

Economics 102
Summer 2016
Answers to Homework #3
Due 7/7/16

Directions: The homework will be collected in a box **before** the lecture. Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade. Please remember the section number for the section **you are registered**, because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please remember to

- Staple your homework before submitting it.
- Do work that is at a professional level: you are creating your “brand” when you submit this homework!
- Not submit messy, illegible, sloppy work.

1. For each of the following scenarios determine the effect on GDP of the described event. Then, explain the reasoning behind your answer.

a. Tim’s Bikes produces 1000 Bikes in 2014 and sells 700 of these Bikes in 2014 for a price of \$200 per bike. In 2015 Tim’s Bikes produces another 1000 bikes and sells 1300 Bikes in 2015 for a price of \$200 per bike. What was the impact of Tim’s Bikes on GDP in 2014 and 2015? Explain your answer.

b. Susie raises goats on a 50 acre plot outside of Madison, WI. In 2015 she decides to sell 25 acres of her goat farm to a neighbor. The price per acre for this transaction is \$2,000. What is the impact of this transaction on GDP in 2015? Explain your answer.

c. Michelle sold her "app" to Google in 2012 and was hired by Google to facilitate getting this app up and running on the Google platform. As part of her compensation package she also received 100 shares of Google stock. In 2014 she sold 50 of these shares to Bob for \$50 a share. What was the impact of Michelle's selling of this stock on GDP in 2014? Explain your answer.

d. Michael changes the oil in his car every six months as does his neighbor Millie. At the beginning of 2013 Michael incorporates an oil change business and starts providing these services professionally. Millie is one of his first customers and she pays him \$20 twice a year to change the oil in her car. In addition, Millie contracts with Michael to rotate her car's tires once a year for an additional \$30. Given Michael and Millie's actions, what is the impact on GDP in 2013 from these events?

e. Both Jason and Miranda in 2014 opened an after-school childcare facility. Jason’s enterprise is not licensed and is strictly a word-of-mouth, cash operation. Jason has six children who come to the facility for \$25 per child per week. Jason’s center is open for 36

weeks a year. Miranda's facility is a licensed provider of care for young children. She currently has 15 children that come to the facility at a cost of \$30 per child per week. The center is open for 36 weeks a year. What was the effect of Jason and Miranda's activities on GDP in 2014?

f. Elizabeth has a vintage car that has been in her family for 60 years. A recent appraisal of the car noted that it was worth \$60,000 due to its age and uniqueness. In 2015 she realized that the car needed some repair and refinishing after all these years of use. She took the car to "Hotrod Betsy", a local vintage car restorer, who repaired and refinished the car. Hotrod Betsy charged Elizabeth \$6000 (including a sales tax of \$330) for this work. What was the contribution to GDP in 2015 from these activities?

Answer:

a. GDP in 2014 changed by $(1000 \text{ bikes})(200/\text{bike}) = \$200,000$. An alternative way to see this is to use the expenditure approach: $GDP = C + I + G + (X - M)$. C in 2014 from bike consumption is $(700 \text{ bikes})(\$200/\text{bike}) = \$140,000$. But, I in 2014 was $(300 \text{ bikes added to inventory})(\$200/\text{bike}) = \$60,000$. So, the effect on GDP in 2014 using the expenditure approach would be $(\text{the change in consumption spending}) + (\text{the change in investment spending}) = (\$140,000) + (\$60,000) = \$200,000$. Note that the two approaches give us the exact same number.

GDP in 2015 changed by $(1000 \text{ bikes})(\$200/\text{bike}) = \$200,000$. An alternative way to see this is to use the expenditure approach: $GDP = C + I + G + (X - M)$. C in 2015 from bike consumption is $(1300 \text{ bikes})(\$200/\text{bike}) = \$260,000$. But, I in 2015 was $(-300 \text{ bikes drawn down from inventory})(\$200/\text{bike}) = -\$60,000$. So, the effect on GDP in 2015 using the expenditure approach would be $(\text{the change in consumption spending}) + (\text{the change in investment spending}) = (\$260,000) + (-\$60,000) = \$200,000$. Note that the two approaches give us the exact same number.

b. This transaction does not impact GDP for 2015 because it does not represent any current production. It simply reflects a change in land ownership and since GDP is about measuring production this transaction does not get included in the value of GDP for 2015.

c. This transaction does not impact GDP in 2014 because it does not represent any current production. It simply reflects a change in the stock ownership and since GDP is about measuring production this transaction does not get included in the value of GDP for 2014.

