, financial, and economical forecasting.

INTRODUCTION

Subject of the Study

The Istanbul Stock Exchange was established at the end of 1985 and it was opened in early 1986. The Istanbul Stock Exchange National 100 Index (ISE100 or XU100) is composed of National Market companies except investment trusts. The companies that included in the index are selected on the basis of pre-determined criteria. Subject of the study is the application of the combining forecasting method for the daily Istanbul Stock Exchange National 100 Index.

Background of the Problem

Forecasting in finance is the process of the prediction of future business activities. Forecasting is important for business institutions since it helps to improve effectiveness and it helps to adjust unexpected changes in business environment. A successful forecasting of stock market could yield a significant profit furthermore a successful forecasting can limit the risks and it can prevent investors from unpredictable future price movements therefore forecasting stock prices is becoming very important for financial analysts and researchers in financial field. However there are two completely opposite theorem about predictability of stock prices. According to efficient-market hypothesis the stock prices follow a random pattern that is random walk hypothesis. On the other hand the other theorem suggests that the stock prices are predictable using some methods. The history of predicting stock prices or returns is probably as old as the markets themselves. Markowitz's Portfolio Selection (1952) is milestone for the predictability of stock returns or prices. Markowitz suggested a mathematical model based on some assumptions. Although some assumptions like 'no taxes', 'information is available for everybody and it is costless', 'no transaction cost' do not exist in real world, the tools developed by him allow to measure the risk and return. His formula stated a linear relationship between return and risk. After Markowitz Sharpe, Lintner, and Mossin independently developed Capital Asset Pricing Theory (CAPM) based on Markowitz Portfolio Theory in 1964, 1965, and 1966 respectively. CAPM claimed that there is a linear relation between expected return and beta (covariance of rate of a stock return and market return divided by variance of market return).

Ross (1976) introduced Arbitrage Pricing Theory (APT) instead of extending the CAPM. Although the Capital Asset Pricing Model has only one explanatory variable which is beta Arbitrage Pricing Theory is defined as a model which is a linear function of various factors. Merton (1973) introduced intertemporal capital asset pricing model (ICAPM). Fama and French (1993) found that the two classes of stocks are better than the others. The value stocks have provided much better return than growth stocks that is stocks which have high book to market ratio and the small stocks have provided much better than large stocks in the market as a whole. Fama-French 3 factor model was introduced by adding these two factors. Forecasting methods are separated into two main groups as qualitative forecasting methods and quantitative forecasting methods. Quantitative forecasting methods are based on mathematical modeling. Quantitative forecasting methods can also be separated into two main groups as time series models and associative (causal) models. Asset pricing models are based on associative forecasting models. CAPM and ICAPM have only one explanatory factor, Fama-French model has three factors to explain the stocks prices movement. APT has n number of factors however the number of the factors and the identification of these factors are not specified in the model. Haznedaroglu and Tas (2010) searched the effects macroeconomic variables such as national gross product, industrial production index, and etc and the financial data like interest rate and exchange rates on the predictability of Istanbul Stock Exchange National 100 index. They concluded the fact that there are too many variables-including meteorological and astronomical variables- that affecting Istanbul Stock Exchange National 100 index. Tursoy, Gunsel, and Rjoub (2008) examined the Arbitrage Pricing Theory in Istanbul Stock Exchange Market empirically during the period of February 2001 and September 2005. Tursoy and et al. concluded that the results of the empirical tests showed that there was no significant pricing relation between the stock return and the tested macroeconomic variables. On the other hand time series forecasting methods assume that the future will follow the similar pattern as the past. Therefore time series forecasting methods are based on the historical data to make forecast for future outcomes. Moving average, exponential smoothing, autoregressive (AR) models, autoregressive moving average (ARMA) models, autoregressive integrated moving average (ARIMA) models, and autoregressive conditional heteroskedasticity (ARCH) type models are some types of time series forecasting methods. There are more than 60 different techniques that can be considered as time series forecasting (Time Series Forecasting Techniques, http://www.sagepub.com/upm-

