**Economics 102**

**Spring 2018**

**Answers to Homework #3**

**Due 3/15/2018**

**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!
* Do not submit messy, illegible, sloppy work.
* Show your work to get full credit.

1. Classify the following scenarios based on the component of GDP (C, I, G, X-IM) or not counted (NC) and then how GDP is affected (increase, decrease, or no change)

|  |  |  |
| --- | --- | --- |
| **Scenario** | **Component of GDP** | **Effect on GDP** |
| The government hires workers to build a new road | G | Increase |
| A Canadian company decides to change from a US supplier to a Canadian supplier | NC | No change |
| A bakery purchases a new industrial oven | I | Increase |
| Consumers start saving more, worried a recession is coming | C | Decrease |
| A UW Madison student pays monthly apartment rent | C | Increase |
| A retiree receives his social security check | NC | No change |
| A clothing manufacturer buys more cotton | NC | No change |
| A local company outsources its call center to overseas (Hint: they’re buying a service) | X-IM | Decrease |

1. Use the following information to answer this set of questions where you will be asked to use your knowledge of GDP measurement and the expenditure approach, income approach, and value added approaches to measuring GDP. Assume that there are only two firms in this economy: Wisco Dairy Farm that produces milk and Madtown Creamery that produces ice cream using milk it buys from Wisco Dairy Farm.

|  |  |  |  |
| --- | --- | --- | --- |
| Wisco Dairy Farm | | Madtown Creamery | |
| **Revenues** | | **Revenues** | |
| Sales to Madtown Creamery | $15,000 | Sales of ice cream to customers | $55,000 |
| Sales to Canadian Creamery | $10,000 |  |  |
| Sale of milk to customers | $5,000 | **Expenses** | |
| **Expenses** | | Input: Wisco dairy | $15,000 |
| Wages | $10,000 | Wages | $14,000 |
| Profits | $1,000 | Profits | $5,000 |
| Rent | $15,000 | Rent | $15,000 |
| Interest Payments | $4,000 | Interest Payments | $6,000 |

* 1. Calculate GDP using the final goods approach

Here, we only want to counts sales to customers, not sales of intermediate goods.

GDP = Sales to Canadian Creamery ($10,000) + Sales of milk ($5,000) + Sales of ice cream to customers ($55,00) = $70,000

* 1. Calculate GDP using the value-added approach. Show your steps.

Value added = Price of final good – price of intermediate goods

Value added by Wisco Dairy Farm = $15,000 + $10,000 + $5,000 - $0 = $30,000

Value added by Madtown Creamery = $55,000 - $15,000 = $40,000

So value added = $30,000 + $40,000 = $70,000

* 1. Calculate GDP using the factor payment approach. Show your steps clearly.

GDP = wages + interest + rent + profits.

At Wisco Dairy Farm: $10,000 + $1,000 + $15,000 + $4,000 = $30,000

At Madtown Creamery: $14,000 + $5,000 + $15,000 + $6,000 = $40,000

So GDP = $30,000 + $40,000 = $70,000

1. Consider the economy of Sweetums, which produces three goods: fudge, brownies, and cake. Round your answers to two places past the decimal point.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2016 | | 2017 | | 2018 | |
| Good | Price per unit | Units Sold | Price per unit | Units Sold | Price per unit | Units sold |
| Fudge | $2 | 10,000 | $2 | 11,000 | $3 | 10,500 |
| Brownies | $4 | 2,000 | $5 | 2,000 | $5 | 2,500 |
| Cake | $10 | 500 | $11 | 400 | $14 | 500 |

* 1. Calculate nominal GDP for the years 2016, 2017, 2018.

Nominal GDP = sum (P\*Q) for all the final goods and services

Nominal GDP 2016: $2\*10,000 + $4\*2,000 + $10\*500 = $20,000 + $8,000 + $5,000 = $33,000

Nominal GDP 2017: $2\*11,000 + $5\*2,000 + $11\*400 = $22,000 + $10,000 + $4,400 = $36,400

Nominal GDP 2018: $3\*10,500 + $5\*2,500 + $14\*500 = $31,500 + $12,500 + $7,000 = $51,000

* 1. Calculate Real GDP for all three years, using 2016 as the base year.

When calculating Real GDP, we keep the prices fixed at the base year and vary quantity over the years – so in this case, we keep prices (Fudge, Brownies, Cake) fixed at ($2, $4, $10).

