

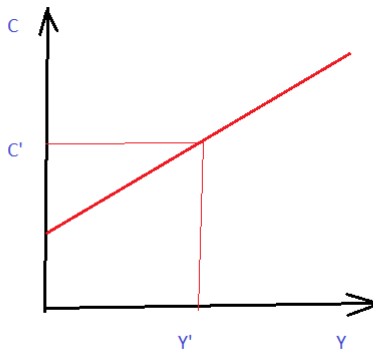
180.101 Principles of Macroeconomics, Fall 2011
First Term Exam : Practice Problems

Question 1. Suppose you have the following consumption function $C = \alpha + \beta Y + \gamma Z$ where $\alpha > 0$ is a constant, $0 < \beta < 1$, $\gamma < 0$, Z is some variable that affects consumption and Y is income.

(a) Explain the economic meaning of α , β , and γ .

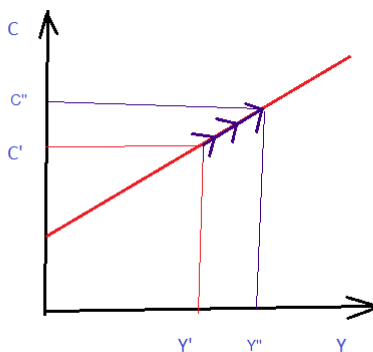
α is autonomous consumption, we are used to seeing it as \bar{C} . It represents the quantity of consumption that depends neither on income nor on Z . β is the marginal propensity to consume (MPC) with respect to income Y , we are used to seeing it as b . For every additional dollar of income in society, there will be β more dollars of aggregate consumption. γ can only be described as the slope of the consumption function with respect to Z . If Z is some variable denominated in dollars, then γ is the marginal propensity to consume from Z , otherwise it is almost (but note quite) an MPC.

(b) Plot C against Y . Describe the intercept and the slope.



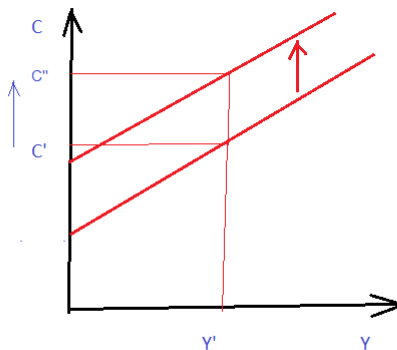
Note that we are holding Z fixed. The intercept reflects the sum of autonomous consumption, α and γZ . Slope, β , reflects MPC with respect to income, Y .

(c) Explain what will happen to the consumption curve if Y increases. Show your answer graphically.



Nothing will happen to the consumption curve. Increasing Y is represented by a shift along the curve, not a shift in the position of the curve. This corresponds to households purchasing more consumption goods as they receive more income.

- (d) Explain what will happen to the consumption curve if Z decreases. Show your answer graphically.



When Z decreases, this is effectively an increase in the intercept of the curve. Consumption will rise equally at every level of income, so the entire curve shifts up uniformly, with no change in slope.

- (e) Suppose by using the above formula we calculated consumption in 2009 to be 100 and 150 in 2011. Calculate the growth rate of consumption between 2009 and 2011.

$\frac{C^{2011} - C^{2009}}{C^{2009}} = \frac{150 - 100}{100} = \frac{1}{2}$ (or $\frac{1}{2} \times 100 = 50$ percent). This is a biennial, rather than annual, growth rate.

- (f) Explain what it means for the economy to be in recession. Explain what it means for the economy to be expansion. Do you have enough information to establish whether the economy is in recession or expansion from your answer to part (e)? What other information would you need to figure this out?

A recession is when real income falls for two or more consecutive quarters. An expansion is when real income rises for two or more consecutive quarters. Phrased differently, if the growth rate of real income is less than zero for two consecutive quarters ($\frac{\Delta Y_t}{Y_{t-1}} < 0$), the economy is in a recession; if the growth rate of real income is more than zero for two consecutive quarters ($\frac{\Delta Y_t}{Y_{t-1}} > 0$), then the economy is in an expansion.

