Background

Research Question: To what extent did a country's pre-crisis wealth level predict the post-2008 gap in living standards from its counterfactual?

Data Source:

- GDP per capita (constant prices, PPP, 2017 int'l dollar) — IMF WEO
- Population — IMF WEO

Potential Application:

- This research is a complement to Ball (2014). It suggests that the more developed a country was before 2008, the more vulnerable it would be to the crisis in terms of recovery back to its pre-2008 trend projection.
- Therefore, wealthier countries have a greater incentive to make policies to prevent financial crises, because they tend to suffer a heavier toll.

Methodology

Sample Time Period for Prediction: 1980 – 2007

- For countries with shorter data records (e.g., former Soviet republics), we use the earliest available data, with a minimum of 16 time periods for prediction.

Countries:

- 162 countries with GDP per capita data available from 1992 or earlier, and population data available through 2024.

Model:

- Assume an exponential growth trend for GDP per capita:

$$y_t = Ae^{\alpha \cdot t + u_t}, \quad u_t \sim N(0, \sigma_1^2).$$

- This is an intrinsically linear model that can be transformed for OLS estimation:

$$\ln(y_t) = \ln(A) + \alpha \cdot t + u_t, \quad u_t \sim N(0, \sigma_1^2).$$

Methodology

Step 1: Estimate $\ln(A)$, α, and σ_1^2 based on data from 1980 (or later, but not later than 1992) to 2007, using OLS.

Step 2: Forecast the estimated potential GDP per capita $\hat{y}_t$ from 2008 to 2024.

Step 3: Compare the predicted value and the 95% confidence interval with the actual value.

- **Comparative Analysis:** For the United States, choose 1986, 1996 and 2019 as sample ending years to compare the impacts of these crises with the Great Recession.

