

金融危機預測- HW7

魏上傑

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1 資料處理

使用資料從 IMF 官網下載得到。

```
library(tibble)
India_data <- read.csv("India_data.csv")
```

由於論文中所使用的資料部分未能找到，或有太多缺失值，因此將採用最類似的項目。

```
demand_deposits <- India_data[India_data$Indicator.Name==
                             "Monetary, Banking Institutions, Demand Deposits (Non-Stan

saving_deposits <- India_data[India_data$Indicator.Name==
                             "Monetary, Banking Institutions, Time, Savings, and Foreign

foreign_liabilities <- India_data[India_data$Indicator.Name==
```

```

                                "Monetary, Monetary Authorities, Foreign Liabilities (
Reserves <- India_data[India_data$Indicator.Name==
                                "Monetary, Banking Institutions, Reserves (Non-Standardized Prese
nominal_interest <- India_data[India_data$Indicator.Name==
                                "Financial, Interest Rates, Lending Rate, Percent per ann
                                &
                                India_data$Attribute=="Value",]

Inflation <- India_data[India_data$Indicator.Name==
                                "Prices, Consumer Price Index, All items, Percentage change, Pre

```

1.1 資料篩選與轉換

```

library(dplyr)

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

demand_deposits <- select(demand_deposits, X1990Q1:X2021Q3)
saving_deposits <- select(saving_deposits, X1990Q1:X2021Q3)
foreign_liabilities <- select(foreign_liabilities, X1990Q1:X2021Q3)
Reserves <- select(Reserves, X1990Q1:X2021Q3)
nominal_interest <- select(nominal_interest, X1990Q1:X2021Q3)
Inflation <- select(Inflation, X1990Q1:X2021Q3)

var_list <- list(demand_deposits = demand_deposits, saving_deposits = saving_deposits,
                foreign_liabilities = foreign_liabilities, Reserves = Reserves,

```

```
nominal_interest = nominal_interest, Inflation = Inflation)

var_list <- lapply(var_list, as.numeric)
```

1.2 儲存資料

```
start_date <- as.Date("1990-03-01")
end_date <- as.Date("2021-9-01")
all_dates <- seq(start_date, end_date, by = "quarter")

df <- tibble(all_dates, var_list[[1]], var_list[[2]], var_list[[3]],
             var_list[[4]], var_list[[5]], var_list[[6]])

colnames(df) <- c("all_dates", "demand_deposits", "saving_deposits",
                 "foreign_liabilities", "Reserves", "nominal_interest", "Inflation")
```

1.3 計算 Reserves to Deposits Ratio

```
df$real_interest <- df$nominal_interest-df$Inflation

df$Total_deposits <- df$demand_deposits+df$saving_deposits+df$foreign_liabilities

df$gamma <- df$Reserves/df$Total_deposits
```

1.4 計算變化率及標準差

```
Delta_gamma <- diff(df$gamma, lag=1, differences = 1)

Delta_real_interest <- diff(df$real_interest, lag=1, differences = 1)

sigma_delta_gamma <- sd(Delta_gamma, na.rm = TRUE)
sigma_delta_real_interest <- sd(Delta_real_interest, na.rm = TRUE)
```

1.5 計算 IMP 指標

```
IMP <- Delta_gamma/sigma_delta_gamma + Delta_real_interest/sigma_delta_real_interest

# 計算 98.5 分位數
IMP_98.5 <- quantile(IMP, probs=0.985, na.rm = TRUE)
IMP_98.5 <- as.numeric(IMP_98.5)

start_date <- as.Date("1990-06-01")
end_date <- as.Date("2021-09-01")
all_dates2 <- seq(start_date, end_date, by = "quarter")

df2 <- tibble(all_dates2, IMP)

df2$potential_crisis <- df2$IMP>IMP_98.5
df2.sub <- df2[df2$potential_crisis,]
na.omit(df2.sub)

## # A tibble: 2 x 3
##   all_dates2    IMP potential_crisis
##   <date>      <dbl> <lgl>
## 1 1991-06-01   3.59 TRUE
## 2 1992-09-01   2.73 TRUE
```

2 資料判讀

具體而言，銀行危機的起始點，必須符合兩個條件：第一，IMP 指標超過 98.5 分位數 (基於樣本 IMP 指標)。第二，與上一期相比，IMP 指標必須起碼增加 5%。

根據上面的操作，1991Q2, 1992Q3 滿足第一個條件，以下檢驗是否滿足第二個條件。

```
(3.59162778 - (-1.39773092)) / (1.39773092)
```

```
## [1] 3.569613
```

```
(2.73380441 - (-1.71985783)) / (1.71985783)
```

```
## [1] 2.589553
```

根據計算，條件二有符合，因此印度在 1991Q2, 1992Q3 可能有發生銀行危機。

然而這個估計與論文的估計並不同，根據論文的結果，印度是在 1999Q4 發生銀行危機，這部分可能是因為使用資料不同導致。例如名目利率項，論文是採用 Money Market Rates，但由於在查詢 Financial, Interest Rates, Money Market, Percent per annum 後，發現有許多缺失值，所以改用了 Financial, Interest Rates, Lending Rate, Percent per annum。這些都可能導致估計上的誤差。