Economics 2
Fall 2024

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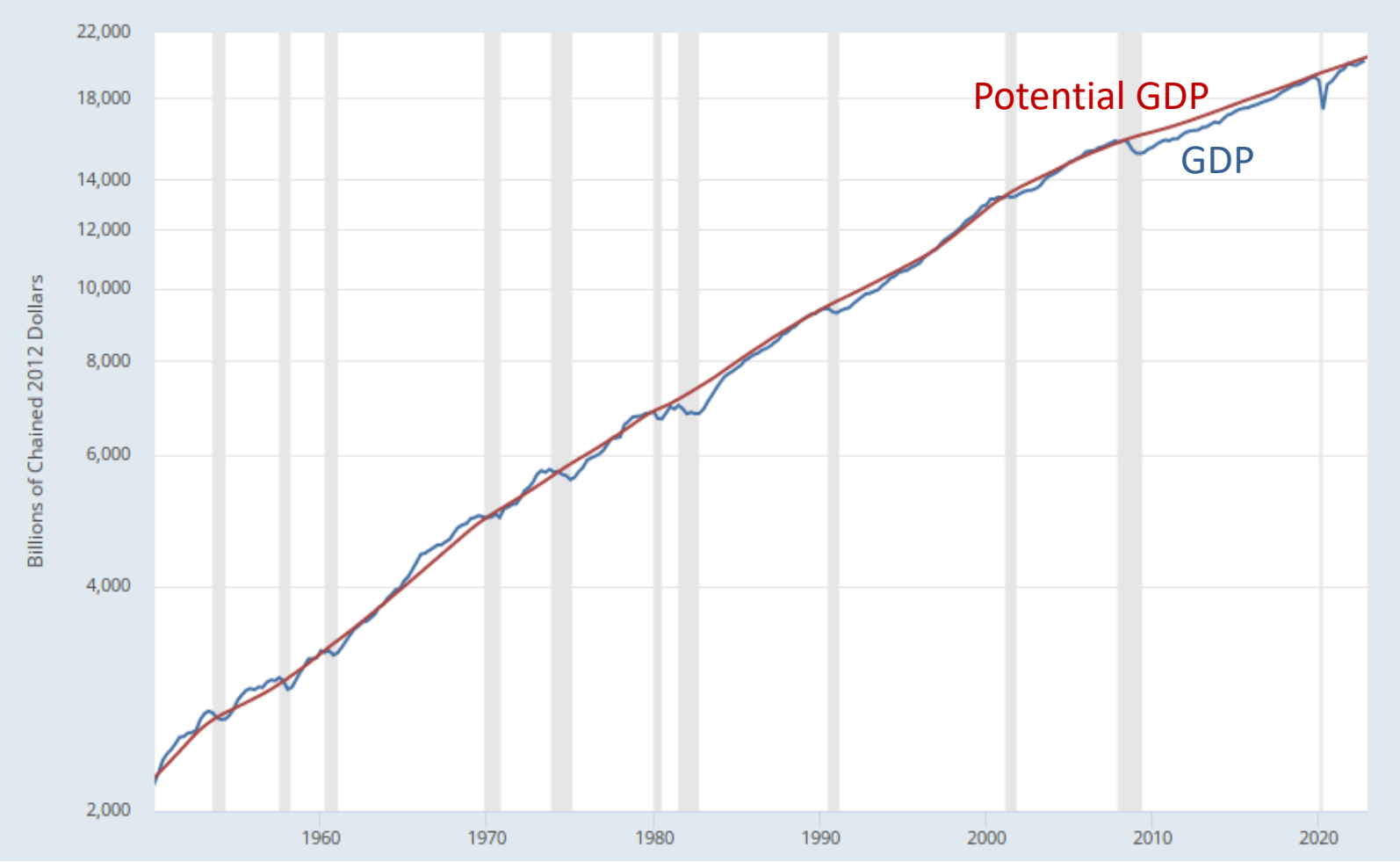
LECTURE 16

Short-run Macro Fluctuations

I. Overview of Short-Run Fluctuations

Actual and Potential Real GDP in the U.S.

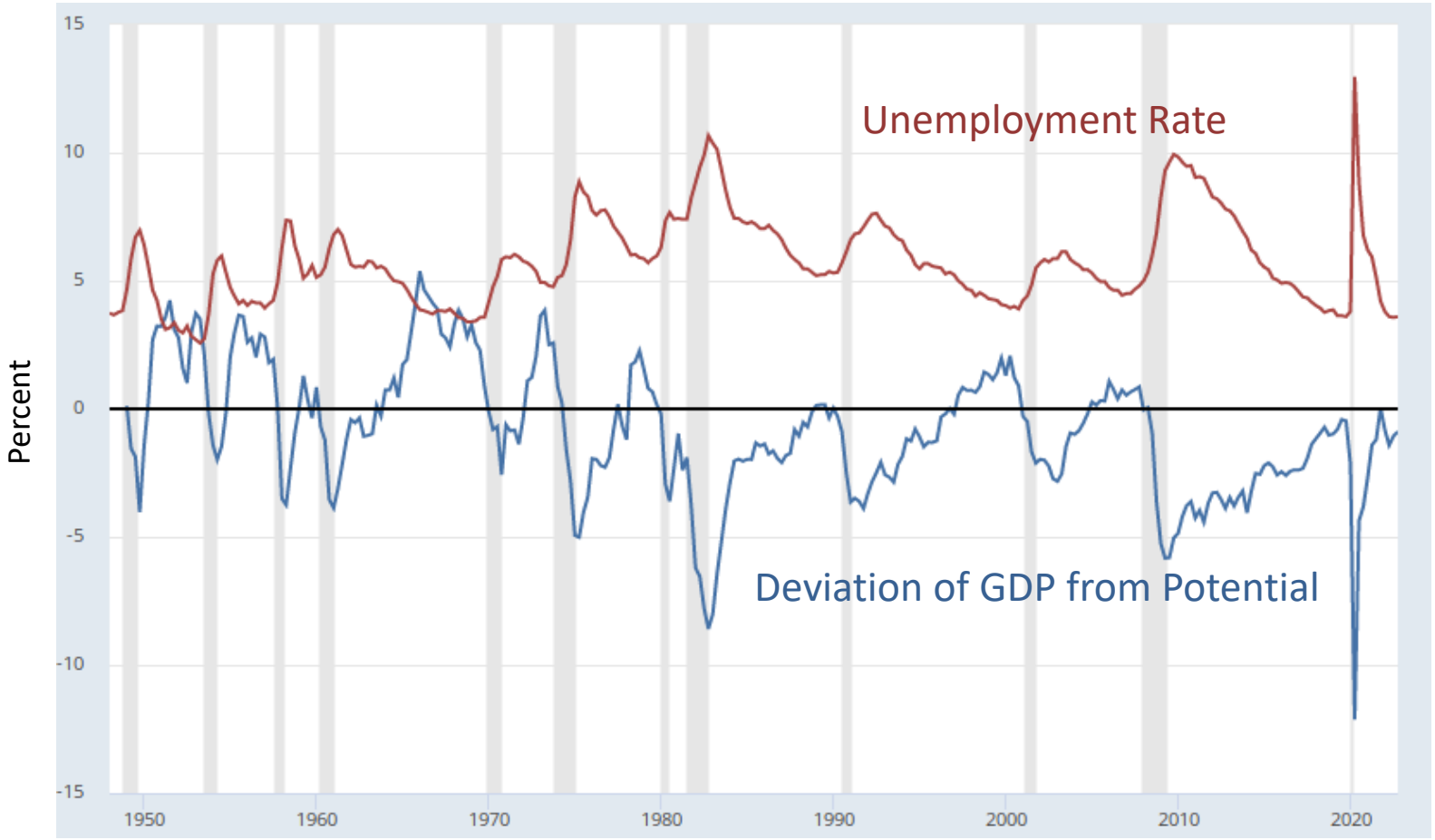


Source: FRED (Federal Reserve Economic Data); data from BEA and CBO.

Short-Run Fluctuations

- Times when output moves above or below potential (booms and recessions).
- Recessions are costly and very painful to the people affected, especially the unemployed
- Short-run fluctuations look tiny relative to long-term growth:
  - Rational model: people should care about long-term growth not short-term fluctuations (Robert Lucas)
  - Real world: short-run fluctuations matter a lot to people (affect elections). Losses are a lot more salient than gains to people.

Deviation of GDP from Potential and the Unemployment Rate



Source: FRED; data from Bureau of Labor Statistics, BEA, CBO.

Unemployment and Well-being

Unemployment has negative impacts on the unemployed over and beyond economic income loss

- Self-reported happiness/satisfaction/self-esteem drops sharply upon becoming unemployed
- Unemployment associated with higher levels of depression and anxiety, more medications, and more physician visits (Linn et al. 1985)
- Half of American households don't have any savings at hand to cushion blow from lost earnings
  - Liquid wealth is safety against economic "shocks"

Plan for Our Study of Short-Run Fluctuations

- This lecture: discuss the framework.
- Then turn to the role of government budget policy (taxes and government spending)
- Then turn to monetary policy and the Federal Reserve.
- Then expand the framework to understand inflation and the eventual return to potential output.

II. The Key Role of Demand

Key Determinant of Output in the Short Run

- In the long run, output (GDP) is equal to potential output.
    - Potential output is determined by normal capital, labor, and technology.
- In the short run, output can be above, below, or equal to potential output.
    - Short-run output is determined primarily by demand: what consumers, firms, and government are purchasing

The Composition of GDP

- Recall that GDP Y=C+I+G+NX

- Consumption (C) [65-70% of US GDP]
- Investment (I) [15-20% of US GDP]
- Government purchases (G) [15-20%]
- Net Exports = Exports - Imports (NX) [-3%]

Three Terms that Mean the Same Thing

- Planned aggregate expenditure.
- Planned spending.
- Planned aggregate demand.
- All three terms refer to the total amount that people/businesses/govt in the economy plan to buy.
- In the short run, if planned aggregate expenditure changes, output changes.

