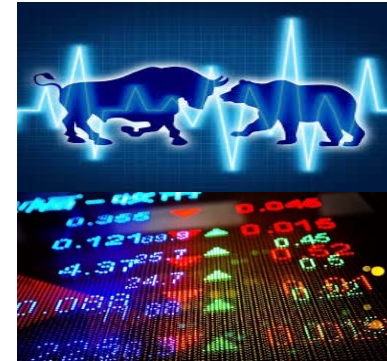




SCALABLE MULTI-STEP HYBRID MODEL FOR STOCK MARKET INDEX PREDICTION



Hi all,

Please note that the proposed methodology section in this presentation is truncated to avoid copyright issues. Hope it is OK with you.

Regards
Wajira

Unitec Research Symposium 2017
by
Wajira Dassanayake

Presentation Summary

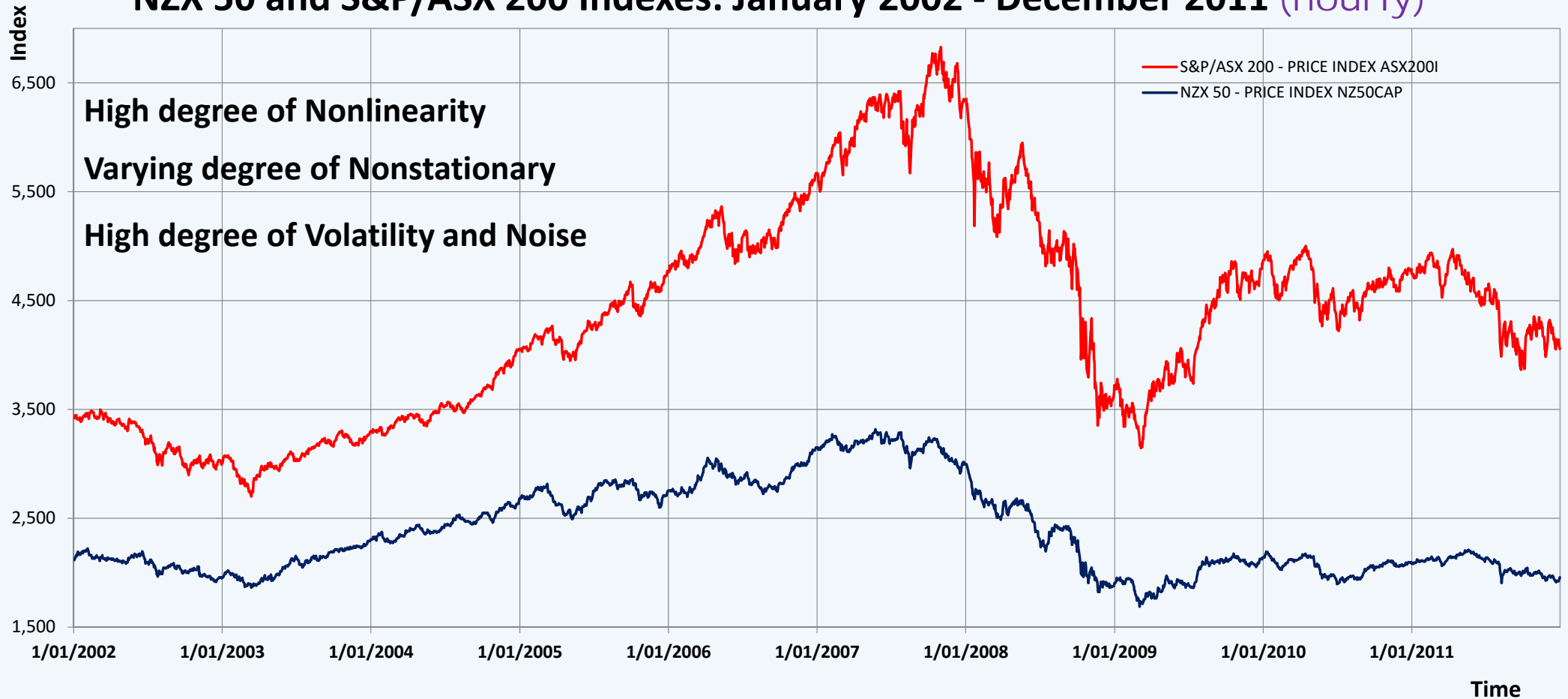
- 1. INTRODUCTION**
- 2. BACKGROUND**
- 3. PURPOSE**
- 4. RESEARCH OBJECTIVE**
- 5. PROPOSED METHODOLOGY**
- 6. PERFORMANCE EVALUATION**
- 7. LIMITATIONS**
- 8. CONTRIBUTION**
- 9. CONCLUSION**

