**Economics 111**

**Fall 2019**

**Answers to Homework #5**

**General Instructions:**

* Homework is due at the beginning of the lecture.
* Do not submit the homework questions. Just submit your answers: these answers should be neat, legible, and easy to follow. Be generous with your use of paper. Do not write in small, hard to read font. If asked to provide a graph, provide a generous graph.
* All homeworks should be stapled and on the front page your name should be legibly written.
* It is all right to do homework with a "study buddy": however, when asked to explain your answer your words should be significantly different from your "study buddy's" words. Homeworks that are too similar to one another will not receive any credit.
* To get full credit for the homework you need to answer every question that is asked. A failure to answer all the questions will result in a lower homework score.
* It is a good idea to make a copy of your homework so that you can compare your answers to the posted answers. Your copy (a digital photo) also provides a time-stamped proof that you did the homework.

**GDP Measurement:**

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

a. Joe’s T-shirts produces 1000 t-shirts in 2013 and sells 1800 of these t-shirts in 2013 for a price of $10 per t-shirt. In 2014 Joe’s T-shirts produces another 1000 shirts and sells 600 t-shirts in 2014 for a price of $10 per t-shirt. What was the impact of Joe’s t-shirts on GDP in 2013 and 2014?

b. Susie owns 100 shares of IBM stock and during 2013 she sells 70 of these shares for $100 per share to Marty. In 2014 Susie purchases 35 shares of GM stock from Billy for $34 a share. What is the impact of these activities on GDP in 2013 and 2014?

c. Michael cuts his grass every Saturday as does his neighbor Millie. In 2013 Michael incorporates a lawn care business and starts providing lawn care services. Millie is one of his first customers and she pays him $20 a week to cut her grass. Her grass needs cutting for forty weeks. In addition, Millie contracts with Michael for snow removal and he gets paid $10 per week for the ten weeks of winter season to provide this service to Millie. Given Michael and Millie’s actions, what is the impact on GDP in 2014 from these events?

d. Both Josie and Zena in 2013 opened daycare facilities. Josie’s daycare is not licensed and is strictly a word-of-mouth, cash operation. Josie has ten children who come to the daycare facility for $250 per child per week. Josie’s daycare center is open for 50 weeks a year. Zena’s daycare is a licensed daycare facility for young children. She currently has 20 children that come to the daycare facility at a cost of $300 per child per week. The center is open for 50 weeks a year. What was the effect of Josie and Zena’s activities on GDP in 2014?

e. Elizabeth has a desk that has been in her family for 100 years. A recent appraisal of the desk noted that it was worth $1250 due to its age and uniqueness. In 2014 she realized that the desk needed some repair and refinishing after all these years of use. She took the desk to “Dr. Phil”, a local furniture restorer, who re-glued and refinished the desk. Dr. Phil charged Elizabeth $125.38 (including a sales tax of $8.38) for this work. What was the contribution to GDP in 2014 from these activities?

Answer:

a. GDP in 2013 changed by (1000 t-shirts)($10/shirt) = $10,000. An alternative way to see this is to use the expenditure approach: GDP = C + I + G + (X – M). C in 2013 from t-shirt consumption is (1800 t-shirts)($10/t-shirt) = $18,000. But, I in 2013 was (-800 t-shirts drawn down from inventory)($10/t-shirt) = $8,000. So, the effect on GDP in 2013 using the expenditure approach would be (the change in consumption spending) + (the change in investment spending) = ($18,000) + (-$8,000) = $10,000. Note that the two approaches give us the exact same number.

GDP in 2014 changed by (1000 t-shirts)($10/shirt) = $10,000. An alternative way to see this is to use the expenditure approach: GDP = C + I + G + (X – M). C in 2014 from t-shirt consumption is (600 t-shirts)($10/t-shirt) = $6,000. But, I in 2014 was (400 t-shirts added to inventory)($10/t-shirt) = $4,000. So, the effect on GDP in 2014 using the expenditure approach would be (the change in consumption spending) + (the change in investment spending) = ($6,000) + ($4,000) = $10,000. Note that the two approaches give us the exact same number.

b. There is no impact on GDP in 2013 or 2014 from these activities since there has been no production that has occurred as a result of these activities.

c. Michael continues to cut his grass and remove his snow through 2014, but because he is not doing these activities through an organized market this production does not count as part of GDP in 2014. However, the activities that Michael performs for Millie do get counted since he is now operating an incorporated lawn care service. So, the value of the lawn care service provided to Millie is (40 weeks)($20 per week) = $800. The value of the snow removal service is ($10 per week)(10 weeks) = $100. So, total value of production from the described activities in 2014 is $900.

d. GDP in 2014 was not affected by Josie’s daycare activities since she is operating a daycare facility that is not part of a legal, organized market. We know that because the daycare center is not licensed and it is a cash-only operation (this makes it far harder for the IRS and other government authorities to track what is going on at Josie’s). Zena’s activities increase GDP in 2014 by ($300 per child per week)(20 children per week)(50 weeks) = $300,000.

e. Although the desk is appraised at a high value, none of this appraised value is part of GDP in 2014. The desk when it was created a100 years ago was valued in GDP that year. But, the repair and refinishing work that was done in 2014 does get counted in GDP: we know that Dr. Phil is running a legal business because he is charging taxes on the work he is doing. GDP in 2014 will increase by $117.00 due to the production that Dr. Phil provided. Note that the tax of $8.38 does not represent production. If you wanted to include this amount, you would have to assume that there is government spending of $8.38 and that would make the increase in GDP from these activities equal to $125.38.

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

a. Window Makers produced 500 windows in 2015 and sold 300 of these windows in 2015 for $400 per window. In 2016 Window Makers produced an additional 500 windows and sold 600 windows for $400 per window. What was the impact of Window Makers on GDP in 2015 and 2016? Explain your answer using two different methods to get to this answer.

b. Mario has 10,000 shares of Exxon stock and he decides to sell this stock in 2017. He sells his share through a broker for $120 a share and the broker collects a commission of 2% of the value of the transaction. What is the impact of this transaction on GDP in 2017? Explain your answer.

c. Jenny sold her house in 2017 for $400,000. She purchased the house as its third owner in 2004. Over the years she made $150,000 of renovations that were all completed prior to 2015. She sold the house without using any real estate brokerage help. What was the impact of this transaction on GDP in 2017? Explain your answer.

d. Charlene and Michael live across the street from one another. Both are tax preparers. Charlene does her own taxes as does Michael. They both spend 15 hours preparing their taxes and their wage rate if $50 per hour. How does this transaction affect GDP this year? Explain your answer.

e. Charlene and Michael from the previous scenario decide they would both feel better about their taxes if they were prepared by an objective third party. They both independently hire Jane to do their taxes. Jane spends 12 hours preparing Charlene's taxes and 8 hours preparing Michael's taxes. Jane's hourly rate is $30 per hour. What is the impact of this transaction on GDP this year? Explain your answer.

f. Mary went to the store and bought $20 worth of grapefruits grown in the state of Texas, $15 of cheese produced this year in France, $8 of crackers made in Wisconsin this month, $40 worth of beef produced this year in Argentina, and $30 of flour grown and milled last year in Minnesota. What was the impact of this transaction on GDP this year? Explain your answer and use at least two methods to get your answer. And, if your answer is different depending upon the method, redo the example so that the two methods agree.