d. Once Michael incorporates his business and starts providing these services professionally then they get counted in GDP. So in 2013 his business contributes $(\$20 \text{ per oil change})(2 \text{ oil changes per year}) + (\$30 \text{ per tire rotation})(1 \text{ tire rotation per year}) = \70 due to Millie's use of his legally provided services.

e. Jason's activities are not counted in GDP for 2014 because he is not operating a licensed, legal business. His activities would be considered part of the underground economy. Miranda's activities on the other hand are part of the legal, market economy so her

production would get counted in GDP for 2014. What is this production worth? Miranda's contribution to GDP for 2014 = (15 children)(\\$30 per week per child)(36 weeks per year) = \\$16,200.

f. Although the vintage car is appraised at a high value, none of this appraised value is part of GDP in 2015. The car when it was produced 60 years ago was valued in GDP that year. But, the repair and refinishing work that was done in 2015 does get counted in GDP: we know that Hotrod Betsy is running a legal business because she is paying taxes on the work she is doing. GDP in 2015 will increase by $\$6000 - \$330 = \$5670$ due to the production that Hotrod Betsy provided. Note that the tax of \\$330 does not represent production.

2. Suppose you are told that in the economy of McKeiverville that rent payments for land resources are equal to \\$2000 million in 2015, interest payments for capital are equal to \\$750 million in 2015, consumer expenditures on goods and services are equal to \\$1800 million in 2015, profits are equal to \\$250 million in 2015, investment spending is equal to \\$800 million in 2015 and net exports are equal to \\$200 million in 2015. You also know that in McKeiverville in 2015 that wage income was 20% of the amount spent by the government on goods and services during 2015. Determine the level of GDP in McKeiverville in 2015, the level of wage income in 2015, and the level of government spending in 2015. In determining these levels verbally describe how you are finding these answers and in your verbal description make specific reference to the definition(s) of GDP you are using to find the answers.

Answers:

To find these three measurements-GDP, G and wages-it is helpful to first organize the data you have been given. In your organization it is worth thinking about the various definitions of GDP: in particular, it is helpful to think about the factor payment approach to GDP measurement as well as the expenditure approach to GDP measurement. Recall the following:

Factor payment approach: $GDP = \text{wages} + \text{interest} + \text{rent} + \text{profits}$

Expenditure approach: $GDP = C + I + G + (X - M)$

Looking at the data we have:

Factor payment approach: $GDP = \text{Wages} + 750 + 2000 + 250$ or $GDP = \text{Wages} + 3000$

Expenditure approach: $GDP = 1800 + 800 + G + 200$ or $GDP = 2800 + G$

GDP should be equivalent using these two different methods of measurement, so we can write:

$\text{Wages} + 3000 = 2800 + G$ or $\text{Wages} = G - 200$

Looking at the given data we also know the relationship between wages and government spending: $\text{Wages} = .2G$ or $G = (1/.2)(\text{Wages})$. So, use this equation to substitute into the first equation:

$$\text{Wages} = (1/.2)(\text{Wages}) - 200$$

$$200 = 4(\text{Wages})$$

$$\text{Wages} = \$50 \text{ million}$$

$$\text{Government Spending} = (1/.2)(\text{Wages}) = (5)(\$50 \text{ million}) = \$250 \text{ million}$$

$$\text{Factor payment approach: } \text{GDP} = \text{Wages} + 3000 = \$50 + \$3000 = \$3050 \text{ million}$$

$$\text{Expenditure approach: } \text{GDP} = 2800 + G = 2800 + 250 = \$3050 \text{ million} =$$

3. You are told the following information about the economy of Denville. Worth Brick a company located in Denville produced \$1 million worth of bricks in 2015 and sold \$1.2 million of brick as final goods to consumers in Denville. Worthy Brick was able to sell this much brick by drawing down their inventories. In addition, in 2015 an additional \$200,000 worth of bricks were sold to consumers located outside of Denville. Consumers in this economy during 2015 make purchases of \$2.75 million on goods and services. Included in these purchases are purchases of \$400,000 of fine British wool (produced in 2015 in Great Britain and not produced in Denville), and \$175,000 worth of bananas grown in Costa Rica. Consumers in Denville also purchase \$3,000,000 worth of newly constructed homes during 2015. In 2015 government purchases in Denville totaled \$750,000. There is no other data to consider when computing the GDP of Denville for 2015. For each question below show how you got your numerical value.