Why is Output Determined by Demand in the Short Run?

- Prices don't change quickly or thoroughly enough to keep output at potential.

- Due to limited information, long-term contracts, dislike of "unfair" price changes by consumers, dislike of wage cuts by workers, or other factors.

- **Keynesian revolution in economics:** after the Great Depression, Keynes built a framework to account for short-run macro fluctuations still in use in textbook macro

Mom-and-Pop Restaurant Analogy

- Short-run: Prices in the restaurant are fixed and hence restaurant produces more or less simply based on demand fluctuations (busy vs. quiet days)

- Long-run: Prices adjust so that restaurant owners have normal workload: If demand is high, they increase prices to reduce it. If demand is low, they cut prices to increase it.

- If prices adjusted perfectly and immediately, there would be no short-term business fluctuations (absent a real shock like weather for agriculture or COVID).

- Keynes key contribution: need different analysis in short run vs. long run.

III. Planned Aggregate Expenditure

Components of Planned Aggregate Expenditure (PAE)

- Recall that GDP is Y=C+I+G+NX
- Consumption (C)
- Investment I, Planned investment (I^p)
- Government purchases (G)
- Net exports (NX) = Exports - Imports

$$PAE = C + I^p + G + NX$$

Quiz

Why are net exports = exports minus imports part of GDP?

- A. Because imports are consumed domestically but bought from abroad
- B. Because exports are domestic production that is sold abroad.
- C. Because imports are already counted in C but exports are not
- D. All of the above
- E. None of the above

Components of Aggregate Demand (GDP)

	US	Eurozone (19 countries)	China
Consumption (C)	68.4%	55.9%	37.3%
Government spending (G)	15.1%	21.1%	14.1%
Investment (I)	19.1%	19.5%	47.3%
Change in inventories	0.4%	0.0%	2.0%
Exports (X)	13.6%	43.9%	26.2%
Imports (M)	16.6%	40.5%	23.8%

Figure 13.7 Decomposition of GDP in 2013 for the US, the Eurozone, and China.

OECD. 2015. *OECD Statistics*; The World Bank. 2015. *World Development Indicators*. OECD reports a statistical discrepancy for China equal to -3.1% of GDP.

Short Run versus Long Run

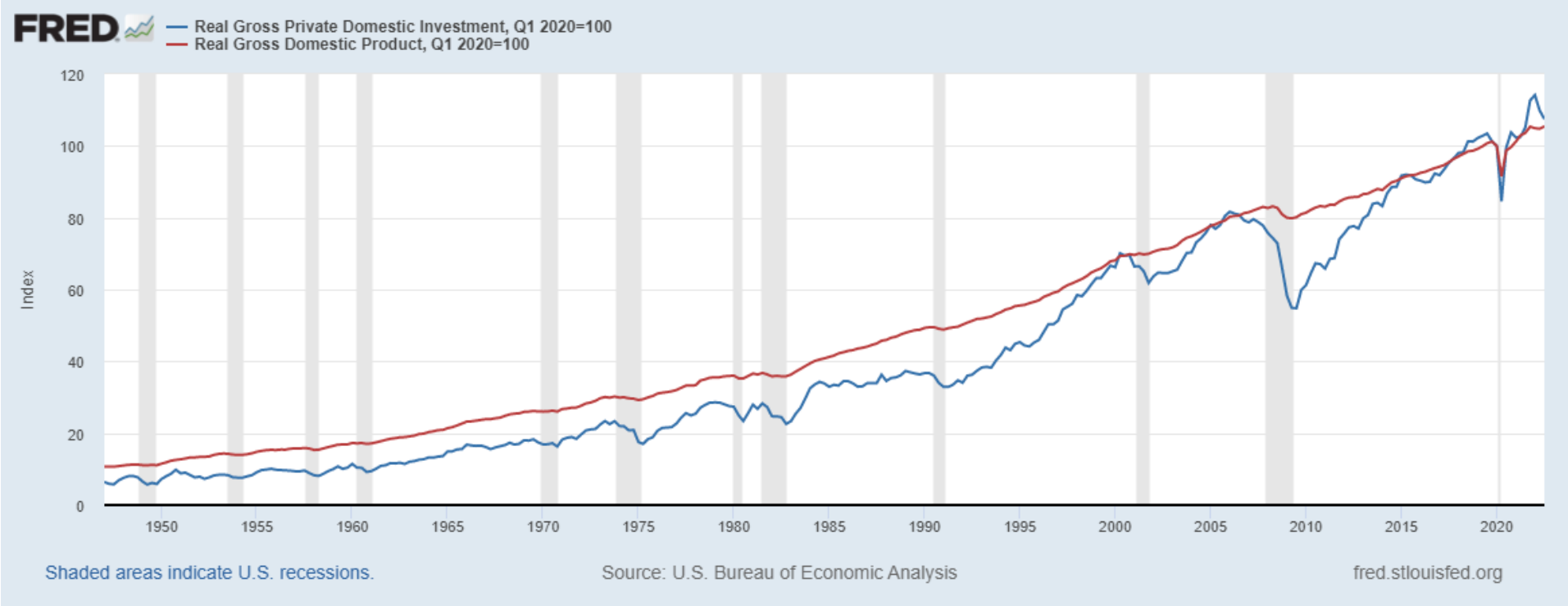
- In the short run:
  - PAE can be more than, less than, or equal to Y*.
  - Output responds to match PAE.
- In the long run:
  - Output is at Y* (determined by normal capital, labor, and technology).
  - PAE adjusts to equal Y*.
  - Movement in r* (long-run interest rate) brings this about.

IV. Determinants of Each Component of PAE

Determinants of Planned Investment (I^p)

- Real interest rate (r). A rise in the real interest rate reduces planned investment.
- Expectations about future demand ("animal spirits")
- We talk about "planned investment" because we are leaving out the unplanned investment in inventories that happens when PAE is different from actual output.
- Note: inventory are goods produced but not yet sold (counted as investment in GDP)

Investment fluctuates more than GDP over the business cycle



Determinants of Government Purchases (G)

- Politics.
- Wars, natural disasters.
- We take G as given.

Quiz

Among those, which one is not part of G?

- A. The salary of a public school teacher in California
- B. A new military plane bought by the US army.
- C. An unemployment benefit check received by an unemployed person in Oregon
- D. Funds spent by the City of Berkeley repairing its streets
- E. All of the above are part of G

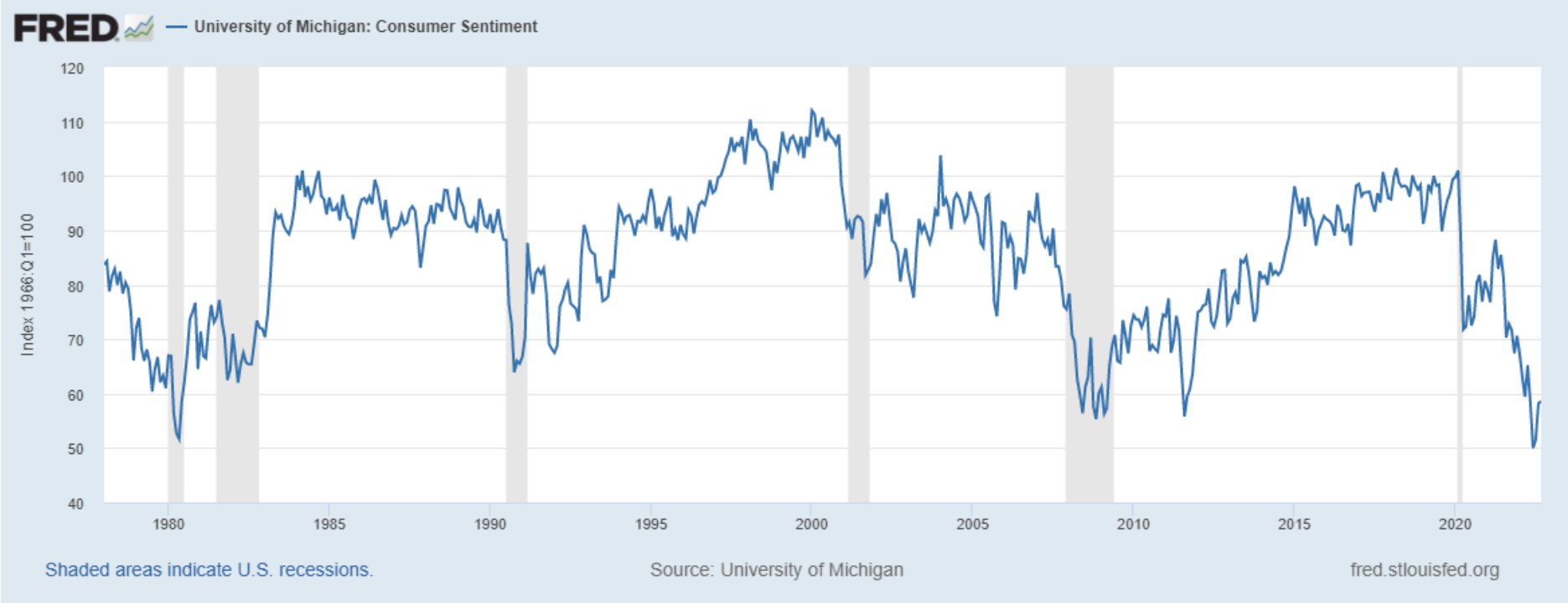
Determinants of Net Exports (NX)

- Net exports = Exports minus Imports
- For now we are assuming they are just given.
- Will discuss the economic determinants later in the course.

Determinants of Consumption (C)

- Real interest rate (r): A rise in the real interest rate reduces current consumption (savings' lecture)
- Expectations about future income ("consumer confidence")
- Wealth: A rise in wealth (e.g. stock market boom) increases consumption.
- Disposable (or after-tax) income: A rise in disposable income increases consumption.

Consumer Sentiment Index



The University of Michigan Survey of Consumer Sentiment Index is an economic indicator which measures the degree of optimism that consumers feel about the overall state of the economy and their personal financial situation.

