

Lab #4
Agricultural and Resource Economics
(ARE 012)

Name: _____

Time/Day of Lab: _____

This lab assignment is worth 100 points.

Purpose of Lab:

This assignment will teach you how to calculate your tax burden, disposable income, and discretionary income, introduce you to the Consumption - Production Model of economic activity, show you how to incorporate fiscal policy into the Consumption - Production Model, and analyze the components of interest rates.

Assignments:

1. Calculating Your Tax Burden, Disposable Income, and Discretionary Income.
Chapter 20 of "Everyday Economics" and your notebooks will assist you.

Please answer the questions below using the following information:

Bill Smith's gross income in 2008 was \$32,000. His wife Mary grossed \$38,000 in 2008. Bill and Mary have two small children and qualify for the \$1,000.00 federal child tax credit and the \$100 state child tax credit for each child. Grandparents provide care for the children during the workday.

The standard deduction for a couple jointly filing a 2008 Federal Tax Return is \$10,950. Bill and Mary have calculated that their itemized deduction is \$15,000. The personal exemption for each adult and dependent exemption for each child is \$3,500. The combined Social Security and Medicare tax rate is 7.65% payable on gross income.

The tax on Bill and Mary's personal property that is paid to their municipal and county government is \$1300. Bill and Mary purchased 1,200 gallons of gas for their vehicles in 2008. The excise tax rate on gas in North Carolina is \$.483 per gallon, which includes the state and federal excise tax (\$.299 state plus \$.184 Federal). Bill and Mary incurred \$2700 of state and county sales taxes during the year.

Bill and Mary save approximately 5% of their take-home pay. They spend about 50% of their gross income on family living expenses (e.g., mortgage payment, food, clothing, car payment, utilities).

A tax credit is a dollar for dollar reduction in your tax liability.

a) What is Bill and Mary's gross joint income?

b) What is Bill and Mary's taxable income? Taxable income is calculated as follows:

Taxable Income = Gross Income

Less the larger of the Standard Deduction or Itemized Deduction

Less the Value of Personal Exemptions (one per family member)

c) What is Bill and Mary's federal income tax? Answer this question using the Federal Income Tax Table that is attached and adjust for the federal child tax credit.

d) What is Bill and Mary's state income tax? Answer this question using the N.C. Income Tax Table that is attached and adjust for the state child tax credit.

e) What is the amount of Social Security and Medicare tax that was withheld from Bill and Mary's checks? The Social Security and Medicare tax is calculated as follows:

$$\text{Social Security and Medicare Tax} = \text{Gross Income} \times \text{Social Security and Medicare Tax Rate}$$

f) What is Bill and Mary's take-home pay? Take-home pay is calculated as follows:

$$\begin{aligned} \text{Take-Home Pay} = & \text{Gross Pay} \\ & \text{Less Federal Income Tax} \\ & \text{Less State Income Tax} \\ & \text{Less Social Security and Medicare Tax} \end{aligned}$$

g) How much money did Bill and Mary spend in 2008?

h) How much money did Bill and Mary pay in sales tax?

i) How much money did Bill and Mary pay in gasoline taxes? The gasoline tax is calculated as follows:

$$\text{Gasoline Tax} = \text{Gallons of Gasoline Purchased} \times \text{Tax Rate per Gallon}$$

j) How much money did Bill and Mary pay in taxes? The money paid in taxes is calculated as followed:

$$\begin{aligned} \text{Money Paid in Taxes} = & \text{Federal Income Tax} \\ & \text{Plus State Income Tax} \\ & \text{Plus Social Security and Medicare Tax} \\ & \text{Plus Gasoline Tax} \\ & \text{Plus Sales Tax} \\ & \text{Plus Personal Property Tax} \end{aligned}$$

k) What is Bill and Mary's tax burden as a percent of their gross income? The tax burden is calculated as follows:

$$\text{Tax Burden} = (\text{Money Paid in Taxes} / \text{Gross Income}) \times 100$$

l) What is Bill and Mary's disposable income? Disposable income is calculated as follows:

$$\text{Disposable Income} = \text{Gross Income} - \text{Taxes paid}$$

m) How much money did Bill and Mary spend on family living expenses?

n) What is Bill and Mary's discretionary income? Discretionary income is calculated as follows:

$$\text{Discretionary Income} = \text{Disposable Income} - \text{Family Living Expenses}$$

2. Introducing the Consumption - Production Model. The Consumption - Production Model explains the relationship between the consumption of a good or service by consumers and the production of these products by suppliers. It states that the economy has a natural tendency to equate the level of consumption and the level of production. You may want to refer to your class notes for an extensive discussion of the Consumption - Production Model.