US Real GDP Per Capita vs Multi-Trends

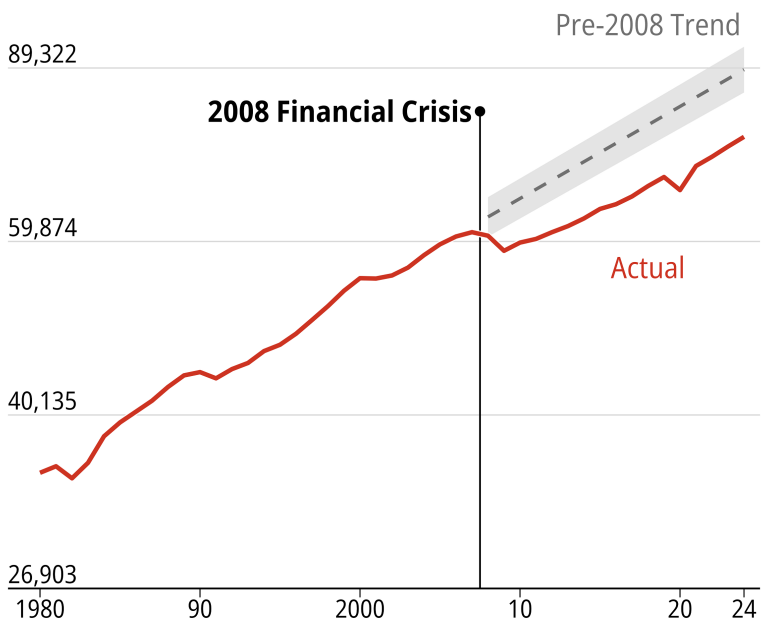


Figure 1: US vs Pre-2008 Trend

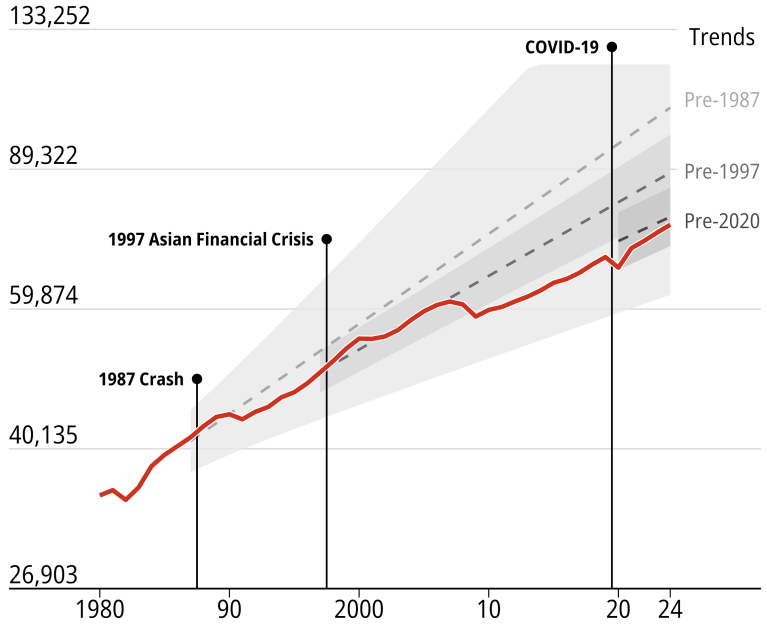


Figure 2: US vs Multi-Trends

Findings: The 2008 Financial Crisis impacted the United States' living standards more seriously than other recent crises.

