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

An example from the 2020 Covid-19

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    This paper examines the impacts of global crises focusing on the 2020 COVID-19 pandemic's effects on low and high-income countries. It highlights how globalization links economies, leading to shared challenges during worldwide disturbances. The analysis reveals that low-income countries have suffered more acutely, experiencing higher unemployment, inflation, and slower GDP growth.

Table of contents

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*Code and data are available at: https://github.com/Sluuu/Final-Paper.git

1 Introduction

Globalization improves the connection of different countries of the world. Economically, globalization benefits different countries in multiple ways and being able to trade goods across borders.(Takefman 2023) However, the effects of globalization brings the whole economy on the same boat. Consequently, when various global crises occur, they have multiple and different impacts on the world economy.

In this paper, my focus is on the varying impacts of global crises on low and high income countries. I have selected the 2020 COVID-19 pandemic as the primary subject of my study. This crises have led to varying degrees of economic uncertainty and fluctuations in economic performance worldwide.(Strauss-Kahn 2020) The World Bank indicates that the COVID-19 pandemic has widen the inequality between low and high-income countries, with low-income countries experiencing higher unemployment and inflation rates, along with slower GDP growth. These trends align with the expectations set in my study.(Kim Parker 2020)

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. Which I have grouped out there are 27 low-income countries in this definition and 85 high-income countries.

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 have missing values and some repeated values. After combining and deleting the extra and missing values, I have 112 observations and 10 variables. Which each observations represents a country.

2.1 Variables

- `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 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.
- `low_income`: It is a dummy variable indicating that if a country has a GNI per capita less than or equal to \$3995 it will be 1, else, 0.