data/4913_Mentzer_Chapter_3_Time_Series_Forcasting_Techniques.pdf). Qualitative forecasting methods are another alternative way to make financial forecasting. These methods are based on human judgment and opinions. Qualitative methods are preferable when there is insufficient data to make forecast. Qualitative forecasting methods can capture some nuances that very simple or very complex quantitative forecasting methods may not capture. Qualitative methods can improve forecasting accuracy by using the flexibility that owns in its nature. On the other hand these methods can bias the forecast and increase the forecast error. Both time series forecasting methods as quantitative methods and qualitative methods have been used to make forecast for Istanbul Stock Market. From the simplest to very complicate forecasting methods were applied to make forecast. Asarkaya (2010) used eight different models; random walk, historical mean, exponential smoothing, ARCH(1,1), GARCH(1,1), EGARCH(1,1), APARCH(1,1) and GJR-GARCH(1,1) to forecast weekly volatility of Istanbul Stock Exchange 100 Index between 2002 and 2008 and concluded that exponential smoothing which was not the most complicated method had the best forecasting accuracy. Yumlu, Gurgen, and Okay (2004) used mixture of experts and they stated that in short term Mixture of Experts model was observed as a more powerful forecasting method.

Statement of the Problem

Asset pricing models are based on associative (causal) models. These models showed poor forecasting performance (Simin, 2008). The associative models try to explore cause-and-effect relationship and use decided indicators to make forecast. Since there are too many factors that affecting stock markets, asset pricing models have poor forecasting performance therefore these models are not preferable to make forecast for stock markets. Time series forecasting methods as quantitative methods have been used instead of asset pricing models for the purpose of prediction of future stock markets movements. There are more than sixty different time series methods. Qualitative methods have also been used in this field of forecasting. Smith and Ryoo (2003) used multiple variance ratio test to investigate the behavior of the ISE100 index movements. Balaban (1995), Cevik and Yalcin (2003), Tas and Dursunoglu (2005), Yavuz and Kiran (2010) studied on randomness of ISE market. Tursoy,, Gunsel andRjoub (2008) and Haznedaroglu and Tas (2010) examined the cause-effect model for ISE market. Ok, Atak and Akcayol (2011) and

Aygoren, Saritas and Morali (2012) used very complex forecasting methods but results indicated that these methods produced less forecasting accuracy. Yumlu, Gurgen and Okay (2004) used mixture of expert method and some other quantitative forecasting methods and they found that forecasting performance differed. Asarkaya (2010) used eight different forecasting methods for forecasting of ISE 100 index.

The methods that used in this study are already found and applied for many years for stock market forecasting. However there is a gap in the knowledge about stock market forecasting because of the ambiguity of the existence of the best separate model and the selection of the best separate model.

Purpose of the Study

Istanbul Stock Exchange National 100 index will be forecasted by using combination of both quantitative and qualitative methods. Superiority of combination method to the separate forecasting methods will be shown by using forecast performance evaluation. Research design is based on using mixed methods. One-step ahead in-sample forecasting will be applied to make forecast of Istanbul Stock Exchange National 100 Index for the period of 2006 and 2012.

Importance of the Study

A better forecasting accuracy helps the investors and managers to provide relevant and reliable information about present and future events in stock market. Important decisions can be given confidently by managers if forecasting provides information about the potential future events and their consequences for possible stock market movements. A better forecasting method reduces the level of uncertainty for the investors and managers. Traded value in Istanbul Stock Exchange per year is around 300 billion US dollar in the last years so even 0.01% changes in the accuracy means a lot for the investors, managers, and financial analysts.

Motivation, Primary Research Questions and Hypothesis

It is known that forecasting is very important in economics and finance but what is the best method to make forecast? Deciphering the best forecasting method is not an easy task. The

process of the selection the best forecasting method in advance is not possible in most cases. Rather than trying to make forecasting by a single method, combining forecasting by using separate models can be taken into consideration to make forecast.

Can the combination of different forecasting models produce a better forecasting accuracy than the separate models? This is the primary research question in the study. How to combine separate models and which models to combine are the other research questions in the study. Can involving judgmental method in combination method help to increase forecast accuracy? Combining method instead of forecasting using separate models increases the forecast accuracy for forecasting Istanbul Stock Exchange National 100 index is the hypothesis of the study.