1. Introduction:

- 😊 Stock market price movements are influenced by macroeconomic, historical and spontaneous factors.
- 😊 Accurate prediction of stock market price movement is useful to make effective trading strategies to make substantial profits with minimum associated risks.
- 😊 A considerable research attention has been devoted to stock market price prediction.

1. Introduction:

NZX 50 and S&P/ASX 200 Indexes: January 2002 - December 2011 (hourly)



1. Introduction:

- 😊 For approximately nine decades, researchers have been attempting to analyse stock market price prediction. (Yule 1927)
- 😊 The existing literature on stock market price movements can be broadly categorised into three branches.
 1. Fundamental Analysis
 2. Technical Analysis
 3. Textual Analysis

1. Introduction:

What is the uniqueness of my research?

Why should we focus on multiple factors?

Why should we focus on **MULTIPLE** factors?

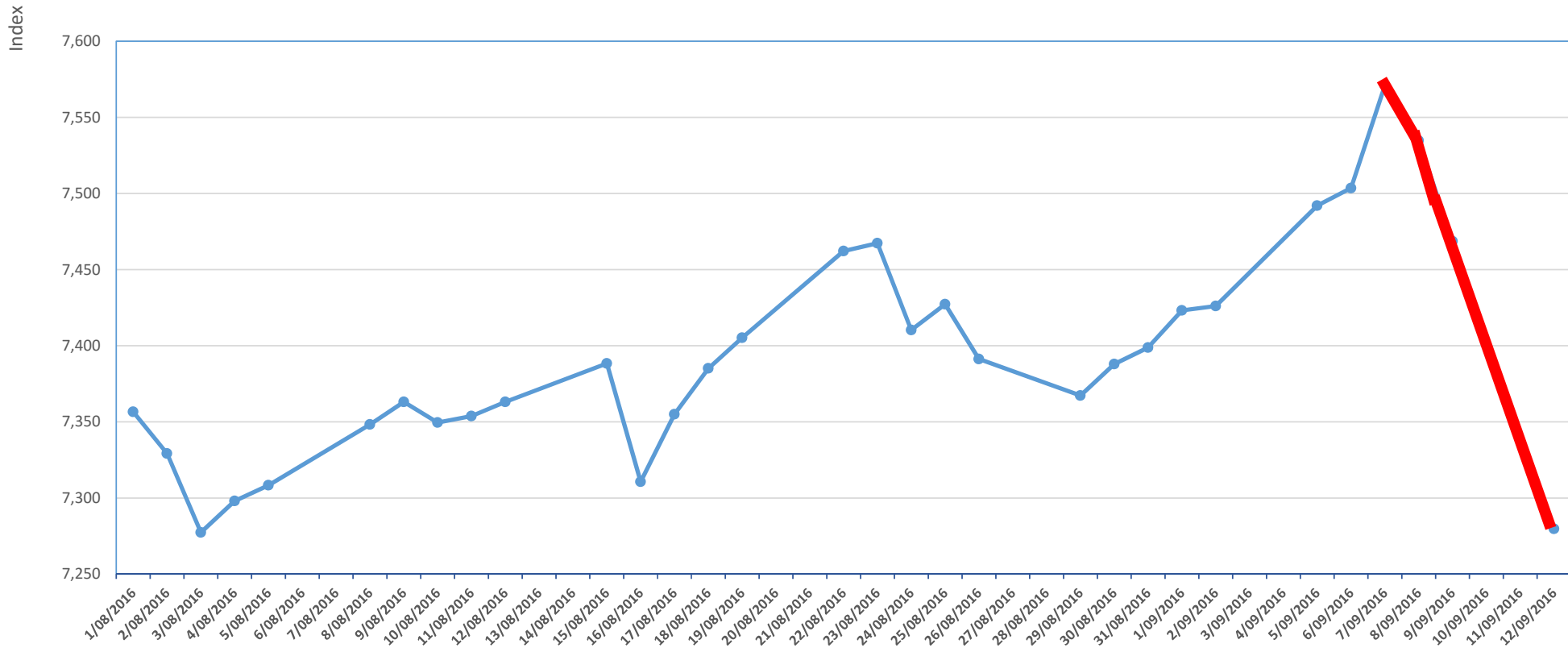
Daily closing S&P/NZX 50 INDEX from 1/01/2015 to 12/09/2016