China and India Real GDP Per Capita

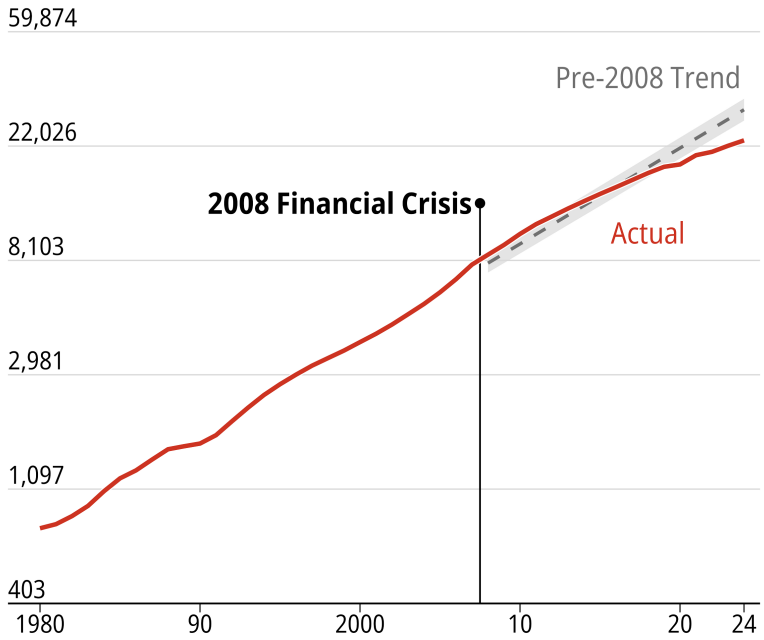


Figure 3: China vs Pre-2008 Trend

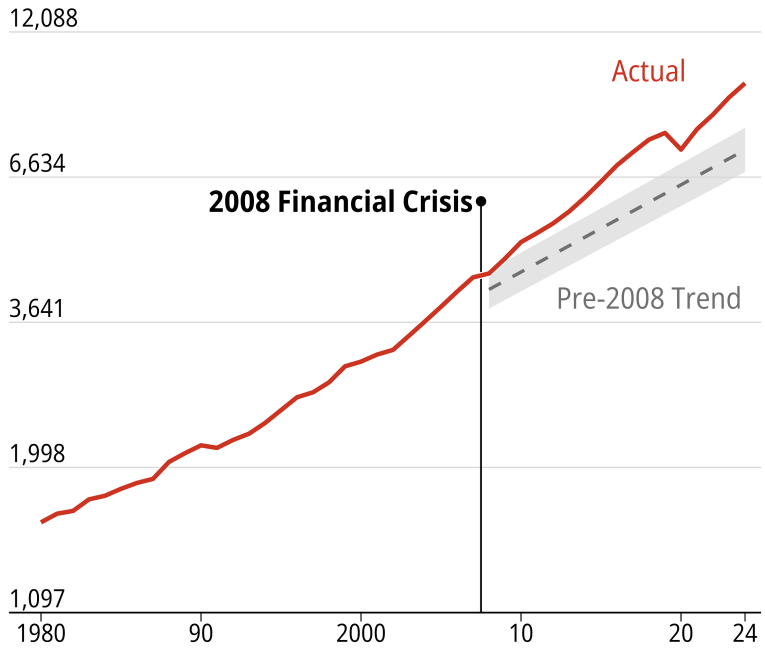


Figure 4: India vs Pre-2008 Trend

Findings: China's growth aligned with its pre-crisis trend until the pandemic, while India's growth surpassed it.