Research Design and Theoretical Framework

The subjects of the quantitative and qualitative study in this paper are the historical daily Istanbul Stock Exchange National 100 Index (ISE100). The sample that is taken for the study is the period of 2006 and 2012. Research is based on combination of the quantitative and qualitative research methods which is called mixed method. The procedure that will be followed as theoretical framework is started by applying quantitative methods to ISE100 between the period of 2006 and 2012. The behavior of the ISE100 index movements will be investigated by using unit root and variance ratio test. Although the forecasting methods are based on time series methods why the associative (causal) forecasting methods are not preferable will be explained very briefly. Simple moving average, exponential smoothing, autoregressive models, autoregressive moving average models, autoregressive integrated moving average models, and autoregressive conditional heteroskedasticity type models will be applied to make forecast as an application of separate models. Forecast accuracy will be evaluated by using mean error, mean absolute error, mean absolute percentage error, and mean squared error. New forecasts will be generated by using combined methods that including both quantitative and qualitative methods. These results will be compared by forecasts that generated by separate models. In the conclusion part these results will be analyzed and superiority of the combining forecasting method to the other separate models will be shown. This study includes both theoretical and practical research.

CONCLUSION

The study has developed the combining method of forecasting. The method was used to form combining method for forecasting the daily Istanbul Stock Exchange National 100 index. Research was based on setting out to investigate performance of the combining method and comparing with separate models. Istanbul Stock Exchange was founded on Dec. 26, 1985 and began operating on Jan., 1986. The number of companies traded in ISE was 40 at that time and daily trading volume was 50 thousand USD. According to the 2011 year-end data, there were 359 companies and the economic value of the ISE was around 307 billion USD. SPK (Capital Markets Board in Turkey) plans to prepare joint projects in order to increase the economic value of 500 billion USD. Therefore the improvements in the forecasting accuracy are very important for the investors, managers, and financial analysts. The reasons and motivation for applying combining forecasting method were ambiguity of the existence of the best single method and difficulties of selecting one best model in advance. The practical and theoretical literature on the subject of combining method that is applied to Istanbul Stock Exchange is insufficient. The study investigated to answer these questions:

1. Does the combination of different forecasting models produce a better forecasting performance than the single forecasting methods for ISE 100 index?

2. How should be the separate models combined?

Empirical Findings

The empirical findings are summarized within the empirical results chapter to answer the study's research questions.

The beginning stage of the empirical results obtained from the quantitative methods. Quantitative methods are divided into groups as associative (causal) models and time series models. Causal models were not used to make forecast in the study. The reasons were stated in the chapter of empirical results as follow:

First of all, there were many factors that affecting the index value of ISE (Haznedaroglu and Tas, 2010). The huge number of factors made the causal models unsuitable for forecasting. Secondly, the direction of the impact of the factors to the ISE100 index could be changed over time. For

example, it was shown that USD/TL currency rate affected the index value of ISE in different ways when two different time intervals were taken. Because of these reasons time series models were used and the associative models were not used in the study. Smoothing techniques, Box-Jenkins method, and ARCH-types forecasting models were analyzed. After that eight different time series models and Naïve model were chosen to perform to make forecast ISE100 index. ME was used to report whether errors tended to be disproportionally positive or negative. As it was seen in the Empirical Results Chapter, MAE and MAPE of the individual forecasting methods and the models that formed by the combination of the individual methods were very close to each other. Since MSE is more sensitive to changes in errors, MSE is used to compare the forecasts performance of the individual forecasting methods and combining forecasting methods in the final stage of the research. The forecast accuracy was calculated by using MSE and according to MSE the following ranking was recorded. MSE is commonly used to measure forecasting performance and to compare the skills of different forecasting methods (Stewart, 1994).