Daily data from 01/08/2016 till 12/09/2016

Why should we focus on **MULTIPLE** factors?

Daily closing S&P/NZX 50 INDEX from 1/08/2016 to 12/09/2016



Daily data from 01/08/2016 till 12/09/2016

Why should we focus on **MULTIPLE** factors?

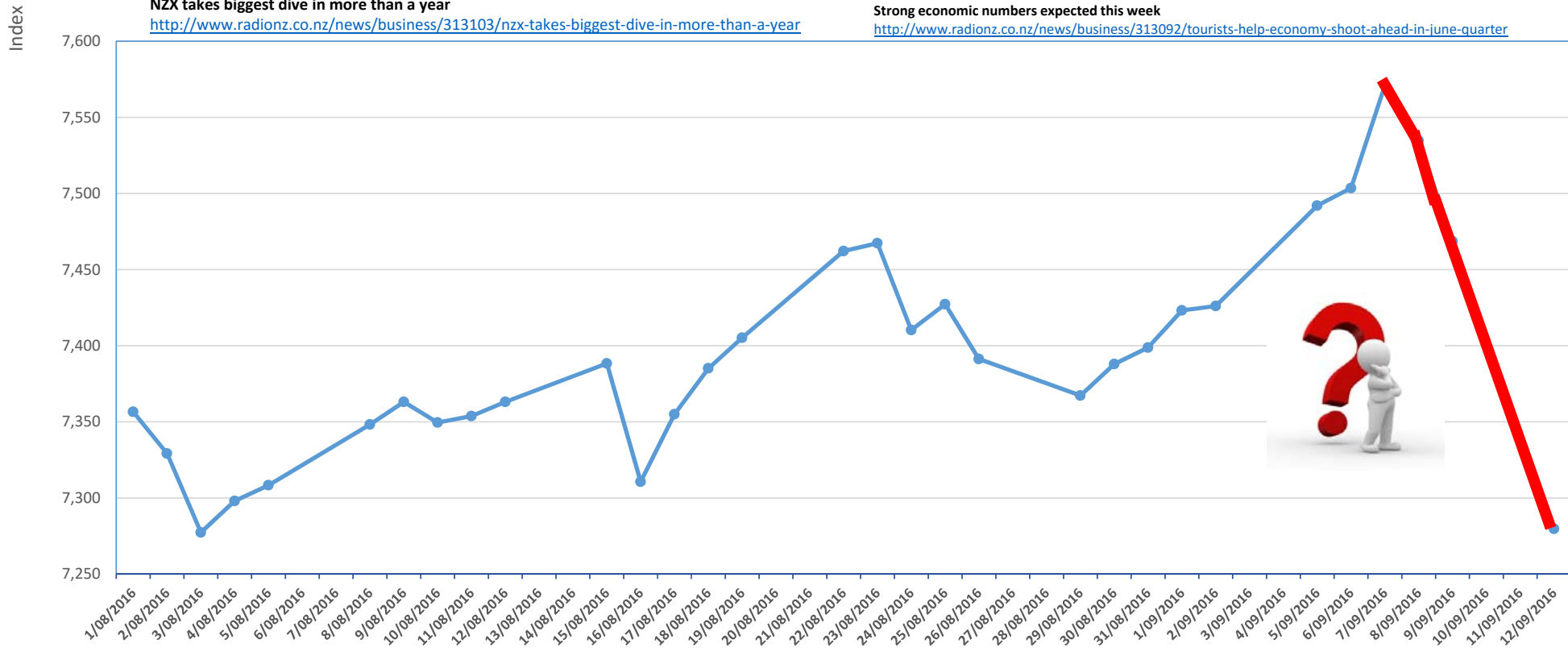
Daily closing S&P/NZX 50 INDEX from 1/08/2016 to 12/09/2016

