Expenditure Multiplier Model

ECO 120: Global Macroeconomics

Goals of this chapter

Unit Goals

1. Describe how spending plans are determined when the price is fixed in the short run.
2. Explain the intuition behind the expenditure multiplier.
3. Use the expenditure multiplier to compute predicted changes for real GDP as a result of changes in expenditure plans.
4. Use the expenditure multiplier to explain how recessions and expansions begin.
5. Be able how to pronounce Keynes. It's like candy canes.

Learning Objectives

LO5: Use the model of aggregate demand and supply to evaluate the short-run and long-run impacts of fiscal and monetary policy on production, employment, and the price level.

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- **Canvas Quiz due Wednesday 11:59 PM**. Multiple-choice, 10 questions, unlimited attempts allowed, only best score counts
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Keynesian Model Intuition

- Everybody's expenditure is someone else's income
- Suppose James Murray has high confidence about future income and decides to buy a $2,000 bike.
- That becomes $2,000 of income for the bike shop owners and employees.
- Maybe they save about $200 of that, and spend the other $1,800 on clothing, restaurants, and stuff.
- The owners of the restaurants, clothing stores, and other stuff stores have $1,800 of new income, they turn around and spending $1,620.
- And it goes on. An initial increase in expenditure of $2,000 leads to an even larger change in total spending.
- Expenditures get *multiplied* to something larger.

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Keynesian Model Background

- All prices and wages are assumed to be fixed $\rightarrow$ *very* short run.
- Quantities firms sell only depend on aggregate demand $\rightarrow$ only aggregate demand matters for determining real GDP
- **Aggregate expenditure**: expenditure *plans* for consumer spending + government spending + spending on investment + exports - imports
- **Real GDP**: equal to aggregate expenditure *in equilibrium*.
  - An increase in aggregate expenditure leads to an increase in real GDP.
  - An increase in real GDP is an increase in income, leading to an increase in consumption and imports
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Marginal Propensity to Consume

Marginal propensity to consume (MPC)

The fraction of an increase in income that is consumed.

$$\text{MPC} = \frac{\Delta C}{\Delta Y}$$

Marginal propensity to save (MPS)

The fraction of an increase in income that is saved.

$$\text{MPS} = 1 - \text{MPC}$$

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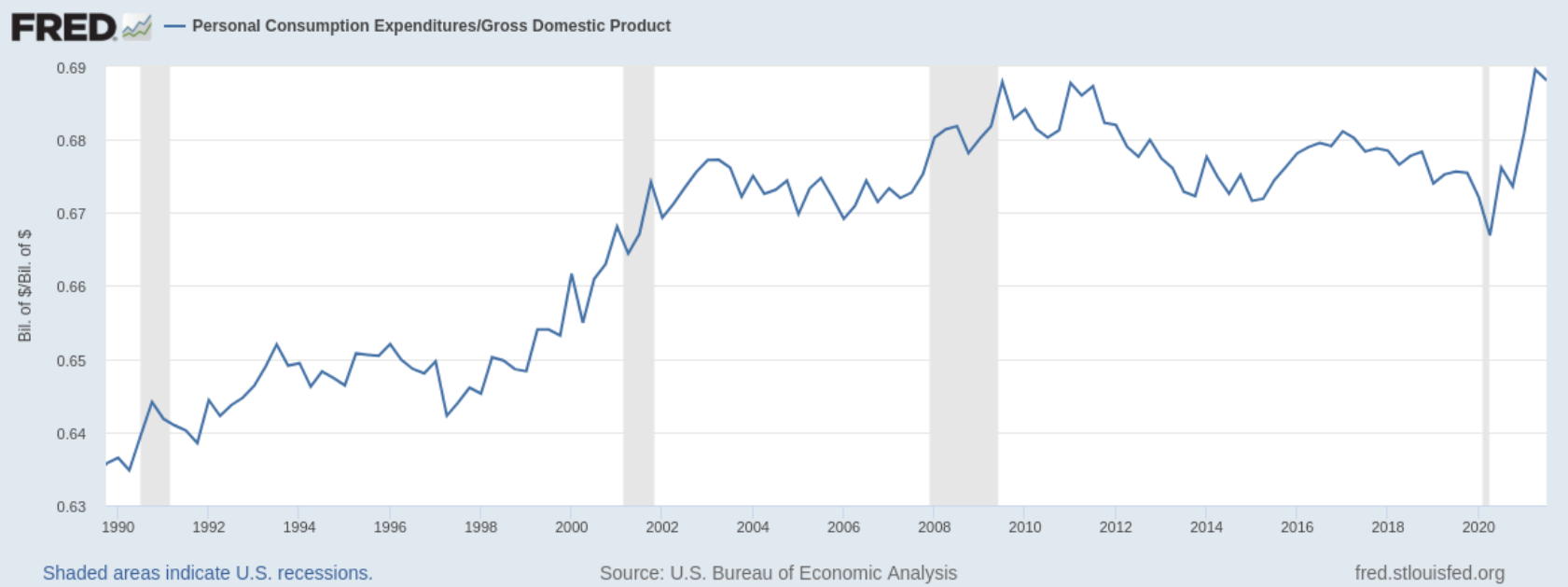
U.S. Consumption as a Fraction of Real GDP