No, we can't tell whether the economy is in an expansion or recession based on the provided data. While it is tempting to say that real income increased during this period, which motivated the observed increase in consumption, we don't know what happened to Z over this time period. It might be that while Y fell somewhat (a recession), Z decreased a lot, inducing households to purchase more consumption goods. Even if we assume that Z was constant over this period, we cannot infer whether the economy was in a recession or expansion. It could be that the economy boomed greatly from 2009 to 2010, then real income fell from 2010 to 2011. We can't be sure about what has happened over the last two quarters based on what happened over the past two years.

- (g) Suppose $Z = P$, meaning Z reflects prices. How do changes in price affect consumption?

A decrease in prices will lead to an increase in consumption. This change will be uniform across levels of real income, and would be depicted by a parallel shift up in the consumption curve, as in part (d).

Question 2. Suppose nominal GDP in 2008 was calculated to be 10 billion dollars using the factor income approach. In addition, in 2010 nominal GDP was calculated to be 5 billion dollars using the value added approach. Finally, in 2011 nominal GDP was calculated to be 15 billion dollars using the expenditure approach.

- (a) Can you calculate the growth rate of nominal GDP between 2008 and 2011 using the given information? If yes, what is it? If not, explain what other information you need.

Yes, since accounting identity tells us that all three approaches should give us the same answer. The three approaches are simply three methods for calculating the same object, not different concepts. In practice, any difference between them is simply measurement error.

$\frac{GDP^{2011} - GDP^{2008}}{GDP^{2008}} = \frac{15 - 10}{10} = \frac{1}{2}$ (or $\frac{1}{2} \times 100 = 50$ percent). This is a triennial growth rate, not an annual growth rate.

- (b) If the population of this country is 10 million (in each year), calculate the GDP per capita for each year.

$$\text{GDP per capita in 2008} = \frac{10 \text{ billion}}{10 \text{ million}} = 1000 \text{ dollars}$$

$$\text{GDP per capita in 2010} = \frac{5 \text{ billion}}{10 \text{ million}} = 500 \text{ dollars}$$

$$\text{GDP per capita in 2011} = \frac{15 \text{ billion}}{10 \text{ million}} = 1500 \text{ dollars}$$

- (c) Is GDP a comprehensive measure of this country's well being? If yes, explain why. If not explain why not.

No. GDP does not take into account non-market activities, the underground or black market economy, environmental costs imposed by economy activities, the value of leisure activity, quality of life, etc. All of these factors contribute to the happiness and economic well being of a country, and thus GDP is not a comprehensive measure. Moreover, GDP does not take into account the population of a country, so it does not tell us about how much income is available for each household or individual.

Question 3. Answer the following (very) short questions.

- (a) Describe what it means to be a closed economy.

In a closed economy, there are no imports or exports.

- (b) Explain what it means to have "completely slack conditions".

An economy operating under completely slack conditions is producing output well under its capacity level: $Y \ll Y^{capacity}$. This means that there is very likely to be relatively high unemployment and excess capacity: there are many workers who do not have a job, and much of the capital stock is not being productively used. The result of this is that the price level is "sticky": $P = \bar{P}$. The level of output can move around freely and the price level will not change. Suppose a firm tried to raise their prices under completely slack conditions. Each of that firm's competitors (making similar products) could keep their price at the same level, but rapidly increase production by hiring the abundant unemployed workers and turning on unused plants and equipment. The competitors would thus undercut the first firm's higher price and take all of their business. Firms thus cannot raise prices under completely slack conditions, resulting in a fixed price level.

- (c) What does it mean that $Y = Y^{capacity}$?

Output is produced under 100% Employment and 100% percent capacity utilization. All workers and machines are being put to their fullest economic use, so the economy cannot produce any more output. Even if the price level were to rise, output cannot increase beyond $Y^{capacity}$.