Answer:

a. One way to answer this is through multiplying the quantity of the good times the price of the good. So, the value of production (hence, the addition to GDP) from Window Makers was (500 windows)($400 per window) = $200,000 in 2015 and the same, $200,000 in 2016.

But, can we get these numbers through one of the other approaches to measuring GDP? Yes. Let's use the expenditure approach:

Windows Makers impact on GDP in 2015 = Consumption expenditure on windows + addition to inventory = (300 windows)($400 per window) + (200 windows)($400 per window) = $120,000 + $80,000 = $200,000.

Windows Makers impact on GDP in 2016 = Consumption expenditure on windows + addition to inventory = (600 windows)($400 per window) + (-100 windows)($400 per window) = $240,000 - $40,000 = $200,000.

b. Mario sell of the stock has a total value of (10,000 shares)($120 a share) = $1,200,000. The stock broker collects 2% of this or (.02)($1,200,000) = $24,000. The sale of the shares does not affect the value of GDP for 2017 since it does not represent any new production but is instead just a change in ownership of an asset. But the stock broker's commission does affect GDP: GDP increases by $24,000 due to this transaction.

c. This transaction had no impact on GDP in 2017. The value of the house when it was originally produced was included in GDP for that year as part of investment spending (residential construction). The renovations were all done in prior years and the value of this new production would have been included in the GDP for the year in which the renovation was done. Jenny did not use a real estate firm to help her sell the house so there was no production provided in the form of real estate services. So, there was no new production that occurred because of this transaction.

d. This transaction has no impact on GDP this year. These two individuals are doing work that is not going through an organized, legal market. This is like mowing your own lawn, doing your own housework, providing your own childcare. So, no impact on GDP.

e. Jane is providing a professional service and this represents new production. So, the impact on GDP is equal to (12 hours of tax work)($30 per hour) + (8 hours of tax work)($30 per hour) = $360 + $240 = $600. GDP goes up by $600 this year due to this transaction.

f. First let's just total up domestic production that occurred this year:

$20 of grapefruits grown in Texas (perishable, so we assume grown this year)

$8 of crackers from Wisconsin

GDP using just domestic product that occurred this year is equal to $28.

Second method: let's use the expenditure approach.

GDP = C + I + G + (X – IM)

GDP from this transaction = C' + I' + G' + (X' – IM')

C' = $20 + $15 + $8 + $40 + $30 = $113

I' = -$30 [this reflects the purchase of the flour grown and milled last year that was not purchased last year and was instead a positive addition to inventory last year and a "draw down" of inventory this year]

IM' = $15 + $40 [this is the French cheese and the beef from Argentina] = $55

GDP from this transaction = $113 - $30 - $55 = $28.

3. 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.

Answer:

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 = wages + interest + rent + profits

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

Looking at the data we have:

Factor payment approach: GDP = Wages + 750 + 2000 + 250 or GDP = 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:

Wages + 3000 = 2800 + G or Wages = G - 200

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

Wages = (1/.2)(Wages) - 200

200 = 4(Wages)

Wages = $50 million

Government Spending = (1/.2)(Wages) = (5)($50 million) = $250 million

Factor payment approach: GDP = Wages + 3000 = $50 + $3000 = $3050 million

Expenditure approach: GDP = 2800 + G = 2800 + 250 = $3050 million

4. You are told the following information about the economy of Smithville. Lee Enterprises a company located in Smithville produced $2 million worth of goods in 2016 and sold $1.8 million of these goods as final goods to consumers in Smithville. Lee Enterprises sold an additional $.5 million of these goods as final goods to consumers located outside of Smithville. Consumers in Smithville during 2016 made purchases of $3 million on goods and services. Included in these consumer purchases were $500,000 worth of French wine produced in 2016 in France rather than Smithville; $200,000 worth of bananas produced in Costa Rica; and $700,000 worth of steel produced in Japan. Consumers in Smithville also purchased $1.2 million worth of new residential construction during 2016. The government of Smithville spent $1.2 million in 2016. There is no other data to consider when computing the GDP for Smithville in 2016. For each question show how you got your numerical value.

a. Given the above data, what is the level of consumer expenditure in Smithville in 2016?

b. Given the above data, what is the level of government expenditure in Smithville in 2016?

c. Given the above data, what is the level of investment expenditure in Smithville in 2016?

d. Given the above data, what is the level of imports to Smithville in 2016?

e. Given the above data, what is the level of exports to Smithville in 2016?

f. Given the above data, what is the level of GDP in Smithville in 2016?

a. Consumer expenditure in Smithville in 2016 was $3,000,000. This number will be adjusted by subtracting out the imported goods: the imports will be $500,000 worth of French wine, $200,000 of Costa Rican bananas, and $700,000 worth of steel produced in Japan. While the $3,000,000 represents total consumption it includes production that was done outside of Smithville. Notice that the goods sold to consumers as final goods are not being added to the $3 million: this is because the $3 million already includes this consumer expenditure.

b. Government expenditure in 2016 is equal to $1,200,000.

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 $1,200,000 + (-$300,000) or $900,000. The (-$300,000 represents the inventory adjustment. The other $500,000 in goods sold by Lee Enterprises to consumers located outside of Smithville will be included in exports since these units were sold to buyers located outside of Smithville.

d. Imports in this example are equal to the sum of the value of the French wince, the Costa Rican bananas, and the Japanese steel. That is, imports are equal to $500,000 + $200,000 + $700,000 or $1,400,000. This is the value of goods and services purchased in Smithville in 2016 that were not produced in Smithville.

e. The level of exports in Smithville is equal to $500,000, the value of the goods sold to consumers located outside of Smithville.

f. GDP = C + I + G + (X – M)

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

C = $3,000,000 or $3 million

I = $900,000 or $.9 million

G = $1,200,000 or $1.2 million

X = $500,000 or $.5 million

M = $1,400,000 or $1.4 million

So, GDP = 3 + .9 + 1.2 + (.5 – 1.4)

GDP = $4,200,000 or $4.2 million

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

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Nominal GDP | Real GDP | GDP Deflator |
| 2000 | $200 Million |  | 80 |
| 2001 |  |  |  |
| 2002 |  | $300 Million | 100 |
| 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 | $200 Million | $250 Million | 80 |
| 2001 | $220 Million | $250 Million | 88 |
| 2002 | $300 Million | $300 Million | 100 |
| 2003 | $432 Million | $360 Million | 120 |
| 2004 | $432 Million | $270 Million | 160 |

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 | 36.36% | 20% | 13.6% |
| 2003 | 44% | 20% | 20% |
| 2004 | 0% | -25% | 33.33% |

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).

**Unemployment:**

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

* In Thomasville there are 70 people who are less than 16 years old
* In Thomasville there are 20 people who are over 70 years old and are fully retired
* In Thomasville there are 40 people who are currently not working, are available to work, and have submitted job applications during the past four weeks
* In Thomasville 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 Thomasville
* In Thomasville there are 90 full-time college students who are not currently seeking work
* In Thomasville there are 100 people who are working part-time but who would like to work full-time
* The rest of the Thomasville 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 Thomasville? Explain how you got your answer.

