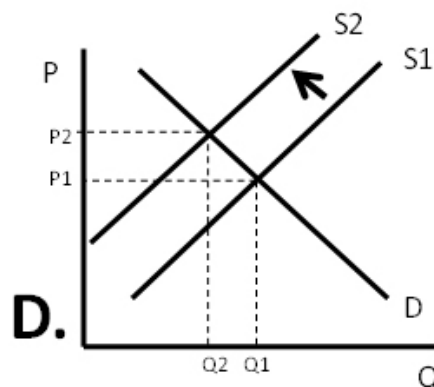
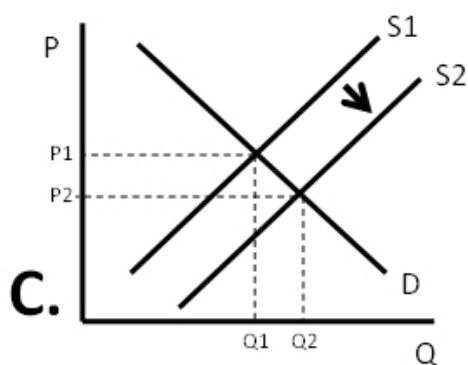
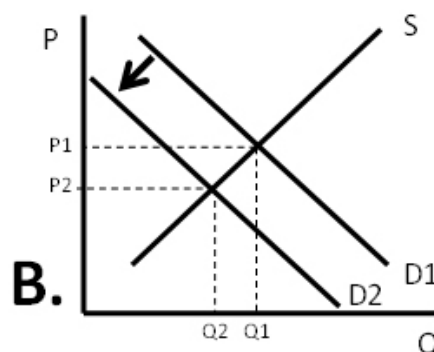
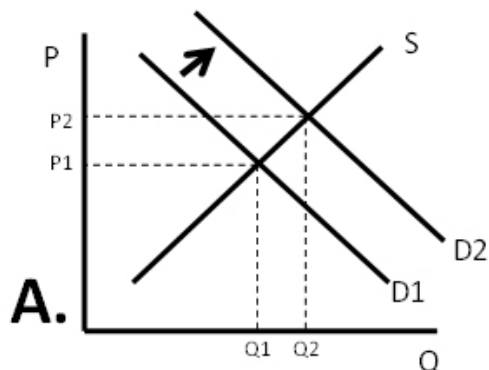


APPENDIX

The appendix presents four assignments, exactly as distributed to students. Sections begin with a brief synopsis, provided for context and are followed by the assignment itself.

A. Guided Study Quiz

This quiz is from module 1, Level 4. Five questions will be presented in a quiz, which are randomly drawn from a pool. All refer to the four demand/supply diagrams, which are pictured in each question.



1. Suppose recession decreases the incomes of consumers. Which of the above diagrams describes what will happen in the market for *cars*, which are *normal* goods?
2. A beloved football star's Mom endorses chicken soup. Which of the above diagrams describes what will happen in the market for chicken soup?
3. Suppose the price of crude oil increases. Which of the above diagrams shows what is likely to happen in the market for gasoline?
4. Suppose property taxes are one of the costs of providing rental housing. Which of the above diagrams describes what will happen in the market for rental housing, if the property tax decreases?
5. Suppose the price of taco chips increases. Which of the above diagrams describes what will happen in the market for *salsa*?

B. In-Class Group Project

Quiz Questions, Prepared in Advance

Example: Macro Group Quiz, Interest Rates

1. Look again at your spreadsheet calculations from Module 1. In what year was the BAA-AAA corporate bond interest rate spread the highest?

Answer: 1982

2. Calculate the average BAA-AAA interest rate spreads by decade. In which decade was average BAA-AAA interest rate spread the lowest?

- a. The 1960's.
- b. The 1970's.
- c. The 1980's.
- d. The 1990's.

3. Study the BAA-AAA interest rate spreads in each decade from the 1960's to the 1990's.

Which of the following statements is most correct?

- a. Interest rate spreads were low through most of the 1960s, were also low during the 1970s, bounced up and down in the 1980s but got big in mid-decade, and hit record highs early in the 1990s, but then slowly declined.
- b. Interest rate spreads hit record highs early in the 1960s, but then slowly declined, were low through most of the 1970s, were also low during the 1980s, and bounced up and down in the 1990s but got big in mid-decade.
- c. Interest rate spreads were low during the 1960s, bounced up and down in the 1970s but got big in mid-decade, hit record highs early in the 1980s, but then slowly declined, and were low through most of the 1990s.

4. Consider the money market in our macroeconomic model. We'll measure the real interest rate "r" on the vertical axis with the BAA-AAA interest rate spread. In the first spreadsheet assignment, you found that the spread was 0.69 in 2014, 1.11 in 2015 and 1.07 in 2016. Which two changes could cause this increase in "r" from 2014 to 2015-16, measured by the interest rate spread?

- a. An increase in the money supply and an increase in money demand.
- b. An increase in the money supply and a decrease in money demand.
- c. A decrease in the money supply and an increase in money demand.
- d. A decrease in the money supply and a decrease in money demand.

5. Consider second shift #3, where changes in the goods market affect the money market. Which change in aggregate demand could cause an increase in the real interest rate in the money market?

- a. An increase in aggregate demand.
- b. A decrease in aggregate demand.

Example: Macro Group Quiz, Inflation

1. Look again at your spreadsheet calculations from Module 1. In what year was the CPI inflation rate the highest?

Answer: 1980

2. Calculate the average CPI inflation rates by decade. In which decade was average CPI inflation rate the highest?

- a. The 1960's.
- b. The 1970's.
- c. The 1980's.
- d. The 1990's.

3. Study the CPI inflation rates in each decade from the 1960's to the 1990's. Which of the following statements is most correct?

- a. Inflation rates were pretty low during the 1960s, falling then rising during the 1970s, highest during the 1980s, and low but rising during the 1990s.
- b. Inflation rates were falling then rising during the 1960s, highest during the 1970s, low but rising during the 1980s, and pretty low in the 1990s.
- c. Inflation rates were low but rising during the 1960s, highest throughout the 1970s, falling then rising during the 1980s, and pretty low in the 1990s.

4. Consider the goods market in our macroeconomic model. During the years after 1955, we'll measure "P" on the vertical axis with the inflation rate. Increases in P mean the inflation rate has increased; decreases in P mean the inflation rate has decreased. In the first spreadsheet assignment, you found that the inflation rate in 2015 was 0.1%, and the inflation rate in 2016 was 1.2%. Which two goods market shifts could cause this change?

- a. A decrease in aggregate demand or a decrease in aggregate supply.
- b. A decrease in aggregate demand or an increase in aggregate supply.
- c. An increase in aggregate demand or a decrease in aggregate supply.
- d. An increase in aggregate demand or an increase in aggregate supply.