NZX takes biggest dive in more than a year

<http://www.radionz.co.nz/news/business/313103/nzx-takes-biggest-dive-in-more-than-a-year>

Strong economic numbers expected this week

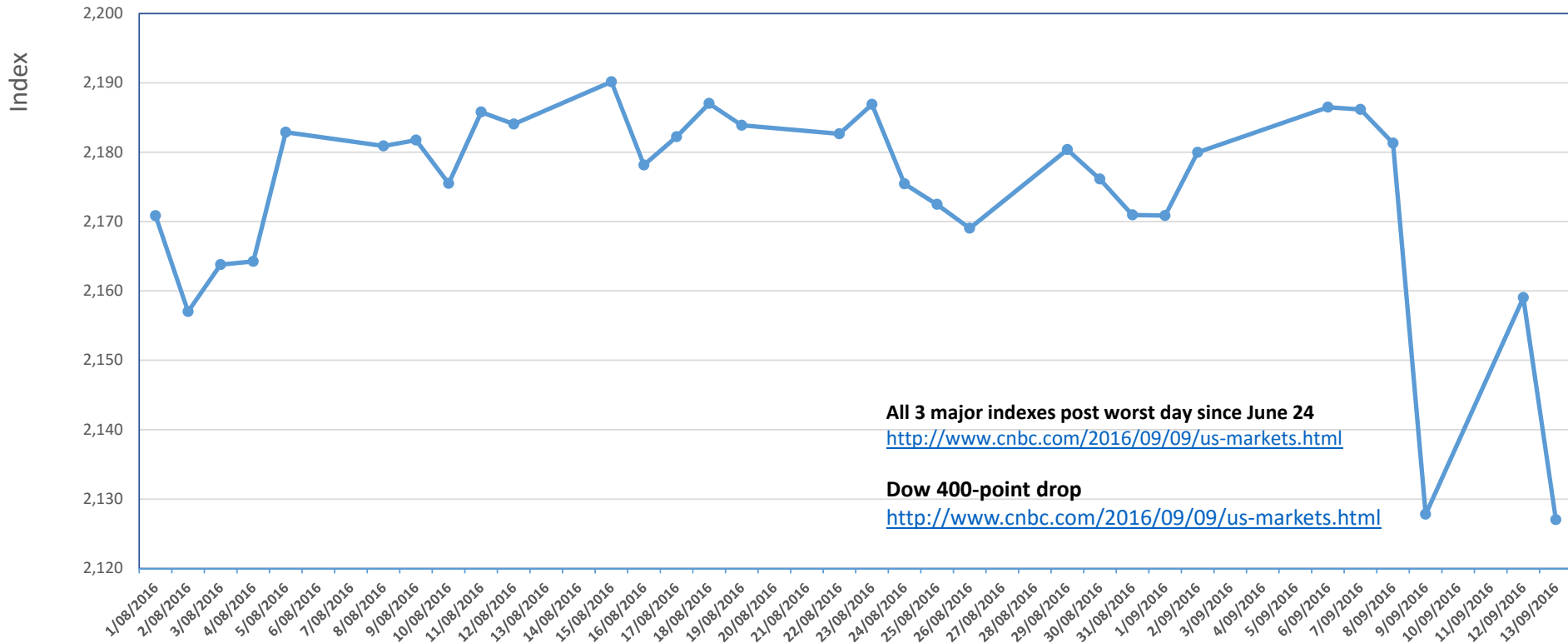
<http://www.radionz.co.nz/news/business/313092/tourists-help-economy-shoot-ahead-in-june-quarter>