Components of Planned Aggregate Expenditure (PAE)

- Recall that GDP is Y=C+I+G+NX
- Consumption (C)
- Investment I, Planned investment (I^p)
- Government purchases (G)
- Net exports (NX) = Exports - Imports

$$PAE = C + I^p + G + NX$$

Consumption and Disposable Income

- Aggregate income: Same as aggregate output (Y)
- Aggregate net tax payments: Same as government net tax revenues (T) = taxes – transfers back to households (e.g. Social security retirement benefits)
- Aggregate disposable income: Y−T. It can be used for consumption and savings
- Consumption function: C = f(Y−T) increasing in Y-T
- Sometimes written in the particular linear form:

$$C = \bar{C} + c \cdot (Y - T)$$

Consumption Function

$$C = \bar{C} + c \cdot (Y - T)$$

- Autonomous consumption: The part of consumption that does not vary with income ($\bar{C}$).
- Marginal propensity to consume (MPC): The change in consumption due to a change in disposable income (c). It is between 0 and 1.
- MPC at the macrolevel is the average across all individuals in the economy. Poor have high MPC equal to 1, rich have much lower MPC (closer to 0)

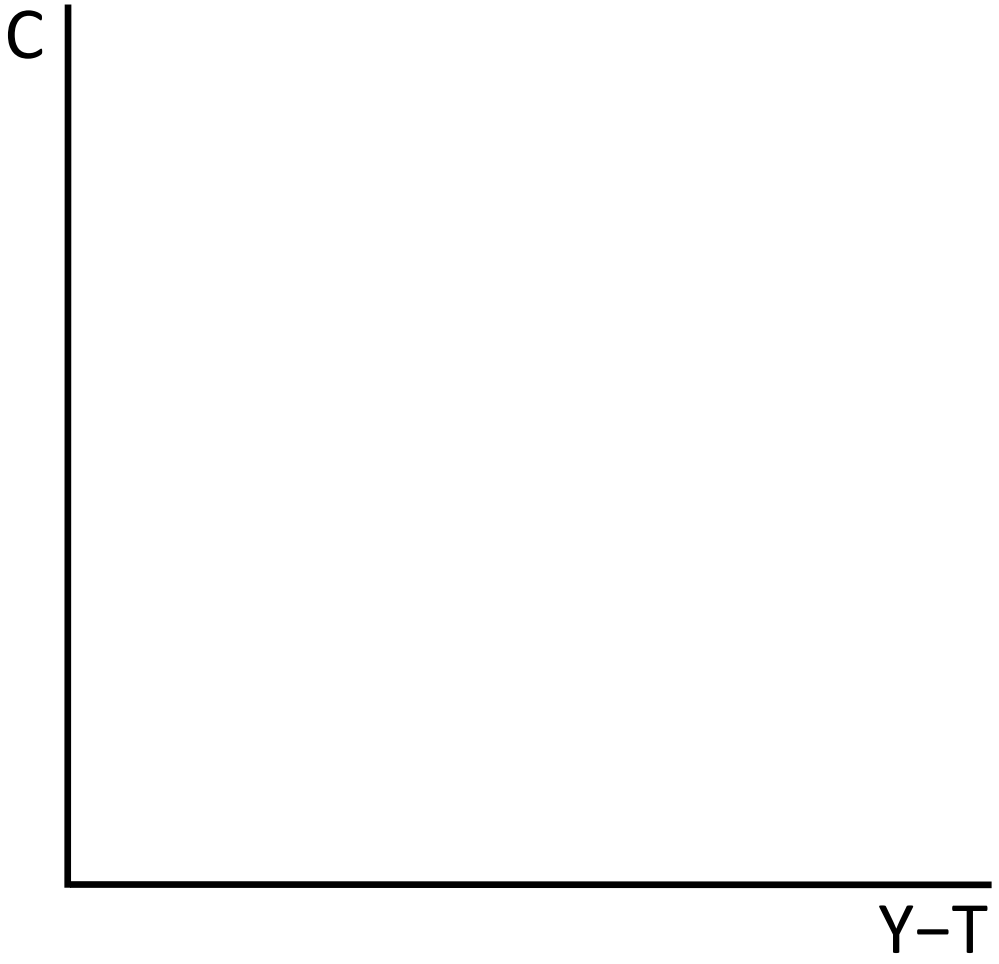
Quiz: what is your MPC?

Suppose UC Berkeley gives you an extra fellowship of $4000 this academic year only. How would this change your spending this academic year?

- A. I would just spend the full $4000 extra this year (MPC=1). And even then, I'd struggle to meet my needs.
- B. I would spend $2000 extra this year and save $2000 for future years (MPC=.5). I'd like to build up a small cushion of savings in case anything bad happens.
- C. I would save the full $4000 because I already have too much income relative to my spending needs (MPC=0).

Consumption Function

$$C = \bar{C} + c \cdot (Y - T)$$



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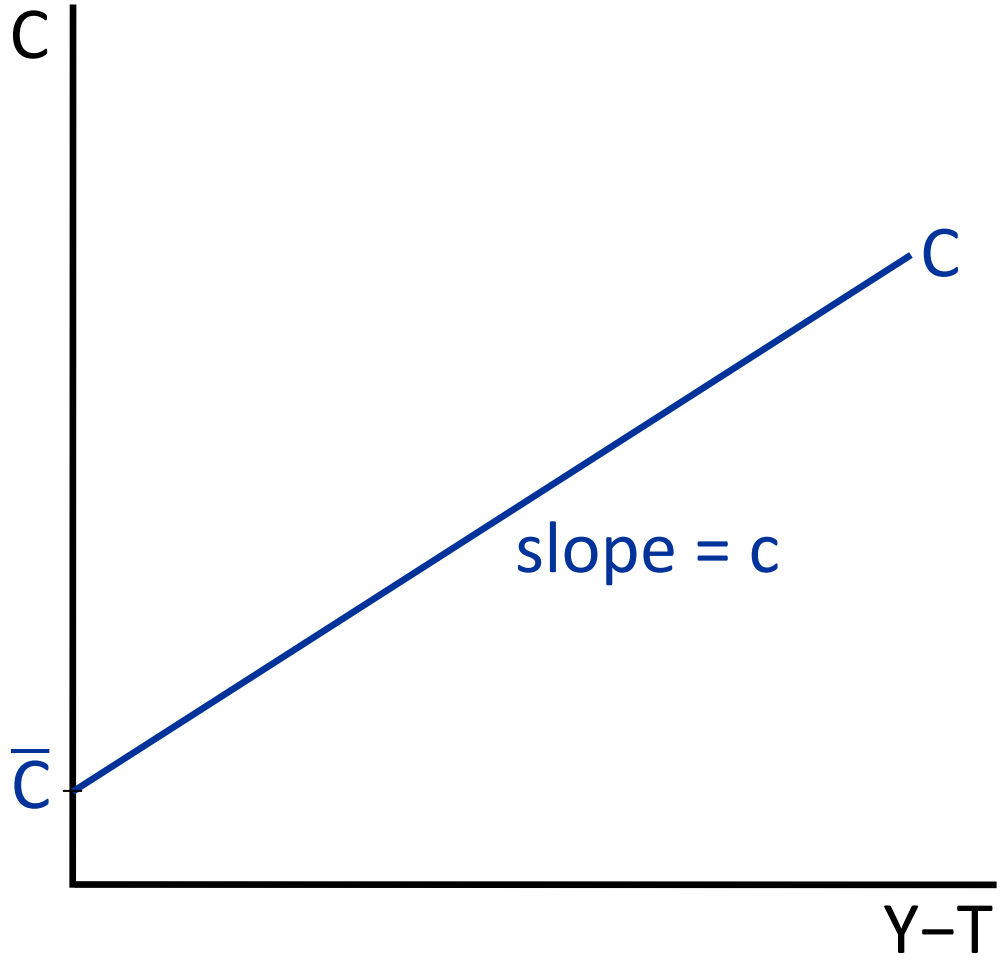
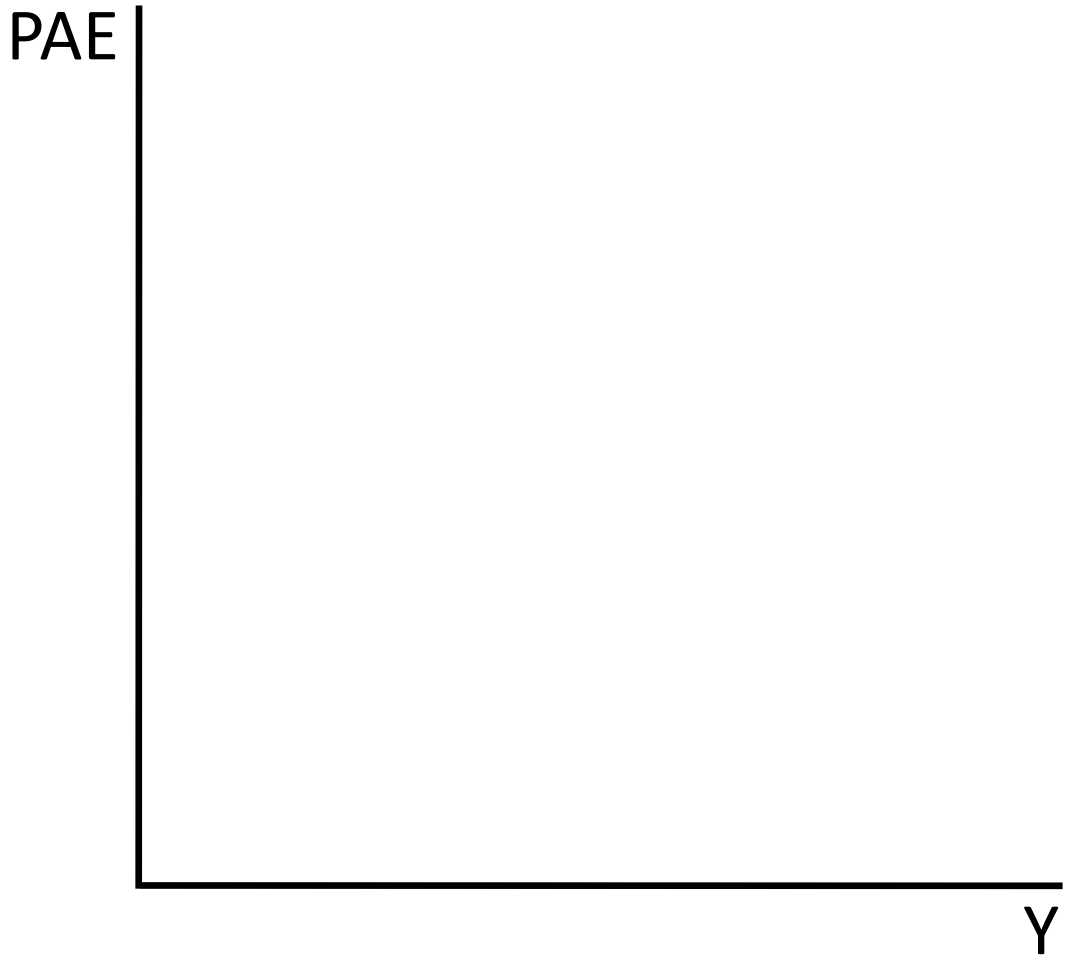