5. Consider second shift #2, where changes in the money market affect the goods market. Which change in the money supply could cause an increase in the price level (measured by inflation) in the goods market?

- a. An increase in money supply.
- b. A decrease in money supply.

Example Macro Group Quiz, Unemployment

1. Look again at your spreadsheet calculations from Module 1. In what year was the unemployment rate the highest?

Answer: 1982

2. Calculate the average unemployment rates by decade. In which decade was average unemployment rate the highest?

- a. The 1960's.
- b. The 1970's.
- c. The 1980's.
- d. The 1990's.

3. Study the unemployment rates in each decade from the 1960's to the 1990's. Which of the following statements is most correct?

- a. Unemployment rates started high then fell to record lows in the 1960s, unemployment rates got very high in the mid-1970s, then declined, unemployment rates hit record highs in the first half of the 1980s, then declined, and unemployment rates decreased through most of the 1990s.
- b. Unemployment rates decreased through most of the 1960s, unemployment rates started high then fell to record lows in the 1970s, unemployment rates got very high in the mid-1980s, then declined, and unemployment rates hit record highs in the first half of the 1990s, then declined.
- c. Unemployment rates hit record highs in the first half of the 1960s, then declined, unemployment rates decreased through most of the 1970s, unemployment rates started high then fell to record lows in the 1980s, and unemployment rates got very high in the mid-1990s, then declined.

4. Consider the goods market in our macroeconomic model. Remember that we represent unemployed resources--like unemployed labor--by the difference between equilibrium output and potential output. In the first spreadsheet assignment, you found that the unemployment rate in 2015 was 5.3%, and the unemployment rate in 2016 was 4.9%. Which two goods market shifts could cause this change in unemployment?

- a. A decrease in aggregate demand or a decrease in aggregate supply.
- b. A decrease in aggregate demand or an increase in aggregate supply.

- c. An increase in aggregate demand or a decrease in aggregate supply.
- d. An increase in aggregate demand or an increase in aggregate supply.

5. Consider second shift #2, where changes in the money market affect the goods market. Which change in the money supply could cause a decrease in the unemployment rate in the goods market?

- a. An increase in money supply.
- b. A decrease in money supply.

Example: Macro Group Quiz, Gross Domestic Product

1. Look again at your spreadsheet calculations from Module 1. In what year was the real GDP growth rate the highest?

Answer: 1984

2. Use the spreadsheet data from Module 1 to calculate the average real GDP growth rates by decade. In which decade was average real GDP growth the highest?

- a. The 1960's.
- b. The 1970's.
- c. The 1980's.
- d. The 1990's.

3. Study the real GDP growth rates in each decade from the 1960's to the 1990's. Which of the following statements is most correct?

- a. There were two years of decline in the 1960s, the 1970s started with a severe output decline and then saw rapid growth in the middle of the decade, the 1980s saw high growth rates in the second half of the decade, and real GDP growth was highest during the 1990s.
- b. Real GDP growth was highest during the 1960s, there were two years of decline in the 1970s, the 1980s started with a severe output decline and then saw rapid growth in the middle of the decade, and the 1990s saw high growth rates in the second half of the decade.
- c. The 1960s saw high growth rates in the second half of the decade, real GDP growth was highest during the 1970s, there were two years of decline in the 1980s, and the 1990s started with a severe output decline and then saw rapid growth in the middle of the decade.

4. Consider the goods market in our macroeconomic model. "Q" or "output" on the horizontal axis is real GDP, so movements to the right mean real GDP growth, and movements to the left mean real GDP decline. In the first spreadsheet assignment you found that the real GDP growth rate in 2016 was 1.2%, which is slow growth, but still positive. Which two goods market shifts could cause this change in real GDP?

- a. A decrease in aggregate demand or a decrease in aggregate supply.
- b. An increase in aggregate demand or a decrease in aggregate supply.
- c. A decrease in aggregate demand or an increase in aggregate supply.
- d. An increase in aggregate demand or an increase in aggregate supply.

5. Consider second shift #2, where changes in the money market affect the goods market. Which change in the money supply could cause an increase in real GDP in the goods market?

- a. An increase in money supply.
- b. A decrease in money supply.

Project Assignment

Each 4-person group receives data and questions for one decade, the 1960's, 1970's (shown here), 1980's or 1990's. Each group member has taken a quiz on Blackboard, due the night before, about either real GDP growth, the unemployment rate, the CPI inflation rate or the BAA-AAA interest rate spread (and real interest rates). The quiz answers were based on the spreadsheet assignment from the first module.

The U.S. Economy in the 1970's

Questions 5 and 15 are worth 2 points, others are worth 1 point each.

1970s

Year	Real GDP Growth	Unemployment Rate	CPI Inflation Rate	BAA-AAA Interest Rate Spread
1970	0.2%	5.0%	5.9%	1.07%
1971	3.3%	6.0%	4.2%	1.17%
1972	5.3%	5.6%	3.3%	0.95%
1973	5.6%	4.9%	6.3%	0.80%
1974	-0.5%	5.6%	11.0%	0.93%
1975	-0.2%	8.5%	9.1%	1.78%
1976	5.4%	7.7%	5.8%	1.32%
1977	4.6%	7.0%	6.5%	0.95%
1978	5.6%	6.1%	7.6%	0.76%
1979	3.2%	5.8%	11.3%	1.06%

Averages

1970s	3.2%	6.2%	7.1%	1.08%
1960-2016	3.1%	6.1%	3.8%	1.02%

The Data

1. During the 1970's, in the years that real GDP declined,
 - a. the unemployment rate increased from the previous year.
 - b. the unemployment rate decreased from the previous year.
 - c. the unemployment rate increased in some years, and decreased in other years.
 - d. There were no years in the 1970's that real GDP declined.
2. In the years when the unemployment rate was below the 56-year average (1960-2016),
 - a. There were no years in the 1970's that the unemployment rate was below the 56-year average.
 - b. the inflation rate increased in some years and decreased in some years.
 - c. the inflation rate increased from the year before.
 - d. the inflation rate decreased from the year before.
3. In the years that the inflation rate was in "double-digits", meaning at 10% or above,
 - a. the BAA-AAA interest rate spread increased from the year before.
 - b. the BAA-AAA interest rate spread decreased from the year before.
 - c. the spread increased in some years and decreased in some years.
 - d. There were no years in the 1970's that the inflation rate was at 10% or above.
4. In the years that the BAA-AAA interest rate spread was above the 56-year average,
 - a. There were no years in the 1970's that the interest rate spread was above the 56-year average.
 - b. the real GDP growth rate was always positive.
 - c. the real GDP growth rate was always negative.
 - d. the real GDP growth rate was sometimes positive and sometimes negative.
5. (2 points) Choose the paragraph that best describes the data for your whole decade.
 - a. The decade saw one of the longest expansions in U.S. history. After a mild recession at the start, output grew steadily, at above average rates towards the end of the decade. Unemployment peaked early, then declined to low levels by the end of the decade. In the money market lenders were confident through most of the decade, after a bit of trouble early. Inflation was troublesome early in the decade. Remarkably, though, despite steady growth and falling unemployment, inflation declined and remained below average during most of the decade.