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

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

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

e. How would the unemployment rate change in Thomasville 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 Thomasville 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 Thomasville 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 Thomasville is equal to the 100 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 Thomasville which is 500. Then subtract out the 70 children, the 20 people who are retired, the 20 people who are not working but who have also given up searching for work, the 40 people who are not working but who are still seeking a job, the 90 college students, and the 100 part-time workers. The total number of employed people in Thomasville is 260 people.

b. The number of unemployed people in Thomasville 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 Thomasville the number of unemployed is equal to 40 people.

c. The labor force is defined as the number of employed plus the number of unemployed. In Thomasville the labor force is therefore equal to 300 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 [(40)/(300)] \* 100% = 13.3%.

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 60 people; it would also cause the labor force to increase by 20 to 320 people. Thus, the unemployment rate with this change would equal [(60)/(320)] \* 100% or 18.75%.

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 100 to 140 people (here I am leaving the discouraged workers out of the calculation); it would not affect the labor force which would still equal 300 people. Thus, the unemployment rate with this change would equal [(140)/(300)] \* 100% or 46.7%.

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

a. Mary turned sixteen on April 4, 2014. She currently works at Kohl’s Department Store 10 hours a week. She is not enrolled in school.

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

c. Susie volunteers ten hours a week with Habitat for Humanity. Susie is also enrolled as a full-time college student. Susie celebrated her 21st birthday at the Nitty Gritty in March, 2014.

d. Todd is out of work currently, but he is available to work and three weeks ago he submitted an application to a local software company that was advertising a job that he thought he might be able to get. However, yesterday Todd 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. Tyler is not currently working, but is available for work and is looking for work. Tyler is finding it tough to find positions that suit his skills and interests. The last time Tyler submitted a job application was April 15, 2014 and it is now July 5, 2014. Tyler turned 19 on January 1, 2014.

f. Samantha is fifty five years old and she has worked throughout much of her adult life. In 2010 her work hours were cut to 20 hours a week at her job as a quality control officer for a local company. Samantha 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. Melinda works at a local copy shop forty hours a week. Melinda is 38 years old. But, for the past two weeks Melinda has not been at work and she has not been paid. Melinda and her family have been on a two week-long camping trip as part of their annual vacation.

Answer:

a. Mary 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. Mary is considered employed.

b. Jose 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: Jose 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. Todd appears to be unemployed: out of work, available for work, and applying for a job within the last four weeks. However, his decision to accompany his cousin on a western tour for the next four weeks places 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. Tyler is old enough to be included in the unemployment statistics and Tyler seems to meet the criteria for being considered unemployed: out of work, available for work, and applying for jobs. But, Tyler has not applied for a job within the last four weeks: Tyler would be considered not part of the labor force. Tyler is neither employed nor unemployed. His story is an example of a discouraged worker.

f. Samantha is old enough to be included in the unemployment statistics. Samantha works at least one hour a week for pay, so although Samantha 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. Melinda is considered employed even though she has been on vacation from her job. She is over 16years old and she has a paid position with a company.

**Inflation and the CPI:**

8. 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 Greensboro the market basket for purposes of calculating the consumer price index (CPI) consists of 50 sandwiches, 1 moped and 60 apples. You are given the following information about prices of these three goods for the years 2010, 2011, and 2012. Assume the price is the price per unit.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Price in 2010 | Price in 2011 | Price in 2012 |
| Sandwich | $3.00 | $4.00 | $5.00 |
| Moped | $800.00 | $820.00 | $840.00 |
| Apples | $1.00 | $1.50 | $1.00 |

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 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

b. Calculate the CPI for 2010, 2011, and 2012 in Greensboro 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 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

c. Calculate the CPI for 2010, 2011, and 2012 in Greensboro using a one hundred point scale and with the base year equal to 2012. Put your answers in the following table.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2012 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

d. Calculate the annual rate of inflation in Greensboro using 2010 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 2010 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

e. Calculate the annual rate of inflation in Greensboro using 2012 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 2012 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

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.

Answer:

a.

Cost of Market Basket

|  |  |
| --- | --- |
| Year | Cost of Market Basket |
| 2010 | (50 sandwiches)($3 per sandwich) + (1 moped)($800 per moped) + (60 apples)($1 per apple) = $1010 |
| 2011 | (50 sandwiches)($4 per sandwich) + (1 moped)($820 per moped) + (60 apples)($1.50 per apple) = $1110 |
| 2012 | (50 sandwiches)($5 per sandwich) + (1 moped)($840 per moped) + (60 apples)($1 per apple) = $1150 |

b.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2010 |
| 2010 | [1010/1010] \* 100 = 100 |
| 2011 | [1110/1010] \* 100 = 109.90 |
| 2012 | [1150/1010] \* 100 = 113.86 |

c.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2012 |
| 2010 | [1010/1150] \* 100 = 87.83 |
| 2011 | [1110/1150] \* 100 = 96.52 |
| 2012 | [1150/1150] \* 100 = 100 |

d.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2010 |
| 2010 | ----- |
| 2011 | [(109.90 – 100)/(100)](100%) = 9.90% |
| 2012 | [(113.86 – 109.90)/(109.90)](100%) = 3.60% |

e.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2012 |
| 2010 | ------ |
| 2011 | [(96.52 – 87.83)/( 87.83)](100%) = 9.89% (rounding discrepancy |
| 2012 | [(100 – 96.52)/( 96.52)](100%) = 3.61% (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.

9. It is Thanksgiving 2015 and once again Uncle Roger and Scooter have gotten into a heated argument (this happens every year!). Scooter's son just got hired in an entry-level management position where he will earn $32,000 during his first year of employment. Uncle Roger is long retired but he is busy reminiscing about the “good old days” and he insists that life was much tougher for him when he was starting out. In fact he states that his first job paid him only $2000 a year. Uncle Roger got this job in 1950 while Scooter's son got his job in 2014 (the 2015 data weren’t available last Thanksgiving).

a. Scooter argues that Uncle Roger is making a serious error in his argument. Write an explanation about what you think Uncle Roger’s error is.

Scooter goes to the computer and finds the Bureau of Labor Statistics site that provides him with the Consumer Price Index for 1950, 2014, and for the base year 1982-1984 (this reflects the use of a "chain-weighted index" method).

|  |  |
| --- | --- |
| Year | CPI with base year 1982-1984 |
| 1950 | 24.1 |
| 1982-1984 | 100.00 |
| 2014 | 236.74 |

b. Given the above data, what scale is the CPI measured on?

c. Compute the following table’s missing values using 1982-1984 as the base year. Make sure you show the work you did to get the missing values. Round your answer to the nearest whole number.

|  |  |  |
| --- | --- | --- |
|  | Nominal Value | Real Value using 1982-1984 as Base Year |
| Uncle Roger’s Salary |  |  |
| Scooter’s Son's Salary |  |  |

d) Compute the following table’s missing values using 2014 as the base year. Make sure you show the work you did to get the missing values. Round your answer to the nearest whole number.

|  |  |  |
| --- | --- | --- |
|  | Nominal Value | Real Value using 2014 as Base Year |
| Uncle Roger’s Salary |  |  |
| Scooter’s Son's Salary |  |  |

e) Uncle Roger contends that Scooter’s son's salary is 16 times greater than his starting salary was. Thus, Uncle Roger concludes that Scooter's son has it much easier than Uncle Roger did when he was first starting out. Analyze this argument and provide some clarity for these two relatives! (If you need to round in your answer, round any calculations to two places past the decimal.)