Methodology

Step 4: Ratio of actual GDP per capita to its pre-2008 prediction **in 2024 (Assumption 1)** as a measure of how much a country has recovered from the 2008 Crisis (100% = fully recovered):

$$\text{Recovery}_i = \frac{y_{i,2024}}{\hat{y}_{i,2024}} \times 100\%.$$

Step 5: GDP per capita in 2007, $y_{i,2007}$, as a measure of a country's pre-crisis wealth level.

Step 6: Assume a **linear model (Assumption 2)**:

$$\text{Recovery}_i = \beta_0 + \beta_1 \cdot y_{i,2007} + \varepsilon_i, \quad \varepsilon_i \sim N(0, \sigma_2^2).$$

Step 7: After **deleting 7 outliers (Assumption 3)**, estimate β_0, β_1, and σ_2^2 based on 155 observations, using **OLS (Assumption 4)**.

Main Findings

Main Findings:

- A global divergence in recovery.
- A **negative correlation** between a country's pre-crisis wealth and its post-crisis recovery level.
- 72 countries (46.5%) exceeded their pre-crisis trend projections by 2024.
- 82 countries (53.5%) fell short of their predicted growth level.

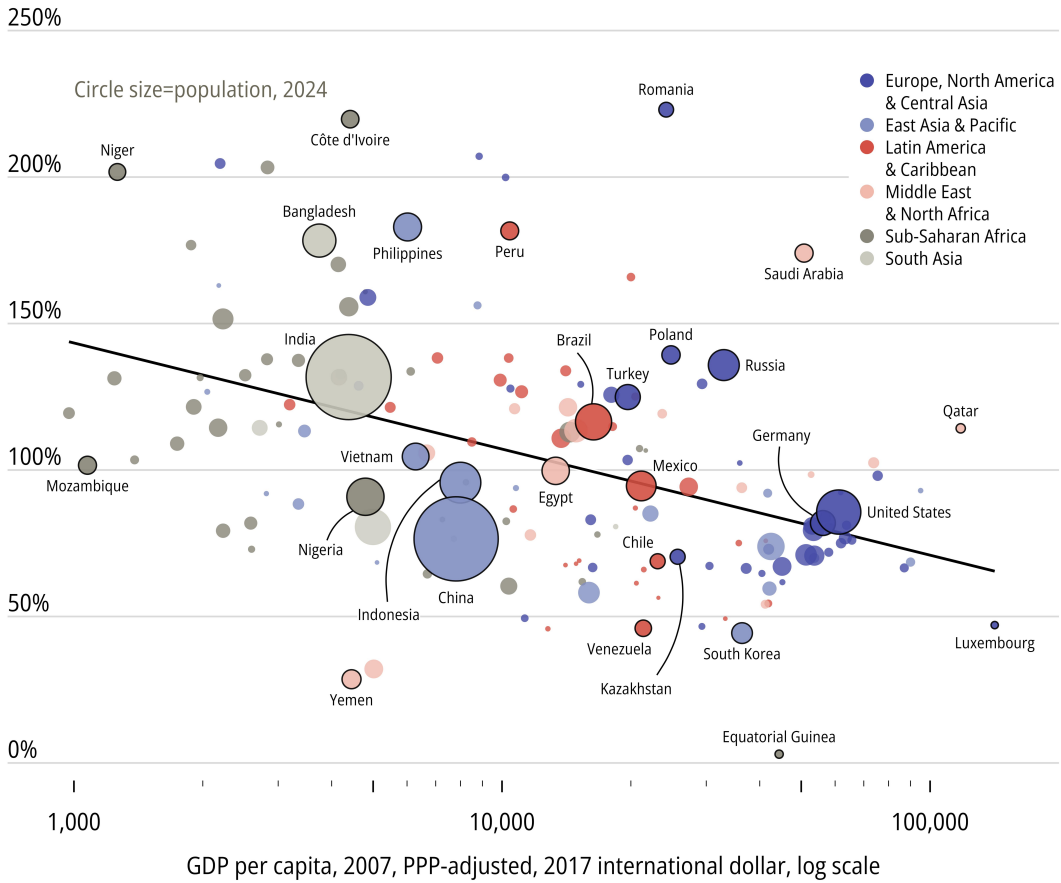


Figure 5: Pre-Crisis Wealth and Recovery in 2024

Sensitivity Analysis

Assumption 1

Use $y_{i,2024}$ as a share of $\hat{y}_{i,2024}$ to measure the gap in living standards.

Problem: The result might be confounded with the impact of Covid-19.

- As shown in Figure 3, China surpassed or at least aligned with its pre-2008 trend until it was hit by Covid-19.

Sensitivity Check: Use $y_{i,2019}$ as a share of $\hat{y}_{i,2019}$ to construct Recovery_i.

Assumption 2

Do not control for regional fixed effects.

Problem: It is reasonable to assume that all countries in the same region have been impacted similarly by the crisis.

Sensitivity Check: Divide countries into six regions denoted $g(i)$, using de-meaned method to estimate γ_1 ($\overline{\text{X}}_{g(i)}$ = mean of X for region $g(i)$) :

$$\text{Recovery}_i - \overline{\text{Recovery}}_{g(i)} = \gamma_1 \cdot [y_{i,2007} - \overline{(y_{i,2007})}_{g(i)}] + \tilde{\mu}_i.$$

Sensitivity Analysis

Assumption 3

For illustrative purposes, exclude 7 outliers with a recovery level higher than 250% from the regression.

Problem: Selection bias.
Sensitivity Check: Run the original regression with all 162 countries.

Assumption 4

Use OLS method to estimate β_1:

$$\min_{\beta_0, \beta_1} \sum_{i=1}^{155} (\text{Recovery}_i - \beta_0 - \beta_1 \cdot y_{i,2007})^2.$$

Problem: Economies with different population sizes are treated equal.
Sensitivity Check: Use WLS method ($\omega =$ population in 2024) :

$$\min_{\beta_0, \beta_1} \sum_{i=1}^{155} \omega_i (\text{Recovery}_i - \beta_0 - \beta_1 \cdot y_{i,2007})^2.$$