If the economy is out of equilibrium (i.e., consumption \neq production), the level of inventories will adjust until equilibrium is restored. That is, inventories will increase or decrease, as the situation dictates, until consumption and production are equal:

i) Consumption $>$ Production \Rightarrow Economy is Out of Equilibrium and Inventories are Falling \Rightarrow Need to Push Inventories Up to Restore Equilibrium \Rightarrow Inventories will Increase \Rightarrow Consumption = Production \Rightarrow Economy is Back in Equilibrium

ii) Consumption $<$ Production \Rightarrow Economy is Out of Equilibrium and Inventories are Rising \Rightarrow Need to Push Inventories Down to Restore Equilibrium \Rightarrow Inventories will Decrease \Rightarrow Consumption = Production \Rightarrow Economy is Back in Equilibrium

There are two common ways to increase the level of inventories:

i) An increase in commodity prices will increase inventories by kicking some consumers out of the market (i.e., less consumption). This method of increasing inventories is likely to be observed in the short run when the firms producing the product are operating at or near full capacity and unemployment is low. In the long run, higher prices are likely to increase market inventories by attracting new firms to the industry and encouraging existing firms to expand their production capacity.

ii) An increase in production will increase inventories by making a greater quantity of the product available for sale (i.e., more output). This method of increasing inventories is likely to be observed in the short run when the firms producing the product are operating at less than full capacity and unemployment is relatively high. In the long run, an increase in production is usually associated with an increase in the price of the product to cover the additional costs associated with increased production.

There are two common ways to decrease the level of inventories:

i) A drop in prices will decrease inventories by attracting new customers to the market (i.e., more consumption). This method of decreasing inventories is likely to be observed in the short run when the firms producing the product are operating at less than full capacity and unemployment is relatively high. In the long run, a drop in prices will decrease production by forcing some firms out of business.

ii) A decrease in production will decrease inventories by making less of the product available for sale (i.e., less output). This method of decreasing inventories is likely to be observed in the short run when the firms producing the product are operating at full capacity and unemployment is relatively low. In the long run, a decrease in production may also be combined with a decrease in the price of the product.

Fill in the blanks below with \uparrow to indicate an increase in the variable or with \downarrow to indicate a decrease in the variable. Answer the questions with a brief written response.

a) Consumption $>$ Production \Rightarrow Economy is Out of Equilibrium \Rightarrow
 Inventories _____ \Rightarrow Prices must _____ or Production must _____ to Restore
 Equilibrium \Rightarrow Inventories _____ \Rightarrow Consumption = Production \Rightarrow
 Economy is back in Equilibrium

Under what conditions is price more likely to change than production to restore equilibrium in this situation?

b) Consumption _____ Production \Rightarrow Economy is Out of Equilibrium \Rightarrow
 Inventories _____ \Rightarrow Prices must _____ or Production must \uparrow to Restore
 Equilibrium \Rightarrow Inventories _____ \Rightarrow Consumption = Production \Rightarrow
 Economy is back in Equilibrium

Under what conditions is production more likely to change than price to restore equilibrium in this situation?

c) Consumption $<$ Production \Rightarrow Economy is Out of Equilibrium \Rightarrow
 Inventories _____ \Rightarrow Prices must _____ or Production must _____ to Restore
 Equilibrium \Rightarrow Inventories _____ \Rightarrow Consumption = Production \Rightarrow
 Economy is back in Equilibrium

Under what conditions is price more likely to change than production to restore equilibrium in this situation?

3. Incorporating Fiscal Policy into the Consumption - Production Model. Fiscal policy can be incorporated into the Consumption - Production Model through its effects on consumption and production. We will concentrate our discussion on the effects of government spending and taxation on consumption. You may want to refer to your class notes for an extensive discussion of the Consumption - Production Model.

There are two ways in which government spending may increase consumption of goods and services by consumers:

i) An increase in government spending may increase consumption in the short run when there is high unemployment but the outlook for the economy is optimistic. For example, a new highway project will probably put some people to work that were previously unemployed. These people will spend a part of their paychecks on goods and services, which will increase the level of consumption. In the long run, an increase in government spending is not likely to have any effect on the real level of disposable income since it will drive up prices at the same time that it increases income (inflation).