- Given the above data, what is the level of consumer expenditure in Denville in 2015?
- Given the above data, what is the level of government expenditure in Denville in 2015?
- Given the above data, what is the level of investment expenditure in Denville in 2015?
- Given the above data, what is the level of imports to Denville in 2015?
- Given the above data, what is the level of exports to Denville in 2015?
- Given the above data, what is the level of GDP in Denville in 2015?

Answer:

a. Total consumer expenditure for 2015 is equal \$2,750,000 or \$2.75 million. This number will be adjusted by subtracting out the imported goods: the imports will be \$400,000 worth of fine British wool and \$175,000 of Costa Rican bananas. While the \$2,750,000 represents total consumption it includes production that was done outside of Denville. Notice that the bricks sold to consumers are not being added to the \$2.75 million: this is because the \$2.75 million already includes this consumer expenditure.

b. Government expenditure in 2015 is equal to \$750,000.

c. Investment expenditure is equal to the sum of new residential construction, inventory adjustment, and domestic plant and equipment expenditure. In this case investment

expenditure is equal to $\$3,000,000 + (-\$200,000)$ or $\$2,800,000$. The $(-\$200,000)$ represents the inventory adjustment. The other $\$200,000$ in bricks sold to consumers located outside of Denville will be included in exports since these units were sold to buyers located outside of Denville.

d. Imports in this example are equal to the sum of the value of the fine British wool + the value of Costa Rican bananas. That is, imports are equal to $\$400,000 + \$175,000$ or $\$575,000$ or $\$.575$ million. This is the value of goods and services purchased in Denville in 2015 that were not produced in Denville.

e. The level of exports in Denville is equal to $\$200,000$, the value of the bricks sold to consumers located outside of Denville.

f. $GDP = C + I + G + (X - M)$

From our work in (a) through (f) we know the following:

$C = \$2,750,000$ or $\$2.75$ million

$I = \$2,800,000$ or $\$2.8$ million

$G = \$750,000$ or $\$.75$ million

$X = \$200,000$ or $\$.2$ million

$M = \$575,000$ or $\$.575$ million

So, $GDP = 2.75 + 2.8 + .75 + (.2 - .575)$

$GDP = \$5.925$ million or $\$5,925,000$

4. Consider the community of Clarkville. There are six hundred people who live in Clarkville and your task is to answer the following set of questions based on the information below:

- In Clarkville there are 90 people who are less than 16 years old
- In Clarkville there are 40 people who are over 70 years old and are fully retired
- In Clarkville there are 60 people who are currently not working, are available to work, and have submitted job applications during the past four weeks
- In Clarkville there are 40 people who are currently not working, are available to work, but who have given up submitting job applications because they do not believe there is any work to be had in Clarkville
- In Clarkville there are 70 full-time college students who are not currently seeking work
- In Clarkville there are 140 people who are working part-time but who would like to work full-time
- The rest of the Clarkville population is over 16 years old and currently working

In your answers round to the nearest tenth of a percent when calculating the percent value.

a. What is the number of employed people in Clarkville? Explain how you got your answer.

b. What is the number of unemployed people in Clarkville? Explain how you got your answer.

- c. What is the labor force equal to in Clarkville?
- d. What is the unemployment rate in Clarkville? Show how you found your answer.
- e. How would the unemployment rate change in Clarkville if discouraged workers were counted as unemployed workers? Verbally describe how the unemployment rate would change and then calculate a numeric value based on this change in the definition of unemployment.
- f. How would the unemployment rate change in Clarkville if part-time workers were counted as unemployed workers rather than employed workers? Verbally describe how the unemployment rate would change and then calculate a numeric value based on this change in the definition of unemployment.

Answer:

a. The number of employed people in Clarkville includes all those individuals who are 16 years old or older and who are currently working, whether working part-time or full-time. Thus, the number of employed people in Clarkville is equal to the 140 part-time workers plus the 160 full-time workers. To get the 160 full-time workers you need to start with the total population of Clarkville which is 600. Then subtract out the 90 children, the 40 people who are retired, the 40 people who are not working but who have also given up searching for work, the 60 people who are not working but who are still seeking a job, the 70 college students, and the 140 part-time workers. The total number of employed people in Clarkville is 300 people.

