**Economics 102**

**Summer 2013**

**Answers to Homework #3**

**Due July 9, 2013**

**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 in 2013 of the described event. Then, explain the reasoning behind your answer.

a. Joe’s T-shirts produces 1000 t-shirts in 2012 and sells 800 of these t-shirts in 2012 for a price of $10 per t-shirt. In 2013 Joe’s T-shirts produces another 1000 shirts and sells 1200 t-shirts in 2013 for a price of $10 per t-shirt.

b. Marty’s Marketing in 2013 decided to expand the business and to do this it needed to raise financial capital. The company issued 100 shares of stock and sold these shares for $500 per share. The business expansion is slated to begin sometime in mid-2014.

c. Sammy and Joan live next door to each other and they each have two children that are under the age of five. During the week Sammy looks after Joan’s children and on the weekend Joan looks after Sammy’s children. The value of these childcare services is equal to $300 per week for each household. Sammy and Joan, recognizing that the value is equivalent for both of them, do not actually write each other a check in payment for the services and they do not record this income on their respective tax returns.

d. Harry and Megan live next door to each other and they each have two children that are under the age of five. During the week Harry looks after Megan’s children and on the weekend Megan looks after Harry’s children. The value of these childcare services is equal to $300 per week for each household. Harry writes Megan a check each week for fifty weeks (two weeks both households are on vacation) and Megan writes Harry a check each week for fifty weeks. Both Megan and Harry comply with all income tax regulations and social security regulations with regard to reporting this income.

e. Elizabeth has a desk she purchased in 1981 for $75 that was built in 1860. In 2013 she realized that the desk needed repair after years of heavy use. She took it in to “Dr. Phil”, a local furniture restorer, who re-glued and repaired the desk. The bill for this work was $140.64.

Answer:

a. In 2013 the effect of Joe’s activities on GDP will be $10,000 since in 2013 the new production is 1000 t-shirts with each t-shirt having a value of $10. The additional 200 t-shirts sold in 2012 were counted in GDP in 2012 since they were produced in 2012. In 2012 the 1000 t-shirts got valued as $8000 in consumption expenditure and $2000 in inventory expenditure (a part of investment spending). In 2013 the 1200 t-shirts sold were valued as $12000 in consumption expenditure and -$2000 in inventory expenditure (a part of investment spending).

b. This transaction has no effect on GDP in 2013 since it does not represent any kind of production that has occurred.

c. Although there is productive activity going on here (the minding of children is work!), the productive activity is not going through a legal market. We know this because neither Sammy nor Joan is reporting this activity on their tax returns. Hence, even though there is productive work going on GDP in 2013 is not affected. This example should make us pause and reflect on the many instances when productive work is not included in GDP: GDP figures may have a tendency to grossly under report important productive activities in an economy.

d. Harry earns ($300 per week)(50 weeks) = $15,000 as does Megan. The total of $30,000 gets counted as GDP in 2013 since the income is reported on income tax returns.

e. In 1981 Elizabeth purchased the desk for $75, but this sum did not affect the GDP for 1981 since the expenditure did not reflect new production but just an exchange of ownership of existent production. The value of the desk was part of GDP in 1860 when it was produced. But, in 2013 Elizabeth did get the repair of the desk done and this reflected new production. So, the value of $140.64 is credited to GDP for 2013.

2. Suppose you are told that in the economy of Leesville that rent payments for land resources are equal to $150 million in 2010, interest payments for capital are equal to $125 million in 2010, consumer expenditures on goods and services are equal to $350 million in 2010, profits are equal to $50 million in 2010, government expenditures on goods and services are equal to $95 million in 2010, and net exports are equal to -$20 million in 2010. You also know that in Leesville in 2010 that wage income was two times bigger than the level of investment spending on goods and services during that same year. Determine the level of GDP in Leesville in 2010, the level of wage income in 2010, and the level of investment spending in 2010. 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, I 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 = wages + interest + rent + profits

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

Looking at the data we have:

Factor payment approach: GDP = wages + 125 + 150 + 50 or GDP = wages + 325

Expenditure approach: GDP = 350 + I + 95 + (-20) or GDP = 425 + I

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

Wages + 325 = 425 + I or Wages = 100 + I

Looking at the given data we also know the relationship between wages and investment: wages = 2I or I = (1/2)wages. So, use this equation to substitute into the first equation:

Wages = 100 + (1/2)(wages)