Also, we know that Nominal GDP in base year = Real GDP in base year, since we are using the same prices. Thus, Real GDP 2016 = Nominal GDP 2016 = $33,000

Real GDP 2017 = $2\*11,000 + $4\*2,000 + $10\*400 = $22,000 + $8,000 + $4,000 = $34,000

Real GDP 2018 = $2\* 10,500 + $4\*2,500 + $10\*500 = $21,000 + $10,000 + $5,000 = $36,000

* 1. Calculate Real GDP for all three years, using 2017 as the base year.

Real GDP 2016 = $2\*10,000 + $5\*2,000 + $11\*500 = $20,000 + $10,000 + $5,500 = $35,500

Real GDP 2017 = Nominal GDP 2017 = $36,400

Real GDP 2018 = $2\*10,500 + $5\*2,500 + $11\*500 = $21,000 + $12,500 + $5,500 = $39,000

* 1. Using your answer from part (b), calculate Real GDP growth from 2016 to 2018 with 2016 as base year. Then, using your answer from part (c), calculate Real GDP growth from 2016 to 2018 with 2017 as the base year. Round your answer to two places past the decimal point. Do you get the same number? Why or why not?

GDP growth rate = {[(New GDP) – (Old GDP)] / (Old GDP)}\*100%

With base year 2016, real GDP growth from 2016 to 2018 = [($36,000 – $33,000) / $33,000]\*100% = 9.09%

With base year 2017, real GDP growth from 2016 to 2018 = [($39,000 – $35,500) / $35,500]\*100% = 9.86%

We don’t get the same answer because our calculations of real GDP growth depend on the base year we choose. This is one reason that some economists suggest we use a more sophisticated measure of calculating GDP, called real chain-weighted GDP (but you won’t be tested on this).

* 1. Calculate the GDP deflator using 2016 as a base year. Then use this to calculate how prices changed from 2016 to 2018. Measure the GDP deflator on a 100 point scale and round all calculations to two places past the decimal.

GDP deflator for year Y = [(Nominal GDP year Y) / (Real GDP year Y using BY 2016)] \*100

GDP deflator for 2016 = $33,000/$33,000 \*100 = 100

GDP deflator for 2017 = $36,400/$34,000 \*100 = 107.06

GDP deflator for 2018 = $51,000/$36,000 \*100 = 141.67

Change in Prices: [(141.67 – 100)/100]\*100% = 41.67%

* 1. Calculate the GDP deflator using 2017 as a base year. Then use this to calculate how prices changed from 2016 to 2018. Compare this to your answer from (e).

GDP deflator for 2016 = $33,000/$35,500 \*100 = 92.96

GDP deflator for 2017 = $36,400/$36,400 \*100 = 100

GDP deflator for 2018 = $51,000/$39,000 \*100 = 130.77

Change in Prices: [(130.77 – 92.96) / 92.96]\*100% = 40.67%

The percentage change in the price level between 2016 and 2018 are not the same for the two different base years. Again, the difference arises from the fact that our choice of base year affects our calculations here.

* 1. Calculate the CPI for all three years using 2016 as the basket and the base year. Calculate the change in prices from 2016 to 2018 using the CPI. Show your work. Measure the CPI on a 100 point scale and round your answers to two places past the decimal.

Now, we fix the number of units sold in 2016, and allow prices to vary over the years. CPI in year Y = [(cost of basket in year Y) / (cost of basket in base year)] \*100

First, let’s find the cost of 2016 basket with base year 2016. It will turn out to just be nominal GDP in 2016 = $33,000.

Next, cost of basket in 2017 = $2\*10,000 + $5\*2000 + $11\*500 = $20,000 + $10,000 + $5,500 = $35,500

Cost of basket in 2018 = $3\*10,000 + $5\*2,000 + $14\*500 = $30,000 + $10,000 + $7,000 = $47,000

CPI 2016 = $33,000/$33,000 \*100 = 100

CPI 2017 = $35,500/$33,000 \*100 = 107.58

CPI 2018 = $47,000/$33,000 \*100 = 142.42

Change in prices: [(142.42 – 100) / 100] \*100% = 42.42%

* 1. Calculate the CPI for all three years using 2016 quantities as the basket but 2017 as the base year. Calculate the change in prices from 2016 to 2018 using this new CPI. Show your work. Measure the CPI on a 100 point scale and round your answers to two places past the decimal.