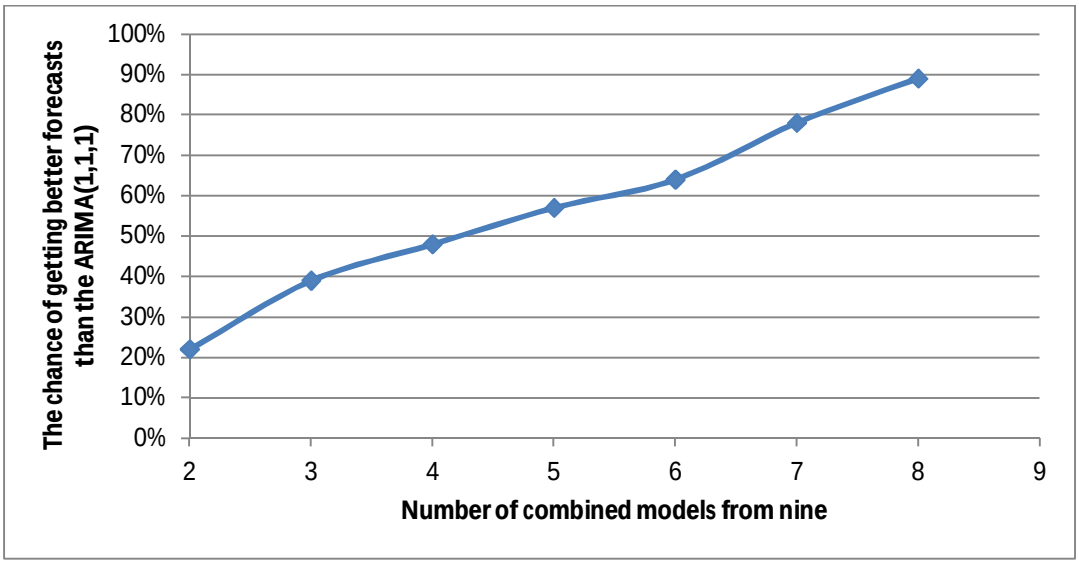
Table 1: The ranking of the forecasting models by using MSE

Model Name				
ARIMA(1,1,1)	ARIMA(0,1,1)	ARIMA(1,1,0)	GARCH(1,1)	EGARCH(1,1)
NAÏVE	GARCH(var)(1,1)	GARCH(std)(1,1)	GARCH(log(var))(1,1)	

The best model ARIMA(1,1,1) was reported and its MSE was calculated as 685324 for the adjusted data set of ISE100 in the study. In the next stage different combinations were formed and their forecast accuracies were evaluated. Combinations of the models with containing 2, 3, 4, 5, 6, 7, 8 and 9 models were formed. . The number of the combinations that formed from single forecasting method was more than five hundred. MSE of these models were calculated and reported to compare their forecast accuracies. The findings from empirical results can be summarized as follow:

As the number of the models in the combination increased the percentage of the chance of getting a better forecast than the best single forecasting method which was ARIMA(1,1,1).

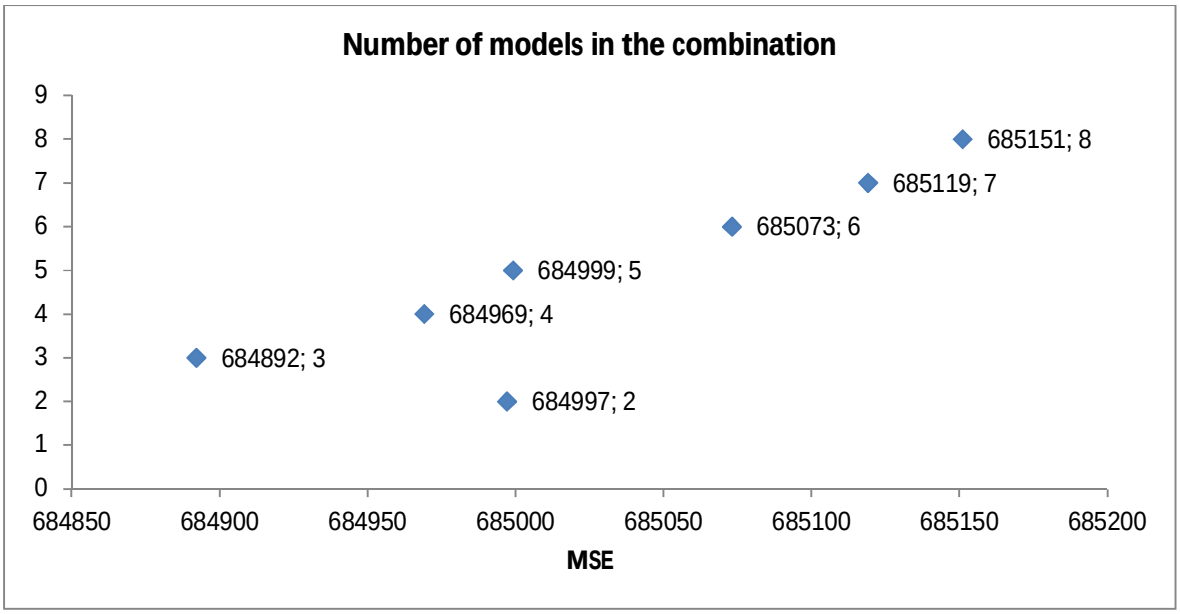
Figure 1: Comparing the number of models that combined in the combinations and the chance of having better forecasts than ARIMA(1,1,1)