V. Determination of Output in the Short Run

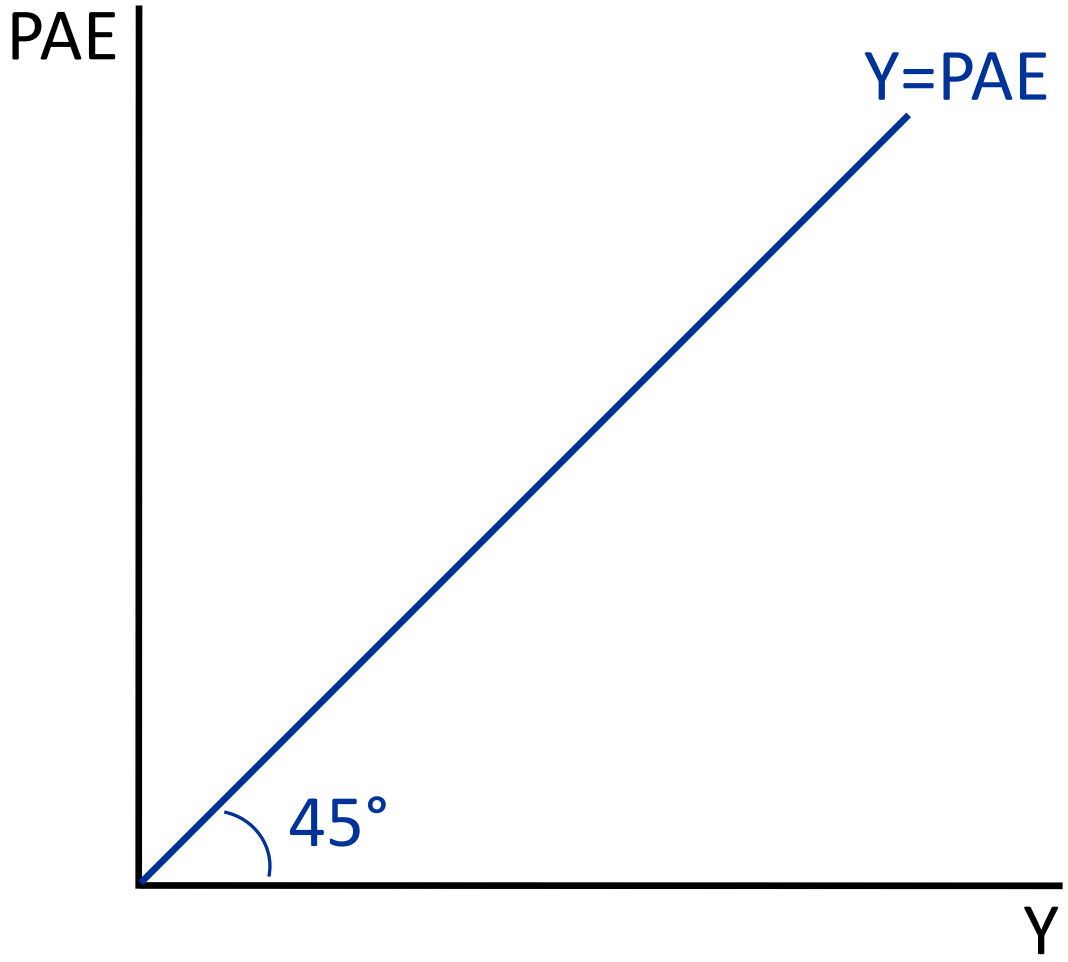
45-degree Line

- Captures the equilibrium condition that Y = PAE.
- Also reflects the empirical reality that output responds to planned spending in the short run.
  - Useful analogy: mom-and-pop Berkeley restaurant faces fluctuations in demand (time of day, day of the week, special events, etc.). How many meals they sell (output) is entirely demand driven (as they don't adjust prices based on short-run demand)
  - When demand is low, they are partly idle. When demand is high, they get (overly) busy

45-degree Line



45-degree Line



Expenditure Line

- Captures the fact that planned aggregate spending is a function of total income (which is the same as total output).
- Recall that PAE = C + I^p + G + NX.
- PAE is a function of Y because one component (Consumption) depends on Y.

Substituting the Consumption Function into PAE

$$C = \bar{C} + c \cdot (Y - T)$$

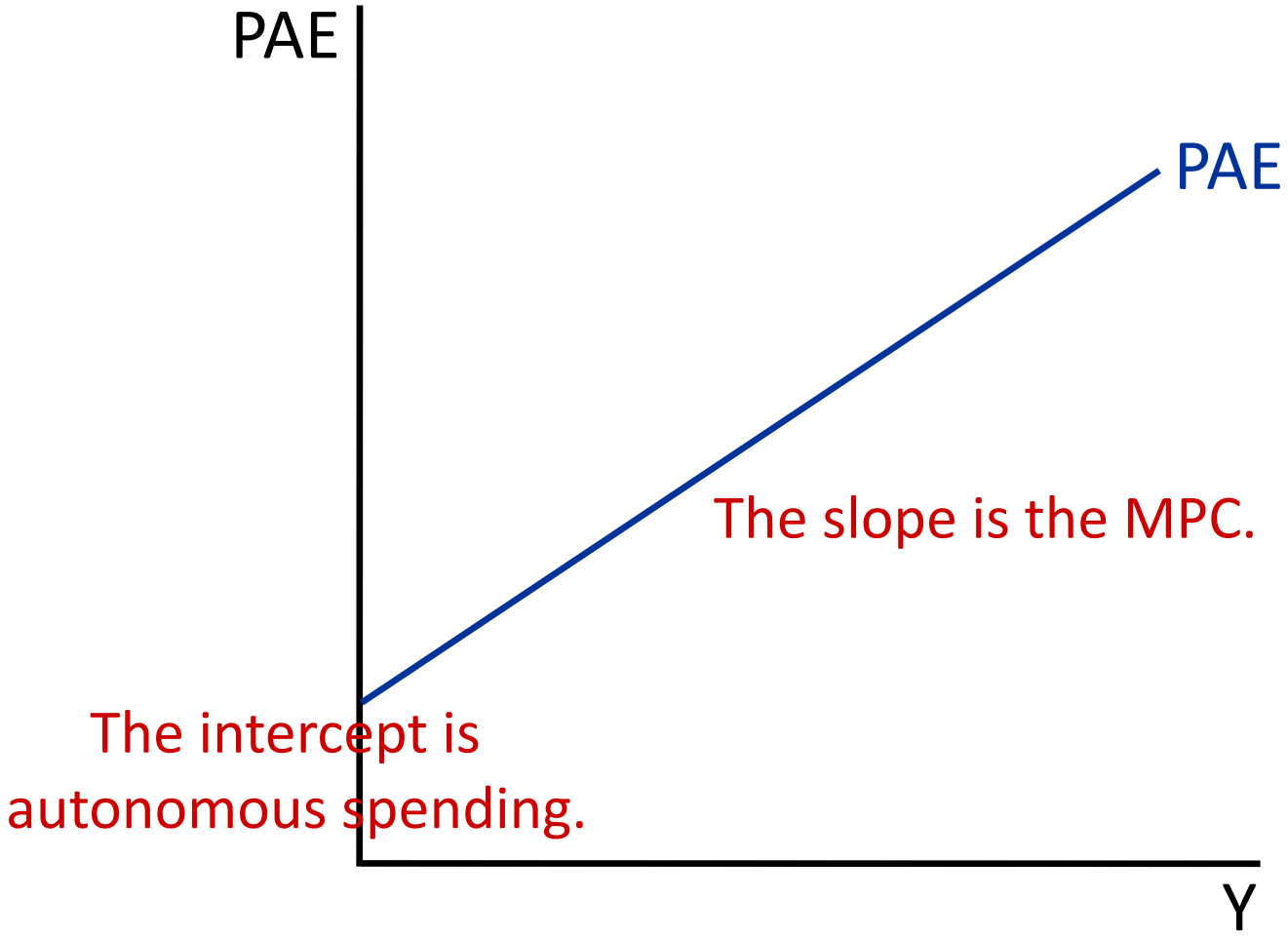
$$PAE = C + I^p + G + NX$$

$$= \bar{C} + c \cdot (Y - T) + I^p + G + NX$$

$$= \bar{C} + c \cdot Y - c \cdot T + I^p + G + NX$$

$$= \underbrace{(\bar{C} - c \cdot T + I^p + G + NX)}_{\text{Autonomous Spending}} + c \cdot Y$$