- b. The decade began with the worst recession since the Great Depression. Output fell substantially and unemployment rose to the highest levels in decades. Inflation was high as well, the worst of all possible worlds. Money markets became severely pessimistic with the downturn, and lenders remained gloomy throughout most of the decade. The recovery saw rapid growth at first, but the unemployment rate fell to acceptable levels only by decade's end. The recession helped bring down inflation, though, to very low levels by mid-decade. Inflation crept up again by the decade's end, however.
- c. The decade saw an unstable economy. In several years output grew rapidly, but there was a recession at the decade's beginning and a severe recession in the middle. Unemployment dropped early in the decade, then soared to high rates during the recession. Lenders became very pessimistic during the mid-decade recession, so riskier corporations had trouble borrowing. And, to top it all off, the decade saw the highest inflation of the past fifty years. There were some years when inflation and unemployment were both above average, the worst of all possible worlds.
- d. The decade saw one of the longest expansions in U.S. history. After a mild recession at the beginning of the decade, output grew steadily, often rapidly. Unemployment rates declined to very low levels by the end of the decade. The money market was settled, as lenders remained confident throughout the decade. All was not as well as it seemed, though. Inflation was under control at the beginning of the decade. After a steady rise, by the end of the decade it had become a problem.

The Model

6. Consider the goods market in our macroeconomic model. Which two changes could cause a decline in real GDP, which is "output" or "Q" on the horizontal axis?
 - a. An advance in computer technology and an increase in government purchases.
 - b. A rise in oil prices and a decrease in consumer spending.
 - c. An increase in investment spending and a fall in oil prices.
 - d. A decrease in import spending and a hurricane season without any hurricanes.

7. Consider the goods market in our macroeconomic model. Which two changes could both cause a decrease in unemployment, which is represented by equilibrium output relative to potential output?
 - a. A fall in oil prices and a decrease in government purchases.
 - b. An increase in investment spending and perfect weather for agriculture.
 - c. An increase in import spending and a decrease in export spending.
 - d. A rise in oil prices and an increase in consumer spending.

8. Consider the goods market in our macroeconomic model. Which two changes could cause inflation, which is a rise in the price level or “P” on the vertical axis?

- a. A fall in oil prices and a decrease in government purchases.
- b. A decrease in investment spending and perfect weather for agriculture.
- c. An increase in import spending and a decrease in export spending.
- d. A rise in oil prices and an increase in consumer spending.

9. Consider the money market in our macroeconomic model. Which two changes could both cause an increase in the real interest rate, which is represented by “r” on the vertical axis?

- a. Optimism by lenders and an increase in incomes.
- b. Decreases in bank reserves and a decrease in incomes.
- c. Pessimism by lenders and an increase in the price level.
- d. Increases in bank reserves and a decrease in the price level.

The Data and the Model: 1973 to 1975

Now let’s relate our macroeconomic model to our data. To do this:

- Assume that Q on the horizontal axis of the goods market represents real GDP.
- Assume that changes in P on the vertical axis of the goods market represent changes in the inflation rate (so a fall in P represents a decrease of the inflation rate).
- Assume that unemployment is represented by the difference between equilibrium output and potential output, and that the unemployment rate at potential is 5%.
- Assume that changes in r on the vertical axis of the money market represent change in the interest rate spread (so a rise in r means a bigger spread).

Consider the changes in the economy from 1973 to 1975, as measured by the four indicators. What was going on in the goods and money markets during this period?

10. Which shift best describes this time period in the goods market? (Ask—what was happening to real GDP and the inflation rate?)

- a. Aggregate supply was decreasing.
- b. Aggregate supply was increasing.
- c. Aggregate demand was decreasing.
- d. Aggregate demand was increasing.

11. How did equilibrium output compare to potential output? (Ask—was the unemployment rate above or below the long-term average unemployment rate?)

- a. First equilibrium output was less than potential output, then it was nearly equal to potential output.
- b. First equilibrium output was nearly equal to potential output, then it was less than potential output.

- c. Equilibrium output was greater than potential output.
- d. Equilibrium output was less than potential output.

12. Which shifts best describe this time period in the money market? (Ask—what was happening to the interest rate spread? What money market shifts are consistent with the changes in the goods market?)

- a. Money demand was increasing and money supply was decreasing.
- b. Money demand was increasing and money supply was increasing.
- c. Money demand was decreasing and money supply was decreasing.
- d. Money demand was decreasing and money supply was increasing.

13. Which of the goods market graphs on the last page of these questions best describes the 1973-1975 period?

- a. A
- b. B
- c. C
- d. D

14. Which of the money market graphs on the last page of these questions best describes the 1973-75 period?

- a. E
- b. F
- c. G
- d. H

The Story

15. (2 points) Choose a “story” that best matches the data and the analysis from the model for the years 1973 to 1975. (The names of wars and policymakers have been removed so as not to give away the answer to those who know U.S. history.)