The linear relationship was reported between the number of models that combined in the combinations and the chance of having better forecasts than ARIMA(1,1,1). Another analysis performed to understand the possible relationship between the best results in the models and the number of models that combined in the combinations. The results showed that combination of three models had the smallest MSE. Combination of four, two, and five models ordered as having the least amount of MSE after combination of three models respectively. There was no linear relationship between the number of models that combined in the combinations and the best forecast accuracy in the models.

There was a plenty of literature about forecasting by combining however the number of models in the combinations were not analyzed in the most of the studies. Armstrong (2001) suggested using five or more single forecasting methods for combining in the combinations to improve forecasting accuracy in his article. He stated also adding more and more methods might result in diminishing rates of improvement.

Figure 2: Number of models in the combination and MSE



The examination of the relationship between the number of models in the combination and the improvement of forecasting accuracy differs according to direction of the analysis. If getting the higher chance of the better forecasting than the best single forecasting models among the individual methods was aimed, adding more models increased the possibility. However if getting the best forecasting accuracy from the different combinations was aimed, the study showed there was no relationship between the number of models in the combinations and best forecasting results with respect to the MSE.

The superiority of the ARIMA models was observed in the empirical results. The forecasting performance evaluation tests showed that in all combinations two of three ARIMA models were included.

Table 2: The models that produced the least MSE

Number of models in the combination	Combination that produced the least MSE
2	ARIMA(1,1,1), ARIMA(0,1,1)
3	ARIMA(1,1,1), ARIMA(0,1,1), and GRACH(log(var))

4	ARIMA(1,1,1), ARIMA(0,1,1), EGARCH(1,1), and GRACH(log(var))
5	ARIMA(1,1,1), ARIMA(0,1,1), ARIMA(1,1,0), EGARCH(1,1), and GARCH(log(var))
6	ARIMA(1,1,1), ARIMA(0,1,1), ARIMA(1,1,0), GARCH(1,1), EGARCH(1,1), and GARCH(log(var))
7	ARIMA(1,1,1), ARIMA(0,1,1), ARIMA(1,1,0), GARCH(1,1), EGARCH(1,1), GARCH(std), and GARCH(log(var))
8	ARIMA(1,1,1), ARIMA(0,1,1), ARIMA(1,1,0), Naïve, GARCH(1,1), EGARCH(1,1), GARCH(std), and GARCH(log(var))

ARIMA models were chosen to combine in the other stage of the research. These models were combined by finding their simple mean and by assigning different weights which were calculated by regression to the models. It was found that the combining ARIMA models in both ways produced less error than the best single forecasting method. It was also found that the combining by assigning different weights had better forecasting accuracy than the combining by simple mean.