Daily data from 01/08/2016 till 12/09/2016

Why should we focus on **MULTIPLE** factors?

Daily closing S&P 500 Index from 01/08/2016 to 13/09/2016



All 3 major indexes post worst day since June 24

<http://www.cnbc.com/2016/09/09/us-markets.html>

Dow 400-point drop

<http://www.cnbc.com/2016/09/09/us-markets.html>

Daily data from 01/08/2016 till 12/09/2016

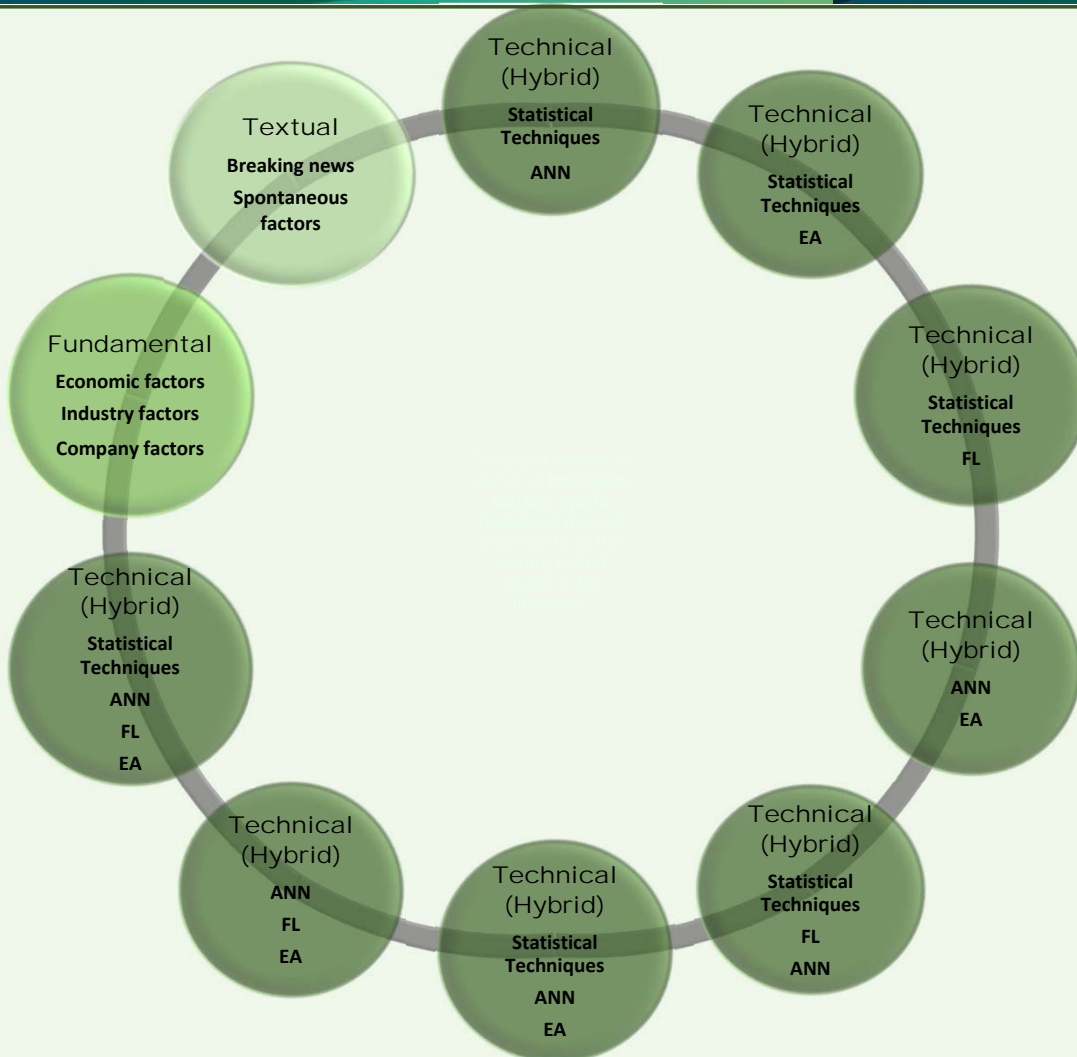
1. Introduction:

1. Historical (**internal**) influence: Effects of historical values.
2. Macroeconomic (**external**) factors: Macroeconomic factors such as interest rate, inflation rate, exchange rate, foreign shocks.
3. Spontaneous (**external**) factors: Breaking news, other random factors such as war on terror, bomb explosions, earthquakes, epidemics.

1. Introduction:

- ☺ As you witnessed, in the real **dynamic** world, these factors can **concurrently** influence the stock market prices.
- ☺ Numerous attempts have been made to forecast stock market prices based on **either** technical analysis **or** fundamental analysis **or** textual analysis.

2. Background: Present state



Current state of stock market prediction models

3. Purpose

- ☺ The aim of this research is to formulate a dynamic stock market forecasting model that has the ability to incorporate as many crucial stock market determinants as possible to predict the future stock market price movements.

4. Research Objective

- ☺ The objective of this research is to generate a **single multistep scalable intelligent hybrid** model to predict the future movements of **New Zealand (S&P/NZX50)** and **Australian (S&P/ASX200) stock market indices.**

5. Proposed Methodology:

4. Proposed model:

Multi-Step stock market index forecasting model (Y_1^* , Y_1^{**} , Y_1^{***}) using

1. Historical effects (Y_1^*)
2. Macroeconomic factors (Y_1^{**})
3. Spontaneous incidents (Y_1^{***})

5. Proposed Methodology:

The proposed methodology aims at capturing three sources of stock market index prediction data (Y_1^* , Y_1^{**} , Y_1^{***}) to develop a single multistep hybrid model.

..... **AND SO ON**

6. Performance Evaluation

- To evaluate the performance of the proposed model three error statistics are planning to be performed.