Answer:

a) Uncle Roger’s error is that he is comparing a 1950 dollar to a 2014 dollar: dollars do not maintain constant purchasing power over time so basically Uncle Roger is comparing salaries that are measured in units that do not have the same value over time. Uncle Roger needs to convert these nominal salaries into real salaries if he wants to compare salaries from two different points in time.

b) The CPI is measured on a 100 point scale: we can see this since the base year CPI is given as 100.

c)

|  |  |  |
| --- | --- | --- |
|  | Nominal Value | Real Value using 1982-1984 as Base Year |
| Uncle Roger’s Salary | $2000 | 2000(100)/24.1 = $8298.75 |
| Scooter’s Son's Salary | $32,000 | 32000(100)/236.74 = $13516.94 |

d)

|  |  |  |
| --- | --- | --- |
|  | Nominal Value | Real Value using 2014 as Base Year |
| Uncle Roger’s Salary | $2000 | [2000(100)]/[(24.1)(100)/(236.74)] = $19,646.47 |
| Scooter’s Son's Salary | $32,000 | [32000(100)]/[(236.74)(100)/(236.74)] = $32,000 |

e) Uncle Roger gets his number by comparing the ratio of Scooter’s son's nominal salary to his own nominal salary:

Nominal salary ratio = (32,000)/(2000) = 16

But, this is essentially comparing apples and oranges since the two salaries are measured using nominal dollars. So, let’s compare the real salary ratio (note it will not matter which year you use as base year in this calculation):

Real salary ratio using 1982-1984 as the base year = Scooter’s son's real salary/Uncle Roger’s real salary

Real salary ratio using 19882-1984 as the base year = $13,516.94/$8298.75 = 1.63

Real salary ratio using 2014 as the base year = Scooter’s real salary/Uncle Roger’s real salary

Real salary ratio using 2014 as the base year = $32,000/$19,646.47 = 1.63

Uncle Roger overstates the difference in their two salaries: Scooter's son is earning more than Uncle Roger and thus has it “easier” if we only look at real purchasing power (he might have job stresses and uncertainties that Uncle Roger never faced-but, we are not valuing these items here), but he is earning 1.63 times more than Uncle Roger did in his entry job and not 16 times more.

10. Tommy recently graduated from college and is now in the process of deciding where he wants to start his career. He has three job offers (!) for similar work and similar future opportunities, but each job offer is in a different city. Tommy has no strong geographic preference and his only goal is to select that job that results in his being financially best off. From his economics class Tommy knows that he needs to be thoughtful when comparing these offers. This is what he knows:

Job Offer #1: is for a job in Toledo that pays $40,000 for his first year of work (for convenience, let’s refer to this as year 2015), guarantees him a 10% increase in his nominal salary for the second year (2016), and a 10% increase in his nominal salary for the third year (2017). After that his nominal salary will be adjusted so that his real salary stays constant.

Job Offer #2: is for a job in Miami that pays $42,000 for his first year of work (for convenience, let’s refer to this as year 2015), guarantees him a 5% increase in his nominal salary for the second year (2016), and a 5% increase in his nominal salary for the third year (2017). After that his nominal salary will be adjusted so that his real salary stays constant.

Job Offer #3: is for a job in St. Paul that pays $48,000 each year for the first and second years (2015 and 2016), and a 3% increase in his nominal salary for the third year (2017). After that his nominal salary will be adjusted so that his real salary stays constant.

a. Let’s start by simply analyzing the nominal values of these three job offers. Given the above descriptions fill out the table below so that Tommy can compare the nominal values of the offers he has. Once you fill out the table rank the options in terms of their nominal values. Show in the table how you computed these answers.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Nominal Wage in 2015 | Nominal Wage in 2016 | Nominal Wage in 2017 |
| Toledo |  |  |  |
| Miami |  |  |  |
| St. Paul |  |  |  |

b. Tommy understands from his economics class that he needs to really consider real salaries rather than nominal salaries in making his decision about which offer to accept. Luckily for him we have data about the CPI projections for the next three years for each of these cities. The table below provides our best estimates of what the CPI for 2015, 2016 and 2017 will be in each of these cities.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Projected CPI 2015 | Projected CPI 2016 | Projected CPI 2017 |
| Toledo | 100 | 120 | 130 |
| Miami | 110 | 120 | 130 |
| St. Paul | 120 | 125 | 130 |

Use this information to complete the following table of real salary values for these three job offers. In the table, you should round your answers to the nearest whole number. Show in the table how you computed your answers. Once you fill out the table rank the options in terms of their real values. Which job offer should Tommy accept?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Projected Real Salary in 2015 | Projected Real Salary in 2016 | Projected Real Salary in 2017 |
| Toledo |  |  |  |
| Miami |  |  |  |
| St. Paul |  |  |  |

c. To drive home the difference between the nominal and real values a bit more. Let’s complete one more table using the data you have been given. Here is the table: make sure you show your work for how you computed your answers.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Percentage change in nominal salary from 2015 to 2016 | Percentage change in nominal salary from 2015 to 2016 | Percentage change in real salary from 2015 to 2016 | Percentage change in real salary from 2016 to 2017 |
| Toledo |  |  |  |  |
| Miami |  |  |  |  |
| St. Paul |  |  |  |  |

Answer:

a.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Nominal Wage in 2015 | Nominal Wage in 2016 | Nominal Wage in 2017 |
| Toledo | $40,000 | $40,000\*1.10 = $44,000 | $44,000\*1.10 = $48,400 |
| Miami | $42,000 | $42,000\*1.05 = $44,100 | $44,100\*1.05 = $46,305 |
| St. Paul | $48,000 | $48,000 | $48,000\*1.03 = $49,440 |

From the table we can see if we only look at the first year and nominal values that Tommy would rank the options from best to worst as St. Paul, Miami, and Toledo. If Tommy goes to the third year and out into the future using these nominal values we see that he would rank the offers in the following order: St. Paul, Toledo, and Miami. So, over time the relative rankings in nominal terms changes with these three offers.

b.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Projected Real Salary in 2015 | Projected Real Salary in 2016 | Projected Real Salary in 2017 |
| Toledo | ($40,000/100)\*100 = $40,000 | ($44,000/120)\*100 = $36,667 | ($48,400/130)\*100 = $37,231 |
| Miami | ($42,000/110)\*100 = $38,182 | ($44,100/120)\*100 = $36,750 | ($46,305/130)\*100 = $35,619 |
| St. Paul | ($48,000/120)\*100 = $40,000 | ($48,000/125)\*100 = $38,400 | ($49,440/130)\*100 = $38,031 |

Using the values in this table we can see that the job offers in real salary terms in terms of best offer to worst offer are rank as: St. Paul, Toledo, and Miami three years out and into the future after that. Tommy if his only goal is to maximize his purchasing power should accept the job in St. Paul. But, notice that the St. Paul and Toledo offers in real terms are not nearly so far apart as the nominal job offers seemed.