b. The number of unemployed people in Clarkville includes all those individuals who are 16 years old or older and who are currently not working, but who are available to work and who are also actively looking for a job. All three of these criteria must be met to be considered unemployed. Thus, in Clarkville the number of unemployed is equal to 60 people.

c. The labor force is defined as the number of employed plus the number of unemployed. In Clarkville the labor force is therefore equal to 360 people.

d. The unemployment rate is equal to $[(\text{the number of unemployed})/(\text{labor force})] * (100\%)$. In this case we have that the unemployment rate is equal to $[(60)/(360)] * 100\% = 16.7\%$.

e. If discouraged workers were counted as unemployed workers this would cause the unemployment rate to increase. In this example, changing the definition of unemployed so that it includes the discouraged workers would cause the number of unemployed to increase by 40 to 100 people; it would also cause the labor force to increase by 40 to 400 people. Thus, the unemployment rate with this change would equal $[(100)/(400)] * 100\%$ or 25%.

f. If part-time workers were counted as unemployed workers this would cause the unemployment rate to increase. In this example, changing the definition of unemployed so that it includes the part-time workers would cause the number of unemployed to increase by 140 to 200 people (here I am leaving the discouraged workers out of the calculation); it would not affect the labor force which would still equal 360 people. Thus, the unemployment rate with this change would equal $[(200)/(360)] * 100\%$ or 55.6%.

5. For each of the following scenarios decide whether the person is employed or unemployed. Explain the reasoning behind your answers.

a. Patsy turned sixteen on April 4, 2016. She currently works at Metcalfe's Market 5 hours a week. She is not enrolled in school.

b. Pepper is twenty years old and works in his family's lawncare business for sixteen hours a week. Pepper does not get paid for this work. Pepper is not enrolled in school.

c. Susie volunteers ten hours a week with a local food pantry. Susie is also enrolled as a full-time college student. Susie celebrated her 21st birthday at the Nitty Gritty in February 2016.

d. Wilbur is out of work currently, but he is available to work and six weeks ago he submitted an application to a local cable company that was advertising a job that he thought he might be able to get. However, yesterday Wilbur agreed to go on a four week long vacation with his first cousin to see the western United States. They will leave next Tuesday for their trip.

e. Mariah is not currently working, but is available for work and is looking for work. Mariah is finding it tough to find positions that suit her skills and interests. The last time Mariah submitted a job application was June 15, 2016 and it is now July 5, 2016. Mariah turned 19 on January 1, 2014.

f. Josephine is sixty years old and she has worked throughout much of her adult life. In 2014 her work hours were cut to 20 hours a week at her job as a animal control officer for the local government. Josephine would like to work full-time and she is persistently looking for that kind of work and she is submitting job applications every week, but she has been unsuccessful in finding a full-time job.

g. Morris works at a local bakery forty hours a week. Morris is 38 years old. But, for the past two weeks Morris has not been at work and he has not been paid. Morris has been out sick with a bad flu bug.

Answers:

a. Patsy is old enough to be included in the unemployment statistics and she is also not a full-time student. She is working for pay for at least one hour a week. Patsy is considered employed.

b. Pepper is old enough to be included in the unemployment statistics and he is also not a full-time student. He is working without pay for more than fifteen hours a week: Pepper is considered employed.

- c. Although Susie is old enough to be included in the unemployment statistics, she is a full-time college student and is therefore considered to be not in the labor force. Susie is not considered employed or unemployed.
- d. Wilbur appears to be unemployed: out of work, available for work, and applying for a job within the last six weeks. However, if we stop right here he is actually not considered unemployed because he has not applied for a job within the last four weeks! Just based on this information we would consider Wilbur to not be in the labor force. Now, with his decision to accompany his cousin on a western tour for the next four weeks this continues to place him in the not in the labor force category since he will be unavailable to work during this next four week period of time.
- e. Mariah is old enough to be included in the unemployment statistics and Mariah seems to meet the criteria for being considered unemployed: out of work, available for work, and applying for jobs. Mariah applied for a job within the last four weeks: Mariah would be considered unemployed and therefore part of the labor force.
- f. Josephine is old enough to be included in the unemployment statistics. Josephine works at least one hour a week for pay, so although Josephine would like full-time work and she is dissatisfied with her current work situation, she is still considered employed. She is an example of a marginally attached worker: a person who is currently working in a part-time position but who would like a full-time position.
- g. Morris is considered employed even though he has been absent from his job due to illness. He is over 16 years old and he has a paid position with a company.

