

# AP Macroeconomics

## Fun!!! With the MPC, MPS, and Multipliers

# Disposable Income

- Net Income
- Paycheck
- After-tax income

# Marginal Propensity to Consume (MPC)

- The fraction of any change in disposable income that is consumed.
- $MPC = \frac{\text{Change in Consumption}}{\text{Change in Disposable Income}}$
- $MPC = \frac{\Delta C}{\Delta DI}$

# Marginal Propensity to Save (MPS)

- The fraction of any change in disposable income that is saved.

- $MPS = \frac{\text{Change in Savings}}{\text{Change in Disposable Income}}$

- $MPS = \frac{\Delta S}{\Delta DI}$

# Marginal Propensities

- $MPC + MPS = 1$ 
  - $\therefore MPC = 1 - MPS$
  - $\therefore MPS = 1 - MPC$
- Remember, people do two things with their disposable income, consume it or save it!

# The Spending Multiplier Effect

- An initial change in spending ( $C$ ,  $I_G$ ,  $G$ ,  $X_N$ ) causes a larger change in aggregate spending, or Aggregate Demand (AD).
- Multiplier =  $\frac{\text{Change in AD}}{\text{Change in Spending}}$
- Multiplier =  $\Delta AD / \Delta C, I, G, \text{ or } X$

# The Spending Multiplier Effect

- Why does this happen?
  - Expenditures and income flow continuously which sets off a spending increase in the economy.

# The Spending Multiplier Effect

- Ex. If the government increases defense spending by \$1 Billion, then defense contractors will hire and pay more workers, which will increase aggregate spending by more than the original \$1 Billion.



# Calculating the Spending Multiplier

- The Spending Multiplier can be calculated from the MPC or the MPS.
- Multiplier =  $1 / (1 - \text{MPC})$  Or  $1 / \text{MPS}$
- Multipliers are (+) when there is an increase in spending and (-) when there is a decrease

# Calculating the Tax Multiplier

- When the government taxes, the multiplier works in reverse
- Why?
  - Because now money is leaving the circular flow
- Tax Multiplier (note: it's negative)
  - =  $-\text{MPC} / 1 - \text{MPC}$  or  $-\text{MPC} / \text{MPS}$
- If there is a tax-CUT, then the multiplier is +, because there is now more money in the circular flow

# MPS, MPC, & Multipliers

- Ex. Assume U.S. citizens spend 90¢ for every extra \$1 they earn. Further assume that the real interest rate ( $r\%$ ) decreases, causing a \$50 billion increase in gross private investment. Calculate the effect of a \$50 billion increase in  $I_G$  on U.S. Aggregate Demand (AD).
  - Step 1: Calculate the MPC and MPS
    - $MPC = \Delta C / \Delta DI = .9 / 1 = \underline{.9}$
    - $MPS = 1 - MPC = \underline{.10}$
  - Step 2: Determine which multiplier to use, and whether it's + or -
    - **The problem mentions an increase in  $\Delta I_G$  .: use a (+) spending multiplier**
  - Step 3: Calculate the Spending and/or Tax Multiplier
    - $1 / MPS = 1 / .10 = \underline{10}$
  - Step 4: Calculate the Change in AD
    - $(\Delta C, I_G, G, \text{ or } X_N) * \text{ Spending Multiplier}$
    - $(\$50 \text{ billion } \Delta I_G) * (10) = \underline{\$500 \text{ billion } \Delta AD}$

# MPS, MPC, & Multipliers

- Ex. Assume Germany raises taxes on its citizens by €200 billion . Furthermore, assume that Germans save 25% of the change in their disposable income. Calculate the effect the €200 billion change in taxes on the German economy.
  - Step 1: Calculate the MPC and MPS
    - $MPS = 25\%$ (given in the problem) = .25
    - $MPC = 1 - MPS = 1 - .25 = \underline{.75}$
  - Step 2: Determine which multiplier to use, and whether it's + or -
    - The problem mentions an increase in T .: use (-) tax multiplier
  - Step 3: Calculate the Spending and/or Tax Multiplier
    - $-\frac{MPC}{MPS} = \frac{-.75}{.25} = \underline{-3}$
  - Step 4: Calculate the Change in AD
    - $(\Delta \text{Tax}) * \text{Tax Multiplier}$
    - $(\text{€}200 \text{ billion } \Delta T) * (-3) = \underline{-\text{€}600 \text{ billion } \Delta \text{ in AD}}$

# MPS, MPC, & Multipliers

- Ex. Assume the Japanese spend  $\frac{4}{5}$  of their disposable income. Furthermore, assume that the Japanese government increases its spending by ¥50 trillion and in order to maintain a balanced budget simultaneously increases taxes by ¥50 trillion. Calculate the effect the ¥50 trillion change in government spending and ¥50 trillion change in taxes on Japanese Aggregate Demand.
  - Step 1: Calculate the MPC and MPS
    - $MPC = \frac{4}{5}$  (given in the problem) = .80
    - $MPS = 1 - MPC = 1 - .80 = \underline{.20}$
  - Step 2: Determine which multiplier to use, and whether it's + or -
    - The problem mentions an increase in G and an increase in T.: combine a (+) spending with a (-) tax multiplier
  - Step 3: Calculate the Spending and Tax Multipliers
    - Spending Multiplier =  $\frac{1}{MPS} = \frac{1}{.20} = \underline{5}$
    - Tax Multiplier =  $\frac{-MPC}{MPS} = \frac{-.80}{.20} = \underline{-4}$
  - Step 4: Calculate the Change in AD
    - [  $\Delta G$  \* Spending Multiplier ] + [  $\Delta T$  \* Tax Multiplier ]
    - [ (¥50 trillion  $\Delta G$ ) \* 5 ] + [ (¥50 trillion  $\Delta T$ ) \* -4 ]
    - [ ¥250 trillion ] + [ - ¥200 trillion ] = ¥50 trillion  $\Delta AD$

# The Balanced Budget Multiplier

- That last problem was a pain, wasn't it?
- Remember when Government Spending increases are matched with an equal size increase in taxes, that the change ends up being = to the change in Government spending
- Why?
  - $\frac{1}{MPS} + \frac{-MPC}{MPS} = \frac{1 - MPC}{MPS} = \frac{MPS}{MPS} = 1$
- The balanced budget multiplier always = 1