c.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Percentage change in nominal salary from 2015 to 2016 | Percentage change in nominal salary from 2015 to 2016 | Percentage change in real salary from 2015 to 2016 | Percentage change in real salary from 2016 to 2017 |
| Toledo | [(44,000 – 40,000)/40,000]\*100 = 10% | [(48,400 – 44,000)/44,000]\*100 = 10% | [(36,667 – 40,000)/40,000]\*100 = -8.3% | [(37,231 – 36,667)/36,667]\*100 = 1.5% |
| Miami | [(44,100 – 42,000)/42,000]\*100 = 5% | [(46,305 – 44,100)/44,100]\*100 = 5% | [(36,750 – 38,182)/(38,182]\*100 = -3.8% | [(35,619 – 36,750)/36,750]\*100 = -3.1% |
| St. Paul | [(48,000 – 48,000)/48,000]\*100 = 0% | [(49,440 – 48,000)/48,000]\*100 = 3% | [(38,400 – 40,000)/40,000]\*100 = -4% | [(38,031 – 38,400)/38,400]\*100 = -0.96% |

**AD/AS Model:**

11. Use the AD-AS Model to answer this question. For each description assume that the AD-AS Model is initially in long-run equilibrium.

a. Suppose that there is a real estate boom in this economy. Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the short run? Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the long run? Explain your answer.

b. Suppose that the government in this economy goes to war. Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the short run? Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the long run? Explain your answer.

c. Suppose that the price of energy decreases in the economy. Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the short run? Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the long run? Explain your answer.

d. Suppose that the government reduces taxes and at the same time an announcement is made that a major new oilfield has been discovered in western Nebraska and this oilfield is anticipated to be so large that the country no long will need to import oil. Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the short run? Holding everything else constant, what do you predict will happen to real GDP and the aggregate price level in the long run? Explain your answer.

Answer:

a. With a real estate boom you can expect that in the short run the AD curve will shift to the right resulting in real GDP increasing above its full employment level and the aggregate price level increasing relative to its initial long run equilibrium level. In the long run, there are a number of possible scenarios: I will sketch out two possibilities and leave you to imagine a third combination that is a combination of my two scenarios. The first scenario has the SRAS curve shifting to the left over time so that the economy in the long run returns to the full employment level of real GDP but with the aggregate price level higher than the initial long run equilibrium aggregate price level. The second scenario has the real estate boom go bust and this will cause the AD curve to shift back to the left: the level of real GDP will fall and it may even fall below the full employment level of real GDP if the shift is too large. The aggregate price level will fall from its short run level and will move back towards its initial long run level. If the real estate boom bursts in a spectacular manner (think 2008!) then the economy may move from a boom to a recession.

b. When the country goes to war this will cause the aggregate demand (AD) curve to shift to the right in the short run due to increased government spending to finance the war. In the short run then the aggregate level of real GDP and the aggregate price level will increase relative to their initial levels. Thus, the short run level of real GDP will be greater than the full employment level of real GDP. In the long run the economy will return to full employment level of real GDP as the short run aggregate supply curve shifts to the left as nominal wages increase. In the long run we can expect real GDP to return to its original level (the full employment level) while the aggregate price level will be higher than it was initially.

c. The short run aggregate supply curve will shift to the right and this will result in the level of real GDP increasing relative to its initial level and the aggregate price level decreasing relative to its initial level. This implies then that the economy in the short run will be producing a level of real GDP that is greater than the full employment level of real GDP. In the long run nominal wages and prices will rise and the short run aggregate supply curve will shift left until real GDP returns to full employment real GDP. In the long run then we would expect real GDP and the aggregate price level to return to their original level.

d. In the short run a reduction in taxes will shift the aggregate demand curve to the right since people will demand more at every aggregate price level. As taxes decrease people’s disposable income will increase and this will result in greater consumption spending and therefore greater aggregate demand at every price level holding everything else constant. The short run aggregate supply curve will also shift in the short run to the right since this new oilfield will increase the quantity of energy resources available to this economy and should therefore lead to lower resource prices. In the short run then we know with certainty that real GDP will increase; we do not know if the aggregate price level will increase, decrease, or remain the same as the initial level since we do not know the magnitude of the two shifts. So, in the short run the aggregate price level is indeterminate. Since real GDP is greater than full employment real GDP in the short run this tells us that we should expect nominal wages and prices to increase and the short run aggregate supply curve to eventually shift back to the left restoring this economy’s level of output to full employment real GDP and the aggregate price level to a price level higher than the initial aggregate price level.

12. Use the AD-AS Model to answer this set of questions. Suppose you are given the following information:

Long run aggregate supply (LRAS): Yfe = 2500

Short run aggregate supply (SRAS): Y = 250P – 500

Aggregate demand (AD): Y = 4,000 – 200P

where Y is real GDP and P is the aggregate price level.

a. Given the above information, find the short run equilibrium level of real GDP and the aggregate price level.

b. Draw a graph representing the SRAS curve, the AD curve, and the LRAS curve. Label the short run equilibrium.

c. Given your answers in (a) and (b), in this economy in the short run in a boom or a recession? Explain your answer.

d. In the long run, holding everything else constant, what do you predict will happen in this economy?

e. Given the above information, provide a numerical answer for the long run values of real GDP and the aggregate price level in this economy.

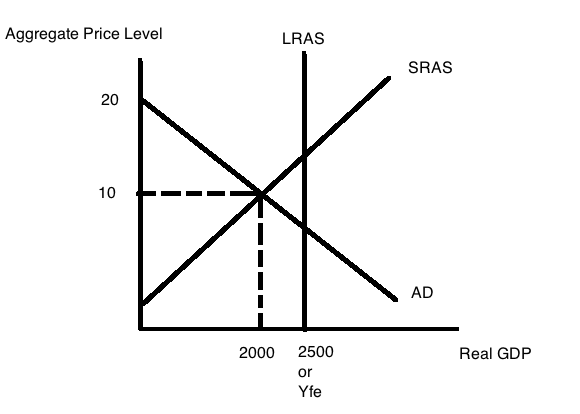
f. Given your answers in (d) and (e), provide an equation for the new SRAS curve.

g. At each aggregate price level, what was the decrease in real GDP given your new SRAS curve for (f)?

Answer:

a. In the short run the equilibrium occurs where the AD curve intersects the SRAS curve. Thus, 4,000 – 200P = 250P – 500 or P = 10. Ye = 4,000 – 200(10) = 2,000.

b.



c. The economy in the short run produces where real GDP is equal to $2000. $2000 is less than Yfe of $2500: this implies that this economy is operating in an economic recession since the level of real GDP is less than the full employment level of real GDP.

d. The SRAS curve will shift to the right until real GDP returns to the full employment level of real GDP. The aggregate price level will decrease to a level that is less than the initial aggregate price level.