Factors Affecting Consumption

Interest rate

- Suppose there is an increase in interest rates
- Higher incentive to save
- More expensive to borrow
- Demand for consumer spending decreases

Wealth

- Suppose an increase in stock market values lead to higher wealth for consumers
- Consumers can afford to withdraw savings, or save less
- Demand for consumer spending increases

Expected Future Income

- Suppose consumers expect higher incomes in the future
- Consumers expect to afford to withdraw savings, or save less, or borrow more
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Interest rate

- Suppose there is an increase in interest rates
- More expensive to borrow to finance capital purchases
- Higher opportunity cost of using savings to finance capital purchases
- Demand for investment decreases

Business Economic Outlook

- Suppose businesses expect a decrease in profitability in the future
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Technology / Capital Productivity

- Suppose improvements in technology lead to higher productivity
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Factors Affecting Export Demand

Exchange Rates

- Suppose the domestic currency appreciates relative to major trading partners
- Country's currency is more expensive for people in foreign countries
- Demand for exported goods and services decreases
- Leads to a *decrease* in aggregate expenditures

Foreign Income or Wealth

- Suppose income or wealth in foreign countries that are trading partners increases
- People in foreign countries have higher demand for goods and services produced in this country
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Import Demand

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1. Consumers import products: ↑ real GDP → ↑ imports
2. Producers import intermediate goods: ↑ real GDP → ↑ production → ↑ imports of intermediate goods
3. Imports increase as real GDP increases.

Marginal propensity to import (MPM)

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- MPM increases as the global economy becomes more integrated.

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Marginal propensity to import (MPM)

- MPM: The fraction of an increase in real GDP that is spent on imports.
- MPM increases as the global economy becomes more integrated.

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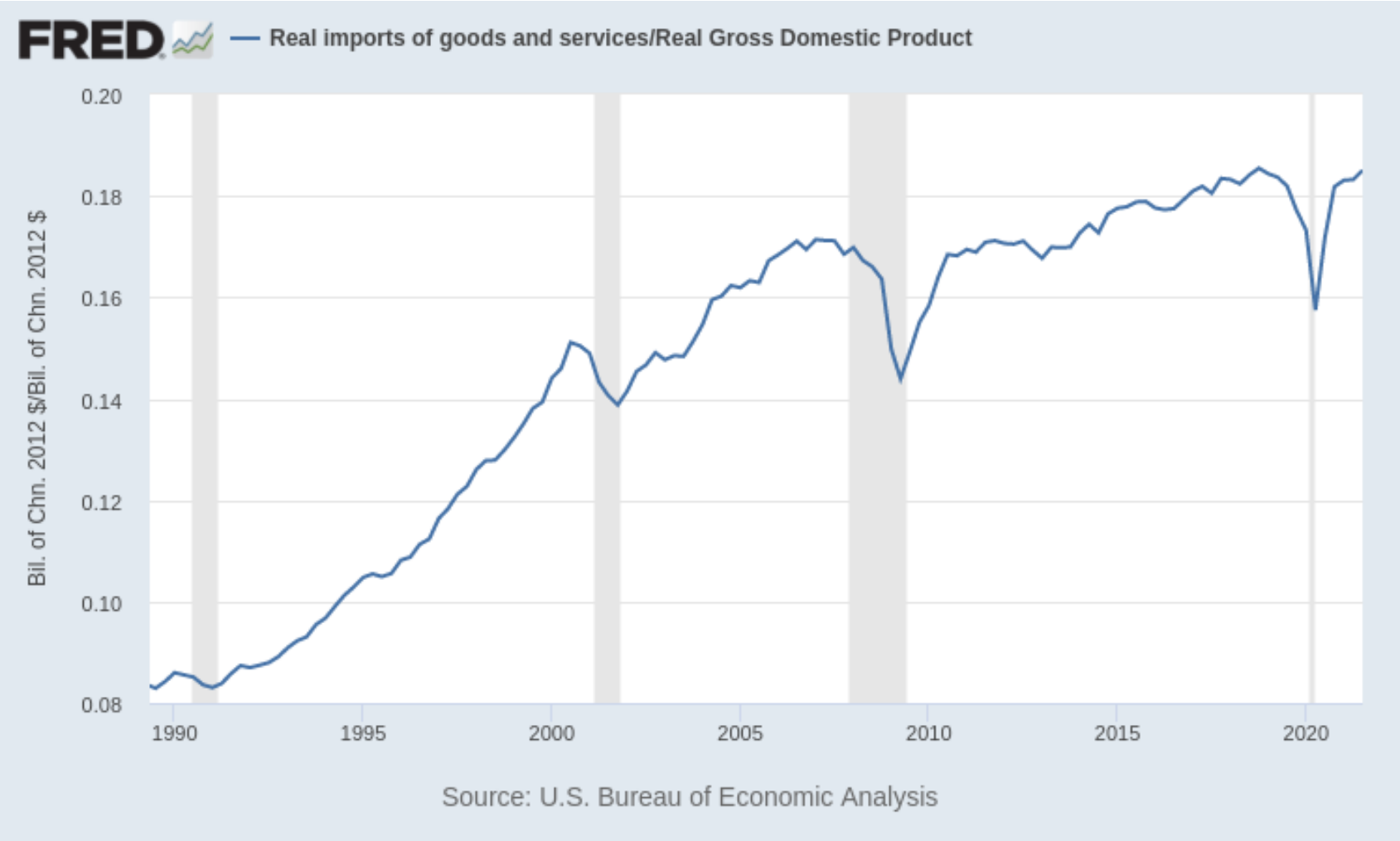
U.S. Imports as a Fraction of Real GDP



