

Title : Developing a model for forecasting the procurement costs of imported materials and equipment based on foreign exchange rates and foreign inflation rates.

Author(s) : 1. Ms.Piyaporn Khamtha

Student ID : 640510558

Major : Statistics

Advisor(s) : 1. Assistant Professor Dr. Nawapon Nakharutai
2. Dr. Parichart Pattarapanitchai

Type of presentation* (choose 1) : Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
 Poster (กรณี นำเสนอผลงานปัญหาพิเศษ/การค้นคว้าอิสระ)
 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

This research aims to develop a model for forecasting the procurement costs of imported materials and equipment in advance, based on monthly foreign exchange rates and international inflation rates. The study employs time series forecasting models to predict monthly exchange rates and inflation rates, identifying the most suitable forecasting approach.

The dataset includes monthly exchange rate data for four currencies USD GBP EUR and CNY historical data for 22 years from 2002 to 2023, with a total of 264 data points for each currency. Additionally, the dataset includes monthly inflation rate data from four countries: the United States (USA), the United Kingdom (UK), the European Union (EU), and China. The inflation data for the USA, UK, and EU cover a 22-year period from 2002 to 2023, with 264 data points for each country. However, the Chinese inflation data covers only an 8-year period from 2016 to 2024, with 96 data points. This limitation arises because, based on available sources, monthly inflation data for China is only accessible from 2016 onward, whereas earlier data is available only on an annual basis. As a result, China's inflation data could not be aligned with the same timeframe as the other three countries.

The study divides the foreign exchange rate data into two sets are 1. Training data: January 2002 – December 2019 and 2. Testing data: January 2020 – December 2023 Similarly, the inflation rate data for the USA, UK, and EU are divided into 1. Training data: January 2002 – December 2019 and 2. Testing data: January 2020 – December

*Type of presentation must be matched with an option you choosing on student upload system.

**The abstract can be more than one page and must be approved by project advisor before upload.

2023 for China, inflation data is divided into 1. Training data: January 2016 – December 2021 and 2. Testing data: January 2022 – December 2023.

The training data is used to develop forecasting models employing three methods including the Exponential Smoothing Method Box–the Jenkins Method (ARIMA) and Decomposition Method

The testing data is used to evaluate the accuracy of the forecasting models using Root Mean Square Error (RMSE) and Mean Absolute Percentage Error (MAPE).

Results of the study found that the most suitable forecasting model for monthly foreign exchange rates of the four currencies (USD, GBP, EUR, and CNY) is the Exponential Smoothing Method, yielding RMSE values of 1.6936, 1.8241, 1.1217, and 1.2975, respectively, and MAPE values of 0.7051, 1.0602, 0.5179, and 0.0795, respectively.

For monthly inflation rates : The Box–Jenkins (ARIMA) method is best suited for the USA and China, with ARIMA(1,1,1) and ARIMA(0,1,0) models, respectively. The RMSE values are 18.3482 and 21.5461, and MAPE values are 0.4296 and 0.5867, respectively. The Exponential Smoothing Method is best suited for the UK and the EU, yielding RMSE values of 16.6489 and 47.5693, respectively, and MAPE values of 0.4887 and 0.4081, respectively. These findings indicate that different forecasting techniques are optimal for different currencies and inflation rates, providing a reliable model for estimating future procurement costs based on exchange rate and inflation rate trends.