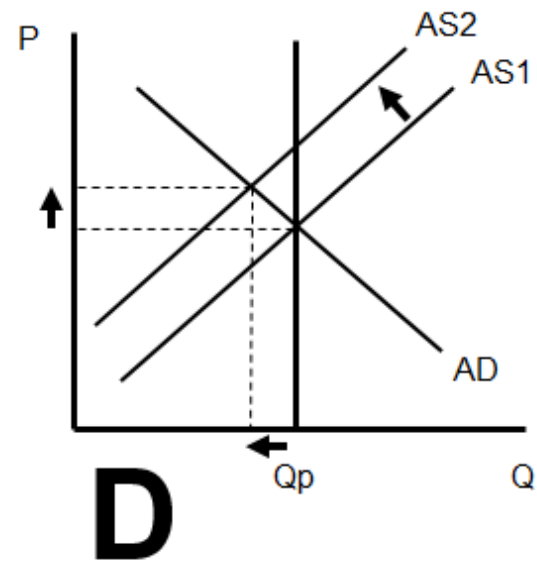
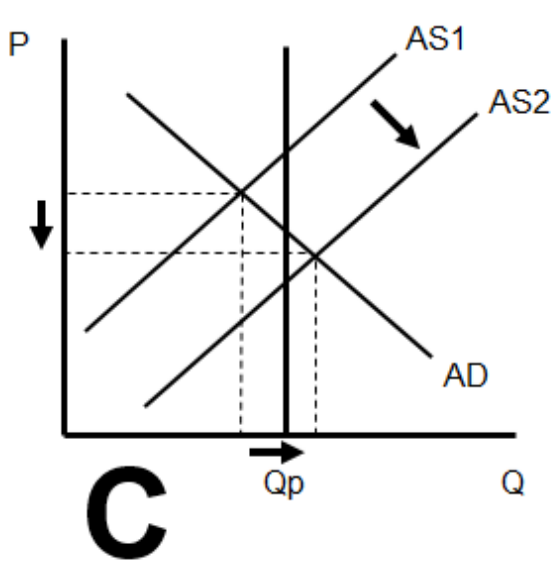
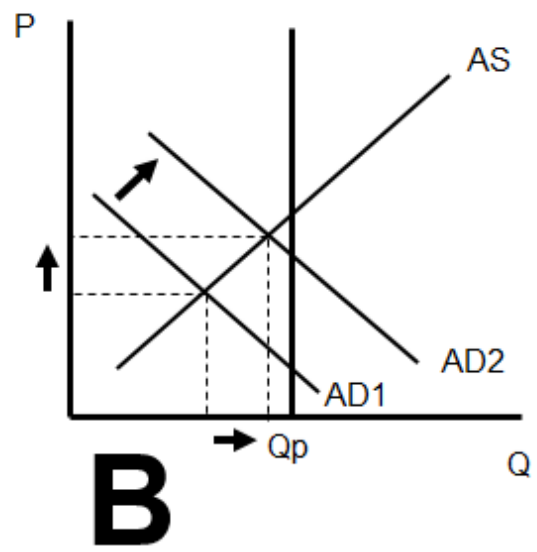
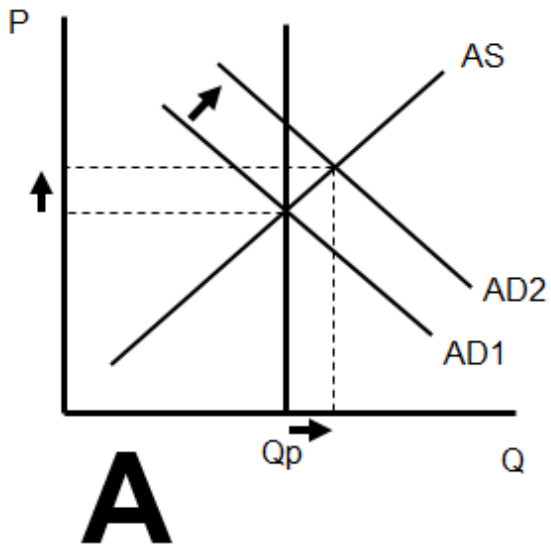
- a. The effects of recession early in the decade had faded by the beginning of this period. Rapid technological advance helped cause steady growth in output. These new technologies along with falling oil prices caused inflation to decrease, even though output rose above potential. Financial markets were optimistic throughout this period. They increased lending enough to hold interest rates stable despite rising incomes.
- b. The effects of a severe recession early in the decade were still being felt at the beginning of this period. Output was less than potential, and financial markets remained pessimistic. As financial markets gained confidence, however, borrowing costs fell for more-risky businesses, which increased investment spending. Tax cuts for households added to consumer spending, and the government increased spending on military purchases.

- c. At the beginning of this period the U.S. President decided to expand Federal social spending and fight a war against U.S. enemies at the same time. A large tax reduction that had been proposed by a previous President took effect. After that, consumer and government spending increased rapidly. Financial markets were generally optimistic, but increasing demand for money raised borrowing costs, especially for more-risky businesses.
- d. At the beginning of this period the economy was expanding and output approached potential. Then a war helped cause large increases in oil prices, which increased business costs. Businesses cut back on production and passed higher costs to consumers in higher prices, as much as they could. High inflation increased money demand, and financial markets became pessimistic, which further contributed to the economy's problems.