6. For this problem you will find it helpful to use either a calculator or an Excel spreadsheet. For your answers, round to the nearest hundredth.

In the economy of Raleigh the market basket for purposes of calculating the consumer price index (CPI) consists of 10 hamburgers, 1 computer and 20 oranges. You are given the following information about prices of these three goods for the years 2013, 2014, and 2015. Assume the price is the price per unit.

	Price in 2013	Price in 2014	Price in 2015
Hamburger	\$4.00	\$5.00	\$6.00
Computer	\$1,000.00	\$800.00	\$900.00
Oranges	\$1.00	\$1.50	\$3.00

a. Given the above information, calculate the cost of the market basket and put your answers in the following table. In your homework show how you got these costs.

Cost of Market Basket

Year	Cost of Market Basket
2013	
2014	
2015	

b. Calculate the CPI for 2013, 2014, and 2015 in Raleigh using a one hundred point scale and with the base year equal to 2013. Put your answers in the following table. Round your answer to the nearest hundredth.

Year	CPI with Base Year 2013
2013	
2014	
2015	

c. Calculate the CPI for 2013, 2014, and 2015 in Raleigh using a one hundred point scale and with the base year equal to 2015. Put your answers in the following table. Round your answer to the nearest hundredth.

Year	CPI with Base Year 2015
2013	
2014	
2015	

d. Calculate the annual rate of inflation in Raleigh using 2013 as the base year. In your answer show how you found this annual rate of inflation. Then put your answers in the following table. Round your answer to the nearest tenth.

Year	Annual Rate of Inflation with Base Year 2013
2013	
2014	
2015	

e. Calculate the annual rate of inflation in Raleigh using 2015 as the base year. In your answers show how you found this annual rate of inflation. Then put your answers in the following table. Round your answer to the nearest tenth.

Year	Annual Rate of Inflation with Base Year 2015
2013	
2014	
2015	

f. Are your answers in (e) and (f) the same? If they are not, then you have made an error and you should go back and correct the error before submitting your homework.

Answers:

a.

Cost of Market Basket

Year	Cost of Market Basket
2013	(10 hamburgers)(\$4 per hamburger) + (1 computer)(\$1000 per computer) + (20 oranges)(\$1 per orange) = \$1060
2014	(10 hamburgers)(\$5 per hamburger) + (1 computer)(\$800 per computer) + (20 oranges)(\$1.50 per orange) = \$880
2015	(10 hamburgers)(\$6 per hamburger) + (1 computer)(\$900 per computer) + (20 oranges)(\$3 per orange) = \$1020

b.

Year	CPI with Base Year 2013
2013	$[1060/1060] * 100 = 100$
2014	$[880/1060] * 100 = 83.02$
2015	$[1020/1060] * 100 = 96.23$

c.

Year	CPI with Base Year 2015
2013	$[1060/1020] * 100 = 103.92$
2014	$[880/1020] * 100 = 86.27$
2015	$[1020/1020] * 100 = 100$

d.

Year	Annual Rate of Inflation with Base Year 2013
2013	-----
2014	$[(83.02 - 100)/(100)](100\%) = -17\%$
2015	$[(96.23 - 83.02)/(83.02)](100\%) = 15.9\%$

e.

Year	Annual Rate of Inflation with Base Year 2015
2013	-----
2014	$[(86.27 - 103.92)/(103.92)](100\%) = -17\%$ (rounding discrepancy)
2015	$[(100 - 86.27)/(86.27)](100\%) = 15.9\%$ (rounding discrepancy)

f. Yes, except for a bit of rounding discrepancy the answers are the same. This is good since the rate of inflation should not depend upon the choice of the base year. The choice of the base year will affect the index numbers (remember the CPI is a price index) but it will not affect the calculation of the rate of inflation between two periods of time based on these index numbers.

7. LaShonda graduated from college in May and received four job offers for a position in economics in four different cities. The work at each of the jobs will be interesting and challenging to LaShonda and she does not have a strong personal preference as to where she would like to live. She does think it is important to compare the salaries for the four offers as well as the likely cost of living in each of the communities. The following table provides the information about the job offers that LaShonda has received.

