

# Week 3 Recitation

---

## Practice Problems

This week's recitation is focused on economic growth, its causes and its possible consequences. We are going to analyze real world data using Gapminder, aiming to understand how the world economy behaved in the last few decades, and how sustainable those trends can be for the future.

For this recitation, it is important to start by reviewing the concepts they learned in the previous week, particularly GDP per capita, how to compare GDP across time (real instead of nominal GDP, so that we adjust for inflation) and how to compare GDP across countries (PPP\$, so that we adjust for cost of living and exchange rates). Again, the students can work by themselves or in groups, depending on the size of your recitation section. At the end of the class, they should present their results for the classroom. Working with real-world data should be exciting for them by itself, but maybe it's worth reminding them that one key component of this class is graphic analysis, so that understanding graphs and what they mean is a very important exercise.

1. The table below pictures the imaginary economy of Wakanda. In the first year, the economy was closed, but after T'Challa appears in front of the United Nations to reveal Wakanda's true state, they became an open economy.

	Year 1	Year 2
Consumption (C)	\$20,000	\$20,000
Investment (I)	\$5,000	\$7,000
Government Expenditure (G)	\$3,000	\$5,000
Exports (X)	-	\$6,000
Imports (M)	-	\$2,000

- a) What is Wakanda's nominal GDP for year 1 and year 2?  **$20,000 + 5,000 + 3,000 = \$28,000$  and  $20,000 + 7,000 + 5,000 + 6,000 - 2,000 = \$36,000$**
- b) What is Wakanda's trade balance for year 1 and year 2?  **$\$0$  (closed economy) and  $6,000 - 2,000 = \$4,000$**
- c) Assume that year 1 is our base year, and the price index for year 2 is 103. What is Wakanda's real GDP for year 1 and year 2?  **$\$28,000 / (100/100) = \$28,000$  and  $\$36,000 / (103/100) = \$34,952$**
- d) How much did Wakanda's nominal GDP grow from year 1 to year 2? If they kept growing at that rate for 5 years, what would be their nominal GDP at the end of that period (consider year 1 as the beginning of the series)?  **$[(36,000 - 28,000) / 28,000] * 100 = 28.57\%$ . At the end of the fifth year:  $28,000 * (1 + 0.2857)^5 = \$98,369$**
- e) Since Wakanda is very intellectually advanced, internationally isolated and highly resourceful, do you believe that they would use GDP as their measure of well-being? Why or why not? **Since the benefits of using GDP are (1) it is easy and cheap to measure and (2) it is easily comparable with other countries (when used in per capita and PPP), together with the fact that Wakanda values education, natural preservation and other variables that are not properly measured in GDP, it would be unlikely for them to use GDP as a relevant variable.**

**When the economy opens, however, it might be useful to compare Wakanda's economy with the rest of the world.**

2. Now consider the employment situation in Wakanda. Their total working age population is 250,000 people, but 50,000 of them are "discouraged" and haven't been looking for work nor are they working. There is currently 192,000 people working for pay. What is the unemployment rate? What about the labor force participation rate?

**First, find the labor force by subtracting the discouraged workers from the working age population.  $(250,000 - 50,000) = 200,000$ . Discouraged workers do not count in labor force because they are not looking for a job. Next, we need to find the number of unemployed persons, which are those in the labor force and not working for pay.  $\text{Unemployed} = (200,000 - 192,000) = 8,000$ . Now, to calculate unemployment rate =  $(\text{unemployed}/\text{labor force}) = 8,000/200,000 = 4\%$ . Lastly, labor force participation rate =  $\text{labor force}/\text{working age population} = 200,000/250,000 = 80\%$ .**

3. Go to [gapminder.com/tools](http://gapminder.com/tools). At the right of the screen, there will be a "FIND" button (magnifying glass icon); click it and select three countries that you are interested at comparing and learning more about. At the bottom, put the gray bar all the way to the left, so that the countries that you didn't select disappear from the graph. Now, select Income in the Y axis and Time in the X axis, then press play at the bottom of the graph. How did income per capita grow over time? Did the countries converge or diverge in terms of income per capita? (Tip: you can change the size of the circles by clicking in "OPTIONS", then "SIZE". They reflect the size of the population, but making them smaller may make it easier to observe the trends.)

**For this question, make sure that the students understand that Income is GDP per capita PPP\$ inflation-adjusted. If they chose countries that are low and middle-income and compared with high-income, incentivize them to talk about convergence.**

4. What are the three components of economic growth? Choose one indicator that you believe is a good proxy for each component and compare it with income by using the indicator income as your Y axis and your indicator of choice as your X axis. Do this analysis for only one of the countries you picked in the previous section. Are periods of economic growth associated with growth in each of those indicators? Which indicator (if any) shows a stronger positive relationship? (Tip: use the zoom tool at the right of the graph to adjust the scale.)

**The three components of economic growth are human capital, physical capital and technology. For human capital, it is intuitive to use an educational variable, such as the OWID Education index, which calculates average years of schooling. Gapminder doesn't really have a good measure of capital formation, so using an infrastructure indicator (such as paved roads) is the best option. Finally, for technology, under Economy -> Economic Situation they have patent applications and patents granted variables. It might take a while for students to figure that out, so giving tips and suggestions is likely necessary.**

5. In general, one of the benefits associated with economic growth is improvements in the conditions of living. For the same country analyzed in the previous question, observe if indeed periods of economic growth are associated with improvements in the Human Development Index.

**Students should be able to understand that they must change only the X axis for Human Development Index. You can find this indicator in the Society folder or just using the search box.**

6. Finally, one of the costs associated with economic growth is the environmental impact. For the same country, observe if indeed periods of economic growth are associated with higher CO<sub>2</sub> emissions.

**Some countries don't have data for CO<sub>2</sub> emissions, but other environmental indicators are available, such as forest coverage.**