(d) Why would we want to relax the assumption of completely slack conditions?

Because we know that the economy does not always operate under completely slack conditions, so a model using this assumption is not applicable most of the time. In reality, we observe changes in the price level, so we need a model that can explain these changes.

(e) What is a market equilibrium?

A market equilibrium is a pair of a price level and a level of real income. Graphically, it occurs at the intersection of the aggregate demand curve and the aggregate supply curve. At that level of $P = P^*$, firms' profit maximizing behavior motivates them to produce at $Y = Y^*$ level of output (a point on the ASC). The demand-side equilibrium level of income is Y^* when $P = P^*$ (a point on the ADC), so the when Y^* is produced as output, the agents of society combine to demand $E = Y^*$ in aggregate planned expenditures. Thus inventories are neither rising nor falling in an unplanned way, so firms have no motivation to change their output behavior. The economy is in a state of balance— a market equilibrium.

(f) What is a demand shock? Why does it matter?

A demand shock is a change in any variable that shifts the aggregate demand curve, usually by shifting the expenditure schedule for a fixed price level. This could be a change in autonomous consumption \bar{C} or autonomous investment \bar{I} due to changes in future outlook or the state of confidence, or a change in nominal fixed money assets A . It could also be due to changes in fiscal policy (but that's for later). Demand shocks are useful for explaining why the price level and aggregate income tend to move in the same direction, as this shifts the market equilibrium along the positively sloped aggregate supply curve.

Question 4. Suppose we live in an economy where folks produce just one thing: cheese! In 2009 the nominal GDP of this economy was CHF (Swiss Franc) 90,000. In 2010 the nominal GDP was CHF 120,000, while the price of cheese was CHF 2. If the real GDP in 2009 (taking as a base year 2010) was CHF 100,000, what is the inflation rate between year 2009 and year 2010 in this country?

Real GDP is nominal GDP divided by the price level (divided by one hundred). Thus the price level (divided by one hundred) is nominal GDP divided by real GDP, then the price level in 2009 was $\frac{90000}{100000} \cdot 100 = 90$. As the base year price is always 100, inflation from 2009 to 2010 can then be calculated as: $\frac{100-90}{90} = \frac{10}{90} \approx 11.1\%$.

Question 5. During the recent recession (2007-2009) the price level in the US fell. This is the reason why the real GDP also fell during the same period. True, false, uncertain; explain carefully.

This is false. The decrease in the price level does not explain the decrease in real income. It is more likely that the same event led to both of these decreases. In particular, the collapse of the stock market and the rapid fall in the value of houses greatly cut into households' nominal wealth. This effectively made households less wealthy in real terms and thus less willing to purchase consumption goods based on their existing wealth. In our model, this is a decrease in A , and thus a shift downward in the expenditure schedule at all levels of real income. This results in lower equilibrium demand side GDP at all price levels: an inward shift in the aggregate demand curve. In an AS-AD environment, this is an adverse demand shock, which reduced both the price level and the level of real income in equilibrium.

Question 6. Suppose a closed economy (no imports nor exports), where $\bar{C} = 100$, $\bar{I} = 20$, and the marginal propensity to consume (MPC) is 80%. In addition, suppose for simplicity that there are no taxes and transfers and that completely slack conditions apply.

(a) Draw the consumption function. Be careful to label properly your graph.

Graph omitted.

- (b) Find the market equilibrium (draw it) and explain it conceptually (how can you tell it is indeed an equilibrium?).

