

Lecture 3 Notes

Michael Brodskiy

Instructor: Prof. Yoon

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1. Aggregate Expenditure (AE)

- (a) John Maynard Keynes analyzed the short run relationship between the aggregate expenditure and GDP in his book, “*The General Theory of Employment, Interest, and Money*” (1936)
- (b) There is a fall in spending and production during a recession
- (c) To explain the business cycle including recession, we must understand the components of aggregate expenditure
- (d) The aggregate expenditure equation consists of four components:
 - i. $AE = C + I + G + NX$
 - ii. Aggregate expenditure is composed of expenditure by households (C), expenditure by firms (I), expenditure by government (G), and expenditure by foreigners minus domestic consumers (NX)
- (e) The Components in Detail:
 - i. Consumption (C)
 - A. An expenditure on goods and services by households and is the highest part of aggregate expenditure (70%)
 - B. Consists of spending on nondurables, durables, and services
 - C. Factors that influence consumption:
 - Disposable personal income (current income)
 - DPI is the amount of income that is available for consumption after tax (adjustable income)
 - $DPI = PI - T$, where PI is personal income, and T is the income tax
 - Personal income = GDP + transfer payments + interest payments - retained earnings
 - Transfer payments are government spending on social welfare to households (ex. unemployment insurance, social security, disability insurance, etc.)

- Interest payments are households' interest income from holding government bonds
- Retained earnings are the earnings from stocks that are reinvested to firms instead of paying back to stockholders as dividends
- There is a positive relationship between DPI and consumption, *ceteris paribus*
- The positive relationship between the two is shown as positive marginal propensity to consume
- The marginal propensity to consume (MPC) is the increase in consumption as a result of increase in DPI by \$1, and ranges between 0 and 1
- Wealth
 - The value of assets minus the value of liabilities
 - Asset is anything of value owned by a person (ex. saving account, stocks, bonds, real estate, etc.)
 - Liability is anything of value owed by a person (ex. mortgage loans, car loans, credit card debts)
 - There is a positive relationship between wealth and consumption, *ceteris paribus* (with higher savings, households tend to consume more)
- Expected income (future income)
 - If people expect their income to rise, they consume more from borrowing money or savings
 - If people expect their income to fall, they consume less in order to save money
 - There is a positive relationship between expected income and current consumption (ex. current consumption drops due to uncertainties from COVID-19)
- Price level
 - Inflation causes consumption to drop because people will have less purchasing power
 - Deflation leads to higher consumption because people will have higher purchasing powers
 - There is a negative relationship between price level and consumption
- Interest rate
 - Interest rate is a cost of borrowing and the price of money paid by borrowers
 - Interest rate is also a return on saving and the price of money received by savers
 - Increase in interest rate will raise the cost of borrowing and lower consumption, especially on durables

- There is a negative relationship between interest rate and consumption

2. Consumption Function

- (a) A function that shows the relationship between consumption and DPI (Y) assuming wealth, expected income, price level, and interest rate are constant (*ceteris paribus*)
- (b) $C = a + bY$, where a is the autonomous consumption (consumption when $DPI = 0$), and b is the marginal propensity to consume (MPC), which is a change in consumption as a result of change in DPI by \$1. $b = \frac{C_1 - C_0}{Y_1 - Y_0} = \text{slope}$
- (c) Assume that $DPI = GDP (Y) \text{ or } \text{transfer payments} + \text{interest payments} = \text{retained earnings} + \text{income tax}$

3. Investment

- (a) The expenditure on goods and services by firms
- (b) It occupies similar proportion of aggregate expenditure as the government spending (20%)
- (c) It consists of non-residential fixed investment (structures, equipment, and intellectual properties), residential fixed investment (new houses bought by households), and change in inventories
- (d) Factors that influence investment:
 - i. Expected profit (income)
 - A. Firms will spend more money on non-residential investment if it is expected to earn higher profit
 - B. Households will spend more money on residential fixed investment if they are expected to have higher income
 - C. There is a positive relationship between expected profit or income and investment
 - ii. Interest rate
 - A. Firms will borrow less money for non-residential fixed investment if the interest rate is high
 - B. Households will borrow less money for residential fixed investment if the interest rate is high
 - C. There is a negative relationship between interest rate and investment
 - iii. Property (corporate) tax
 - A. Firms will spend less money on non-residential fixed investment if a corporate tax rises
 - B. Households will spend less money on residential fixed investment if the property tax or income tax rises

