# Autoregressive -N Method: A short note

Md. Shahrear Zaman

M.S.s in Economics
University of Chittagong
M.S.c student in Economics
University of Kiel

student.eco86@gmail.com

June 2018

# 1 Abstract

In this paper I will discuss about a new forecasting tool named Autoregressive - N method or AR - N method, which is structured by me.

# 2 Introduction

This forecasting method is very simple. We do not need to worry about the difference between endogenous and exogenous variables, rather need the values of one variable to predict (Left hand side variable) and it's own lag or lags and other variables and their lag or lags (Right hand side variables).

The primary ingredient of this method is the OLS (Ordinary Least Square). Please check any relevant text book [Greene, William H.(2012) for example] to know about the OLS and other relevant concepts.

In this method we have considered that, both left hand side variable and error depend on their own future forward value. Left hand side variable also depends on the present value of the other right hand side variables. It is also possible to take their past lags. But it is better to keep the structure of the right hand side variables as simple as possible and always try to follow your own feelings about the model under the consideration of your own knowledge and experiences.

# 3 Technical Note

If we have a vector of a time series variables
$Y_t = (y_1, ..., y_k)^{'}$
AR-N method can be defined as
$Y_t = A_1 Y_{t+l} + B_1 X_t + B_2 X_{t+l} + U_t$
Estimated parameter
$b = (\mathbf{X}^{'}\mathbf{X})^{-1}\mathbf{X}^{'}\mathbf{Y}$
Predicted value of $\mathbf{Y}$
$\hat{\mathbf{Y}} = \mathbf{X}^* b$
$\mathbf{e} = \mathbf{Y} - \hat{\mathbf{Y}}$
$e_t = \gamma e_{t+l} + \varepsilon_t$
Estimated parameter of $e$ for l step forward
$\gamma = (e_{t+l}^{'} e_{t+l})^{-1} e_{t+l}^{'} e_t$
$\hat{\mathbf{e}}_{\mathbf{t}} = \mathbf{e}_{\mathbf{t+l}} \gamma$
Predicted minimum error
$\xi = \mathbf{e} - \hat{\mathbf{e}}$
Thus a p step forward forecast will be,

$$\mathbf{y_{k+l} = b_k x_{k+l} + \xi_k}$$

# 4   Code

*Package : AR − N method, lag*
lag(x,l)
x = matrix
l = number of lags
Though we can transform the data (log transformation for example), it is always better to keep the data unchanged and not to transform. Manipulation of the data always leads us to an imprecise and in some cases unacceptable forecast. The aim of the forecast is not to take the decision by a number, rather a tool, which can help us to take the decision side by side other available information, which have been provided.

In package AR-N, I have provided the source code by an example. We will need the package lags to create the lag values.

The process of forecasting has been explained in the diagram above. In source code you need to set the value of lag and back. In example, the value of lag is 1 and back is 8.
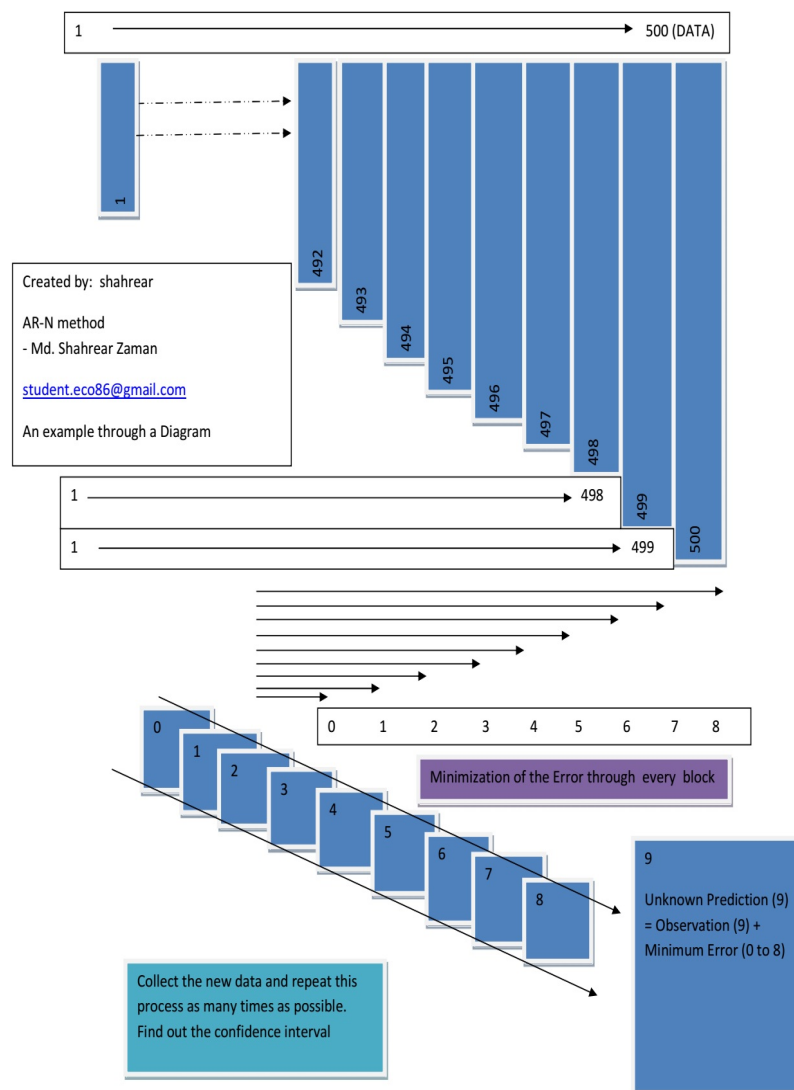Check the following link:
https://github.com/shahrear86/Economet-Stat/blob/master/AR-Nmethod.m

1 ——————————————————→ 500 (DATA)

1

492

493

494

495

496

497

498

499

500

Created by: shahrear

AR-N method
- Md. Shahrear Zaman

student.eco86@gmail.com

An example through a Diagram

1 ——————————————————→ 498

1 ——————————————————→ 499

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

0

1

2

3

4

5

6

7

8

Minimization of the Error through every block

9

Unknown Prediction (9)
= Observation (9) +
Minimum Error (0 to 8)

Collect the new data and repeat this
process as many times as possible.
Find out the confidence interval

Figure 1: AR-N method

4

# 5    Conclusion

The preciseness of this method for the forecasting depends on the available data. As we can take one forward step at once, it's better to update the information and take the next step or repeat the same procedure to find out the confidence interval as quickly as possible through the flow of time.

# 6 Reference

1. Greene, William H.(2012), Econometric Analysis, Pearson Education, Inc., publishing as Prentice Hall; Chapter-20