1. Mean absolute error (MAE) $MAE = \frac{1}{N} \sum_{t=1}^N |X_t - \hat{X}_t|$

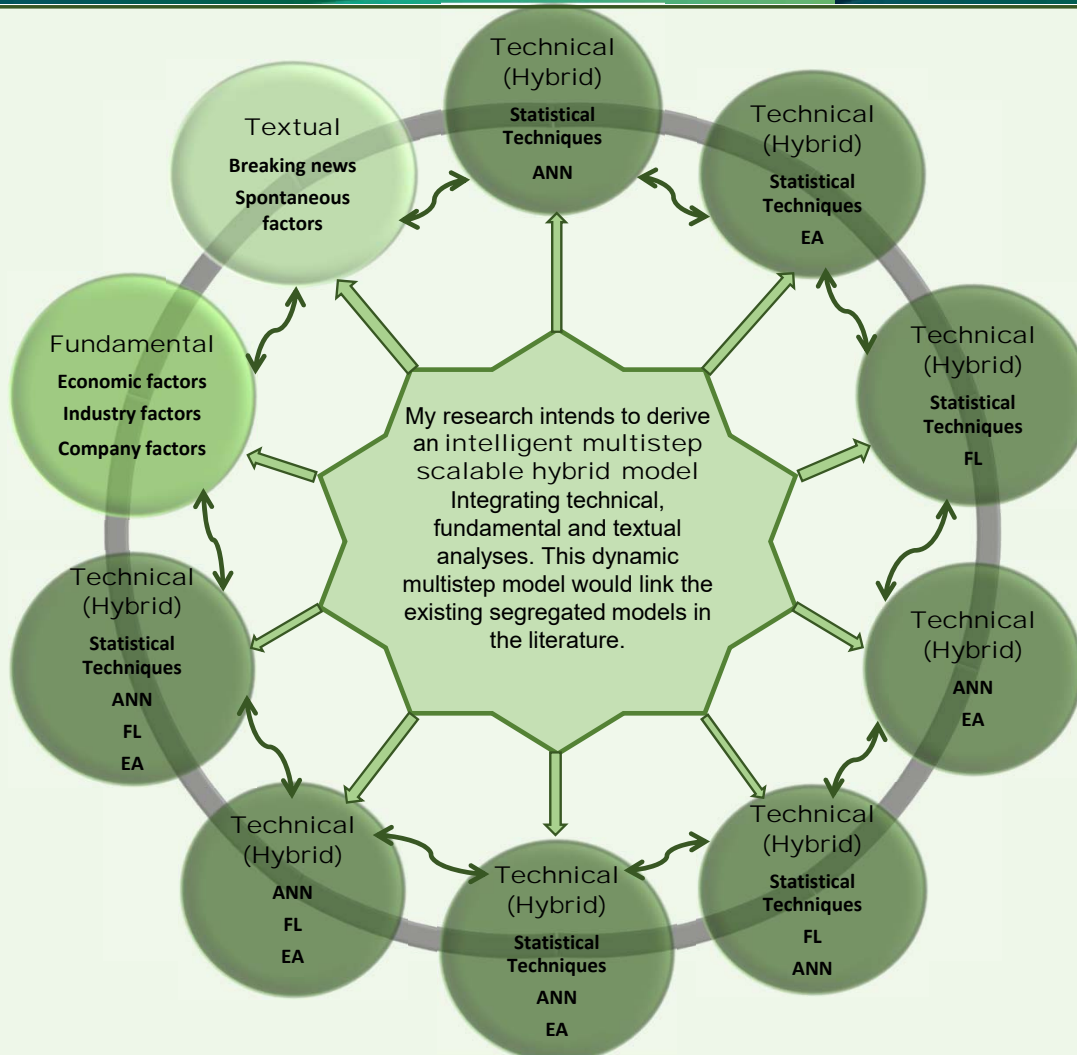
2. Mean absolute percentage error (MAPE) $MAPE = \frac{1}{N} \sum_{t=1}^N \left| \frac{(X_t - \hat{X}_t)}{\hat{X}_t} \right|$

3. Root mean square error (RMSE) $RMSE = \sqrt{\frac{1}{N} \sum_{t=1}^N (X_t - \hat{X}_t)^2}$

7. Limitations

1. Possible aggregation issues could arise when three different forces of stock market determinants are amalgamated.
2. Differences in data frequency window, types of stocks and indices and/or the sample size use in the analysis will be obstacles to device a unique multi-step model.

8. Contribution to the discipline



- ☺ Proposed multistep forecasting model **interconnects** marginally segregated subsets of stock market price forecasting models.

9. Conclusion

- The literature survey reveals that the existing models formulate marginally segregated subsets in the area of stock market price prediction.
- This research will be the **first scientific** exploration to combine the effects of historical factors, macroeconomic determinants and spontaneous events in a single multi-step model to forecast the stock market prices.



**THANKS FOR
LISTENING!**
IT'S
**TIME FOR
QUESTIONS!**