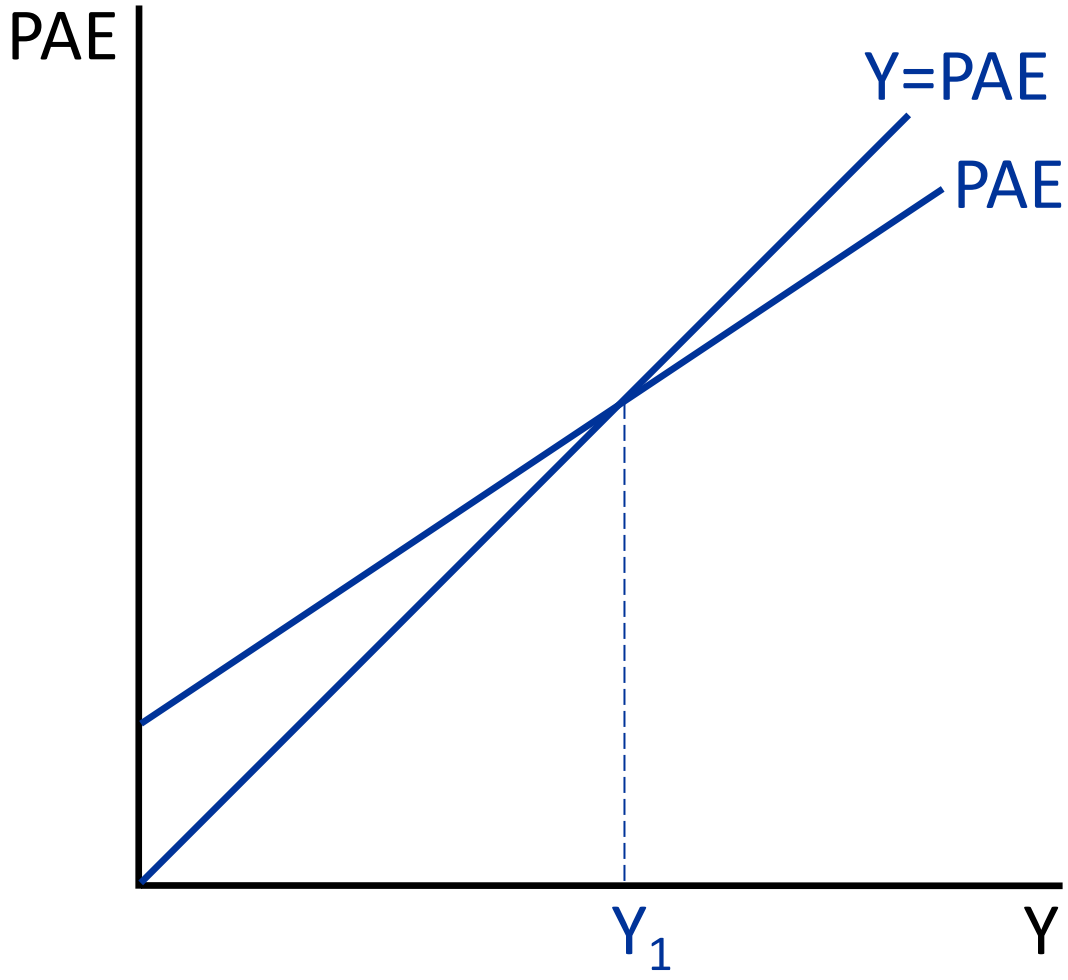
Expenditure Line



Determination of Output in the Short Run

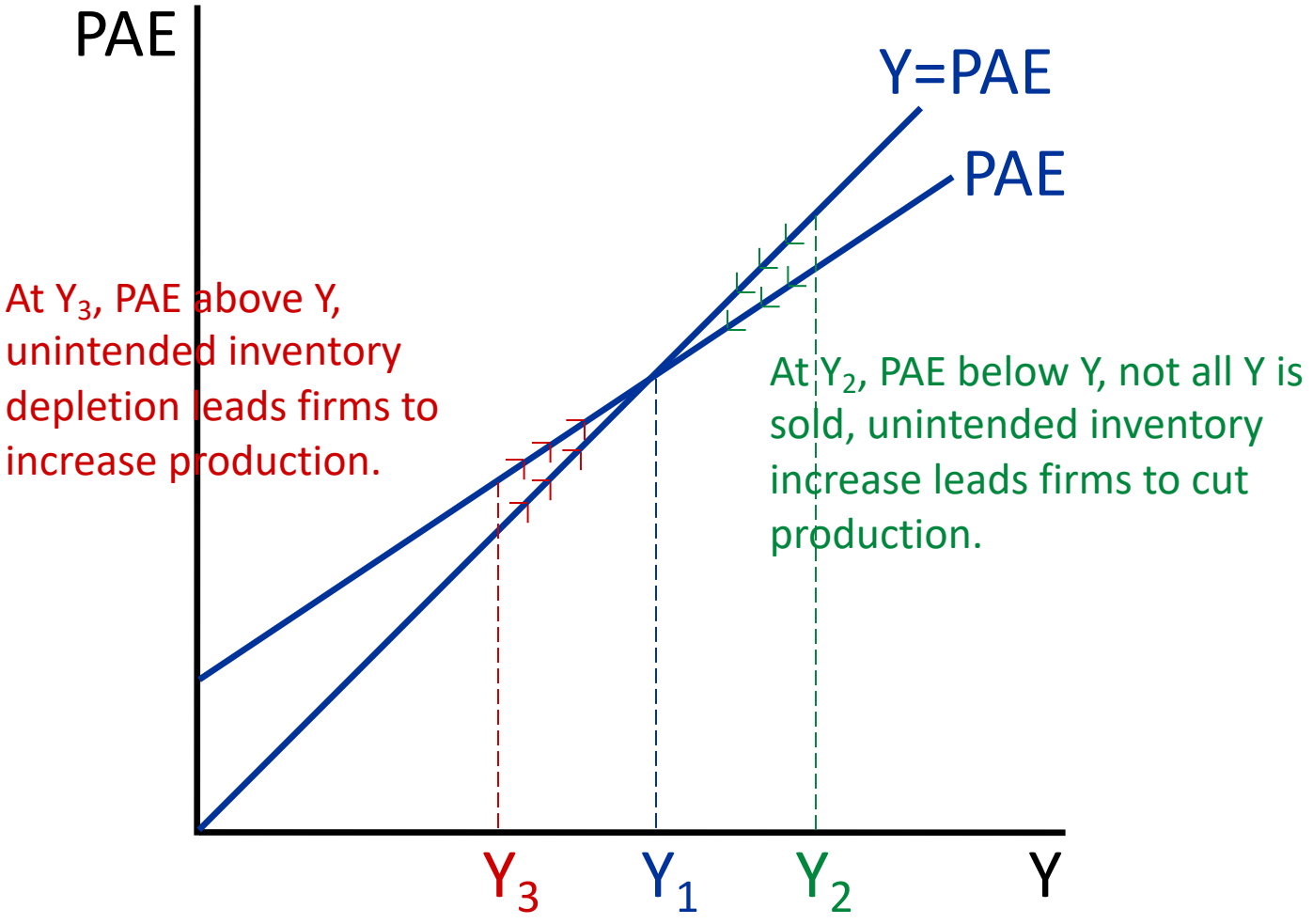
- Output in the short run is determined by the intersection of the 45-degree line and the expenditure line.

Determination of Short-Run Output



Sometimes called the “Keynesian Cross” diagram.

How does the economy get to short-run equilibrium?



The analytics of the Keynesian Cross

$$C = \bar{C} + c\cdot(Y - T) \quad \text{and} \quad PAE = C + I^p + G + NX$$

$$\Rightarrow \quad PAE = (\underbrace{\bar{C} - c\cdot T + I^p + G + NX}_{\text{Autonomous Spending}}) + c\cdot Y$$