Factors Affecting Import Demand

Wealth and Expected Future Income

- Impact on demand for imports is the same as demand for consumption
- Suppose wealth or expected future income increases
- Consumers expect to afford to withdraw savings, or save less, or borrow more
- Demand for imported goods and services increases

Exchange Rates

- Suppose the domestic currency appreciates relative to major trading partners
- Foreign currencies become less expensive, so foreign-produced goods and services are less expensive
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Mathematical Example: Government Spending

- Suppose there is an increase in government spending.
- Y = C + I + G + X - M
- An increase in G will increase Y
- An increase in Y will increase C (consumption plans) and M (import plans)
- The ↑ real GDP equals ↑ G + ↑ C - ↑ M.

$$\Delta Y = \Delta C + \Delta G - \Delta M$$

$$\Delta C = \text{MPC}\ \Delta Y$$

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- Solve for the change in real GDP (ΔY):

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Expenditure Multiplier

General Expenditure Multiplier

$$m = \frac{1}{MPS+MPM}$$

$$\Delta Y = m\ \Delta AE$$

$$= \left(\frac{1}{MPS+MPM}\right) \Delta AE$$

Where ΔAE = any of these:
ΔC, ΔI, ΔG, ΔX, or -ΔM

Example

Let MPS = 0.15, MPM = 0.25, and suppose an increase of consumer spending plans equal to \$75 billion

$$m = \frac{1}{MPS+MPM}$$

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Full employment GDP

- **Full employment GDP** or **Potential GDP**: Level of GDP when all factors of production are used efficiently.
  - Implies cyclical unemployment is equal to zero. Frictional and structural unemployment will still be positive.
- Recession: when real GDP is below potential GDP.
- **Recessionary gap**: amount by which expenditures fall short those required to achieve full employment GDP.
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Recession Example

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- Suppose businesses have a pessimistic outlook for future profitability.
- As a result, investment decreases by \$100 billion
- Suppose *past evidence* revealed that when consumers received a \$600 tax rebate, on average they increased their spending by \$500 and increased import spending by \$50.

Computing Change in Real GDP

$$MPC = \frac{\$500}{\$600} = 0.8333$$

$$MPS = 1 - 0.8333 = 0.1667$$

$$MPM = \frac{\$50}{\$600} = 0.0833$$

$$m = \frac{1}{0.1667 + 0.0833} = 4.0$$

$$\Delta Y = m \times (\Delta I) = 4.0 \times (-\$100\ bn)$$

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- Suppose businesses have a pessimistic outlook for future profitability.
- As a result, investment decreases by \$100 billion
- Suppose *past evidence* revealed that when consumers received a \$600 tax rebate, on average they increased their spending by \$500 and increased import spending by \$50.