Location of Offer	Salary (assume that all employee benefits are comparable and that all LaShonda needs to consider is the salary)
Waukesha, WI	\$85,000
Oakland, CA	\$130,000
Des Moines, MN	\$90,000
Savannah, GA	\$85,000

LaShonda knows that the cost of living is different in these four cities and she would like to choose that job which offers her the best standard of living. Based upon information I got from a Cost-of-Living Calculator on a website entitled money.cnn.com/calculator/pf/cost-of-living I have extrapolated an “inflation index” for each of these cities. Use this information to help guide LaShonda on her decision: remember she only wants to know where her nominal income will provide the best standard of living.

Here is some data that you will find helpful:

Location	Extrapolated Inflation Index
Waukesha, WI	0.693
Oakland, CA	1.000
Des Moines, MN	0.623
Savannah, GA	0.624

a. Use the above information to fill in the following table:

Location	Nominal Salary	Real Salary	Extrapolated Inflation Index
Waukesha, WI			0.693
Oakland, CA			1.000
Des Moines, MN			0.623
Savannah, GA			0.624

b. Given your results in (a), which offer should LaShonda accept?

c. Given your results in (a), which offer is the worst offer in terms of standard of living?

Answers:

a.

Location	Nominal Salary	Real Salary	Extrapolated Inflation Index
Waukesha, WI	\$85,000	\$122,655	0.693
Oakland, CA	\$130,000	\$130,000	1.000
Des Moines, MN	\$90,000	\$144,462	0.623
Savannah, GA	\$85,000	\$136,218	0.624

b. LaShonda should accept the Des Moines offer since it offers the highest real salary of the four choices.

c. The worst offer in terms of standard of living is the Waukesha offer.

8. You are given the following information about an economy:

Year	Nominal GDP	Real GDP	GDP Deflator
2010	\$200 Million		60
2011			
2012			
2013			100
2014			

You are also told that

- Nominal GDP increased by 20% between 2010 and 2011
- Real GDP stayed constant between 2010 and 2011
- Overall inflation, as measured by the GDP deflator, over the period 2010-2014 was 200%
- Real GDP increased 40% between 2011 and 2012
- Inflation increased by 20% between 2012 and 2013 as measured by the GDP deflator
- Nominal GDP between 2013 and 2014 stayed constant at \$440 million

a. Given the above information fill in the missing cells in the table. Round your answers to the nearest whole number.

b. Given the above information calculate the annual percentage change in nominal GDP, real GDP, and the GDP deflator. Put your answers in the following table. Round your answers to the nearest tenth.

Year	Percentage Change in Nominal GDP	Percentage Change in Real GDP	Percentage Change in GDP Deflator
2010	----	----	----
2011			
2012			

2013			
2014			

- c. What does it mean if the percentage change in real GDP is a negative number?
- d. According to your calculations is the percentage change in nominal GDP always equal to the percentage change in the GDP deflator?
- e. According to your calculations is the percentage change in real GDP always equal to the percentage change in nominal GDP?

Answers:

a.

Year	Nominal GDP	Real GDP	GDP Deflator
2010	\$200 Million	\$333 Million	60
2011	\$240 Million	\$333 Million	72
2012	\$387 Million	\$466 Million	83
2013	\$440 Million	\$440 Million	100
2014	\$440 Million	\$244 Million	180

b. To find the percentage change in nominal GDP from 2010 to 2011 you will need to use the following formula:

$$\text{Percentage Change in nominal GDP from 2010 to 2011} = \left\{ \frac{[(\text{Nominal GDP in 2011}) - (\text{Nominal GDP in 2010})]}{(\text{Nominal GDP in 2010})} \right\} * 100\%$$

Modify this formula with the appropriate measure from the appropriate year for the rest of the calculations.

Year	Percentage Change in Nominal GDP	Percentage Change in Real GDP	Percentage Change in GDP Deflator
2010	----	----	----
2011	20%	0%	20%
2012	61.25%	39.93%	15.28%
2013	13.7%	-5.58%	20.48%
2014	0%	-44.55%	80%

c. Real GDP measures the total value of all final goods and services produced in a given year using constant dollar prices. If the percentage change in real GDP is a negative number this tells us that the constant dollar value of real GDP has fallen over the last year.

d. No the percentage change in nominal GDP is not necessarily equal to the percentage change in the GDP deflator. The relationship between the nominal GDP and the GDP deflator also includes real GDP; recall the formula relating these three concepts:

$$\text{Real GDP} = [(\text{Nominal GDP}) / (\text{GDP deflator})] * (\text{scale factor})$$

e. No the percentage change in real GDP is not always equal to the percentage change in nominal GDP. See the formula relating real GDP, nominal GDP and the GDP deflator given in (d).