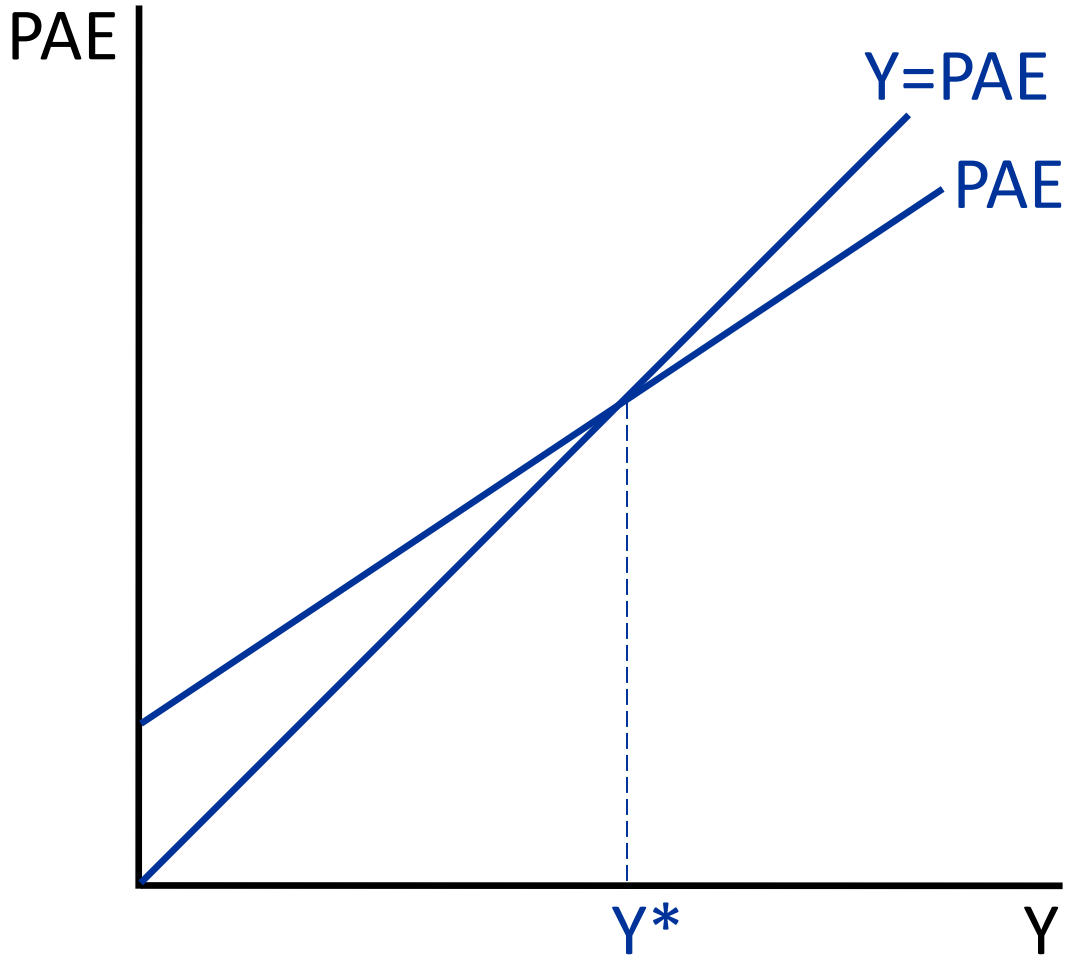
Equilibrium Y=PAE =>

$$Y = (\bar{C} - c\cdot T + I^p + G + NX) + c\cdot Y$$

$$\Rightarrow Y\cdot(1-c) = (\bar{C} - c\cdot T + I^p + G + NX)$$

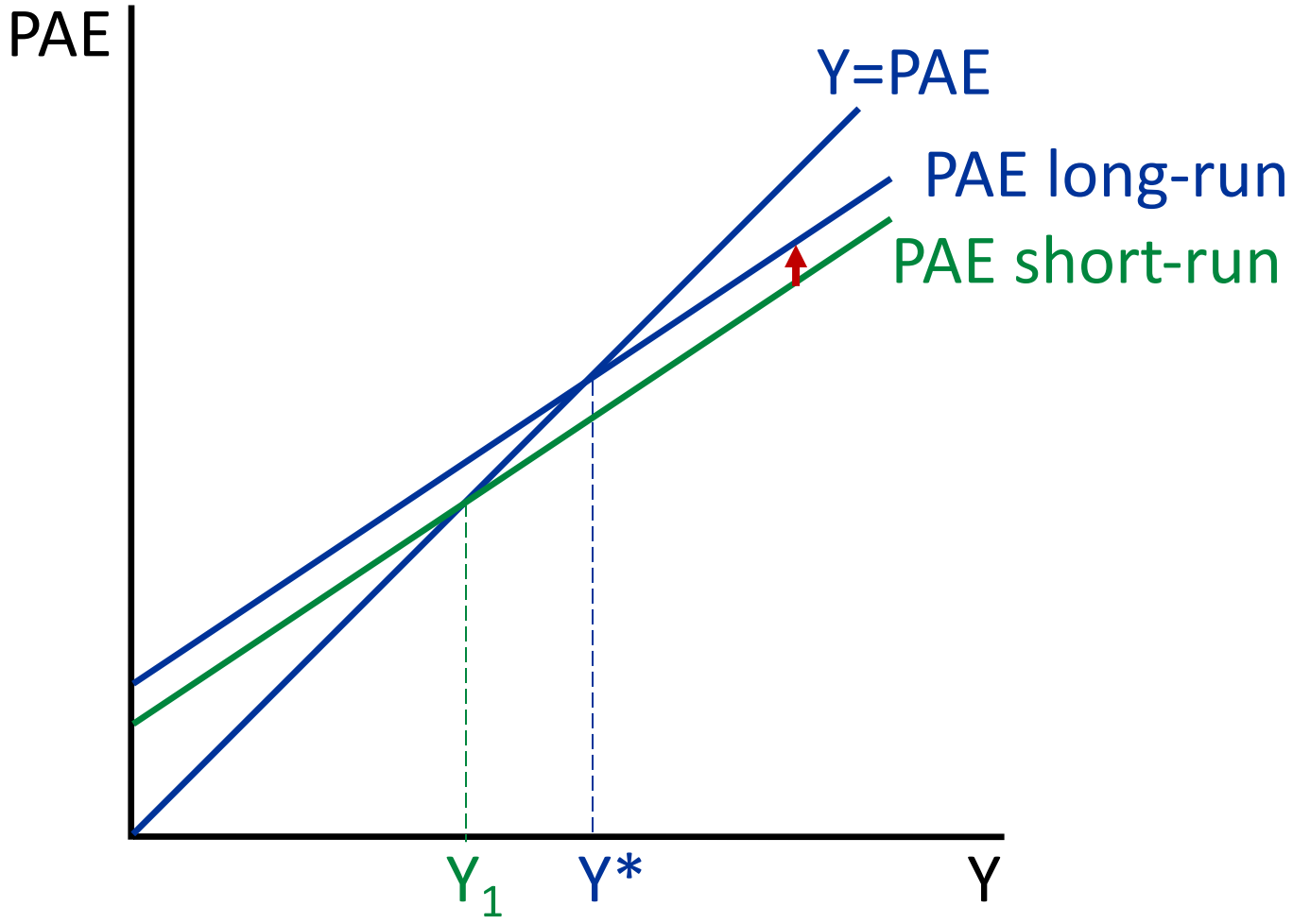
$$\Rightarrow Y = (\bar{C} - c\cdot T + I^p + G + NX) / (1-c)$$

Long-Run Equilibrium



In the long run, Y=PAE and PAE cross at Y* (potential output) with prices adjusting to make Y=PAE happen at Y*

Moving to Long-Run Equilibrium Y*=normal output



In short-run, PAE and Y=PAE cross at Y_1 (not necessarily Y*).

In the long run, prices adjust to shift PAE so they cross at Y*

Output Determination in Short Run vs. Long-Run

- Output in the short run is determined by the intersection of the 45-degree line and the expenditure line = Keynesian analysis
- Output in the long run is equal to Y*: prices adjust to move the PAE curve so that PAE=Y happens at Y* = classical analysis
  - Keynesian analysis looks trivial/absurd from a classical analysis where price is instantaneous mechanism of adjustment
  - Keynesian analysis was a true paradigm shift in economic analysis

VI. Shifts in the Expenditure Line

Crucial Determinant of Short-Run Fluctuations: Shifts in the Expenditure Line

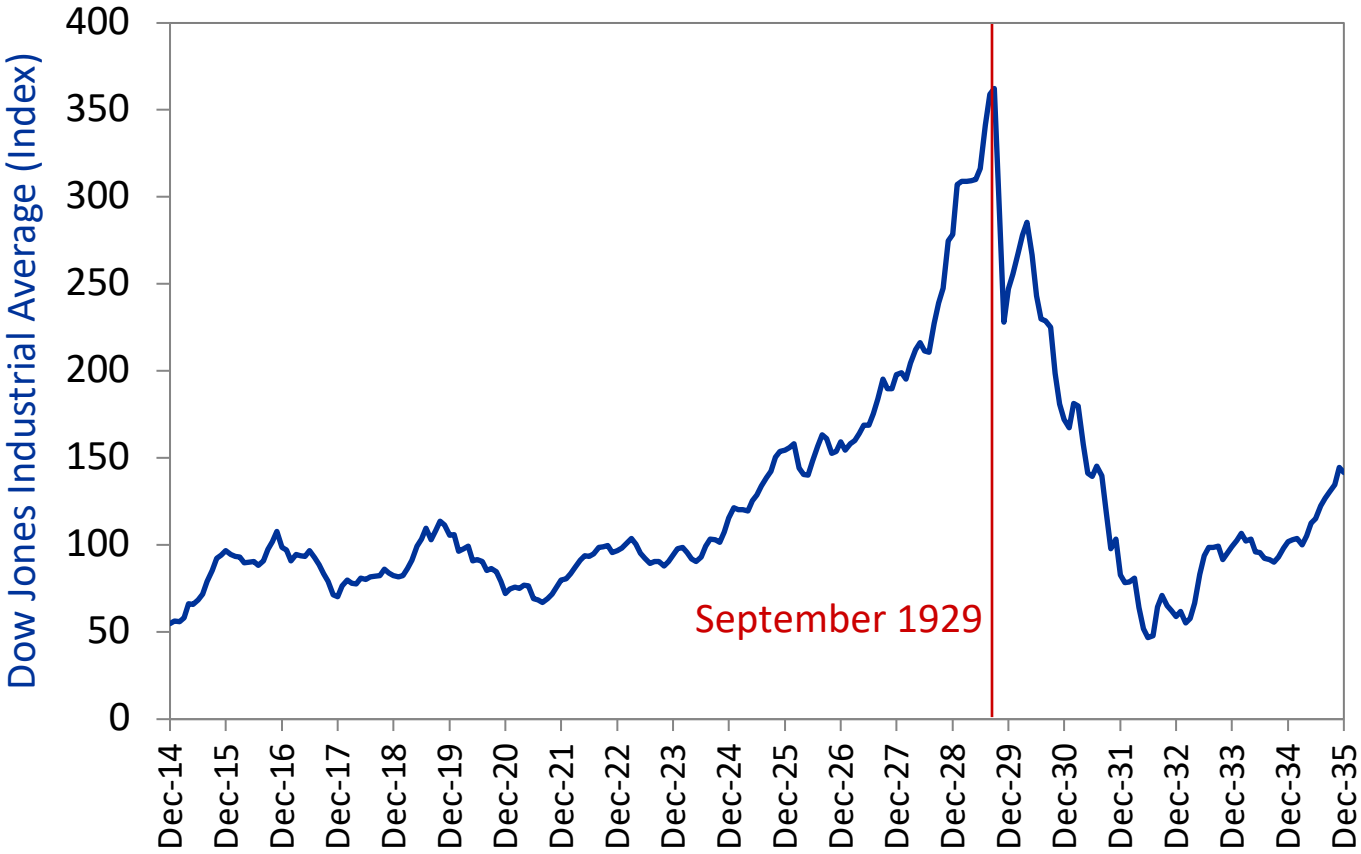
- Expenditure line (PAE) shows how planned spending varies with output.
- Anything that changes planned spending ***other*** than output, will shift the curve.
- If the expenditure line shifts, short-run equilibrium output will change.