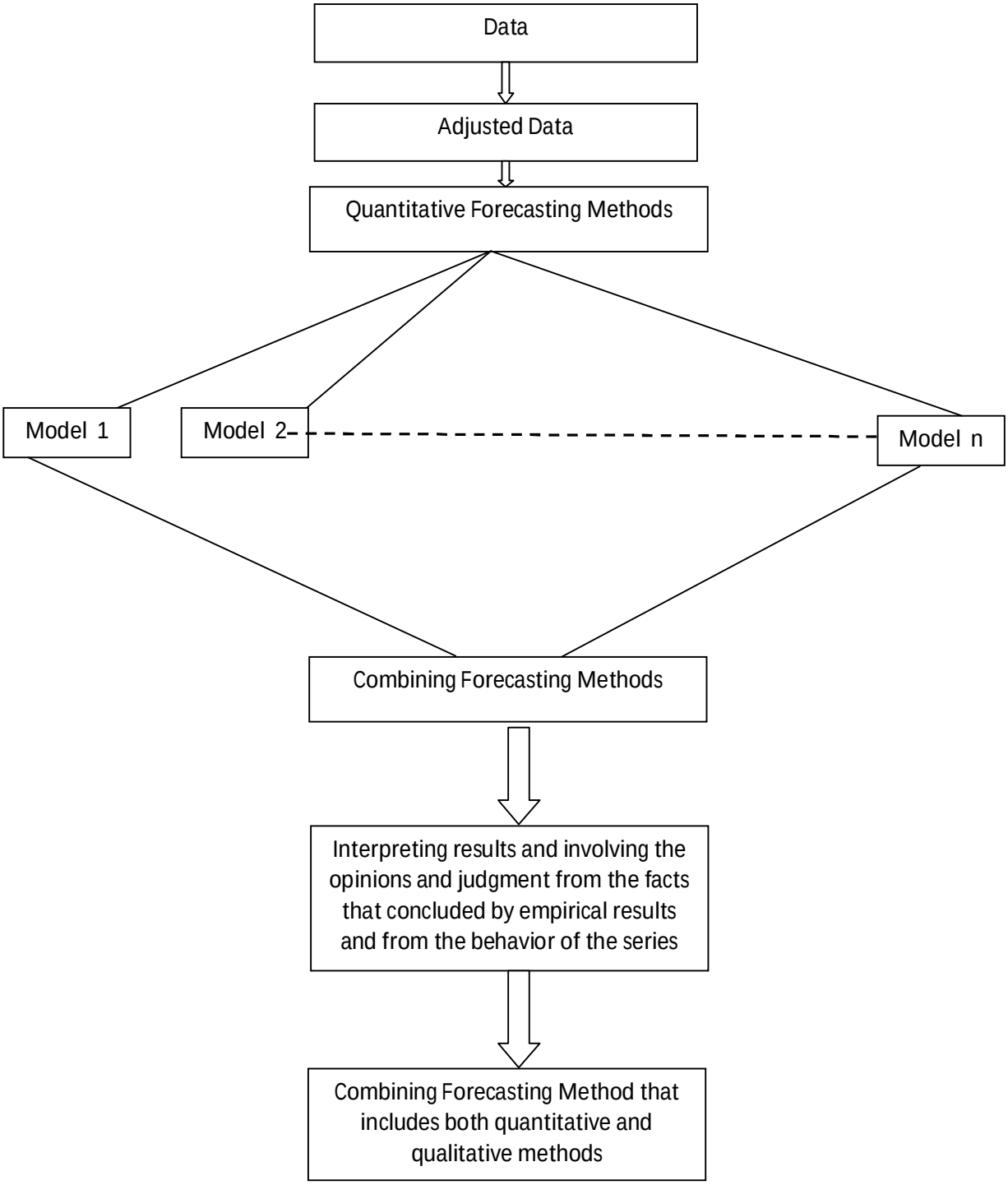
Table 3: Comparison of the combining ARIMA models with simple mean and different weights

Combination method	MSE
Simple mean	685057
Regression	684946

Combining forecasting method increased the accuracy of forecasting. This conclusion was supported by literature review in this field. Literature review consists of many empirical studies that support this hypothesis. This study also showed this general assumption by empirical results. However literature review consists of only the studies that formed by combining forecasting using only quantitative methods or only qualitative methods. The judgment and opinion of the analyst were added to the process of forecasting by combining in this study. Therefore combining by only quantitative methods and combining by quantitative methods together with

qualitative methods were used to make forecast in this study. These empirical results were analyzed and examined. The opinion and judgment of the analyst were based on the facts which were reached by empirical results.