Computing Change in Real GDP

$$MPC = \frac{\$500}{\$600} = 0.8333$$

$$MPS = 1 - 0.8333 = 0.1667$$

$$MPM = \frac{\$50}{\$600} = 0.0833$$

$$m = \frac{1}{0.1667 + 0.0833} = 4.0$$

$$\Delta Y = m \times (\Delta I) = 4.0 \times (-\$100\ bn)$$

$$= -\$400\ billion$$

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Government Policy Example

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- Suppose real GDP is currently \$9 trillion, but at full employment real GDP would be \$10 trillion.
- The government wants to stimulate the economy with an increase in spending to increase real GDP up to \$10 trillion
- We know the desired change in real GDP: $\Delta Y = \$1$ trillion $= \$1000$ billion
- We need to solve for ΔG
- Suppose *past evidence* revealed that when consumers received a \$800 tax rebate, on average they increased their spending by \$600 and increased import spending by \$100.

Compute Change in G

$$MPC = \frac{\$600}{\$800} = 0.75$$

$$MPS = 1 - 0.75 = 0.25$$

$$MPM = \frac{\$100}{\$800} = 0.125$$

$$m = \frac{1}{0.25 + 0.125} = 2.667$$

$$\Delta Y = m \times (\Delta G)$$

$$\$1000\ bn = 2.667 \times (\Delta G)$$

$$\Delta G = \$375\ billion$$

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Scholar Spotlight: Dr. Maarten De Ritter

Multiplier Effect of Education Expenditure, CEPR Working Paper 2022

with Simona Hannon & Damjan Pfajfar, Board of Governors of the Federal Reserve System

Expenditure Multipliers of Pell Grants

- Pell grants: $30 billion federal program to help low income students attend college in the United States
- Estimated local multiplier effects: Additional income earned in cities and towns with colleges and universities with Pell grant recipients
- Expenditure multiplier ≈ 2.5
- Larger than most estimated multipliers, including defense spending multipliers

Dr. Maarten De Ridder
Asst. Professor
London School of Economics

Scholar Spotlight: Dr. James Murray

Fiscal Policy Reactions and Impact Over the Labor Income Distribution in the United States, Working Paper 2023

Multpliers Different Across Income Distribution

- Examines fiscal policy multipliers (eg: increases in government spending, decreases in taxes, increases in unemployment benefits)
- Impact to labor market income for earners at bottom 25%, median, and top 25%
- Increases in government *investment* and cuts to *corporate* taxes have the largest effects on earnings at every level
- Largest benefits to highest income levels
- The most effective fiscal policies for lowest income levels also widen income gap
- Unemployment benefits raise *labor* earnings at lowest income levels, but not others

Dr. James Murray
Professor, UW-La Crosse

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Economic Stability

- Any change in any component of aggregate expenditure has amplified effects:

$$\Delta Y = \left(\frac{1}{MPS + MPM} \right) \Delta AE$$

- Decrease in marginal propensity to save:
  - Denominator gets smaller $\rightarrow$ multiplier gets larger
  - Larger changes in real GDP (positive or negative) $\rightarrow$ less stable economy
  - Larger multiplier $\rightarrow$ larger is the amplification and effectiveness of government policy
- Decrease in marginal propensity to import:
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Extension to Local Multipliers

- The expenditure multiplier is given by, $m = 1/(\text{MPS}+\text{MPM})$
- MPS + MPM = fraction of income *not spent* in the United States (saved or spent abroad).
- If economy does not trade, or if *change in* imports do not depend on change in income, then $MPM = 0$.
- Can think of $1 - (MPS + MPM)$ as fraction of an increase in income that is spent domestically.
- The larger the fraction of an additional dollar of income is spent domestically, the larger will be the multiplier.
- Local or regional multipliers (eg: Big event like concert, professional sporting event, Oktoberfest, Wisconsin state high school track meet)

$$m_{\text{local}} = \frac{1}{1 - (\text{Fraction of additional income spent locally})}$$

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- Can think of $1 - (MPS + MPM)$ as fraction of an increase in income that is spent domestically.
- The larger the fraction of an additional dollar of income is spent domestically, the larger will be the multiplier.
- Local or regional multipliers (eg: Big event like concert, professional sporting event, Oktoberfest, Wisconsin state high school track meet)

$$m_{\text{local}} = \frac{1}{1 - (\text{Fraction of additional income spent locally})}$$

Extension to Local Multipliers

- The expenditure multiplier is given by, $m = 1/(\text{MPS}+\text{MPM})$
- MPS + MPM = fraction of income *not spent* in the United States (saved or spent abroad).
- If economy does not trade, or if *change in* imports do not depend on change in income, then $MPM = 0$.
- Can think of $1 - (MPS + MPM)$ as fraction of an increase in income that is spent domestically.
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