Example: A Fall in Autonomous Consumption

$$C = \bar{C} + c \cdot (Y - T)$$

- A fall in consumption ***not*** caused by a fall in output.
- A decline in the intercept of the consumption function ($\bar{C}$).
- It reduces planned aggregate expenditure at a given level of Y.

Great Crash of the Stock Market in October 1929



Source: Federal Reserve Bank of St. Louis, FRED.

Why Might a Fall in Stock Prices Reduce Consumer Spending (at a Given Level of Output)?

- Reduction in wealth makes consumers feel poorer.
- Fall in stock prices makes consumers pessimistic (lowers consumer confidence).
- Stock price volatility causes uncertainty and leads to “wait and see” behavior.

The Collapse of Consumer Spending in 1929-30 relative to pre-crash September 1929

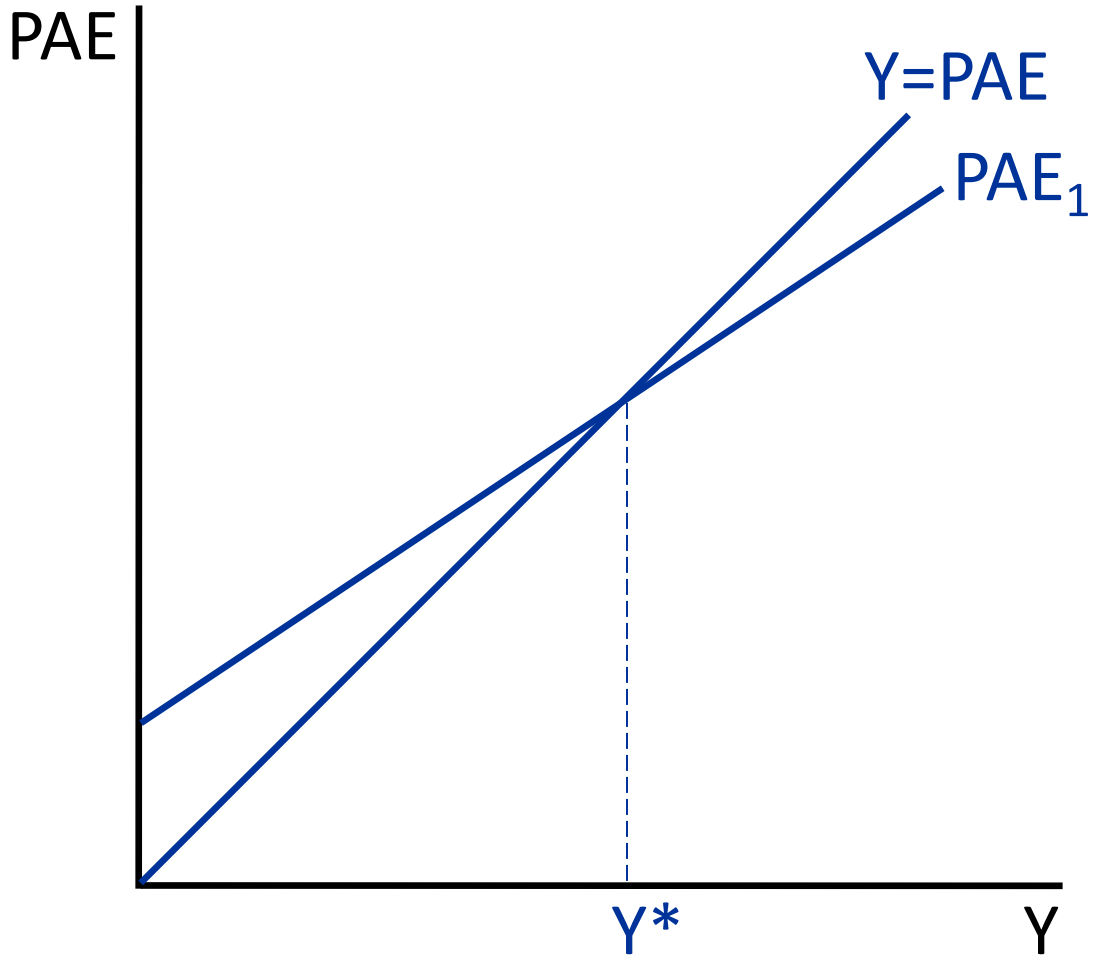
TABLE I

CONSUMER BEHAVIOR FOLLOWING THE GREAT CRASH

	Cumulative percentage change in real seasonally adjusted retail sales					
	Oct. 1929	Nov. 1929	Dec. 1929	Jan. 1930	Feb. 1930	Mar. 1930
Automobile registrations	−5.5	−14.1	−18.9	−23.7	−11.7	−20.4
Department store sales	−8.4	−10.1	−4.5	−15.8	−11.7	−16.4
Mail-order sales	−4.1	−7.4	3.4	−20.6	−25.6	−35.8
Ten-cent store sales	−0.3	1.7	−2.5	−2.7	−0.1	−7.4
Grocery store sales	5.9	3.1	3.4	NA	NA	NA

Source: Christina Romer, "The Great Crash and the Onset of the Great Depression." Crash led to immediate collapse in demand for durable goods (like autos, furniture) but not everyday necessities like groceries. Collapse in demand then led to collapse in production.