The market equilibrium will occur at

$Y^* = \frac{1}{1-b}(\bar{C} + \bar{I}) = \frac{1}{1-0.8}(100 + 20) = \frac{1}{0.2}(120) = 5 \cdot 120 = 600$. The equilibrium occurs when aggregate planned expenditure $E = C + I$ equals aggregate output: $E = Y$. When output is 600, then households receive 600 in income. They want to spend 80% of this, or 480 on consumption in addition to their autonomous consumption of 100, for a total of 580 in consumption. Adding in investment, autonomously fixed at 20, and we find a level of aggregate planned expenditure of 600. Thus aggregate planned expenditure equals aggregate output, so inventories are neither being accumulated nor depleted, and thus firms not want to change their output decision. The economy will be at rest, and equilibrium. Graph omitted.

- (c) Now suppose that consumers lose their confidence in the future and the MPC falls to 0.5. Draw this new scenario. Is the new equilibrium level of output lower or higher than before? Why?

The expenditure schedule will have a shallower slope: aggregate planned expenditure will increase by only 50 cents for each additional dollar of aggregate income or output. The intercept will stay at the same level, as autonomous consumption has not changed. The equilibrium level of output will fall, as can be seen graphically, and solved for mathematically (arithmetic omitted; the new equilibrium occurs at $Y^{**} = 240$). Economically, individuals are not spending (on consumption) as great a portion of their income as they receive it, instead saving the money. This reduction in consumption means that in equilibrium, less output needs to be produced to meet aggregate expenditures. When less output is produced, less income will be paid out to households, further reducing consumption expenditures.

Question 7. For each of the following activities, state whether it would be included in U.S. GDP. If it is included, explain which component (of the expenditure approach) it would be included in, and how much it contributes to GDP. If it is not included, explain why not.

- (a) Honda manufactures a new Accord at a plant in Indiana, which it sells for \$20,000 at a dealership in Toronto.

This is included in GDP as an additional \$20,000 in the X component (a new good is exported to Canada).

- (b) Honda spends \$500,000 to purchase a new RoboRiveter to install in its plant in Indiana.

This is included in GDP as an additional \$500,000 in the I component, because it is a purchase of new capital (assuming the RoboRiveter was manufactured in the US).

- (c) Manuel and Sally each purchase \$75 of Brazilian avocados from Safeway.

This is included as \$150 in the M component because the goods have been imported from Brazil. It also counts for \$75 in the C component; Manuel's purchase counts as consumption because he is the end user of the avocados; Sally's purchase does not count as consumption because she is purchasing them as an intermediate good to make guacamole to sell. The total contribution to GDP is thus $\$75 - \$150 = -\$75$.

- (d) Sally uses the avocados to make four gallons of guacamole, which she sells to the public for \$6 per pint at her specialty foods store.

Sally sells four gallons of guacamole, which each have eight pints, for \$6 per pint, for a total of \$192. This is counted in the C component of GDP.

- (e) Manuel uses the avocados to make four gallons of guacamole to stockpile while studying for his final exams.

When Manuel makes guacamole, it only represents domestic production (work at home); the product will never be sold or become part of a market activity. So this is not included in GDP.

- (f) Sally's food store goes public, issuing \$10 million dollars worth of new shares.

This is not included in GDP, as it represents financial investment, not economic investment. This is only a trade of one financial asset for another, representing no new good or service.

- (g) The city of Skokie, IL pays Ilya \$50,000 to sculpt a statue of its founder.

This counts for \$50,000 in the G component as a government purchase.

- (h) The Social Security Administration pays Ilya \$10,000 in disability insurance after a tragic sculpting accident.

This is not included in GDP, as it is merely a government transfer of wealth; there is no purchase of a good or service.

- (i) Stan pays a stranger \$15 an hour to write bawdy limericks for twelve hours.

Ambiguous, but it is probably included in GDP in the C component as $12 \cdot 15 = \$180$. Stan is consuming the stranger's service of limerick production. On the other hand, one could argue that Stan doesn't know the stranger, and that this is not market activity and is unlikely to ever be reported to the government or an econometrician to be measured as part of GDP and thus is not included.

- (j) Megan's Ming Emporium sells an antique vase for \$12,000.

This is not included in GDP, as the vase does not represent the production of a new good or service (it is antique).