

# How crisis affect the low-income and high-income economies differently\*

Examples from 2008-09 financial crisis and 2020 Covid-19

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First sentence. Second sentence. Third sentence. Fourth sentence.

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\*Code and data are available at: <https://github.com/Shuuu/Final-Paper.git>

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## 1 Introduction

### 1.1 Defining Low-income economies and High-income economies

According to The World Bank (Espen Beer Prydz (2019)), as of July 2019, using the Gross National Income (GNI) per capita by using the World Bank Atlas method. The Atlas method smooths exchange rate fluctuations using a three-year moving average. The low-income economies are defined as \$1,025 or less, lower middle-income economies are those with between \$1,026 and \$3,995. The upper middle-income economies are those between \$3,996 and \$12,375. Lastly, the high-income economies are those with a GNI per capita \$12,376 or more.

For simplicity, I will group the low-income economies and the lower middle-income economies together as low-income economies. Also, the upper middle-income economies and high-income economies will be grouped as high-income economies. Therefore, a country that has a GNI per capita less than or equal to \$3995 will be categorized as low-income country. A country that has a GNI per capita larger than \$3995 will be categorized as high-income country.

## 2 Data

The data is obtained from the World Development Indicators and Other World Bank Data, WDI, Arel-Bundock (2022). The raw data set includes, 17024 observations and 11 variables. As the raw data-set recorded some variables that

- country: It records the country's name.
- year: It records the year of the data being recorded. In our cleaned data set there will only be year 2008, 2009, and 2020.
- inflation: It records the inflation, measured by the consumer price index which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.
- gdp\_growth: It records the annual percentage growth rate of GDP at market prices. The calculations are based on constant local currency.
- population: It records the total population based on all residents regardless of legal status or citizenship.
- unem\_rate: It records the unemployment rate, the unemployment refers to the labours that are not working but is available to work or seeking for employment.
- lf\_par\_rate: It records the labor force participation rate, it calculated the proportion of the population who ages 15 and older that are active economically.
- trade\_per: It records the sum of exports and imports of goods and services measured as a share of GDP.
- gni\_per\_cap: It records the GNI per capita, the unit is converted to U.S. dollars using the World Bank Atlas method. GNI is the sum of value added by all resident producers plus any product taxes. It does not include the value of output plus net receipts of primary income from abroad.

Talk more about it.

## 3 Model

The model is set up by using

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix [B](#).

### 3.1 Model set-up

Define  $y_i$  as the number of seconds that the plane remained aloft. Then  $\beta_i$  is the wing width and  $\gamma_i$  is the wing length, both measured in millimeters.

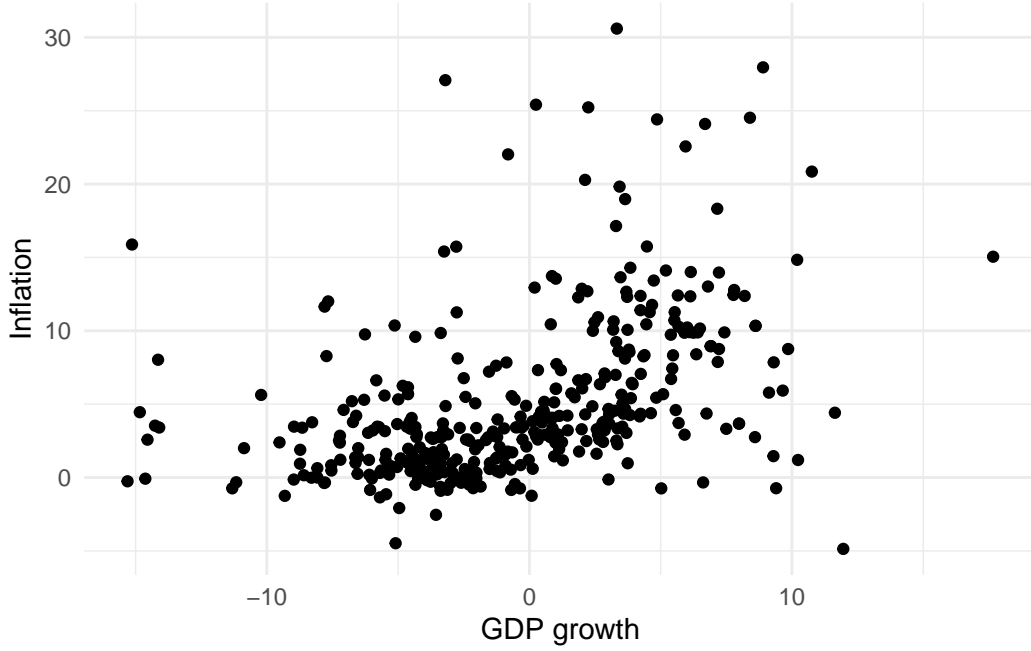


Figure 1: Relationship between GDP growth versus Inflation

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \quad (1)$$

$$\mu_i = \alpha + \beta_i + \gamma_i \quad (2)$$

$$\alpha \sim \text{Normal}(0, 2.5) \quad (3)$$

$$\beta \sim \text{Normal}(0, 2.5) \quad (4)$$

$$\gamma \sim \text{Normal}(0, 2.5) \quad (5)$$

$$\sigma \sim \text{Exponential}(1) \quad (6)$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

### 3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance  $\theta$ .

## **4 Results**

## **5 Discussion**

### **5.1 First discussion point**

If my paper were 10 pages, then should be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

### **5.2 Second discussion point**

### **5.3 Third discussion point**

### **5.4 Weaknesses and next steps**

Weaknesses and next steps should also be included.

## **Appendix**

### **A Additional data details**

### **B Model details**

#### **B.1 Posterior predictive check**

#### **B.2 Diagnostics**

## References

- Arel-Bundock, Vincent. 2022. *WDI: World Development Indicators and Other World Bank Data*. <https://CRAN.R-project.org/package=WDI>.
- Espen Beer Prydz, Divyanshi Wadhwa. 2019. “Classifying Countries by Income.” *The WORLD BANK*. <https://datatopics.worldbank.org/world-development-indicators/stories/the-classification-of-countries-by-income.html>.
- Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. “Rstanarm: Bayesian Applied Regression Modeling via Stan.” <https://mc-stan.org/rstanarm/>.
- R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.