

**Predicting stock price movement in Pakistan: Comparison between
Artificial Neural Network Models and Traditional Linear Models: A
case of KSE**

Submitted to
School of Business and Economics
in Partial Fulfillment of the
Requirements for the Degree of

MASTERS OF SCIENCE IN FINANCE

by

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August, 2015

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To

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Declaration

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Research Completion Certificate

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ABSTRACT

Since the establishment of the Karachi Stock Exchange (KSE) in 1993, Pakistan's stock markets have expanded rapidly. Although this rapid growth has attracted considerable academic interest, few studies have examined the ability of conventional financial models to predict the share price movements of stocks. This gap in the literature is significant, given the volatility of the Pakistani stock market and the additional risk arising from the political and regulatory environs of Pakistan, we examine the relative ability of Hybrid Artificial Neural Networks models to forecast stock returns. In this research, the gap is attended by comparing the predictive ability of three linear models i.e. Univariate ARIMA model, Multivariate CAPM model and Multivariate three factor model. Furthermore, we compared these three linear models with the equally specified artificial neural network models containing the same predictor variables. One of the advantages of artificial neural networks is that they relax the model linearity assumption. The analysis conducted is based on the data from Karachi Stock Exchange, containing data for companies from the period of 2010-2014. The results of the research designate that the multivariate models i.e. the dynamic CAPM and the dynamic three factor model surpass the univariate model, that only incorporate lagged returns of stock prices, in forecasting future returns. Additionally, using the artificial neural networks notably enhance the predictive ability using the same predictor variables. Also, irrespective of the linear or non-linear model used, there is significant difference in the forecasting accuracy of univariate ARIMA, multivariate CAPM and multivariate FF3 model.

KeyWords: Artificial neural network, autoregressive moving average model, capital asset pricing model, three-factor model, stock price prediction

ACKNOWLEDGEMENT

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this research work. I am thankful for their inspiring guidance, invaluable constructive criticism and friendly advice during the research work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the completion of this thesis.

I express my warm thanks to Prof. Dr. Ahmed Faisal Siddiqi and Usman Javed Gilani for their support and guidance as a supervisor in providing valuable suggestions to make my work easier and in continue right direction.

I would also like to thank my project external guide Dr. Muhammad Ali Jibrani from the COMSAT University, Pakistan and all the people who provided me with the facilities being required and conducive conditions for final thesis as a partial fulfillment for my MS degree in Finance.

Thank you,

Muhammad Abubakr Naeem

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LIST OF NOTATIONS

LPCL	Lafarge Pakistan Cement
KEL	K-Electric Ltd
JSCL	Jahangir Siddiqui and Co
MLCF	Maple Leaf Cement
BOP	Bank Of Punjab Limited.
FCCL	Fauji Cement Company Ltd
TRG	TRG Pakistan
FABL	Faysal Bank Limited
DGKC	D. G. Khan Cement Co. Li
EFERT	Engro Fertilizers Ltd
PTC	Pakistan Telecommunicati
ENGRO	Engro Corporation (Pak)
BAFL	Bank Alfalah Limited
NBP	National Bank Of Pakista
AICL	Adamjee Insurance Co. Lt
NIB	NIB Bank Limited
AKBL	Askari Bank Limited
LOTCHEM	Lotte Chemical Pakistan
NML	Nishat Mills Ltd.
SSGC	Sui Southern Gas Co. Ltd
PSO	Pakistan State Oil Co. L
EFOODS	Engro Foods Ltd
PIOC	Pioneer Cement Limited

NCL	Nishat (Chunian) Limited
PACE	Pace (Pak) Ltd.
PPL	Pak Petroleum Ltd.
HUBC	Hub Power Company Limite
FATIMA	Fatima Fertilizer Compan
SNGP	Sui Northern Gas Pipelin
UBL	United Bank Ltd.
AVN	Avanceon Ltd
FFC	Fauji Fertilizer Company
PKGP	Pakgen Power
CHCC	Cherat Cement Company Li
FFBL	Fauji Fertilizer Bin Qas
MARI	Mari Petroleum Company
ATRL	Attock Refinery Ltd.
OGDC	Oil & Gas Dev.Co
KTML	Kohinoor Textile Mills L
LUCK	Lucky Cement Limited
GATM	Gul Ahmed Textile Mills
AHCL	Arif Habib Corporation L
BAHL	Bank AL-Habib Limited
NETSOL	Netsol Technology
GLAXO	Glaxosmithkline (Pak) Lt
SHEL	Shell Pakistan Limited
SNBL	Soneri Bank Limited
KOHC	Kohat Cement Limited

ISL	International Steels
KAPCO	KotAddu Power
HUMNL	Hum Network Ltd
SEARL	The Searl Company Ltd.
MCB	MCB Bank Limited
NPL	Nishat Power Ltd.
HMB	Habib Metropolitan Bank
PAKRI	Pak ReInsurance Co
PSMC	Pak Suzuki Motor Co. Ltd
DAWH	Dawood Hercules Corp.
MEBL	Meezan Bank Ltd.
NCPL	NishatChunian Power
POL	Pakistan Oilfields Ltd.
HBL	Habib Bank Limited
CEPB	Century Paper & Board Mills
PGF	PICIC Growth Fund
ABL	Allied Bank Limited
IGIIL	IGI Insurance Limited
NRL	National Refinery Ltd.
KOHE	Kohinoor Energy Limited
PKGS	Packages Limited
EFUG	EFU General Insurance
THALL	Thal Limited.
ACPL	AttockCem.Pak.Ltd
ICI	I.C.I Pakistan Ltd.

ABOT	Abbott Laboratories (Pak
ARPL	Archroma Pakistan Ltd
SCBPL	Standard Chartered Bank
SHFA	Shifa International Hospital
APL	Attock Petroleum Ltd
MTL	Millat Tractors Ltd.
INDU	Indus Motor Company Limited
EFUL	EFU Life Assurance Limit
SRVI	Service Industries Ltd
MUREB	Murree Brewery Company Ltd
NATF	National Foods Limited
JGICL	Jubilee General Insurance
PAKT	Pakistan Tobacco Co. Ltd
ATLH	Atlas Honda Limited
GRAYS	Grays Of Cambridge (Pakistan)
JDWS	J. D. W. Sugar Mills Lt
PCAL	Pakistan Cables Ltd.
JLICL	Jubilee Life Insurance
ARM	Allied Rental Mod.
PICT	Pakistan International C
SHEZ	Shezan International Ltd
PSEL	Pakistan Services Ltd.
FML	Feroze1888 Mills Ltd.
COLG	Colgate Palmolive (Pakis
BATA	Bata Pakistan Ltd.

NESTLE	Nestle Pakistan Ltd.
RMPL	Rafhan Maize Products Lt
ARIMA	Autoregressive Moving Average
CAPM	Capital Asset Pricing Model
FF3	Fama and French Three Factor Model

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