- C. There is a negative relationship between tax and investment
 - iv. Investment credit
 - A. Firms will spend more money on non-residential fixed investment if investment credit rises
 - B. Households spend more money on residential fixed investment if there is an investment credit for buying new houses
 - C. There is a positive relationship between investment credit and investment
 - v. Cash flow
 - A. The cash revenue minus cash cost
 - B. Profit is the largest portion
 - C. Depreciation is not a cash cost since firms are not paying for it by cash
 - D. Firms will spend more money on non-residential fixed investment if they have more cash flow
 - E. There is a positive relationship between cash flow and investment
 - vi. Price level
 - A. Change in price level indirectly influences investment through change in interest rate
 - B. With inflation, people demand more money, which will result in increase in interest rate in the money market, and lower investment
 - C. With deflation, people demand less money, which will result in decrease in interest rate in the money market, and increase investment
 - D. There is a negative relationship between price level and investment
4. Government purchases
- (a) An expenditure on goods and services by the government
 - (b) Occupies a similar proportion of aggregate expenditure as investment (20%)
 - (c) Consists of spending by state, local, and federal governments
 - (d) The government decides how much it will spend according to citizens' needs
 - (e) In the short run, government purchases are not directly affected by income, wealth, interest rate, price level, and so on
 - (f) We assume that the government purchases are fixed over GDP or do not depend on GDP
 - (g) Transfer payments such as unemployment insurance and social security benefits are excluded in GDP because the government receives nothing in return
5. Net export
- (a) It is exports minus imports
 - (b) Factors that influence net export:

- i. Domestic income
 - A. Increase in domestic income leads to an increase in import and decrease in net export
 - B. There is a negative relationship between domestic income and net export
- ii. Foreign income
 - A. Increase in foreign income leads to an increase in export and increase in net export
 - B. There is a positive relationship between foreign income and net export
- iii. Exchange rate
 - A. Exchange rate is the value of one currency expressed in terms of another currency, normally \$: foreign currency
 - B. Appreciation (increase in exchange rate)
 - ex. from \$1:1000 Korean won to \$1:1200 Korean won
 - Domestic products become more expensive, and export will decrease
 - Foreign products become cheaper, and import will increase
 - As a result, net export will decrease
 - C. Depreciation (decrease in exchange rate)
 - ex. from \$1:1000 Korean won to \$1:800 Korean won
 - Domestic products become cheaper, and export will increase
 - Foreign products become more expensive, and import will decrease
 - As a result, net export will increase
 - D. There is a negative relationship between exchange rate and net export
- iv. Preferences for foreign goods
 - A. When tastes for foreign goods increase or people find foreign goods more attractive, domestic consumers will buy more of foreign goods and import will increase and net export will decline
 - B. There is a negative relationship between tastes for foreign goods and net export
- v. Trade policies
 - A. The effects of trade policies, such as free trade, tariffs, or import quota are reflected in exchange rates and other macroeconomic variables rather than influencing the net export directly
 - B. The effects of trade policies on net export can be analyzed on a case by case basis
- vi. Price level
 - A. Change in price level indirectly affects net export through change in exchange rate
 - B. With inflation, domestic products will become more expensive and exchange rate will rise (appreciate) because the value of domestic currency will increase, resulting in decrease in net export

- C. With deflation, domestic products will become cheaper and exchange rate will decline (depreciate) because the value of domestic currency will decline, resulting in increase in net export

6. Actual vs. Planned Aggregate Expenditure

- (a) Actual aggregate expenditure ($Y = \text{GDP}$) is the amount of spending and production that the economy has already made, whereas planned aggregate expenditure (PAE) is the amount of spending and production that the economy is planning to make
- (b) If $\text{PAE} > Y$, there is a decrease in inventories because fewer products are produced than necessary
- (c) If $\text{PAE} < Y$, there is an increase in inventories because more products are produced than necessary
- (d) If $\text{PAE} = Y$, there is no change in inventories because products are produced exactly as needed

7. Aggregate Expenditure Function

- (a) It is a function that shows the relationship between planned aggregate expenditure (PAE) and actual aggregate expenditure ($\text{GDP} = Y$)
- (b) The aggregate expenditure is composed of four components: consumption, investment, government purchases, and net export
- (c) $AE = C + I + G + NX$
- (d) Consumption is composed of two parts: autonomous consumption and non-autonomous consumption — $C = a + bY$
- (e) Manipulating the function gives us:
 - i. $AE = (a + I + G + NX) + bY \Rightarrow AE = d + bY$, where d is the autonomous AE , which is an AE that does not depend on income, and is composed of autonomous consumption, investment, government purchases, and net export (the Y-intercept of the curve), and bY is the non-autonomous AE , which does depend on income, and is composed of non-autonomous consumption (slope of the curve)

