Unit 07

Exercise 09 - Catch-up Growth in Emerging Markets: SOLUTION

The first thing you need to do is set up the compound growth formula using the input I have provided.

$$\text{GDP}_f = \text{GDP}_p \times (1+r)^t$$

Here is the main mistake most of you (who scored '0') made. The point is that both economies are growing, so the equation must account for this fact. Therefore, the proper equation will be:

$$\text{GDP}_B \times (1+r_B)^t = \text{GDP}_A \times (1+r_A)^t$$

Many of you did not consider this part and instead took Country A's GDP per capita as a fixed value of 50,000 THB. This is why I posted an announcement to give you a chance to correct it. After accounting for this, the formula to calculate the time

$$t = \frac{\ln\left(\frac{\text{GDP}_A}{\text{GDP}_B}\right)}{\ln(1+r_B) - \ln(1+r_A)}$$

Example Calculation for Student ID 660003:

1) Convert the number: Replace all '0's with '1's to get 66111113. Identify the last 4 digits (1113) and the last 2 digits (13). (By the way, some of you made mistakes here.)
2) Calculate the growth rates: $r_A = 0.04$ and $r_B = 0.06$
3) Calculate the time (t) using the formula above:

$$t = \frac{\ln(2.5)}{\ln(1+0.06) - \ln(1+0.04)}$$

$$t = \frac{\ln(2.5)}{\ln(1.06) - \ln(1.04)}$$

$$t = \frac{0.9163}{0.0583 - 0.0392}$$

$$t = \frac{0.9163}{0.0191}$$

$$t \approx 48 \text{ years}$$

Final Note

This exercise is highly relevant for students studying macroeconomics as it introduces key concepts such as **economic growth**, **catch-up growth**, and **compound growth rates**.

By solving this problem, you gain practical experience in:

1. Understanding **Growth Dynamics:** You learn how emerging economies can catch up to developed economies by adopting technology and best practices, which is a central theme in development economics.
2. **Applying Mathematical Tools**: The use of logarithms and compound growth formulas helps you connect mathematical tools to real-world economic scenarios, a critical skill in macroeconomic analysis.
3. **Interpreting Economic Data**: By calculating the time, it takes for one country to catch up to another, you develop the ability to interpret and analyze economic data, which is essential for policymaking and forecasting.
4. **Critical Thinking**: The exercise highlights common mistakes (e.g., assuming fixed GDP values) and encourages you to think critically about the assumptions and limitations of economic models.

Overall, this exercise bridges theoretical concepts with practical applications, preparing you to tackle more complex macroeconomic problems in the future.