Figure 3: The process of combination



The superiority of the ARIMA models was observed and it was seen that at least two ARIMA models were part of the best combined models that produced the least MSE. It was also observed that ARIMA models produced over-forecast and GARCH type models produced under-forecast. Eight best combined models were listed above and GARCH(log(var)) was in the six best combined models. Another observation is about the behavior of the index. The behavior of the index showed that the shocks tended to continue. It was observed that an increase was followed by another increase and a decrease was followed by another decrease. Approximately 30 different combinations were formed that contained ARIMA models and GARCH(log(var)). These models were combined by taking their simple and by assigning different weights. Weights of the models were calculated by regression analysis. 0.5%, 1.0%, and 1.5% of the previous day's shock was added to the combination that produced the least error. The forecasting accuracy was calculated by each combined model. 1.34*ARIMA(1,1,1)-1.23*ARIMA(1,1,0)+0.51*ARIMA(0,1,1)+0.38*GARCH(var) is the best combined model with the MSE as 684849 in this study. 0.5, 1.0, and 1.5 percent of the shock is added to the model. The results are reported in the following table by using MSE.

Table 4: MSE after adding the shock of the previous day

Percentage of the shock added to the model	MSE	ME	MAPE	MAE
0.5	684797			
1.0	684779	-3.6	0.01	623.08
1.5	684796			

The model that formed by adding the 1.0% of the previous day's shock produced the less forecasting error and it was achieved the least forecasting error by this model. Combining forecasting model that formed by using quantitative methods produced better result than individual forecasting models and by using opinion and judgment that are qualitative methods together with quantitative methods in the combination process the forecasting accuracy was improved.

Theoretical implication

The theoretical approaches for combining forecasting should be revisited for further understanding how the forecast accuracy can be substantially improved by combining the multiple separate forecasting methods. The theoretical framework of combining forecasting method implicitly assumes that different forecasting methods may capture different aspects of the information of the series. Therefore combination of the individual forecasting methods may produce better forecasting accuracy than the separate forecasting models. Armstrong (2001) suggested using at least five forecasting methods when possible. He indicated that Makridakis and Winkler (1983) achieved the least error when they combined five methods. He also stated that adding more methods leaded to reduction in forecast accuracy. It is however noted that from this study that such a relationship between number of forecasting methods and forecasting accuracy depends on parameters that are compared. This relationship is consistent when the chance of getting less forecasting accuracy than the best individual best forecasting method and the number of forecasting methods are compared. However the study showed that this pattern contradicted that of Makridakis and Winkler (1983). This study showed that achieving the best forecasting accuracy and better forecasting accuracy than the best individual forecasting method had different relationships with the number of the models that combined. Therefore theoretical approaches should diversify for constructing the theory of combining forecasting method.

Recommendation for Future Research

This study like many others demonstrated that combining forecasting method produced gains in accuracy. However statistical analyses were performed to define the conditions under which combining method produces more accurate results and how methods should be combined for desired results in this study. The theory to explain the success of the combining forecasting method is stated implicitly that different individual forecasting methods use different sets of assumptions and information, and each individual forecasting method contains some incomplete parts of the sets of information about the behavior of the series, and assembling these methods contributes the completing the missing parts of the sets of information. Armstrong (1989) suggested using the methods that differ substantially from one another with respect to the data used and he suggested (2001) using at least five different individual forecasting methods, Makridakis and Winkler (1983) achieved the best forecasting accuracy by combining five

methods. However combining different methods that are completely different type of forecasting methods failed in producing gains in accuracy in this study, furthermore combining four methods with adding judgmental forecast produced the best forecasting accuracy. These contradictions and differences not only in this study but also among the empirical studies indicate that case studies should be considered individually and the theory of combining forecasting method should be constructed for each case since the individual forecasting methods' incomplete information in datasets differ in the forecasted the series. Therefore there is need for more case studies for establishing theory of combining forecasting. Exploring the theory of the success of the combining forecasting in gaining forecasting accuracy will help the forming the best combination.