Now, fix number of units sold in 2016, allow prices to vary.

Cost of 2016 basket is still $33,000

Cost of 2017 basket is still $35,500

Cost of 2018 basket is still $47,000

CPI 2016 with 2017 as the base year = $33,000/35,500 \*100 = 92.96

CPI 2017 with 2017 as the base year = $35,500/35,500 \*100 = 100

CPI 2018 with 2017 as the base year = $47,000/35,500 \*100 = 132.39

Change in prices: [(132.39 – 92.96) / 92.96] \*100% = 42.42%

* 1. Compare your answers about change in prices above (e, f, g, h).

Using the GDP deflator versus the CPI gives us different answers – think about how they’re calculated. We’re fixing different things in each case here. With the GDP deflator, we are fixing prices, and with the CPI we are fixing quantities. Note that you get the same value for the percentage change in the price level between 2016 and 2018 in (g) and (h): this is because of the way the CPI is constructed. The CPI’s measure of the rate of change in the price level (the rate of inflation or deflation) is not dependent on the choice of the base year.

1. For each of the following scenarios, determine whether each person is employed (E), unemployed (U), or not in the labor force (NLF).

|  |  |
| --- | --- |
| **Scenario** | E, U, NLF |
| A UW student working part-time | NLF |
| A 45-year old single dad who is only working part-time but would prefer a full-time job | E |
| A 15 year old actively searching for a job | NLF |
| A full-time Military officer | NLF |
| A new college graduate who has looked for work within the last two weeks | U |
| A family relative who is not working and has not applied to any jobs in the past four weeks | NLF |
| A 30-year old man who lost his job a week ago and has a job interview tomorrow | U |
| A 25-year old woman who lost her job 2 months ago and moved back in with her parents, and hasn’t searched for a job since she lost her job | NLF |

1. Unemployment calculations – consider again the economy of Sweetums. We have historical information on their population and labor force:

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2000 | 2005 | 2010 |
| Population | 25,000,000 | 26,500,000 | 29,000,000 |
| Adult population | 18,000,000 | 20,000,000 | 23,000,000 |
| Adult population able to work | 17,000,000 | 19,500,000 | 22,750,000 |
| Adult population able and wanting to work | 15,000,000 | 18,500,000 | 22,000,000 |
| Number employed | 13,000,000 | 17,000,000 | 19,000,000 |
| Number unemployed | 1,000,000 | 1,000,000 | 2,000,000 |

* 1. Define the labor force in general and then find the labor force for each year given the above information.

The labor force includes everyone who is employed and unemployed.

LF in 2000 = 13,000,000 + 1,000,000 = 14,000,000

LF in 2005 = 17,000,000 + 1,000,000 = 18,000,000

LF in 2010 = 19,000,000 + 2,000,000 = 21,000,000

* 1. Define discouraged workers and find the number of discouraged workers for each year given the above information.

Discouraged workers are workers who attempted to find a job, but gave up hope of finding a job citing that they did not believe there were any jobs available for them, they didn’t have the appropriate training or schooling to qualify for a good job, or that they faced age, gender, or race discrimination.

Discouraged workers (DW) are able and wanting to work but don’t, so we take Adult pop able and wanting to work – LF:

DW 2000 = 15,000,000 – 14,000,000 = 1,000,000

DW 2005 = 18,500,000 – 18,000,000 = 500,000

DW 2010 = 22,000,000 – 21,000,000 = 1,000,000

* 1. Calculate the labor-force participation rate for each year. Round your answer to two places past the decimal.

Labor force participation rate = (labor force) / (civilian non-institutionalized population) \*100%

For this problem we will assume that the civilian non-institutionalized population is the same as the adult population since we are not given any other clarifying information.

LFPR 2000 = 14,000,000/18,000,000 \*100% = 77.78%

LFPR 2005 = 18,000,000/20,000,000 \*100% = 90%

LFPR 2010 = 21,000,000/23,000,000 \*100% = 91.30%

* 1. Calculate the unemployment rate for each year. Round your answer to two places past the decimal.

Unemployment rate is [(number of unemployed) / (number in LF)] \*100%

UR 2000 = 1,000,000/14,000,000 \*100% = 7.14%

UR 2005 = 1,000,000/18,000,000 \*100% = 5.56%

UR 2010 = 2,000,000/21,000,000 \*100% = 9.52%