

Accumulated Remark Forecasting for American NASDAQ Stock Market by using Artificial Neural Network Models from 2006-2015

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Abstract

The stock markets holds a great importance in the contemporary world, and form one of the most important pillars of the modern economy, both in the developed countries that have deepened its role proportionally to the economic and financial progress, particularly in the restructuring of the investment portfolio for individuals and even companies, as well as the rise in the international transactions by shares to reach trillions of Dollars, and for this the global financial markets is consider one of the actors in the global financial architecture, to emphasize the power of the global capital, and across this sector the shocks can travels through the global financial osmosis channels, taking advantage of what had provided by the financial globalization and liberalization of the capital and its Possibilities which were not available on the length of human history

So the study of the stock markets and predicting its situations become the kind of studies that be of interest to the researchers, especially under the trend towards finding a link between the stock trends and indicators of the market on the one hand and between the conditions of international economies on the other hand, and using it as a probe (or an early warning) for crises that could affect these economies.

From here the research derives its importance, as well as the new simulated models like the artificial neural network which have a great ability to come up with accurate data in measurement and prediction.

Keywords: NASDAQ, stock market, contemporary world, modern economy, investment portfolio, artificial neural network.

INTRODUCTION:

NASDAQ considered as one of the most important stock markets in the world, both in the capitalized traded that shared or by the incubating of such companies, especially if those companies are interesting in technological aspects as well as these companies are embodied with global ones out of United states. Moreover, NASDAQ played a great role before and after the global financing crisis.

During the globalization and the rapid changes, the need for filtering data becomes very important through the modern technologies to solve the complexity; one of these technologies is the use of Artificial Neural Network ANN, especially by using the Multilayer Neural Network in stock market forecasting, through applying the announced time chain for the market data from the 1st, of May, 2006 till 30th, of April, 2015 to exam this remark before the global financing crisis 2008, and during it then after this duration when the American economy become more healthy as well as NASDAQ stock market.

APPROACH PROBLEM:

NASDAQ stock market forecasting formed in economic dynamic circumstances that considered as an inclusion depth or global joining economics, because it named as an information revolution as Alphen Toffler called it. This market considered as third direction civilization that depending on a timing series. This timing series change effected by the suitable sample of accumulated data. These timing series samples can submit many avoiding- decisions against the crisis.

Thus, the problem focuses on the capability of using the Artificial Neural Network (ANN) in forecasting for the accumulated remarks of NASDAQ stock market.

THE IMPORTANCE OF RESEARCH AND ITS OBJECTIVES:

Although we have many samples in using the Artificial Neural Network ANN, and with reference to its obvious role in having detailed data in many aspects of knowledge, but, frankly speaking in Arabian countries in general and in Iraq in specific the matter is still different and there is a need for more consideration especially in these usages exactly in financing management.

Thus, this research is seeking to achieve such objectives, such as; trying to find out more usages for the ANN to involve more markets, studying the accumulated remark of NASDAQ stock market during the duration of (before-in between-after) the global financing crisis; and examining the proficiency of ANN sample for NASDAQ stock market forecasting in United State, then how could this sample support the investment decisions.

METHODOLOGY

The research used the inductive mythology through adapting the date of the stock market and the accumulated remark in NASDAQ stock market for a period of time. Then, trying to invest the quantitative quantization by using the Artificial Neural Network ANN for forecasting and analyzing the out puts of this model, and finally conclude the future direction of the stock markets and its relations with the dynamic American economy as a whole.

RESULTS & ANALYSIS

This study is a practical one that joins both inputs and outputs for the ANN. Thus the (2267 view) daily accumulated data from 1/5/2006 to 30/4/2015 was taken for ANN to be certain of the ANN ability to forecast for a period of time, then analyzing these data. Here, they used a program which named (Just NN- Version 4.0b) according to its rapid response and common use that enable the user to forecast as perfect as they desire then solving the difficulties.

Accordingly, ANN presses follow many steps; Selecting input, Analysis, then design, Training and finally testing, and the data as tabled here showed that all the data were forward direction and the ANN estimated values are very near to actual ones.