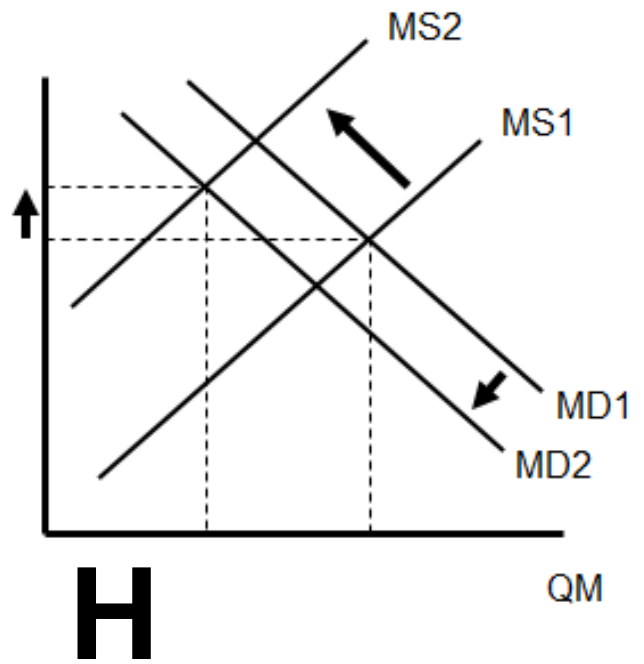
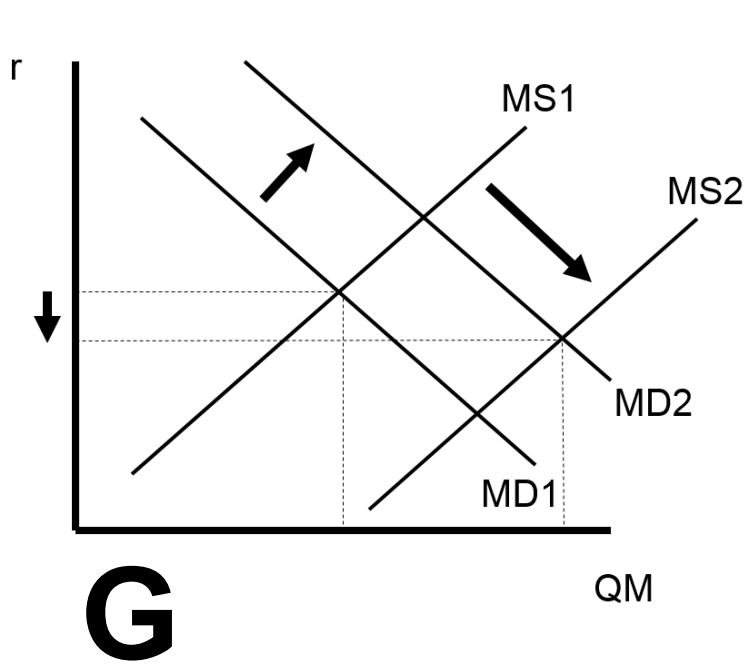
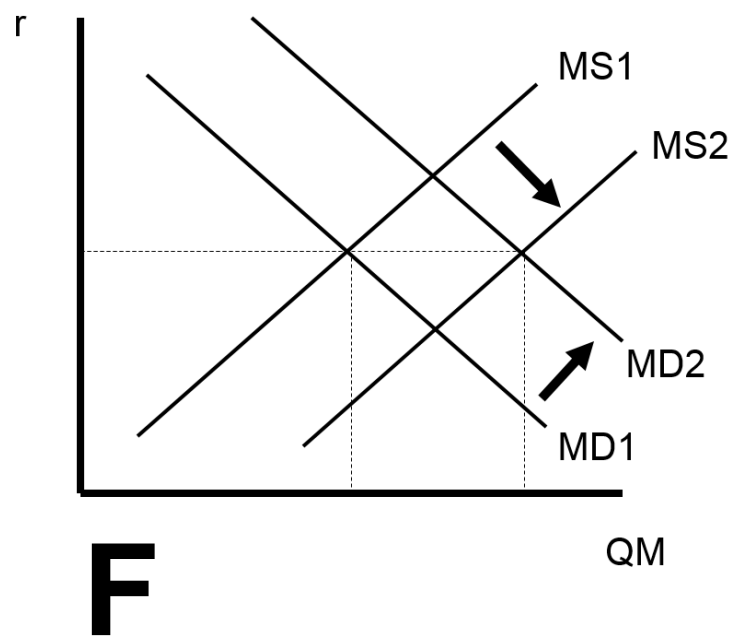
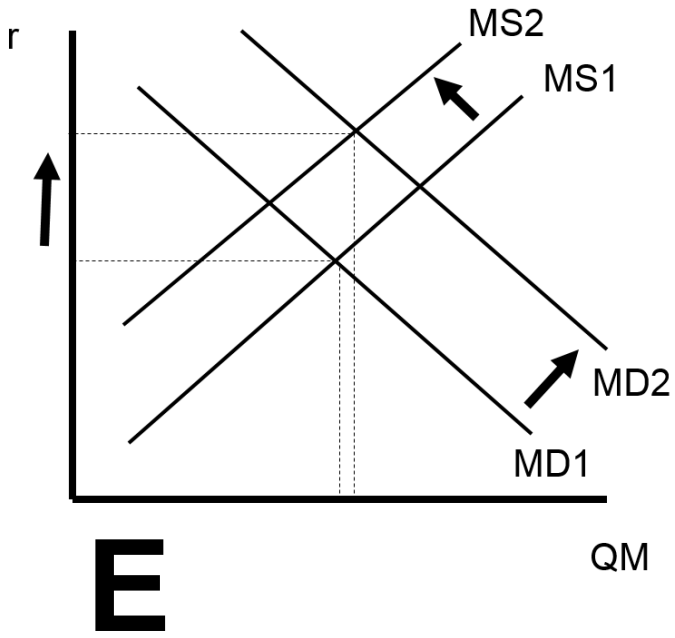
16. (For reference) My group studied the

- a. 1960's
- b. 1970's
- c. 1980's
- d. 1990's

Goods Market



Money Market



C. Spreadsheet Assignment

Students are provided with an excel spreadsheet with data for 1960-2016 on GDP in billions, GDP deflator, CPI price index, Minimum wage, labor force and unemployment in thousands, and the BAA and AAA corporate bond interest rates. Calculations are completed on a spreadsheet, with answers submitted through a Blackboard quiz.

SPREADSHEET ASSIGNMENT 1 GDP, INFLATION, UNEMPLOYMENT and INTEREST RATES

Let's get our hands (virtually) dirty with some data! Here are the instructions and questions for the first spreadsheet assignment. I suggest that you work out the answers using the macroeconomic data file in Excel, write them down on this page, and then type them into the Blackboard quiz. The data file and quiz are available in Module 1 Assignments, under Spreadsheet Assignment 1.

There's a practice quiz on the Assignments page for this assignment. If you're unsure about the calculations, try them and answer the quiz questions to see if you've got them right. You can repeat the practice quiz as many times as you like, and it doesn't count in your grade.

Instructions

To do this assignment you need a copy of the AGE 217 macroeconomic data file, which is an Excel spreadsheet file. It's linked on the Module 1 Assignments page. Once you've got the data file, follow the instructions below and do the spreadsheet calculations. Then click on Spreadsheet Assignment 1 to answer the quiz questions. Type the answers into the appropriate boxes. If you want to leave and come back, click the "Save All Answers" button. When you are ready to submit your answers for grading, click the "Save and Submit" button. You can see your grade and the correct answers right away, by clicking the OK button. Remember, you can only submit the answers once. Make sure they are right before you "Save and Submit"!

Seriously, review your answers a second time. Sometimes stray clicks and mouse wheel rolls can change the answers you submit.

The assignment is written for the Excel spreadsheet software, but any spreadsheet software should work. There are several videos showing how to do the calculation under the Assignment. In addition, in the macroeconomic data file there are tabs at the bottom of your screen. Click on them to see examples of the calculations. And remember the practice quiz questions, to check what you're doing before you submit your answers.

Real Gross Domestic Product

This topic looks at real GDP and how it has changed over the years. The Gross Domestic Product (GDP) figures (series 1) are nominal--they are measured using the prices for each year, so they

reflect changes in both real output and changes in prices. Use the *GDP price deflator* (series 7) to eliminate changes in prices by "deflating" the nominal data. A "deflator" is another name for a price index. To deflate, you divide a dollar figure by a price index (first divide the price index by 100). Deflate the GDP for each year in the 1960-2016 period.

For example, if nominal GDP is in cell b7, and the deflator is in cell d7, in a blank cell type
 $= b7/(d7/100)$.

This will divide the deflator by 100 first, and then divide nominal GDP by the result.

Question 1: (1 point) What was real GDP in 2016? (Type the answer in billions, which will be a four or five digit number like 9000. Don't use a "\$" or "+" sign. You don't need a decimal place.)

Now, calculate the percentage change in real GDP for each year. This is known as real growth (even if it's negative). Annual real growth rates are the percent changes in real GDP from one year to the next. A percent change can be calculated using the formula

$$= (d8 - d7) / d7$$

where d7 is the cell for real GDP in the first year and d8 the cell for real GDP in the second year, if you put real GDP in column D. If you put real GDP in column E, you'll use cells e7 and e8 in the formula.

Multiply the result by 100, *or* (even better) format using the "%" key. Don't multiply by 100 *and* format as a percent—that will make your results 100 times too big. Do this for *each year*, 1961 to 2016. Remember, the beauty of a spreadsheet is that you can copy the formula from one cell to all the others. You should only have to type the formula once.