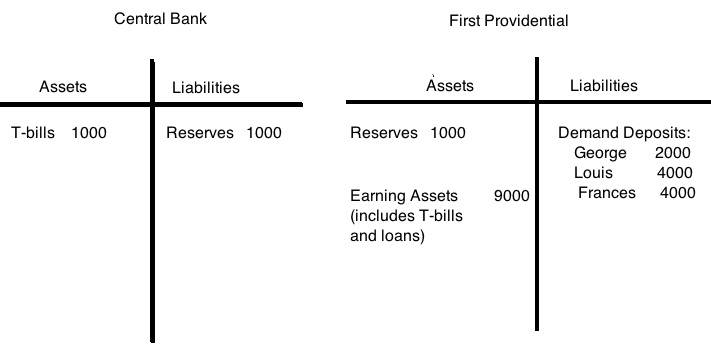
e. We know in the long run, that the equilibrium level of real GDP must equal the full employment level of real GDP. We also know that the full employment level of real GDP is $2500. The long run aggregate price level will be that aggregate price level where the LRAS curve intersects the AD curve since nothing has changed that would cause the AD curve to shift. Hence, we can find this aggregate price level by setting the AD curve equal to the LRAS curve. Thus, 4,000 – 200P = 2500 or P = 7.5.

f. We know one point on the new SRAS curve and that point is (Y, P) = (2500, 7.5). We can rewrite the SRAS curve as P = 2 + (1/250)Y (we are putting the curve in slope intercept form). The new SRAS curve will have the same slope as the initial SRAS but a different y-intercept. Thus, the new SRAS curve could be written as P = b + (1/250)Y. Plugging in the point we know that does sit on this new SRAS curve we get: 7.5 = b + (1/250)(2500) or b = -2.5. Thus the new SRAS curve can be written as P = (1/250)Y – 2.5 or Y = 250P + 625.

g. Initially when P = 10, Y = 2000. Now using the new SRAS curve, Y = 250P + 625, and substituting P = 10 into this equation we get Y = 3125. So, when the aggregate price level is held constant at 10, we find that real GDP increases by $1125. This increase of $1125 would be true no matter what aggregate price level we considered.

**The Federal Reserve:**

13. Suppose that an economy has one bank for the public’s financial transactions and a central bank authorized to manage the economy’s money supply. In this economy no one holds currency (i.e., there are no currency drains) and all purchases are made by writing checks (or using debit cards). Furthermore, First Providential never holds excess reserves after it makes full adjustment for any monetary policy. There are three people-George, Louis and Frances-that live and work in this economy. The following t-accounts provide us with the initial situation in this economy.



a. Given the above information, what is the required reserve ratio in this economy? Explain how you got your answer.

b. Given the above information, what is the money supply in this economy? Explain how you got your answer.

c. Suppose Louis writes a check in order to purchase $500 worth of camera equipment from George who owns and operates a camera store. Describe the impact of this purchase on First Providential’s demand deposits and reserves. Does this purchase affect the Central Bank’s t-account? If so, explain all the changes in this t-account.

d. For this question start with the initial t-accounts. Suppose the central bank decides to sell $200 worth of T-bills to First Providential. Show how this decision first impacts these t-accounts before any adjustment with regard to returning to the required reserve levels has been made (show the first round effects of this transaction and not the final full adjustment).

e. Given (d), right after the central bank purchases the T-bills does First Providential have insufficient or excess reserves? Quantify the level of these reserves relative to the required amount for the given amount of demand deposits.

f. Given (d), suppose First Providential approaches George, Louis and Frances and tells them that the bank will need to call in some of the loans that First Providential has made to George, Louis and Frances. At the end of this process First Providential will have no excess reserves and the percentages of total demand deposits held by George, Louis and Frances are the same as they were initially. Draw this final t-account. [Hint: this will be a t-account where First Providential has made full adjustment to the central bank’s sale of $200 worth of T-bills.] Show in your answer how you calculated the values in your t-account.

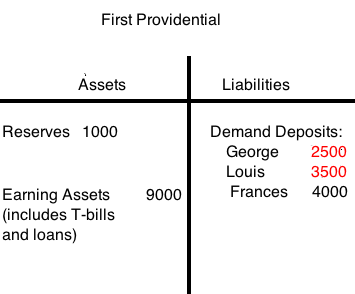
g. Given the transaction in (d), what is the change in the money supply? Provide two different ways (one of these methods should use the money multiplier) to get this change in the money supply.

Answer:

a. The required reserve ratio is 10% since there are $10,000 in demand deposits and $1000 in reserves and we are told that First Providential does not hold excess reserves. Thus, Required Reserves = (RR)(Demand Deposits) where RR is the required reserve ratio. Or, 1000 = (RR)(10,000) and RR = .1 or 10%.

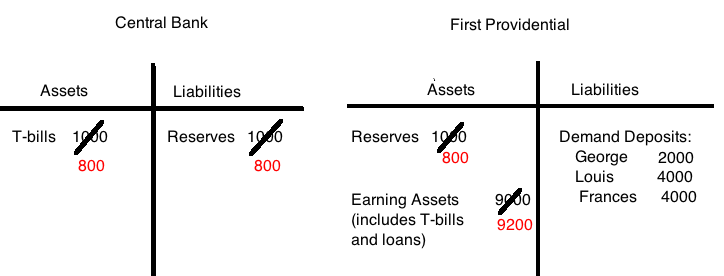
b. The money supply is defined as the sum of currency plus demand deposits. In this economy there is no currency, so the money supply is therefore equal to the level of demand deposits. Thus, the money supply is equal to $10,000.

c. Louis’s check will reduce his demand deposits by $500, so his demand deposits will now equal $3500. First Providential will need to honor his check and will do so by reducing its reserves by $500. George will deposit Louis’s check and this new deposit will increase George’s demand deposits by $500 as well as the bank’s reserves by $500. George’s demand deposits will now equal $2500. So, there is no change in the total amount of reserves and no change in the total amount of demand deposits. Here’s the new t-account for First Providential.



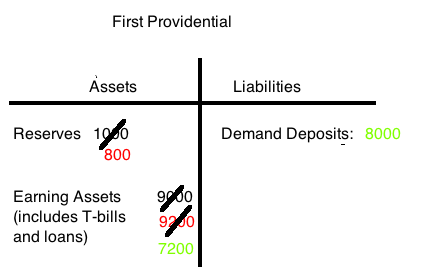
This transaction does not affect the Central Bank’s t-account.

d.

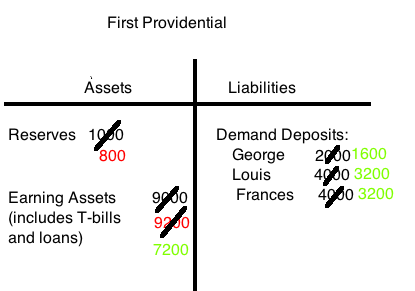


e. Right after the transaction First Providential has $10,000 in demand deposits and therefore requires $1000 in required reserves. However, First Providential has $800 in reserves and therefore is in need of an additional $200 in required reserves.

f. First Providential has a total of $800 in reserves and demand deposits of $10,000 after the central bank’s sale of the T-bills. This means that First Providential has insufficient required reserves of $200 and First Providential will need to reduce the number of loans that they have outstanding. This will effectively reduce the amount of demand deposits that George, Louis and Frances have. With $800 in reserves, First Providential can support a total amount of demand deposits of $8000. Thus, First Providential’s t-account after full adjustment to the central bank’s open market sale will look like this:



The question also asks you to figure out the level of demand deposits held by George, Louis and Frances. Thus, George’s Demand Deposits = (.2)(Demand Deposits) = .2(8000) = $1600; Louis’s Demand Deposits = (.4)(Demand Deposits) = .4(8000) = $3200; and Frances’s Demand Deposits = (.4)(Demand Deposits) = .4(8000) = $3200. The final t-account for First Providential looks like the following:



g. The money supply is defined as the sum of currency plus demand deposits. There is no currency in this economy and the demand deposits initially are $10,000 and at the end of the adjustment to the open market purchase the demand deposits are equal to $8000: the change in the money supply is therefore equal to 8,000 – 10,000 or -$2000.