8. Macroeconomic (Keynesian) Equilibrium

- (a) Keynes explained the macroeconomic equilibrium using two lines: planned aggregate expenditure (PAE) and a 45 degree line that shows $\text{PAE} = Y$, which means whatever is produced in the economy is consumed (no change in inventories)
- (b) Macroeconomic equilibrium occurs when there is no incentive to change or deviate in the economy
- (c) It occurs when the PAE is equal to total production (Y) at the intersection between the AE curve and a 45-degree line

- (d) The GDP at this point is called macroeconomic equilibrium GDP
- (e) If $PAE > Y$, there is a decrease in inventories, and GDP will increase to equilibrium
- (f) If $PAE < Y$, there is an increase in inventories, and GDP will decrease to equilibrium

9. Potential GDP and Business Cycle

- (a) Potential GDP or output (Y_p) is a GDP where there is no cyclical unemployment, a GDP where there is only the natural rate of unemployment, or a GDP at the full employment/capacity
- (b) The most ideal GDP that an economy can reach
- (c) The government uses this as a policy goal that the economy is supposed to reach
- (d) About 4% in the US, on average
- (e) A business cycle (recession and expansion) occurs when the PAE curve shifts due to change in any non-income determinants of PAE (macroeconomic conditions)
 - i. Recession occurs when the equilibrium GDP (Y_E) < potential GDP (Y_p)
 - ii. Occurs when any non-income determinants of PAE will shift the PAE curve right
 - iii. Occurs when wealth, expected profit, cash flow, or foreign income declines
 - iv. Occurs when interest rate, tax, exchange rate, tastes for foreign products, or price level rises
 - v. The difference between equilibrium GDP and potential GDP is the recessionary output gap ($Y_p - Y_E$)
- (f) Expansion occurs when the equilibrium GDP (Y_E) > potential GDP (Y_p)
 - i. Occurs when any non-income determinants of PAE shift the PAE curve left
 - ii. Occurs when wealth, expected profit, cash flow, or foreign income rises
 - iii. Occurs when interest rate, tax, exchange rate, tastes for foreign products, or price level declines
 - iv. The difference between equilibrium GDP and potential GDP is the inflationary output gap ($Y_E - Y_p$)

10. The Aggregate Demand and Aggregate Supply Model

- (a) Represents the relationship between GDP and price level for the economy, whereas demand and supply model represents the relationship between the price and quantity for a product
- (b) GDP is the sum of the market values of all goods and services produced in the economy and represents the total production or total income for the economy
- (c) The price level is the weighted average price of all the goods and services in the economy and is measured by GDP deflator, PPI, or CPI

11. Aggregate Demand Curve

- (a) The aggregate demand is the total quantity of goods and services demanded in the economy at each given price level and is measured by the aggregate expenditure (AE) from the expenditure approach
- (b) The aggregate demand curve is a curve that shows the relationship between price level and GDP
- (c) The price level is measured by CPI, PPI, or GDP deflator, which is a weighted average price of all goods and services in the economy
- (d) Changes in the price level influence the aggregate demand in three ways:
 - i. Wealth Effect (Real-Balance Effect)
 - A. Change in the price level will influence consumption through change in the real value of people's money balance or purchasing power
 - B. Money balance includes checking and saving accounts, cash, and other dollar-denominated assets whose value does not change with change in the price level
 - C. Increase in the price level will reduce the purchasing power of money, which results in decrease in consumption, AE, and GDP
 - D. There is a negative relationship between price level and AE
 - ii. Interest Rate Effect
 - A. Change in the price level will affect investment and consumption through change in the interest rate
 - B. Increase/decrease in the price level will increase/decrease the demand for money because it requires more/less money
 - C. Increase/decrease in the money demand will raise/lower the interest rate (cost of borrowing) in the money market
 - D. With higher/lower cost of borrowing, there is a decrease/increase in consumption on durables, residential fixed investment, non-residential fixed investment, AE, and GDP
 - E. There is a negative relationship between price level and AE through change in interest rate
 - iii. Exchange Rate Effect (International Trade Effect)
 - A. Changes in the price level will affect net export through change in exchange rates
 - B. Increase/decrease in the domestic price level will increase/decrease exchange rates through appreciation/depreciation of domestic currency
 - C. Appreciation/depreciation of domestic currency will increase/decrease import and decrease/increase export, resulting in decrease/increase in net export, AE, and Y
 - D. There is a negative relationship between price level and AE through change in exchange rate