DON'T MAKE THIS MISTAKE! *You should place the percent change from one year to the next in the row corresponding to the second year. For example, the percent change between real GDP for 1960 and 1961 is real GDP growth for 1961, not 1960. You can't calculate a growth rate for 1960, because you don't have GDP or deflator data for 1959. That means the cell for 1960 will be empty when you calculate the real GDP growth rate.*

Question 2: (2 points) What was the percentage change in real GDP from 2015 to 2016? This is the "real GDP growth rate" for 2016. (Type the answer in percentage terms, that is, 2.5 instead of 0.025. Do not use a "%" or "+" sign. Use a "-" sign if needed. Type one decimal place.)

Is 2016's real growth rate high? Low? About average? Let's calculate the average for the whole 1961-2016 period. This is a single number that averages together all of the 56 annual growth rates you just calculated. If your growth rates are in column F, rows 8 through 63, you can use the spreadsheet function "average", like this

=average(f8.f63)

This will average all the cells in column F, rows 8 through 63. Put a period or a colon between the two cell names. Don't use a comma. (A comma will average just f8 and f63, ignoring f9 through f62.) You can type this formula in any empty cell (but put it someplace where you can find it).

Calculate the average real GDP growth rate for 1961-2016. That's *one* average for the whole 56 year series.

Question 3: (2 points) What was the average percentage change in real GDP over the 1961-2016 period? (Type the answer as a percent, that is, 2.5 instead of 0.025. Do not use a "%" or "+" sign. Use a "-" sign if the answer is negative. Use one decimal place.)

We'll count recession years as those years when GDP declined, *or* when it increased by one percent (1.0%) or less. Negative percent changes in real GDP identify recessions. So do real GDP percent changes that are positive but 1.0% or less, because an annual growth rate that low means real GDP was falling sometime during the year. Look at the 56 real growth numbers you calculated, and find those that are negative or less than 1.0%.

Question 4: (9 points) In which of the following years did real GDP grow by 1.0% or less from the previous year, or decline (negative percent change) from the previous year? Note: these are years of recessions: (Points off for wrong answers on this question.)

DON'T MAKE THIS MISTAKE EITHER!! *You've calculated percent changes to show how real GDP changed from year to year. The percent changes show you when the recessions happened. For example, a percent change of -2% or +0.5% means a recession happened that year, because real GDP declined or increased only a little. Don't look at the changes in the percent changes. If the percent change was 4.2% one year, and 2.3% the next, that's not a recession. That just means real GDP grew more slowly the second year—but it still grew more than 1.0%. It wasn't a recession year.*

Inflation and Deflating

Use the Consumer Price Index (CPI) to calculate the annual inflation rates, 1961-2016. You'll need series 19 from the data set. For now, use the CPI, *not* the CPI core, which is series 20.

Annual inflation rates are the *percent changes* in a price index from one year to the next. A percent change can be calculated using the formula

$$=(g8 - g7) / g7$$

where g7 is the cell for the CPI in the first year and g8 the cell for the CPI in the second year. Yes, that's the same formula that you used for real GDP growth.

Question 5: (1 point) What was the CPI inflation rate in 2016? (Type your answer as a percent, for example as 6.5, not 0.065. Do not use a “%” sign. Do not use a “+” sign. Use a “-” sign if needed. Use one decimal place.)

Let's compare the 2016 inflation rate to the average for the whole 1961-2016 period. This is a single number that averages together all of the 56 annual inflation rates you just calculated. Use the =average() function, like you did with real GDP growth.

Question 6: (2 points) What was the average CPI inflation rate over the 1961 - 2016 period? (Type your answer as a percent, that is, 6.5 not 0.065. Do not use a “%” sign. Do not use a “+” sign. Do use a “-” sign if needed. Use one decimal place.)

There have been years since 1961 when inflation was particularly high—10% or above. That's called “double-digit” inflation. When that occurs, policymakers usually take actions to try to bring inflation down.

Question 7: (4 points) In which of the following years did the U.S. have double-digit inflation, which means an inflation rate of 10% or more, as measured by the CPI? Check as many years as apply. (Points off for wrong answers on this question.)

Congress passed an increase in the U.S. minimum wage in 2007. It rose from \$5.15 per hour to \$5.85 per hour in July 2007, increased again to \$6.55 in July 2008, and again to \$7.25 in July 2009. That's just the “nominal” minimum wage, though. You need to calculate the “real” minimum wage, which will tell you a lot more about how well off people are when they earn the minimum wage.

For this you need series 31 in the spreadsheet data file, which is the minimum wage each year. For years like 2009, when the wage increased during the year, the average minimum wage for the year is shown. A “real” dollar figure is the dollar figure divided by a price index. Dividing by a price index is called “deflating.” To get the real minimum wage for each year, first divide the CPI by 100, then divide the minimum wage by the result. A formula that will work is:

$$=h7/(g7/100)$$

if your CPI for 1960 is in cell g7, and the minimum wage for 1960 is in cell h7. This formula divides the CPI by 100 first (for 1960, $29.6 / 100 = 0.296$), then divides the minimum wage by this result (for 1960, $1.00 / 0.296 = 3.38$). What does the result mean? *You would have needed \$3.38 in 1983 to buy what the \$1.00 minimum wage bought in 1960.*

Question 8: (1 point) What was the real minimum wage in 2016? (Use 2 decimal places. Don't type a "\$" or "+" sign.)

The comparison of the real minimum wage among years tells you how its *purchasing power* has changed. "Purchasing power" just means the amount of stuff the wage can buy. Take a look at all 57 real minimum wages you've calculated, and find the year when the real minimum wage was highest.

Question 9: (1 point) In what year was the real minimum wage highest? (Type a 4-digit number beginning with 19 or 20.)

Another way to compare the minimum wage and inflation is to ask what the minimum wage would have to be today to match its purchasing power in some earlier year. When prices go up but the wage does not, the amount of stuff the wage buys is less. Its purchasing power declines.

What would the wage have to be today to match the purchasing power it had in 2010? That was the first full year with the current minimum wage, \$7.25. Calculate the "factor" by which prices increased between 2010 and 2016, by dividing the 2016 CPI by the 2010 CPI. The factor shows you by how many times prices have increased since 2010 (For example, if the factor is 2, "prices have doubled" or if it's 3, "prices have tripled." If the factor is 1.5, prices have increased by 50%.) Multiply this factor by the 2010 *nominal* minimum wage, and you'll see what the wage would be today *if it had kept up with inflation*. If it keeps up with inflation, the wage increases just as much as prices do, so the wage holds its purchasing power. It can keep buying the same stuff. Congressional staffers do just this sort of calculation as a way to analyze particular changes in the minimum wage.