(1/2)(wages) = 100

Wages = $200 million

Investment = $100 million

Factor payment approach: GDP = wages + 325 = 200 + 325 = $525 million

Expenditure approach: GDP = 425 + I = 425 + 100 = $525 million

3. You are told the following information about the economy of Somewhere. Consumers in this economy during 2012 make purchases of $600,000 on goods and services. Included in these purchases are purchases of $50,000 of French wine (produced in 2012 in France and not produced in Somewhere), and $30,000 worth of mangoes grown in Costa Rica. Consumers in Somewhere also purchase $1,200,000 worth of newly constructed homes during 2012. Acme Metals, a company in Somewhere specializing in the manufacture of refrigerator units, produces $100,000 worth of these units in 2012. Acme sells $40,000 worth of these units to customers located outside of Somewhere, sells $50,000 of these units to business customers in Somewhere, and the remaining units are kept as inventory for Acme. In 2012 government purchases in Somewhere totaled $100,000 with $20,000 of these purchases coming from Elsewhere.

There is no other data to consider when computing the GDP of Somewhere for 2012. For each question below show how you got your numerical value.

a. Given the above data, what is the level of consumer expenditure in Somewhere in 2012?

b. Given the above data, what is the level of government expenditure in Somewhere in 2012?

c. Given the above data, what is the level of investment expenditure in Somewhere in 2012?

d. Given the above data, what is the level of government expenditure in Somewhere in 2012? Duplication of the question in part (b): so just ignore it.

e. Given the above data, what is the level of imports to Somewhere in 2012?

f. Given the above data, what is the level of exports to Somewhere in 2012?

g. Given the above data, what is the level of GDP in Somewhere in 2012?

Answer:

a. Total consumer expenditure for 2012 is equal to $600,000. This number will be adjusted by subtracting out the imported goods: the imports will be $50,000 worth of French wine and the $30,000 worth of mangoes. While the $600,000 represents total consumption it includes production that was done outside of Somewhere.

b. Government expenditure in 2012 is equal to $100,000. This is total government expenditure with $80,000 representing production that occurred in Somewhere and $20,000 representing production that occurred outside of Somewhere. Again the import term will include the $20,000 that is not domestic production.

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 $1,200,000 + $60,000 or $1,260,000. The $60,000 includes the $10,000 inventory adjustment as well as the $50,000 worth of refrigerator equipment that is purchased by businesses in Somewhere. The other $40,000 in refrigerator equipment production will be included in exports since these units were sold to buyers located outside of Somewhere.

d. Government expenditure is equal to $100,000 although we will need to remember to include $20,000 in the imports number since the government is not purchasing goods and services that are only produced in the domestic economy.

e. Imports in this example are equal to the sum of the value of the French wine, the mangoes, and the government imports. That is, imports are equal to $50,000 + $30,000 + $20,000 or $100,000. This is the value of goods and services purchased in Somewhere in 2012 that were not produced in Somewhere.

f. The level of exports in Somewhere is equal to $40,000, the value of the refrigerator equipment that was sold to businesses located outside of Somewhere.

g. GDP = C + I + G + (X – M)

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

C = $600,000

I = $1,260,000

G = $100,000

X = $40,000

M = $100,000

So, GDP = $600,000 + $1,260,000 + $100,000 + ($40,000 - $100,000)

GDP = $1,900,000

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

* In Richville there are 40 people who are less than 16 years old
* In Richville there are 30 people who are over 70 years old and are fully retired
* In Richville there are 15 people who are currently not working, are available to work, and have submitted job applications during the past four weeks
* In Richville there are 20 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 Richville
* In Richville there are 50 full-time college students who are not currently seeking work
* In Richville there are 25 people who are working part-time but who would like to work full-time
* The rest of the Richville population is over 16 years old and currently working

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

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

c. What is the labor force equal to in Richville?

d. What is the unemployment rate in Richville? Show how you found your answer.

e. How would the unemployment rate change in Richville 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 Richville 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 Richville 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 Richville is equal to the 25 part-time workers plus the 20 full-time workers. To get the 20 full-time workers you need to start with the total population of Richville which is 200. Then subtract out the 40 children, the 30 people who are retired, the 20 people who are not working but who have also given up searching for work, the 15 people who are not working but who are still seeking a job, the 50 college students, and the 25 part-time workers. The total number of employed people in Richville is 45 people.

b. The number of unemployed people in Richville 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 Richville the number of unemployed is equal to 15 people.

c. The labor force is defined as the number of employed plus the number of unemployed. In Richville the labor force is therefore equal to 6- people.

d. The unemployment rate is equal to [(the number of unemployed)/(labor force)] \* (100%). In this case we have that the unemployment rate is equal to [(15)/(60)] \* 100% = 25%.