- E. Change in price level does not affect government purchases (G) because it is only affected by policy decisions, according to citizens' needs
 - iv. Overall, there is a negative relationship between price level and AE through change in C , I , and NX that comes from the wealth effect, interest rate effect, and exchange rate effect
 - v. Thus, the aggregate demand is downward-sloping
- (e) Non-price factors that shift the aggregate demand:
- i. Increase in disposable personal income (DPI) will increase consumption and shift AD to the right
 - ii. Increase in wealth will increase consumption and shift AD to the right
 - iii. Increase in expected income will increase consumption and shift AD to the right
 - iv. Increase in interest rate will lower consumption by raising the cost of borrowing and shift AD to the left
- (f) Non-price factors that affect investment:
- i. Increase in expected income will increase the residential fixed investment and shift AD to the right
 - ii. Increase in expected profit will increase the non-residential fixed investment and shift AD to the right
 - iii. Increase in corporate tax will lower the non-residential fixed investment and shift AD to the left
 - iv. Increase in income or property tax will lower the residential fixed investment and shift AD to the left
 - v. Increase in investment tax credit will increase non-residential fixed investment and shift AD to the right
 - vi. Increase in cash flow will increase the non-residential fixed investment and shift AD to the right
- (g) Non-price factors that affect government purchases:
- i. Expansionary fiscal policies will increase the government purchases and shift AD to the right
 - ii. Contractionary fiscal policy will lower the government purchases and shift AD to the right
- (h) Non-price factors that affect net export:
- i. Higher domestic income will increase export and net export, and shift AD to the right
 - ii. Higher foreign income will increase import and decrease net export and shift AD to the left
 - iii. Higher exchange rate (appreciation of domestic currency) will reduce net export and shift AD to the left

- iv. Higher tastes for foreign products will increase import and decrease net export and shift AD to the left

12. Aggregate Supply Curve

- (a) The aggregate supply is the sum of the market values of all goods and services produced by all the firms in the economy
- (b) The aggregate supply curve shows the relationship between price level and the value of total production by all firms in the economy
- (c) Price level is again measured by CPI, GDP deflator, or PPI, and the value of total production is measured by GDP
- (d) In macroeconomics, short run is different from long run in that input prices are sticky and not flexible in the short run

13. Short Run Aggregate Supply (SRAS)

- (a) The short run aggregate supply curve shows the relationship between price level and GDP in the short run
- (b) The short run aggregate supply curve is upward sloping because there is a positive relationship between price level and GDP
- (c) Prices of products increase or decrease more quickly than the prices of inputs in the short run because the input prices are normally sticky and adjust slowly in response to change in output prices due to long term contracts of input prices, such as a 1-3 year wage contract
- (d) Firms will produce more with higher profit because the prices of products increase more quickly than prices of inputs
- (e) Firms will produce less with lower profit because the prices of products decrease more quickly than prices of inputs
- (f) As a result, with higher price level, firms will increase production, but, with lower price level, will reduce production

14. Long Run Aggregate Supply (LRAS)

- (a) Long-run in macroeconomics is not a set amount of time (it is the time it takes for prices of inputs to fully adjust to change in the prices of products)
- (b) As a result of full adjustment of input prices to output prices, costs increase as much as revenues increases, resulting in the same profit as before price change
- (c) Once input prices fully adjust to the new price level, the economy will go back to where it started
- (d) In the long run, there is no effect of change in prices of products on the aggregate supply