Question 10: (1 point) What would the minimum wage have to be in 2016 to match its purchasing power in 2010? (Type your answer in dollars and cents, with two decimal places, but no "\$" or "+" sign.)

The Unemployment Rate

Use the labor force and unemployment data (series 16 and 18) to calculate the unemployment rate for each year, 1960-2016. The unemployment rate is the number of unemployed people as a percentage of the labor force. For example, if the number of unemployed people in 1960 is in cell k7 and the labor force is in cell j7, type the formula

=k7 / j7

Then multiply by 100 or (better) format as a percent with the “%” button at the top of the spreadsheet. Don’t do both. In 1960 the formula would calculate

$$3874 / 69659 = 0.056.$$

Format as a percent (or multiply by 100), and you’ll see that the unemployment rate for 1960 was 5.6%--only one decimal place is needed. Do this for each year, 1960 to 2016.

Question 11: (1 point) What was the unemployment rate in 2016? (Type your answer as a percent, that is, 4.2 instead of 0.042. Do not use a “%” or “+” sign. Use one decimal place.)

Question 12: (2 points) What was the average yearly unemployment rate over the 1960 - 2016 period? (Type your answer as a percent, that is, 6.5 not 0.065. Do not use a “%” or “+” sign. Use one decimal place.)

Interest Rates

Finally, let’s do some calculations with interest rates. For these calculations, use the AAA and BAA corporate bond yields, series 21 and 22 in your data file. Corporations borrow large sums of money in the bond market. They sell “bonds” to investors to borrow the money. The bonds are promises to pay interest and repay principle. The Moody’s bond rating service evaluates the corporations that issue the bonds, and decides which are most likely to repay the money they borrow. Corporations rated AAA are nearly certain to repay. BAA corporations are less certain to repay, so lending to BAA corporations is more risky. You’ll see that BAA corporations have to pay higher interest rates to borrow, because lenders aren’t as sure that they’ll be paid back. The higher interest return encourages lenders to lend despite the added risk.

When lenders are confident about the economy, they figure BAA corporations aren’t that risky. Even a poorly run business, or a business with a new untried product, can succeed when the economy is doing well. When the economy is doing poorly, though, lenders shift their money to less risky corporations. The interest rate that riskier corporations must pay goes up compared to the rate that less risky corporations must pay.

That means that the difference or “spread” between the BAA and AAA interest rates is a great measure of how confident lenders are. A small spread means lenders are more confident, a large spread means lenders are less confident, or pessimistic, or even panicky.

Calculate the BAA-AAA corporate bond spread by subtracting the AAA interest rates (series 21) from the BAA interest rates (series 22) for each year. Subtracting the lower AAA rate from the higher BAA rate means the spread will be a positive number. The formula would be

$$=n7 - m7$$

if the BAA interest rate for 1960 was in column N and the AAA interest rate for 1960 was in column M. The calculation for 1960 is

$$5.19 - 4.41 = 0.78. \text{ Use two decimal places.}$$

Question 13: (1 point) What was the corporate BAA – AAA interest rate spread in 2016? (Type your answer as a percent, that is, 1.2 instead of 0.012. Do not use a “%” or “+” sign. Use two decimal places.)

Question 14: (2 points) What was the average corporate BAA – AAA interest rate spread over the 1960-2016 period? (Type your answer as a percent, that is, 1.2 not 0.012. Do not use a “%” or “+” sign. Use two decimal places.)

D. Peer Reviewed Assignment

In peer review, students are given an article to be analyzed and instructions. They are then asked calibration questions based on the three calibration essays written by the instructor. We present these latter components, with the correct calibration answers and the correct score.

New York Times, January 4, 2017

Record 2016 for U.S. Auto Industry; Long Road Back May Be at End

By BILL VLASIC

DETROIT — Unexpectedly strong sales of new vehicles in the United States in December propelled the industry to another record figure in 2016: 17.55 million sold.

That is the good news. The bad news, though, is that the late push to beat the previous record, 17.47 million vehicles sold in 2015, came at a steep cost, as companies piled on higher sales incentives to lure consumers to their showrooms.

And with the American market tilting more than ever toward sales of pickup trucks and sport utility vehicles, companies are cutting production of passenger cars to reduce big inventories of slow-selling models.

As a result, there is little expectation that the sales will continue on this upward trajectory — at least not without cutting deep into profits. That means the numbers released Wednesday could be the high-water mark for the industry's impressive comeback from the depths of the recession, when annual sales fell below 11 million vehicles and General Motors and Chrysler needed government bailouts to survive.

Most major automakers are making big profits these days, as consumers replace aging cars and trucks with new models, loaded with technology, that last year sold for an average sticker price above \$35,000. Demand had steadily grown year after year as consumers took advantage of easy credit and better economic conditions to replace aging vehicles.

Demand, however, has leveled off, and companies are falling back on old habits to move excess inventories. Analysts reported that sales incentives were about 25 percent higher in the fourth quarter of 2016 than in the same period a year earlier, even though overall sales were flat.

That is partly because of a sustained slump in sales of small and midsize cars, which has offset the increased demand for trucks and S.U.V.s. But it forces automakers to rely on discounts to sell

less popular models, adjust production plans on the fly and lay off workers at some of their factories.

General Motors, the nation's largest automaker, has announced plans to cut shifts of workers at three assembly plants that build cars in Michigan and Ohio, and analysts expect more adjustments across the industry as companies try to better match supply with demand.

"We do expect production will likely be cut, particularly in the compact and midsize segments," said Alec Gutierrez, an analyst with the research firm Kelley Blue Book.

Sales of trucks and S.U.V.s accounted for nearly two-thirds of the sales volume during December as consumers continue to turn to the larger vehicles over cars. Analysts expect the trend toward larger vehicles to continue as long as gas prices remain low.

G.M. said its sales in December increased 10 percent, to 319,000 vehicles, although its annual sales for all of 2016 fell 1.3 percent, to 3.04 million vehicles.

The company benefited from strong demand for pickups and its biggest S.U.V.s, such as the Chevrolet Tahoe, whose sales rose nearly 17 percent last year. But G.M. exemplified the market's split personality, as several of its smaller cars experienced sharp declines.

G.M. is expanding its S.U.V. lineup and will unveil new models at the coming Detroit auto show. Moreover, the company expects the industry to achieve near-record levels again in 2017. "Key economic indicators, especially consumer confidence, continue to reflect optimism about the U.S. economy," said Mustafa Mohatarem, G.M.'s chief economist.

Ford Motor, the second-biggest American automaker, said it sold 237,000 vehicles in December, a slight gain from the same month in 2015. For the year, Ford reported sales of 2.61 million vehicles in the United States — essentially the same total as in 2015.

The company's cornerstone product, the F-Series pickup, was once again the top-selling vehicle in the American market, with 820,000 trucks sold last year. But sales of Ford's car models fell about 12 percent in 2016 from a year earlier, with products like the Focus and the Fusion posting double-digit declines.