Table 1: Forecasted NASDAQ Values from 01/05/2015 to 30/06/2015

Date	Actual values	ANN Estimated values
1/5/2015	5005.39	4980.33
4/5/2015	5016.93	4953.89
5/5/2015	4939.33	4895.80
6/5/2015	4919.64	4844.78
7/5/2015	4945.54	4879.42
8/5/2015	5003.55	4927.72
11/5/2015	4993.57	4900.25
12/5/2015	4976.19	4915.02
13/5/2015	4981.69	4930.63
14/5/2015	5050.80	5000.06
15/5/2015	5048.29	5002.15
18/5/2015	5078.44	5051.11
19/5/2015	5070.03	5033.23
20/5/2015	5071.74	4990.05
21/5/2015	5090.79	5000.32
22/5/2015	5085.39	5000.45
26/5/2015	5032.75	4988.89

27/5/2015	5106.59	5056.51
28/5/2015	5097.98	4957.84
29/5/2015	5070.03	4991.43
1/6/2015	5094.94	5090.13
3/6/2015	5098.48	5041.68
4/6/2015	5078.22	5048.69
5/6/2015	5057.04	5072.22
8/6/2015	5066.65	4990.50
9/6/2015	5013.13	4989.48
10/6/2015	5029.41	5093.65
11/6/2015	5088.26	5062.62
12/6/2015	5060.24	5015.41
15/6/2015	5011.79	5002.85
16/6/2015	5023.58	4994.80
17/6/2015	5067.68	4998.23
18/6/2015	5082.06	5150.01
19/6/2015	5139.77	5008.55
22/6/2015	5147.87	5105.96
23/6/2015	5161.68	5153.32
24/6/2015	5151.38	5068.26
25/6/2015	5139.48	5037.72
26/6/2015	5113.26	5147.17
29/6/2015	5021.21	5055.20
30/6/2015	5000.15	4960.16

The analysis covered also more than (7100) company that specified as the biggest global companies of communication, technologies sectors..., the use of these companies is very important here, because they reflect the direction of the global technology market. The table below showed the balance of each company among others from 1999-2013.

Table: 2: Ten Earliest Companies in NASDAQ Stock Market for 1999-2012

1999		2012	
Company Name	The Balance in the stock market (%)	Company Name	The Balance in the stock market (%)
Microsoft	11.4	Apple	11.2
Cisco Systems	6.9	Microsoft	6.0
Intel	5.2	Google	3.5
Oracle	3.0	Oracle	3.3
MCI World com	2.8	Intel	3.0
DELL	2.5	Cisco Systems	2.4
Sun Microsystems	2.3	Qualcomm	2.3
Qualcomm	2.2	Amazon	1.8
Yahoo	2.1	Com Cast	1.4
Amgen	1.2	Amgen	1.3

After reviewing the data of the NASDAQ stock market, the process will classify the timing series into three timing periods, before the crisis (2006-2008), during the crisis (2008-2010) and after the crisis (2011-2015), the data then, reflect the stock market remark either positively or negatively.

- **The first duration (2006-2008)** it reflects a high level of prosperity, in which the ratio was (9.52%) at the last quarter of 2006 which increased around (209 point) rather than 2005, to reach (2415 point) in 2007 then lately reached (2652 point) at the end of 2007.
- **The second duration (2008-2010)** it reflects the crisis duration in which NASDAQ stock market was decreased to a lowest point to reach (1316.12 point) at 20th of November, 2008 and this reflects the ratio (40-45%). This decline happened according to the debts and the mortgage crisis in USA and other countries.
- **The third duration (2011-2015)** it can be described as a healthy back period and the remark increased at 2010 to reach (2667 point) which is nearly to what was on 2007, this USA economic prosperity happened according to the efforts of technologies companies as well as communication ones especially that specified in information technology and biology.