- (e) Long run aggregate supply (LRAS) curve is vertical and perfectly inelastic at the potential output (Y_p)
 - (f) The potential output is the output (GDP) at the full capacity, at the natural rate of unemployment, at full employment, or without cyclical unemployment
 - (g) The most ideal output and the greatest output produced by the economy by using all the resources at the full extent
 - (h) In conclusion, short run aggregate supply is upward sloping due to sticky input prices, but long run aggregate supply is vertical at the potential output due to full adjustment of input prices
15. Non-price factors that shift SRAS and LRAS:
- (a) Increase in labor (human capital) will shift SRAS and LRAS to the right
 - (b) Increase in physical capital will shift SRAS and LRAS to the right
 - (c) Increase in natural resources will shift SRAS and LRAS to the right
 - (d) Positive technological change will shift SRAS and LRAS to the right, and vice versa
16. Non-price factors that shift only SRAS:
- (a) Increase in the prices of inputs will shift SRAS to the left
 - (b) Increase in the expected prices of products will shift SRAS to the left because firms want to produce less now than in the future
 - (c) Increase in the expected prices of inputs will shift SRAS to the right because firms want to produce more now than in the future
 - (d) Changes in the prices of inputs and expected prices of inputs and outputs do not shift LRAS because, in the long run, input prices will fully adjust to change in prices of outputs, regardless of any changes in policies or expectations
 - (e) In the long run, the economy always goes back to the potential output, which is the most ideal economic output
17. Macroeconomic Equilibrium
- (a) Short run macroeconomic equilibrium is a situation where there is no incentive to change or deviate in the economy in the short run
 - i. This occurs at the intersection between SRAS and AD
 - ii. Price level and GDP at the equilibrium are called short run equilibrium price level and GDP
 - (b) Long run macroeconomic equilibrium is a situation where there is no incentive to change or deviate in the economy in the long run

- i. This occurs at the intersection among LRAS, SRAS, and AD (or at the potential GDP)
 - ii. Price level and GDP at this equilibrium is called long run equilibrium price level and GDP
 - (c) The economy is most ideal when short run equilibrium = long run equilibrium
18. Business Cycle
- (a) Recession occurs when SRAS and AD intersect each other below the potential output or the short run equilibrium GDP is lower than Y_p
 - (b) The recessionary outgap is $Y_p - Y_{SR,E}$
 - (c) Expansion occurs when SRAS and AD intersect each other above the potential output or the short run equilibrium GDP is more than Y_p
 - (d) The inflationary outgap is $Y_{SR,E} - Y_p$
19. Short Run Effects of Increase in AD:
- (a) The economy is initially in the long run equilibrium with the equilibrium price level of P_0 and equilibrium GDP of Y_p
 - (b) Suppose that AD will shift to the right from AD_0 to AD_1 due to an increase in expected income
 - (c) The economy is in an expansion because the short run equilibrium $Y_{SR,E} > Y_p$
 - (d) Short run equilibrium price will rise to P_1
 - (e) There is an increase in both, price level and GDP in the short run
20. Long Run Effects of Increase in AD:
- (a) Input prices will fully adjust to an increase in output prices in the long run
 - (b) This will shift SRAS to the left to $SRAS_1$ until the economy goes back to the potential output Y_p at the new price level of P_2
 - (c) In the long run, there is no change in equilibrium GDP, but there is an increase in price level (inflation)
 - (d) In the long run, there is no change in nominal values, only in real values
21. Effects of a Temporary Supply Shock
- (a) Temporary supply shock occurs when a non-price factor that shifts only SRAS changes
 - (b) Short Run Effects:
 - i. The economy is initially in the long run equilibrium with the equilibrium price level of P_0 and GDP of Y_p

- ii. The increase in the price of oil (oil shock) will shift SRAS to the left from $SRAS_0$ to $SRAS_1$
- iii. The economy is in recession because the short run equilibrium $Y_{SR,E} < Y_p$
- iv. The short run equilibrium price level will rise to P_1
- v. This is called stagflation because there is stagnation along with inflation

(c) Long Run Effects:

- i. Input prices will fully drop until the economy goes back to the potential output because input providers are willing to accept lower input prices due to low income and high unemployment during a recession, which will shift SRAS to $SRAS_0$
- ii. In the long run, there is no change in equilibrium GDP and price level

22. Effects of a Permanent Supply Shock

(a) Permanent supply shocks occur when a non-price factor that shifts both LRAS and SRAS changes

- i. Change in labor, human capital, physical capital, natural resources, and technology

(b) Short Run Effects:

- i. The economy is initially in a long run equilibrium with equilibrium price level of P_0 and GDP of Y_{p0}
- ii. The decrease will shift LRAS from $LRAS_0$ to $LRAS_1$ and shift SRAS from $SRAS_0$ to $SRAS_1$
- iii. The economy is in an expansion because the short run equilibrium $Y_{SR,E} > Y_{p1}$
- iv. The short run equilibrium price level rises to P_1

(c) Long Run Effects:

- i. With an expansion, input prices will fully adjust to higher prices of products in the long run until the economy goes back to the new potential GDP Y_{p1}
- ii. This will shift SRAS to the left to $SRAS_2$
- iii. The short run and long run equilibrium GDP will decline to the new potential GDP Y_{p1}
- iv. The price level will increase to P_2
- v. In the long run, there is a decrease in equilibrium GDP and an increase in price level (inflation)