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 20 to 35 people; it would also cause the labor force to increase by 20 to 80 people. Thus, the unemployment rate with this change would equal [(35)/(80)] \* 100% or approximately 43.75%.

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 25 to 40 people; it would not affect the labor force which is equal to 60 people. Thus, the unemployment rate with this change would equal [(40)/(60)] \* 100% or 67%.

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

a. Joe will turn sixteen on June 6, 2013. He currently works at a local fast-food restaurant twenty hours a week.

b. Mary is eighteen years old and works in her family’s restaurant business twenty hours a week. She does not get paid for this work.

c. Jordan volunteers at a local food pantry twenty five hours a week. He is otherwise in school full-time. Jordan is twenty years old.

d. Vince is currently out of work but is looking for work. However for the next four weeks he will be on an extensive family vacation that will take him away from the town where he lives. Vince is thirty five years old.

e. Leann is currently out of work, is available for work and is looking for work but has recently had trouble finding any possible positions that would suit her skills and interests. She last filled out an application for a potential job in January 2013 and it is now June 2013. Leann is forty five years old.

f. Michael is currently working twenty hours a week but would prefer to be working full-time. He has submitted applications for potential jobs in the last four weeks but has not found anything that is full-time yet. Michael’s birthdate is 8/15/1997.

g. Cory works for a local auto body shop for forty hours a week. Cory is twenty six years old. Cory has been on vacation for the past two weeks and has not been to the auto body shop to work during this time.

Answer:

a. Joe is not necessarily in the labor force: it depends upon what you assume the current date is. If you assumed the current date is before 6/6/13 then Joe would not be included in the employment statistics since he is not yet 16. If you assume the date is after 6/6/13 then Joe would be 16, he would be considered employed since he is working for pay.

b. Mary is employed since she is 16 years old or older. She does not need to be paid in the family business in order to be considered employed. She just needs to work 15 or more hours a week.

c. Jordan is not in the labor force (neither employed nor unemployed) since volunteer activity, although valuable, is not considered employment.

d. Vince is not in the labor force (neither employed nor unemployed). To be unemployed Vince must be i) out of work; ii) available for work; and iii) actively applying for jobs. Vince meets the first and third criteria, but he does not meet the second criteria since he will be unavailable for work over the next four weeks while he travels.

e. Leann appears to be unemployed, but she fails the three criteria to be categorized as unemployed (see the answer to (d)) since she is not actively submitting applications. To be considered unemployed you must have submitted a job application within the last four weeks: Leann does not meet this standard. She does meet the standards of i) being out of work and ii) being available for work.

f. Michael is only fifteen years old. So, even though he has a job he is not considered employed because he is not 16 years old or older. He is also not considered unemployed since he is not at least 16 years old.

g. Cory is considered employed even though he has been on vacation from his job. He is over 16years 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 Smithville the market basket for purposes of calculating the consumer price index (CPI) consists of 5 hamburgers, 2 bikes and 6 milk shakes. You are given the following information about prices of these three goods for the years 2008, 2009, and 2010. Assume the price is the price per unit.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Price in 2008 | Price in 2009 | Price in 2010 |
| Hamburger | $4.00 | $5.00 | $5.00 |
| Bike | $500.00 | $520.00 | $540.00 |
| Milk Shakes | $2.00 | $2.50 | $2.00 |

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 |
| 2008 |  |
| 2009 |  |
| 2010 |  |

b. Calculate the CPI for 2008, 2009, and 2010 in Smithville using a one hundred point scale and with the base year equal to 2008. Put your answers in the following table.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2008 |
| 2008 |  |
| 2009 |  |
| 2010 |  |

c. Calculate the CPI for 2008, 2009, and 2010 in Smithville using a one hundred point scale and with the base year equal to 2010. Put your answers in the following table.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2010 |
| 2008 |  |
| 2009 |  |
| 2010 |  |

d. Calculate the annual rate of inflation in Smithville using 2008 as the base year. In your answer show how you found this annual rate of inflation. Then put your answers in the following table.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2008 |
| 2008 |  |
| 2009 |  |
| 2010 |  |

e. Calculate the annual rate of inflation in Smithville using 2010 as the base year. In your answers show how you found this annual rate of inflation. Then put your answers in the following table.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2008 |
| 2008 |  |
| 2009 |  |
| 2010 |  |