Sensitivity Analysis

Figure 6: SA for ASMP 1

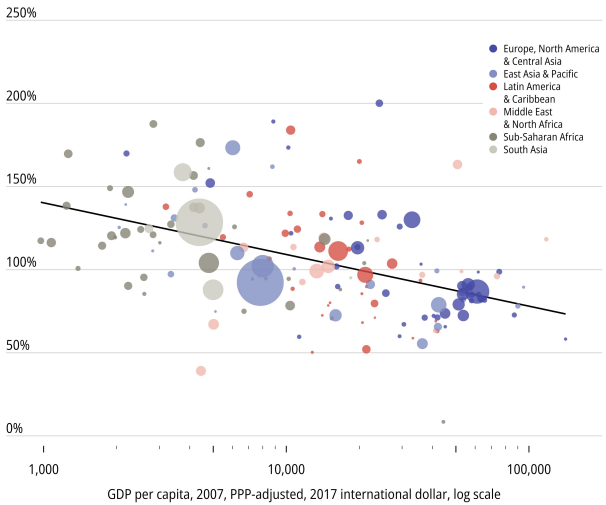


Figure 7: SA for ASMP 2

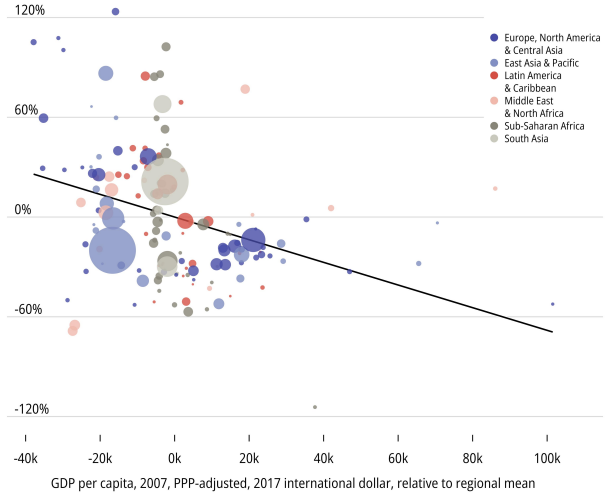


Figure 8: SA for ASMP 3

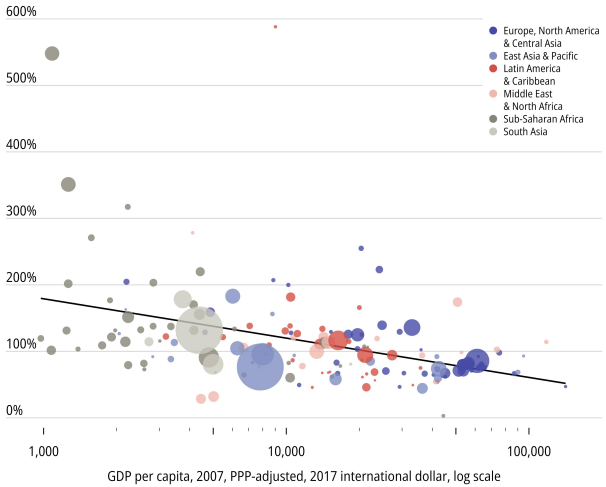
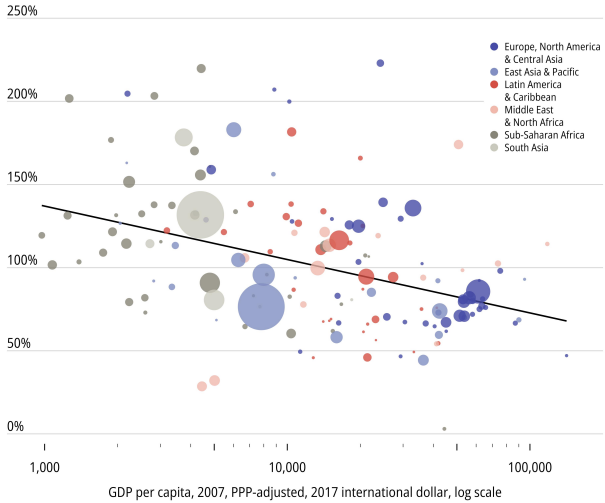


Figure 9: SA for ASMP 4



Regression Table

Table 1: Recovery Ratio and GDP Per Capita in 2007

	Dependent Variable: Recovery Ratio (%)				
	(1)	(2)	(3)	(4)	(5)
GDP per capita in 2007	−6.226***	−5.517***	−6.815***	−9.532***	−5.924***
	(1.255)	(0.996)	(1.455)	(2.255)	(1.475)
Constant	117.489***	118.375***	0.000	136.139***	114.969***
	(4.243)	(3.367)	(3.024)	(7.471)	(3.489)
Recovery Year of Interest	2024	2019	2024	2024	2024
Regional Fixed Effects	×	×	✓	×	×
Includes Outliers	×	×	×	✓	×
Population Weights	×	×	×	×	✓
Observations	155	155	155	162	155
R^2	0.139	0.167	0.125	0.100	0.095
Adjusted R^2	0.133	0.162	0.120	0.095	0.090

Note: Dependent variable is the Recovery Ratio multiplied by 100, interpreted as percentage points. Standard errors are in parentheses. The coefficient for GDP per capita in 2007 has been multiplied by 10,000 for readability. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Conclusion

Key Findings:

- Countries with higher pre-2008 income are less likely to return to their pre-crisis growth trend levels – "too rich to recover."
- This negative association is robust across various sensitivity analyses.

Possible Explanation:

- Developed economies are deeply rooted in their financial systems, which make them vulnerable to crises. In contrast, developing countries have greater growth potential to offset the financial shocks.

Limitations:

- We do not test alternative approaches to estimate potential GDP.
- Some aspects need clarification in the graphical analysis (e.g., interpretation of logarithmic x-axes on Page 10).