An increase in government spending is incorporated into the Consumption - Production Model through its possible effects on disposable income in the short run:

Government Spending $\uparrow \Rightarrow$ Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$
 Consumption and Production are Knocked Out of Equilibrium \Rightarrow Consumption $>$
 Production \Rightarrow Inventories $\downarrow \Rightarrow$ Prices must \uparrow or Production must \uparrow to Restore
 Equilibrium \Rightarrow Inventories $\uparrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in
 Equilibrium

ii) A decrease in the level of taxation may increase consumption. The level of disposable income is directly related to the level of taxation. If the public is expecting lower taxes in the near future or the outlook for the economy is pessimistic, a decrease in taxation may not have a major impact on consumption.

A decrease in taxation is incorporated in the Consumption - Production Model through its possible effects on disposable income in the short run:

Government Taxation $\downarrow \Rightarrow$ Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Consumption
 and Production are Knocked Out of Equilibrium \Rightarrow Consumption $>$ Production \Rightarrow
 Inventories $\downarrow \Rightarrow$ Prices must \uparrow or Production must \uparrow to Restore Equilibrium \Rightarrow
 Inventories $\uparrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium

There are two ways in which government spending may decrease consumption:

i) A decrease in government spending may decrease consumption in the short run. For example, a cut in military spending at Fork Bragg will be felt by merchants in Fayetteville and throughout North Carolina. In the long run, a cut in government spending will probably not have any negative effects on consumption as private firms use the capital that is freed up by less government to expand their production.

A decrease in government spending is incorporated into the Consumption - Production Model through its possible effects on disposable income in the short run:

Government Spending ↓ ⇒ Disposable Income ↓ ⇒ Consumption ↓ ⇒ Consumption and Production are Knocked Out of Equilibrium ⇒ Consumption < Production ⇒ Inventories ↑ ⇒ Prices must ↓ or Production must ↓ to Restore Equilibrium ⇒ Inventories ↓ ⇒ Consumption = Production ⇒ Economy is back in Equilibrium

ii) An increase in the level of taxation is likely to decrease consumption. If the public pays more money in taxes, it has less money to spend in the market, and a dollar spent by the government has less of an effect on consumption than a dollar spent by the private sector.

An increase in taxation is incorporated in the Consumption - Production Model through its possible effects on disposable income:

Government Taxation ↑ ⇒ Disposable Income ↓ ⇒ Consumption ↓ ⇒ Consumption and Production are Knocked Out of Equilibrium ⇒ Consumption < Production ⇒ Inventories ↑ ⇒ Prices must ↓ or Production must ↓ to Restore Equilibrium ⇒ Inventories ↓ ⇒ Consumption = Production

Select the correct answer:

i) The marginal tax rate changes from 16% to 15%. What is a possible outcome?

a) Disposable Income \uparrow \Rightarrow Consumption \uparrow \Rightarrow Inventories \downarrow \Rightarrow Prices \downarrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories \uparrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

b) Disposable Income \downarrow \Rightarrow Consumption \downarrow \Rightarrow Inventories \uparrow \Rightarrow Prices \downarrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories \downarrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

c) Disposable Income \uparrow \Rightarrow Consumption \uparrow \Rightarrow Inventories \downarrow \Rightarrow Prices \uparrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories \uparrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

d) Disposable Income \downarrow \Rightarrow Consumption \uparrow \Rightarrow Inventories \uparrow \Rightarrow Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories \downarrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

e) Not enough information to adequately answer the question

ii) Government spending decreases. What is a possible outcome?

a) Disposable Income \uparrow \Rightarrow Consumption \uparrow \Rightarrow Inventories \uparrow \Rightarrow Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories \downarrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

b) Disposable Income \downarrow \Rightarrow Consumption \downarrow \Rightarrow Inventories \uparrow \Rightarrow Prices \downarrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories \downarrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

c) Disposable Income \uparrow \Rightarrow Consumption \uparrow \Rightarrow Inventories \downarrow \Rightarrow Prices \uparrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories \uparrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

d) Disposable Income \downarrow \Rightarrow Consumption \downarrow \Rightarrow Inventories \uparrow \Rightarrow Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories \downarrow \Rightarrow Consumption = Production \Rightarrow Economy is back in Equilibrium

e) Not enough information to adequately answer the question

iii) Government spending and the marginal tax rate decrease. What is a possible outcome?

- a) Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories $\downarrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- b) Disposable Income $\downarrow \Rightarrow$ Consumption $\downarrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories $\downarrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- c) Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Inventories $\downarrow \Rightarrow$ Prices \uparrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories $\uparrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- d) Disposable Income $\downarrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories $\downarrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- e) Not enough information to adequately answer the question

iv) Gross income increases from \$30,000 to \$32,000. The tax burden increases from 30% to 31% of gross income. What is a possible outcome?