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 |
| 2008 | (5 hamburgers)($4 per hamburger) + (2 bikes)($500 per bike) + (6 milk shakes)($2 per milk shakes) = $1032 |
| 2009 | (5 hamburgers)($5 per hamburger) + (2 bikes)($520 per bike) + (6 milk shakes)($2.50 per milk shakes) = $1080 |
| 2010 | (5 hamburgers)($5 per hamburger) + (2 bikes)($540 per bike) + (6 milk shakes)($2 per milk shakes) = $1117 |

b.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2008 |
| 2008 | [1031/1031] \* 100 = 100 |
| 2009 | [1080/1032] \* 100 = 104.65 |
| 2010 | [1117/1032] \* 100 = 108.24 |

c.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2010 |
| 2008 | [1032/1117] \* 100 = 92.39 |
| 2009 | [1080/1117] \* 100 = 96.69 |
| 2010 | [1117/1117] \* 100 = 100 |

d.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2008 |
| 2008 | ----- |
| 2009 | [(104.65 – 100)/(100)](100%) = 4.65% |
| 2010 | [(108.24 – 104.65)/(104.65)](100%) = 3.43% |

e.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2008 |
| 2008 | ------ |
| 2009 | [(96.69 – 92.39)/(92.39)](100%) = 4.65% |
| 2010 | [(100 – 96.69)/(96.69)](100%) = 3.42% (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. Maryann 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 Maryann 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 three 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 Maryann has received.

|  |  |
| --- | --- |
| Location of Offer | Salary (assume that all employee benefits are comparable and that all Maryann needs to consider is the salary) |
| Madison, WI | $70,000 |
| New York City, NY | $140,000 |
| Chicago, IL | $80,000 |
| Los Angeles, CA | $82,000 |

Maryann 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 [www.payscale.com](http://www.payscale.com) I have extrapolated an “inflation index” for each of these cities. Use this information to help guide Maryann 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 |
| Madison, WI | 1 |
| New York City, NY | 2.06 |
| Chicago, IL | 1.06 |
| Los Angeles, CA | 1.20 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Nominal Salary | Real Salary | Extrapolated Inflation Index |
| Madison, WI |  |  | 1 |
| New York City, NY |  |  | 2.06 |
| Chicago, IL |  |  | 1.06 |
| Los Angeles, CA |  |  | 1.20 |

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

Answers:

a.

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Nominal Salary | Real Salary | Extrapolated Inflation Index |
| Madison, WI | $70,000 | $70,000 | 1 |
| New York City, NY | $140,000 | $67,961 | 2.06 |
| Chicago, IL | $80,000 | $75,472 | 1.06 |
| Los Angeles, CA | $82,000 | $68,333 | 1.20 |

b. Maryann should accept the Chicago offer since if offers the highest real salary of the four choices.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Nominal GDP | Real GDP | GDP Deflator |
| 2000 | $100 Million |  | 100 |
| 2001 |  |  |  |
| 2002 |  | $150 Million | 125 |
| 2003 |  |  |  |
| 2004 |  |  |  |

You are also told that

* Nominal GDP increased by 10% between 2000 and 2001
* Real GDP stayed constant between 2000 and 2001
* Overall inflation, as measured by the GDP deflator, over the period 2000-2004 was 100%
* Real GDP increased 20% between 2002 and 2003
* Inflation increased by 20% between 2002 and 2003 as measured by the GDP deflator
* Nominal GDP between 2003 and 2004 stayed constant

a. Given the above information fill in the missing cells in the table.

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 |
| 2000 | ---- | ---- | ---- |
| 2001 |  |  |  |
| 2002 |  |  |  |
| 2003 |  |  |  |
| 2004 |  |  |  |

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 |
| 2000 | $100 Million | $100 Million | 100 |
| 2001 | $110 Million | $100 Million | 110 |
| 2002 | $187.5 Million | $150 Million | 125 |
| 2003 | $270 Million | $180 Million | 150 |
| 2004 | $270 Million | $135 Million | 200 |

b. To find the percentage change in nominal GDP from 2000 to 2001 you will need to use the following formula:

Percentage Change in nominal GDP from 2000 to 2001 = {[(Nominal GDP in 2001) – (Nominal GDP in 2000)]/(Nominal GDP in 2000)}\*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 |
| 2000 | ---- | ---- | ---- |
| 2001 | 10% | 0% | 10% |
| 2002 | 70.5% | 50% | 13.6% |
| 2003 | 44% | 20% | 20% |
| 2004 | 0% | -25% | 33% |

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:

Real GDP = [(Nominal GDP)/(GDP deflator)] \* (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).