Limitation of the study

The study has offered an important perspective on improving the forecasting accuracy through the combining forecasting method, and was conducted in a theoretical approach in the field through evidence base study.

However the study encountered a number of limitations that need to be considered. Combining forecasting method failed to gain accuracy in forecasting index movement direction. The forecast accuracy was not affected by the combining method. Furthermore the study did not state an explicit theory to explain why the combining forecasting method did not work to gain forecasting accuracy in the forecasting of index movement direction.

Summary

A successful forecasting of stock market could yield a significant profit. A better forecasting accuracy can limit the risks and it can prevent investors from unpredictable future price changes. Traded value in Istanbul Stock Exchange per year is around 300 billion US dollar in the last years therefore studies on gaining forecast accuracy are very important for investors and analysts. The contribution of combining forecasting method for better forecasting accuracy has been shown by concrete empirical results in this study. Combining quantitative methods has decreased the forecast error however the best forecast accuracy has been achieved by involving judgmental forecast in the process of combination. Forecast accuracy for forecasting Istanbul Stock Exchange National 100 index has been gained by using combining forecasting method that formed by applying mixed methods.

- **List of the Author's Publications**

(The Publications appears in SCI, SCI Exp., SSCI and AHCI are shown with *)

I. Journals (*From recent to past*)

- Nurullah Soyhan, Nuran Ilkkutlu, **Ahmet Sekreter**, Dimensioning the Quality of Health Care Services (Karabuk State Hospital Service Quality Dimensions as an Example of Measurement Application), Ibsu Journal of Business, Vol 2, No 1, 2013, pp. 39-44
- Faruk Gursoy, **Ahmet Sekreter**, Huseyin Kalyoncu, FDI and Economic Growth Relationship Based on Cross-Country Comparison, International Journal of Economics and Financial Issues, Vol 3, No 2, 2013, pp. 519-524
- **Ahmet Sekreter** and at al., Parallelism between Interest Rate and Profit Rate: Comparison of Islamic Banking and Conventional Banking, Ibsu Journal of Business, Vol 1, No 2, 2012, pp. 15-24
- Rasit Nurullah Soyhan, Nuran Ilkkutlu, **Ahmet Sekreter**, A Different View of Quality and Total Quality Management, Ibsu Journal of Business, Vol 1, No 2, 2012, pp. 9-14
- **Ahmet Sekreter**, (2012), "Financial Mathematics Using Web Technologies.", Ibsu Journal Of Business, Vol 1, No 1, 2012, pp. 51-54
- **Ahmet Sekreter**, (2011), "Sharing of Risks In Islamic Finance.",Ibsu Scientific Journal 2011, Volume 2, pp 13-20

II. Proceedings (*From recent to past*)

- Ismail Ozsoy, Faruk Gursoy, and **Ahmet Sekreter**, " Global Peace and Tourism", Silk Road International Conference, (2013), Georgia pp. 93-96
- **Ahmet Sekreter** and Okan Eray, Forecasting Number of Georgian Vistors to Turkey with Different Method", Silk Road International Conference, (2013), Georgia, pp. 61-63
- **Ahmet Sekreter**, (2012), "Predictability of Stock Returns ", Silk Road International Conference 2012, Georgia, pp. 41-44
- **Ahmet Sekreter**, (2012), " Regression Analysis Of Stock Returns By Filtering With Simple Moving Averages", Silk Road International Conference 2012, Georgia, pp.77-80
- **Ahmet Sekreter**, (2012), "An Analysis of Theories on Stock Returns", International Symposium On Sustainable Development 2012, Bosnia Herzegovina, pp. 15-20

- **Ahmet Sekreter**, (2010), “Sharing and Managing Risks in Islamic Finance”, International Symposium on Sustainable Development 2010, Bosnia Herzegovina, pp. 55-58