Develop the forecast model in overseas credit card spending and residents travelling overseas from New Zealand using Transfer Function/Cointegration

Team Ensemble

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**Abstract**

*This work is part of assignment to apply transfer function and/or cointegration (if applicable) on Consumer Price Index (CPI) and Exchange Rate (USD-INR). We aim to build a statistical model describing the relationship between an output variable Y and one input variable X. We have selected the data released by New Zealand government about Overseas Credit card spending and NZ resident traveler overseas. We would like to*

# Abbreviation

CPI = Consumer Price Index,

USD = US Dollars,

INR = Indian Rupee.

OEC = n

# Executive Summary

India is the 16th largest export economy in the world and the 46th most complex economy according to the Economic Complexity Index (ECI). The top exports of India are Refined Petroleum ($29.2B), Diamonds ($23.2B), Packaged Medicaments ($13.4B) and others. Its **top imports** are Crude Petroleum ($64.6B), Gold ($35.4B), Petroleum Gas ($11.7B) [[1.]](http://atlas.media.mit.edu/en/profile/country/ind/). As the data by OEC indicates crude oil is the top import product of India. Since the major transaction for crude oil happens in US dollars, fluctuation in USD-INR exchange rate could highly influence India’s market and economy in multiple ways. Since transportation cost is highly dependent on petroleum products and transportation cost affects CPI, our objective is to define and build statistical model which describe the relationship between output variable CPI and input variable exchange rate (USD-INR).

For this exercise, we followed the iterative approach of **model specification, estimation and Model checking**. Our best performing transfer function model produced the following relationship between CPI and exchange:

## Data Selection and Preprocessing

Upon analyzing the dataset,

## Data Partition

Data partitions were done based on model analysis:

## Feature Engineering

Feature analysis was performed on various variables

Here is the summary of our analysis and action taken:

## Model Building

The transfer function modelling procedure consists of the following steps:

* Plot the gathered input/output data.
* Achieve level and variance stationarity of Yt and Xt.
* Fit a univariate model to xt to estimate αt.
* Fit a univariate model to yt as a benchmark and possible Nt.
* Use pre-whitened model of αt and pre-treat yt to get βt.
* Calculate CCF(k) of βtαt-k to identify r,s and b.
* Examine CCFs for r,s and b.
* Estimate the transfer function (TF) using Yt and Xt.
* Use the residual of the TF to identify Nt.

## Model Performance

Modelling performance through reliability analysis is very important in XXX. The presented method can deal with uncertain outage parameters and maximized the possibility of reliability improvement and XXX.

## Business Performance

Below shows the return on investment comparisons of

## References

Lecture Notes: *ARIMA/Transfer Function/Cointegration Test*