- a) Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories $\downarrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- b) Disposable Income $\downarrow \Rightarrow$ Consumption $\downarrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories $\downarrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- c) Disposable Income $\uparrow \Rightarrow$ Consumption $\uparrow \Rightarrow$ Inventories $\downarrow \Rightarrow$ Prices \uparrow or Production \uparrow to Restore Equilibrium \Rightarrow Inventories $\uparrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- d) Disposable Income $\downarrow \Rightarrow$ Consumption $\downarrow \Rightarrow$ Inventories $\uparrow \Rightarrow$ Prices \downarrow or Production \downarrow to Restore Equilibrium \Rightarrow Inventories $\uparrow \Rightarrow$ Consumption = Production \Rightarrow Economy is back in Equilibrium
- e) Not enough information to adequately answer the question

4. Analyzing the Components of Interest Rates. Answer the questions below. You may want to refer to your notebooks for an extensive discussion of interest rates.

If there was no inflation, the *real interest rate* is the return that a person would have to be paid to get that person to delay their consumption from the present to some time in the future. For example, if the real interest rate was 5% APR and there was no inflation, you would have to pay me \$105 to get me to save \$100 for one year (i.e., $\$105 = \$100 \times 105\%$).

The real interest rate is typically greater than zero since consumption today means more to a person than the same amount of consumption at some time in the future. For example, I would rather have you give me \$100 today than to have to wait until next year to receive \$100 from you. You would have to pay me at least \$105 to get me to wait one year for your payment (i.e., assuming the real interest rate is 5% APR).

If inflation is expected to occur between now and some time in the future, you would have to pay me the real interest rate plus the expected rate of inflation to get me to postpone my consumption. In this way, my real return and the amount of purchasing power that I would lose due to inflation would be covered. The **expected inflation rate** is an estimate of the amount of inflation that will occur at some time in the future.

If I thought that there was a chance that I might lose all or part of my money if I saved it, you would have to pay me for undertaking this risk. You would have to cover my real interest rate, the expected inflation rate, and the risk to get me to save money if inflation and risk were expected.

The **risk premium** is the amount of money that you would have to pay someone to undertake risk. It is interesting to note that a U.S. Treasury Security is risk-free (e.g., Treasury Bill). This is because it is generally assumed that the federal government will not default on its debt. All other forms of debt have some level of risk associated with them.

The **nominal interest rate** is the amount of money that a bank would have to pay someone to get that person to save money. It can also be interpreted as the amount of money that a person would have to pay a bank to borrow money. Of course, the interest rate that a bank pays you for using your savings is different from the interest rate that the bank charges you for borrowing money. This is because there are transaction costs associated with a bank loaning you money, and the risk that you will default on a loan is different from the risk that the bank will default on a loan made to the bank by you (a savings account for example). And of course, the bank wants to make a profit. The nominal interest rate is derived from the real interest rate, the expected rate of inflation, and the risk premium as follows:

Nominal Interest Rate = Real Interest Rate + Expected Inflation Rate + Risk Premium

Please answer the following questions:

a) If the real interest rate is 4%, the expected inflation rate is 3%, and the risk premium is 2%, what is the nominal interest rate?

b) If the expected inflation rate is 4%, the nominal interest rate is 10%, and there is not a risk premium, what is the real interest rate?

c) Who would you expect to pay the highest interest rate on a loan? Explain your answer.

- i) Microsoft Corporation
- ii) A 40 year old high school teacher
- iii) A college student

Explain:

d) Let's suppose that the return on a 3-Year U.S. Treasury Note is 4.25%. At the same time, the interest rate on a 3-year loan at Wachovia is 8%. What is the risk premium charged by Wachovia?

2008 Federal Tax Rate Schedule

Married Filing Jointly: If taxable income is

Over	But not over	Your tax is	of the amount of taxable income over
\$0	\$16,050	-----10%	\$0
16,050	65,100	\$1,605.00 + 15%	16,050
65,100	131,450	8,962.50 + 25%	65,100
131,450	200,300	25,550.00 + 28%	131,450
200,300	357,700	44,828.00 + 33%	200,300
357,700	-----	96,770.00 + 35%	357,700

2008 State Tax Rate Schedule

Married Filing Jointly: If taxable income is

Over	But not over	Your tax is	of the amount of taxable income over
\$0	21,250	-----6%	\$0
21,250	100,000	\$1,275 + 7%	\$21,250
100,000	-----	\$6,787.50 + 7.75%	100,000