Alternatively, (the change in the money supply) = (money multiplier)(change in reserves). The money multiplier is equal to (1/rr) or in this case (1/.1) or 10. Thus, (the change in the money supply) = 10(change in reserves). Reserves decrease by $200. So, the change in the money supply = 10(-200) = -$2000.

**A Final Big Problem:**

14. Suppose you are given the following information about an economy:

Required reserve ratio is 5%

Money Supply = Ms: Ms = 12,000

Money Demand = Md: Md = 24,000 – 3000r where r is the interest rate (for this problem we will assume that there are no expectations of inflation so that the nominal interest rate is the same as the real interest rate-this is a simplifying assumption that will make this rather-long problem less complex)

Investment Spending = I: I = 1000 - 100r

Aggregate Expenditure = AE: AE = C + I + G + (X – M)

Consumption Spending = C: C = 200 + .5(Y – T) -100P where P is the aggregate price level

Government Spending = G: G = 200

Net Exports = (X – M): (X – M) = 50

Autonomous Taxes = T: T = 150

Aggregate Demand = AD: AD = AE = Y = C + I + G + (X – M)

Long run Aggregate Supply = LRAS: LRAS = Yfe = 1725

Short run Aggregate Supply = SRAS: Y = 287.50P

a. There is a lot of information given to you in this problem. There is information about the money market; information about aggregate expenditure; and information about the AD, LRAS and SRAS curves. Take a moment and look at this information carefully. Now, focus on the consumption function: what does consumption spending depend upon in this economy? What is the relationship between consumption spending and disposable income (e.g., is it a positive or negative relationship)? What is the relationship between consumption spending and the aggregate price level? Do both of these relationships seem plausible to you? Explain your reasoning.

b. Given the above information, what is the equilibrium interest rate in this economy? Explain how you found this interest rate.

c. Given the above information, what is the level of investment spending in this economy? Explain how you found this level of spending.

d. Given the above information, calculate an equation that expresses this economy’s aggregate demand for goods and services.

e. Given the above information and your work in (a) through (d), find the short run equilibrium level of real GDP (Y) and the short run aggregate price level (P). Then draw a graph illustrating this short run equilibrium. In your graph include the LRAS curve as well. Measure the aggregate price level on the vertical axis and real GDP on the horizontal axis.

f. Suppose the government sets a goal of using fiscal policy to reach the full employment level of output. If the government changes the level of government spending to reach this goal, how much will government spending need to change by holding everything else constant? After you compute the change in government spending, use this new level of spending to recalculate the equilibrium level of real GDP and see if your answer is correct. (Hint: the simple multiplier calculation will result in “too small” a level of stimulus since the aggregate price level will change when the AD curve shifts.) Show your work and your computations.

g. Suppose the government sets a goal of using fiscal policy to reach the full employment level of output. If the government changes the level of autonomous taxes to reach this goal, how much will the autonomous taxes need to change by holding everything else constant? After you compute the change in autonomous taxes, use this new level of taxes to recalculate the equilibrium level of real GDP and see if your answer is correct. (Hint: the simple multiplier calculation will result in “too small” a level of stimulus since the aggregate price level will change when the AD curve shifts.) Show your work and your computations.

h. Suppose the government, for political reasons, finds that fiscal policies are simply not possible to implement in this economy. But, the government is still determined to restore this economy to Yfe, perhaps because the government is concerned with the social instability that high levels of unemployment may create, or because the government is morally concerned about the impact of high unemployment on people in their society, or because….(fill in your own rationale).The government sets a goal of using monetary policy to reach the full employment level of output. Can the government reach this goal using only monetary policy? In your answer remember that it is not possible to have the nominal interest rate go below 0%. Holding everything else constant, what is the highest level of real GDP this economy can attain if the government engages in activist monetary policy? (Hint: you will definitely need your calculator on this one!) And, what will be the monetary policy that is implemented to reach this level of real GDP? In your answer to this last question be specific with the type of policy as well as providing a quantitative number for this policy.

Answer:

a. Consumption spending depends upon disposable income (Y – T) and the aggregate price level. Consumption spending is positively related to disposable income: as disposable income increases, holding everything else constant, the level of consumption spending increases. Consumption spending is inversely related to the aggregate price level: as the aggregate price level increases, holding everything else constant, the level of consumption spending decreases. This reasoning seems plausible: an increase in disposable income suggests that individuals have greater command over goods and services and will decide to purchase more when their disposable incomes have risen. On the other hand, for a given level of nominal income, an increase in the aggregate price level means that consumers have less purchasing power and will therefore reduce their purchases of goods and services.

b. To find the equilibrium interest rate you need to find the interest rate that equates money supply to money demand. Hence,

12,000 = 24,000 – 3000r

r = 4 or 4%

c. We know that I = 1000 - 100r and we just calculated that r = 4%. So,

I = 1000 – 100(4) = $600

d. We know that AD = AE and AE = C + I + G + (X – M). Hence,

Y (a convenient short hand for the level of output demanded) = AE

Y = C + I + G + (X – M)

Y = 200 + .5(Y – T) – 100P + I + G + (X – M)

Y = 200 + .5(Y – 150) – 100P + 600 + 200 + 50

Y = 1050 + .5(Y – 150) – 100P

.5Y = 975 – 1000P

Y = 1950 - 200P

The equation for AD can be written as Y = 1950 - 200P or rearranging and solving for P we have P = 9.75 – (1/200)Y.

e. To find the short run equilibrium we will want to see where the AD curve intersects the SRAS curve. Thus,

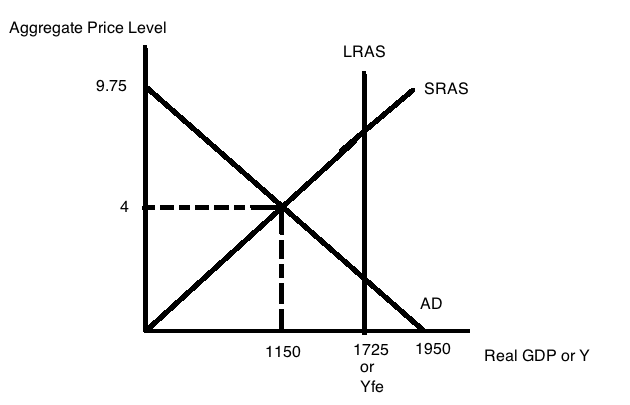
1950 - 200P = 287.50P

487.5P = 1950

Pe = 4

Ye = 1950 - 200P = 1950 - 200(4) = 1150

Or, Ye = 287.50P = 287.50(4)= 1150



f. I started this answer by thinking-“this is easy, all I need to do is use the simple multiplier to figure out the needed level of government spending”. So, let’s try this out and see if it works. First, if we are currently producing at Ye = 1150 and Yfe = 1725 then we need a change in real GDP of 575. And, we know that the relationship between the multiplier, a change in autonomous spending, and real GDP can be written as:

(Change in real GDP) = (multiplier)(change in autonomous spending)

575 = (1/(1-.5))(change in government spending)

Or, 575 = 2(change in government spending)

Change in government spending = 287.50

So, let’s try this and see if it works:

Y’ = 200 + .5(Y’ – T) – 100P + 500 + 487.50 + 50

Y’ = 1237.50 + .5(Y’ – 150) – 100P

.5Y’ = 1162.50 – 100P

Y’ = 2325 – 200P [This is our new AD’ curve: the increase in government spending will shift the AD curve to the right]

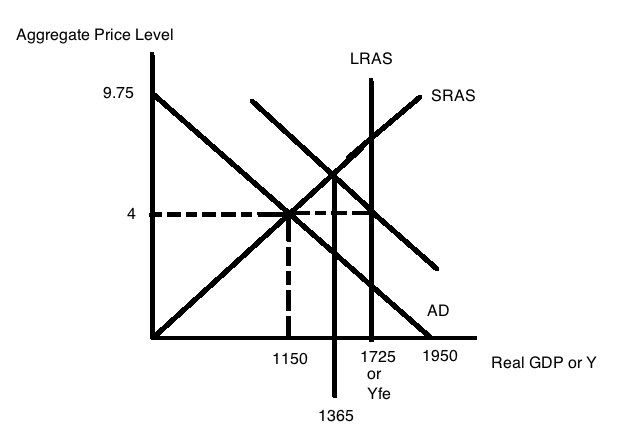
Now, let’s set the AD’ curve equal to the SRAS curve and see what the equilibrium level of real GDP is (we want this to be Yfe = 1725). Thus,

2325 – 200P = 287.5P

487.5P = 2325

P = approximately 4.8

Y’ = 2325 – 200(4.8) = 1365 ! An increase in government spending of $287.50 is not sufficient to get this economy to Yfe. Let’s see if I can draw an image that helps you see why this has failed.



The simple multiplier holds the aggregate price level constant and shifts the AD curve to AD’ where AD’ intersects the LRAS curve at Yfe = 1725. However, the SRAS curve is upward sloping, so when the AD curve shifts this causes a change in the aggregate price level and it results, in this case, in a smaller increase in real GDP than the simple multiplier would have predicted. From the graph we can see that if we want to get to Yfe we will need a higher aggregate price level than 4 and a larger rightward shift of the AD curve than is generated by an increase of $287.50 in government spending. So, let’s try this again.

Looking at the graph let’s first find the aggregate price level where the SRAS and the LRAS intersect. Thus, 1725 = 287.50P or P = 6. So, when the aggregate price level is equal to 6, then Yfe = SRAS curve. Use this aggregate price level to calculate what the change in real GDP needs to be in order for this economy to reach Yfe. Thus, when P = 6, the level of real GDP on the original AD curve is equal to 750 and therefore if we want to shift AD to the right to get to Yfe, the change in real GDP must be 1725 – 750 or 975. Now, using these number let’s repeat the simple multiplier process:

(Change in real GDP) = (multiplier)(change in government spending)

975 = (1/(1-.5))(change in government spending)

975 = 2(change in government spending)

487.50 = Change in government spending

Let’s try this and see if it works:

Y’ = 200 + .5(Y’ – T) – 100P + 687.50 + 600 + 50

Y’ = 1537.5 + .5(Y’ – 150) – 100P

.5Y’ = 1462.5 – 100P

Y’ = 2925 – 200P [This is our new AD’ curve: the increase in government spending will shift the AD curve to the right]

Now, let’s set the AD’ curve equal to the SRAS curve and see what the equilibrium level of real GDP is (we want this to be Yfe = 1725). Thus,

2925 – 200P = 287.5P

487.5P = 2925

P = 6

Y’ = 2925 – 200(6) = 2925 – 1200 = 1725 ! An increase in government spending of $487.5 will get this economy to Yfe.

g. Before reading this answer review the answer in (f) and make sure you understand how the upward sloping (e.g., the aggregate price level is no longer assumed to be constant as it was in the simple Keynesian model) SRAS complicates your work.

From (f) we know that the change in real GDP we need in order to reach Yfe is 975. So,

(Change in real GDP) = (-b/(1 – b))(Change in autonomous taxes)

975 = (-.5/.5)(Change in autonomous taxes)

-975 = Change in autonomous taxes (That is, taxes need to decrease by 975, so that means that the government will basically send taxpayers a total of 825, rather than taxing them at the original level of 150.)

Let’s try this and see if it works:

Y’ = 200 + .5(Y’ – (150 – 975)) – 100P + 850

Y’ = 1050 + .5Y’ +.5(825) – 100P

.5Y’ = 1462.5 – 100P

Y’ = 2925– 200P (This is our new AD’ curve that reflects the decrease in autonomous taxes of 2500. Notice that this is the same equation as we found in (f).)

Set this new AD’ curve equal to the SRAS curve and we have:

2925 – 200P = 287.5P

487.5P = 2925

P = 6

Y’ = 2925 – 200P = 2925 – 200(6) = 1725

Or, Y’ = 287.5P = 287.5(6) = 1725

h. The conduit for monetary policy in this model is the interest rate and its impact on the level of investment. So, let’s start with thinking about the maximum amount of investment spending that will occur in this economy. This maximum level of investment spending is that level associated with a nominal interest rate of 0%. So, I = 1000 - 100r and if r = 0 then we have:

I = 1000 – 100(0) or I = 1000.

But, what monetary policy will result in the interest rate equaling 0%. Monetary policy will shift the money supply curve: in this case we need the money supply curve to shift to the right-so the central bank will need to engage in open market purchases in order to expand the money supply. Money demand when r = 0% is equal to 24,000. So, since the initial money supply was 12,000 we will need the change in the money supply to be 12,000 (that is 24,000 – 12,000 = 12,000). So,

(Change in money supply) = (Money multiplier)(Change in reserves)

12,000 = (1/rr)(change in reserves)

12,000 = (1/.05)(change in reserves)

12,000 = 20(change in reserves)

600 = change in reserves

So, if the government purchases $600 in t-bills this will increase the money supply to 24,000 and result in the interest rate being 0%. When the interest rate is 0% this will result in investment spending being equal to $1000. So, given this policy and its impact, what happens to Ye?

Y = 200 + .5(Y – T) – 100P + 1000 + 200 + 50

Y = 1450 + .5(Y – 150) – 100P

.5Y = 1375 – 100P

Y = 2750 – 200P ( This is our new AD curve that reflects the change in monetary policy and its resultant impact on investment spending.)

Use the SRAS curve and this new AD curve to find the new equilibrium aggregate price level and the new equilibrium real GDP. Thus,

2750 - 200P = 287.5P

487.5P = 2750

P = approximately 5.6

Y = 2750 – 200(5.6) = 2750 - 1120 = 1630

Or, Y = 287.5P = 287.5(5.6) = 1610 (the difference here is due to rounding error)

It is not possible for this economy to reach Yfe solely through monetary policy. This model suggests that it is possible to have an economic scenario where the economy cannot return to Yfe in the short run through government intervention that is solely in the form of monetary policy. (Note: one interpretation of this problem is that it may reflect a bit of “current reality” where monetary policy has not been sufficient to get the economy back to full employment.)