The third major American automaker, Fiat Chrysler, reported one of its weaker months in December, as sales fell 10 percent, to 192,000 vehicles. For the full year, the company said it sold 2.24 million vehicles, a decline of less than 1 percent from the previous year.

Fiat Chrysler has substantially reduced its production of passenger cars and is busy converting car factories into truck plants. Last year, sales of its cars such as the Dodge Dart and the Chrysler

200 dropped precipitously as the company concentrated on beefing up its lineup of S.U.V.s, particularly its hot-selling Jeep models.

While the industry's health appears closely tied to the continued demand for larger vehicles, some automakers have placed big bets on electric cars, which remain a tiny niche in the market.

In one of the most closely watched introductions in the segment, G.M. said it sold 579 Chevrolet Bolts, a new battery-powered sedan, in December, its first month of sales. By contrast, the company sold more than 54,000 Silverado pickups, its most popular product.

We'll apply demand and supply analysis to a real issue in the news: car and truck sales in the United States. Here are excerpts of a recent article (January 4) from the *New York Times*, titled "Record 2016 for U.S. Auto Industry; Long Road Back May Be at End."

Read the article about the 2016 auto sales. You can find it here: "Record 2016 for U.S. Auto Industry; Long Road Back May Be at End."

To analyze this article, consider:

- The article title mentions the "long road back." Back from what? Use demand and supply to analyze what caused the auto industry comeback. Consider the effects of economic recovery and low interest rates ("easy credit").
- Consider not just the price of a vehicle, but the cost to operate it. That cost includes the price of gasoline. Use demand and supply to explain the changes in sales of big vehicles like SUV's and trucks, which use lots of gasoline, and the sales of small cars, which use less gasoline. You could mention "substitute goods."
- Use demand and supply to analyze what has happened to the selling price of smaller cars, including the sales incentives and discounts.
- How are automakers changing their production of smaller cars? What's the effect on employment in factories? Consider the effect of demand changes on the "quantity supplied" of smaller cars.

A good essay will include the following:

1. It will use demand and supply to explain why vehicle sales have increased since the Great Recession.
2. It will use demand and supply to explain the effect of low gasoline prices on sales of big and small vehicles.
3. It will use demand and supply to explain why the selling price of smaller cars has decreased.

4. It will use “quantity supplied” to explain what is happening to the production of smaller cars.

Evaluation Questions

1. Does the essay use demand and supply to explain why vehicle sales have increased since the Great Recession?
 - a. The essay mentions at least two factors that affect demand, like rising incomes, lower interest rates, replacing older cars or rising consumer confidence.
 - b. The essay mentions only one factor that affects demand.
 - c. The essay does not mention any factors that affect demand or supply, or analyzes the factors wrong.
2. Does the essay use demand and supply to explain the effect of low gasoline prices on sales of big and small vehicles?
 - a. The essay explains that low gas prices means that the cost of operating big vehicles has fallen more than the cost of small vehicles, so consumers have substituted to big vehicles.
 - b. The essay mentions of the effect of low gas prices, but has an incomplete analysis using demand and supply.
 - c. The essay does not explain the effects of gasoline prices, or gets the explanation wrong.
3. Does the essay use demand and supply to explain why the selling price of smaller cars has decreased?
 - a. The essay explains that big inventories mean that there is an excess supply of cars, so price must fall.
 - b. The essay offers a partial explanation of the drop in car prices.
 - c. The essay ignores the drop in car prices, or uses demand and supply incorrectly.
4. Does the essay use “quantity supplied” to explain what is happening to the production of smaller cars?
 - a. The essay explains that production and employment are decreasing, because decreases in demand and price decrease the quantity of smaller cars supplied.
 - b. The essay explains how production and employment are changing, but does not use “quantity supplied.”
 - c. The essay ignores production changes, or uses “quantity supplied” wrong.

Evaluated Essay Examples

AAAA. Sales of cars and trucks in the United States set a record in 2016, with about 17.47 million sold. This is a terrific comeback from the Great Recession, when sales fell below 11 million. The recovery increased incomes. Sales increased because cars are normal goods. Interest rates have been low too, so the cost of a loan for a car has been low. People also wanted to

replace their old cars. Sales of SUV's and trucks have increased a lot, but sales of smaller cars are down. Low gasoline prices are the reason. With lower gas prices, the cost to drive a big vehicle goes down a lot, while the cost to drive a small vehicle goes down only a little. Since SUV's are substitutes for small cars, the big drop in their price caused an increase in demand for SUV's, and a decrease in demand for small cars. There are big inventories of small cars, which means excess supply. That made prices fall. Auto companies offered more discounts and sales incentives, which were up 25 percent in the fourth quarter. Lower prices for cars causes decreases in quantity supplied, so auto companies cut production of small cars, and laid off workers. This must mean increased production and more jobs in SUV factories.

ABBC 6. U.S. car and truck sales hit a record high last year. Sales were only 11 million during the Great Recession, but since then they have increased to more than 17 million. That's a really big increase. The reason for the increase is the economic recovery, which increased the incomes of consumers. Income is a determinant of demand. When it increases, so does the demand for cars and trucks. Sales of big vehicles like SUV's and pickup trucks have increased the most, and lately the sales of smaller cars have decreased. As the article says, "Analysts expect the trend toward larger vehicles to continue as long as gas prices remain low." Gas prices are the reason that sales of big vehicles are increasing, and small vehicles are decreasing. The prices of small cars are falling, if you include discounts and incentives as part of price. Incentives were up 25% at the end of last year, which means the prices that buyers paid were especially low. Automakers are trying to sell off their big inventories of small cars, which are there because cars aren't selling. The supply of small cars is decreasing. It might be because production costs are rising, since that's a determinant of supply. The factories are cutting workers, so unemployment is increasing.

BCCC 2. The government bailed out the auto companies, which saved them during the Great Recession. Since then car and truck sales have increased, because of the economic expansion. More consumers have been able to replace their old cars with new ones. Gasoline and vehicles are complementary goods. To drive a car you must buy gasoline. When the price of a complementary good goes up, the demand for the first good goes down. That makes the price of the first good rise. Suppose cars are the complementary good and gasoline is the first good. The price of cars went to \$35,000 in 2016, which is really high. That caused a drop in car sales, and that meant that people needed to buy less gasoline, which is probably why the price of gasoline fell. "Quantity supplied" is the term used in economics when the change in supply is an effect, not a cause. When a determinant of demand changes, demand shifts, and there is a change in quantity supplied. It looks like a move along a fixed supply curve on the demand and supply diagram. So an increase in price would cause a decrease in quantity supplied, which is why the production of cars is down. This was a really interesting article for anyone who drives!