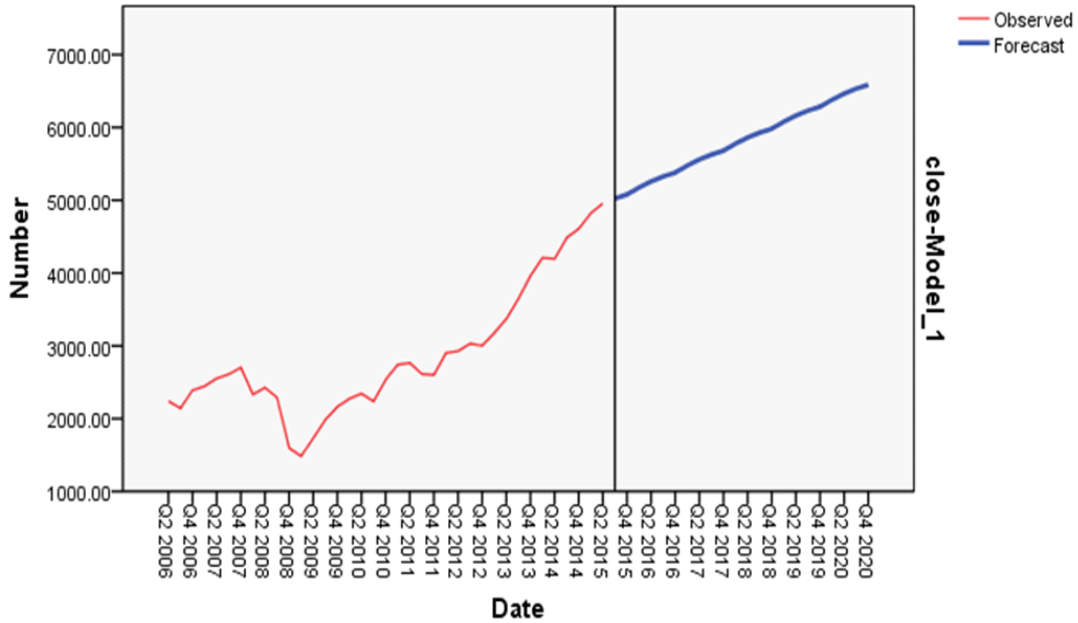
These durations affected the marker of NASDAQ stock market, and made as known the business cycle that started at 2007 with recession phase in most financial sectors till the fourth quarter of 2010 to reach the prosperity phase in financial stock markets and business in general.

According to above mentioned data, this research adapts the SPSS version 21 to forecasting for the five coming years from (2015-2020) through using the seasonally views of (36 view) from 01/05/2006 to 30/04/2015. And the table below reflects the forecasting data from 2015-2020

Table 3: Forecasting NASDAQ Values from 2015 to 2020

Season	Year	Value
Third	2015	5024
Fourth	2015	5077.45
First	2016	5174.86
Second	2016	5257.62
Third	2016	5325.72
Fourth	2016	5379.17
First	2017	5476.59
Second	2017	5559.34
Third	2017	5627.45
Fourth	2017	5680.89
First	2018	5778.31
Second	2018	5861.07
Third	2018	5929.17
Fourth	2018	5982.61
First	2019	6080.3
Second	2019	6162.79
Third	2019	6230.89
Fourth	2019	6284.34
First	2020	6381.75
Second	2020	6464.51
Third	2020	6532.61
Fourth	2020	6586.06

These values are considered as decreasing values, they are continued rapid so the direction is forward as shown in Fig. (1)



Moreover, these values that reached through ANN diagnosis the causes of financial crisis in 2008, and illustrated that there is a business cycle from time to time, as happened between 2000-2002 and the prosperity phase in 2007, such outcomes are briefed here, like recession – prosperity cycle, the prosperity phase is longer than recession one, decreasing forward of the stock especially in communication and technology companies according to the high demand on these stock.

In addition, the NASDAQ stock markets is also affected by such economical elements like Growth Rate GDP which is considered as an interior variables on direct proportion with the movement of stocks from 2011 to 2015. Interest Rate also affected the values as well as inflation which played a good role in increasing the stock market values then affected the real value of investment, while oil prices also affected by the power stock prices according to cost push inflation theory. To measure the relationship among these variables with stock price, the research uses (Seam- log) and exams the results through MindTap program which showed that this model has a high ability to analysis the values, so the regression is (R-91.3%) according to the mathematical equation:

$$\text{Lin Sp} = 7.11 - 0.0304 \text{ IT} + 0.0158 \text{ IF} + 0.0190 \text{ G} + 0.000299 \text{ SP}_{t-1}$$

$$T = 76.84 \quad -2.11 \quad 2.05 \quad 2.49 \quad 12.38$$

$$F = 89.72$$

$$R\text{-Sq} = 92.3\% \quad R\text{-Sq (adj)} = 91.3\%$$

$$\text{Durbin - Watson statistic} = 2.45$$

CONCLUSION

Using ANN now a day is very important in modern applied sciences like computer sciences, mathematics, and statistics, moreover ANN used now in medical, natural, economical and athletic sciences, in addition to financial & economic management science according to its ability to select the values for both meddle and short terms. Although, NASDAQ Stock market is like other business industries influenced by many interior and foreign circumstances but the main industries as technology and biology are considered as the infrastructure of this market. Depending on historical time series is very important for researchers because it has data and information which makes the ANN usage is more valuable.

Forecasting is a part of globalization, without forecasting there is no paved path for business sustainability, and this illustrates the reason for why such companies sustain and others are not. This researcher, unfortunately tried to discover the use of ANN in Arabian countries stock markets, but this theme is still different!

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