In Figure 1, I have presented the relationship between GDP growth and Inflation of each countries from my data-set. Which each dot represents one country. From Figure 1, we could see that countries that have higher/positive gdp growth typically also has a higher inflation rate.
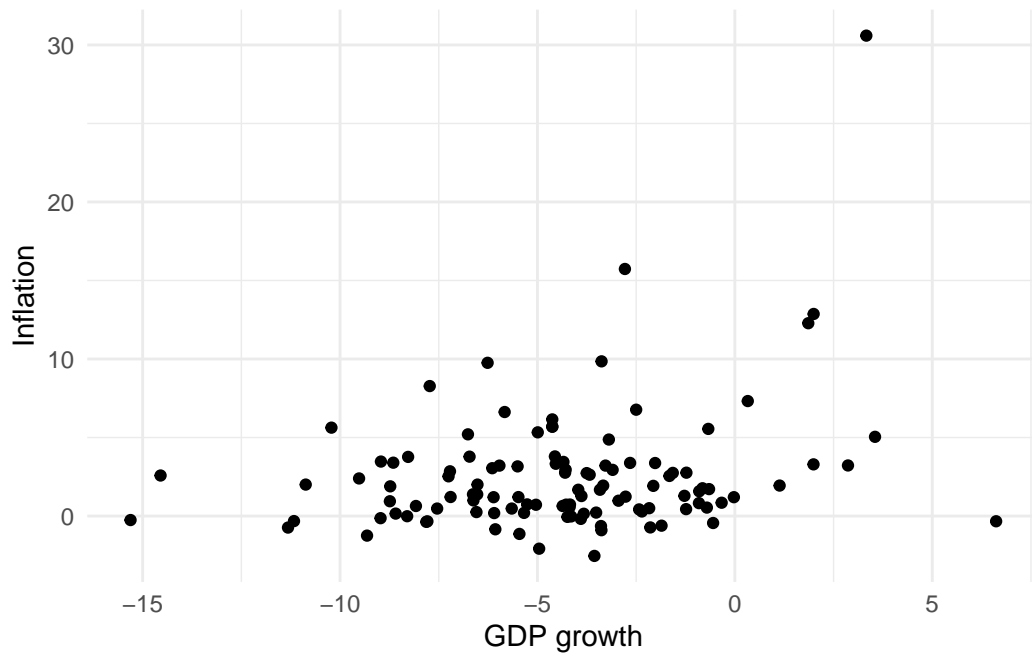
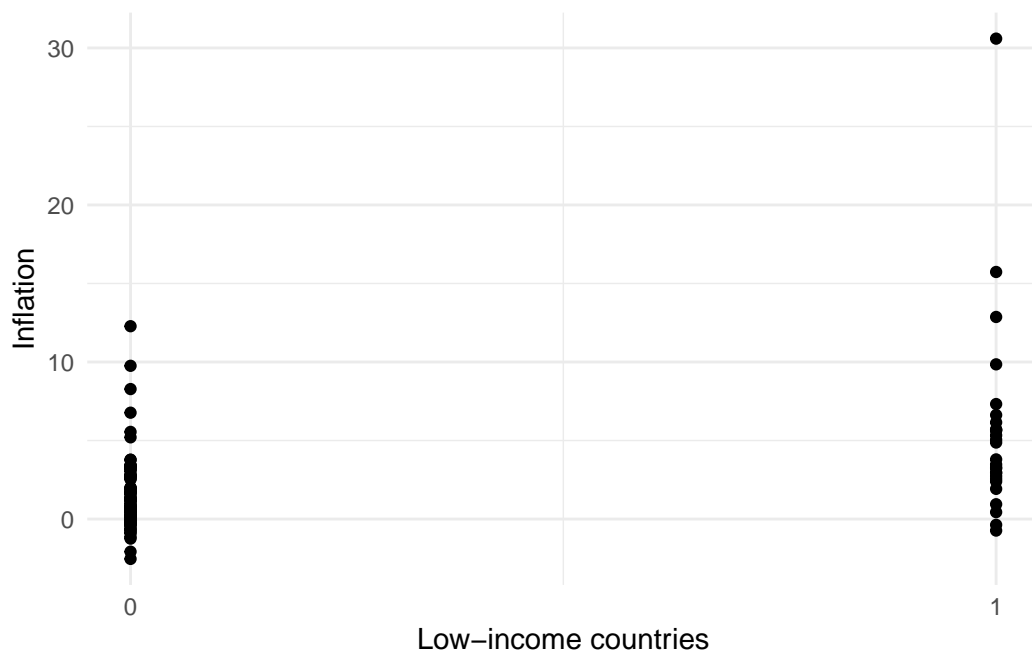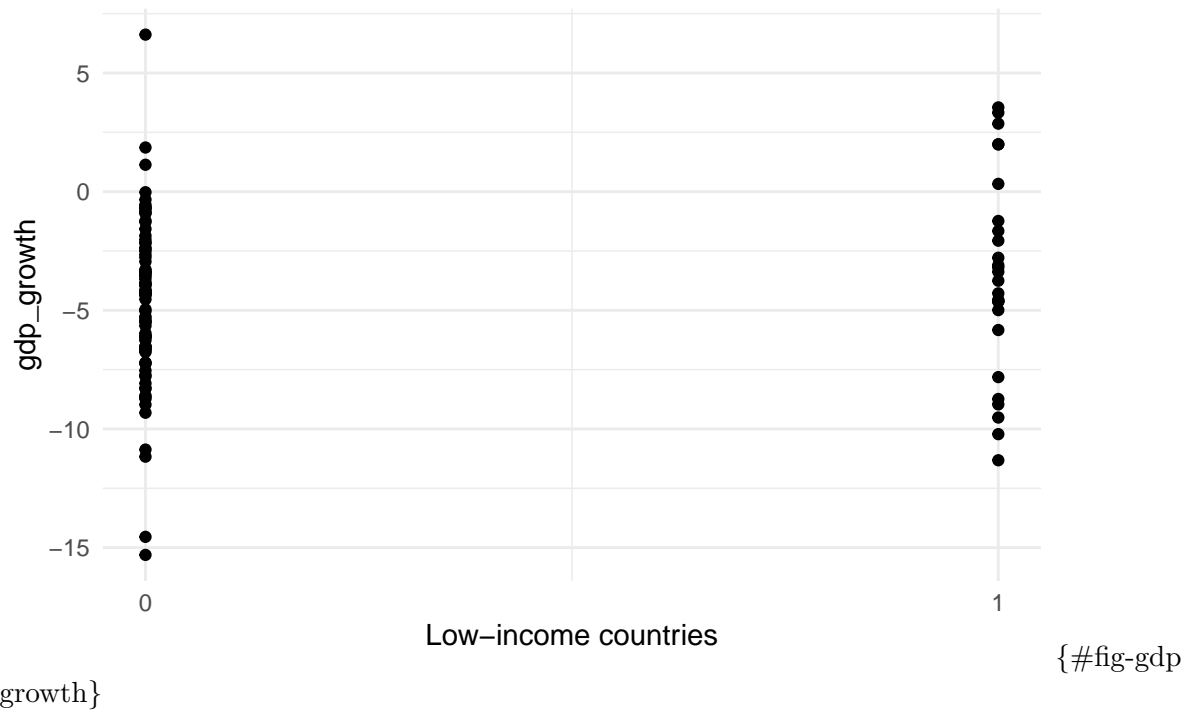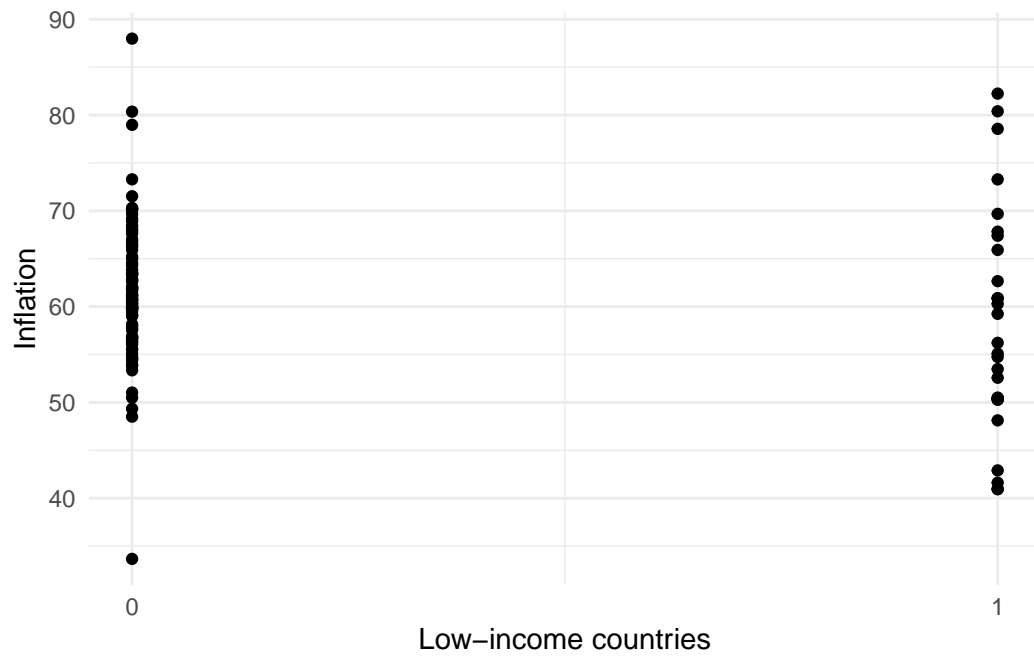Figure 1: Relationship between GDP growth versus Inflation

Figure 2: Relationship between differenct level of income countries versus Inflation

{#fig-gdp growth}

```
data_na |>
  ggplot(mapping = aes(x = low_income, y = lf_par_rate)) +
  geom_point() +
  theme_minimal() +
  labs(x = "Low-income countries", y = "Inflation")+
  scale_x_continuous(breaks = c(0,1))
```

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 β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

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 θ.

4 Results

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be 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

If two different time events occurs does low-income countries being impacted differently before, after they become high-income countries?

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/.

Kim Parker, Jesse Bennett, Rachel Minkin. 2020. "Economic Fallout from COVID-19 Continues to Hit Lower-Income Americans the Hardest." *Pew Research Center.* https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing.* Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Strauss-Kahn, Marc-Olivier. 2020. "Can We Compare the COVID-19 and 2008 Crises?" *Atlantic Council.* https://www.atlanticcouncil.org/blogs/new-atlanticist/can-we-compare-the-covid-19-and-2008-crises/#:~:text=Collapse%3A%20The%20initial%20drops%20in,index%20from%202008%20to%202020.

Takefman, Bruce. 2023. "The Effects of Globalization on Economic Development." *ResearchFDI.* https://researchfdi.com/resources/articles/the-effects-of-globalization-on-economic-development/.