A Fall in Autonomous Consumption $\bar{C}$



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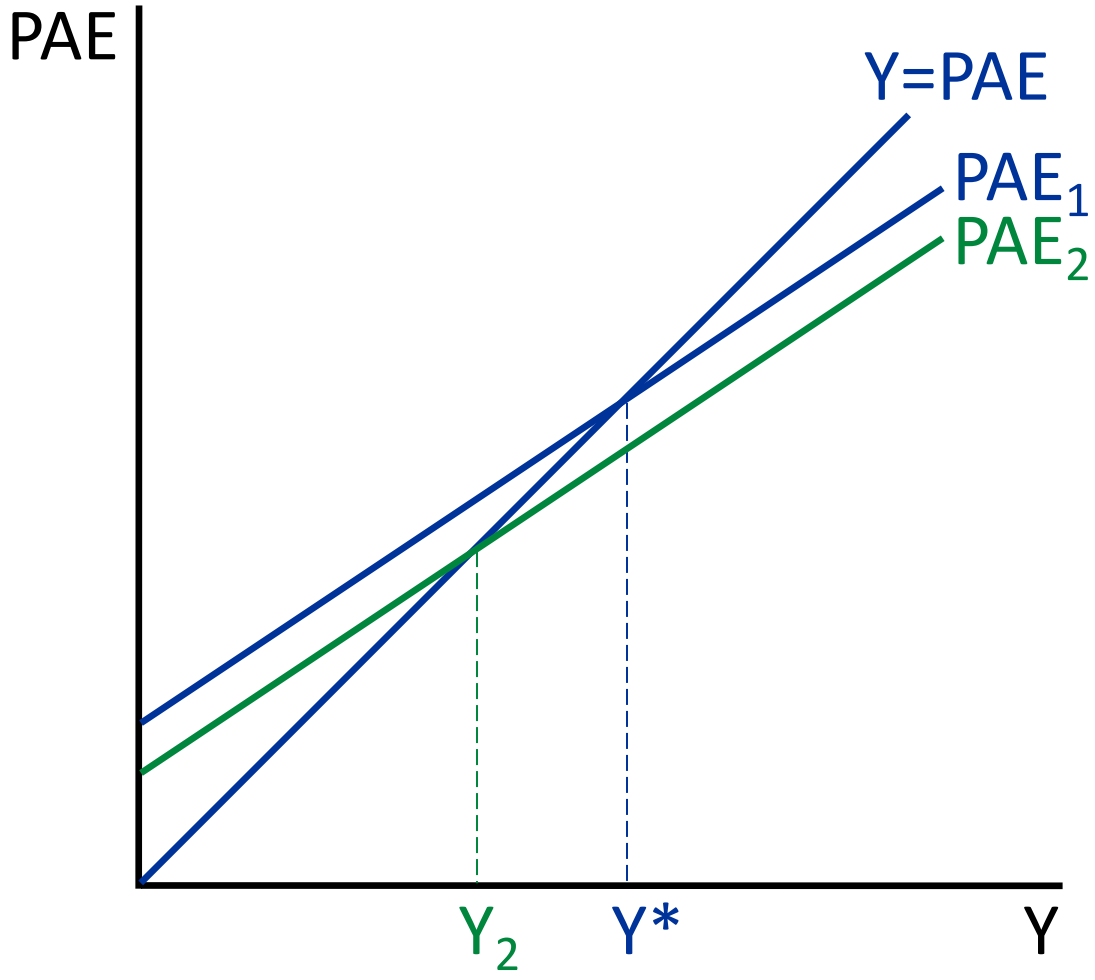
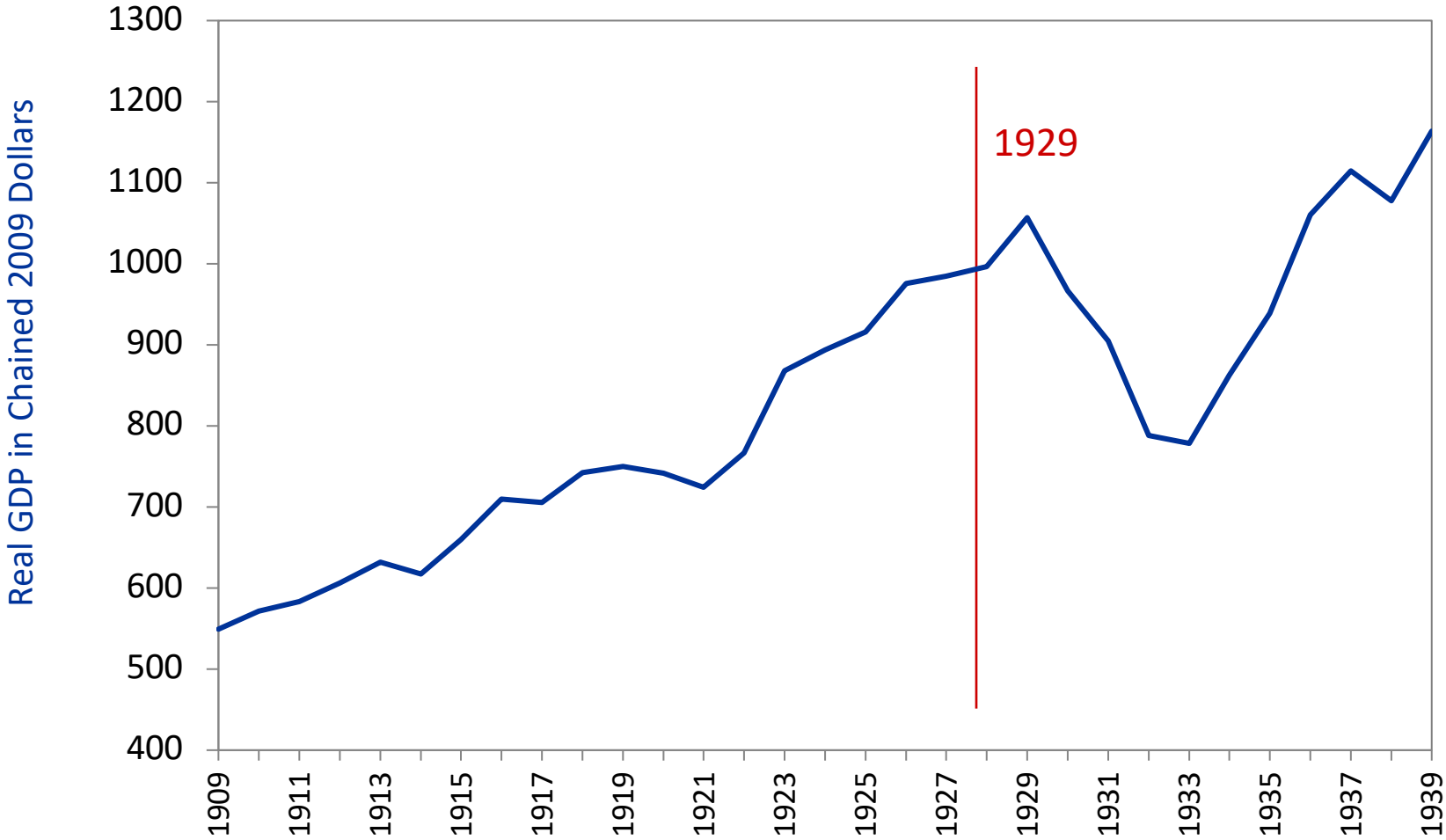
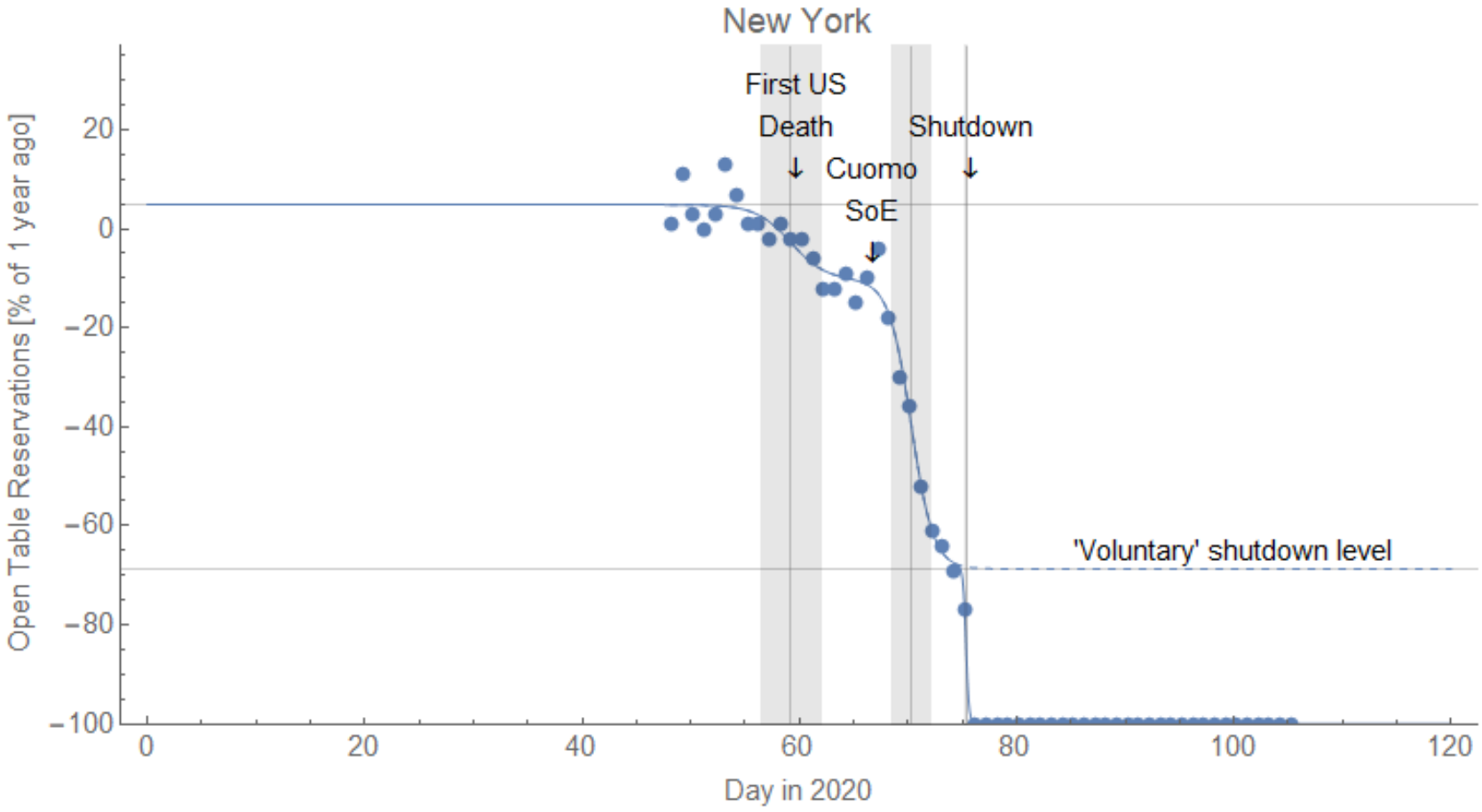


Real GDP, 1909–1939

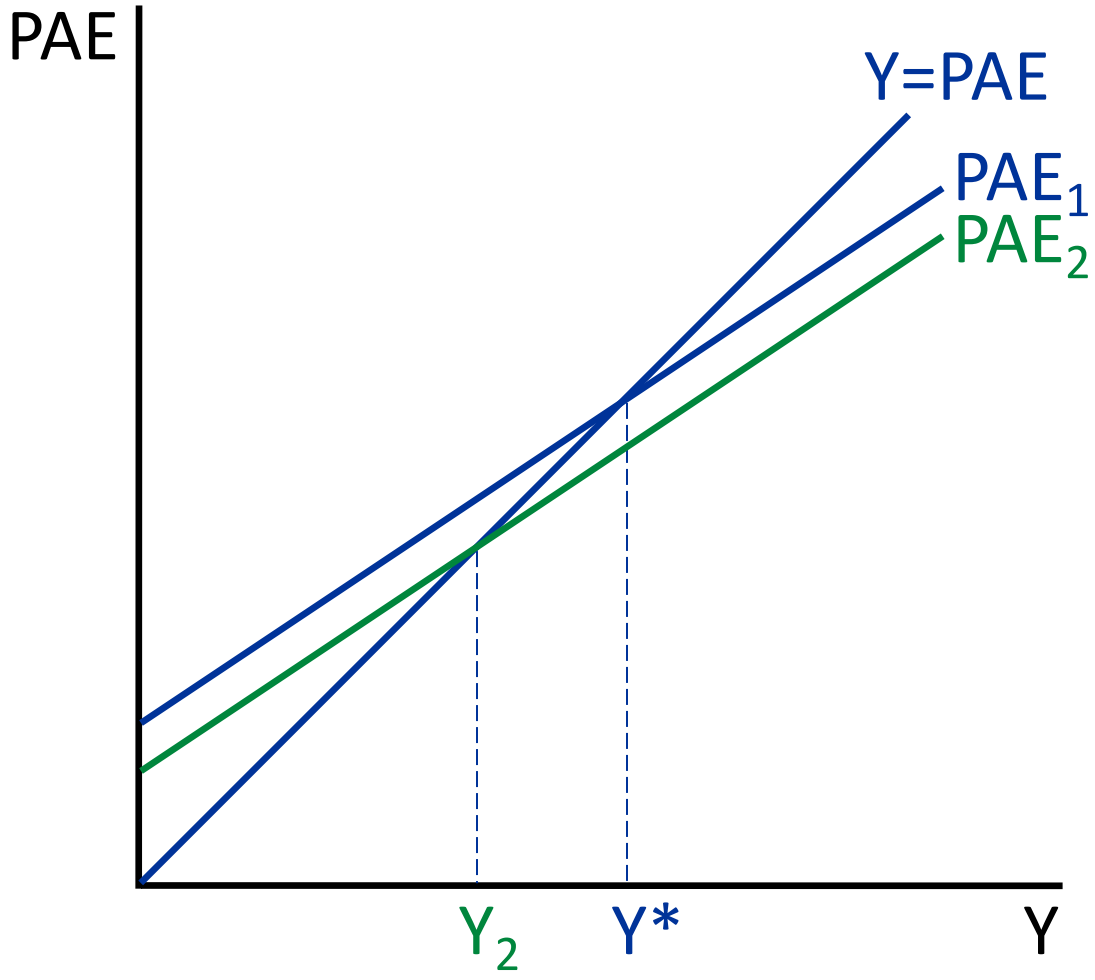


Source: Christina Romer, "The Prewar Business Cycle Reconsidered," and BEA.

OpenTable Reservations in NYC



The Multiplier Effect



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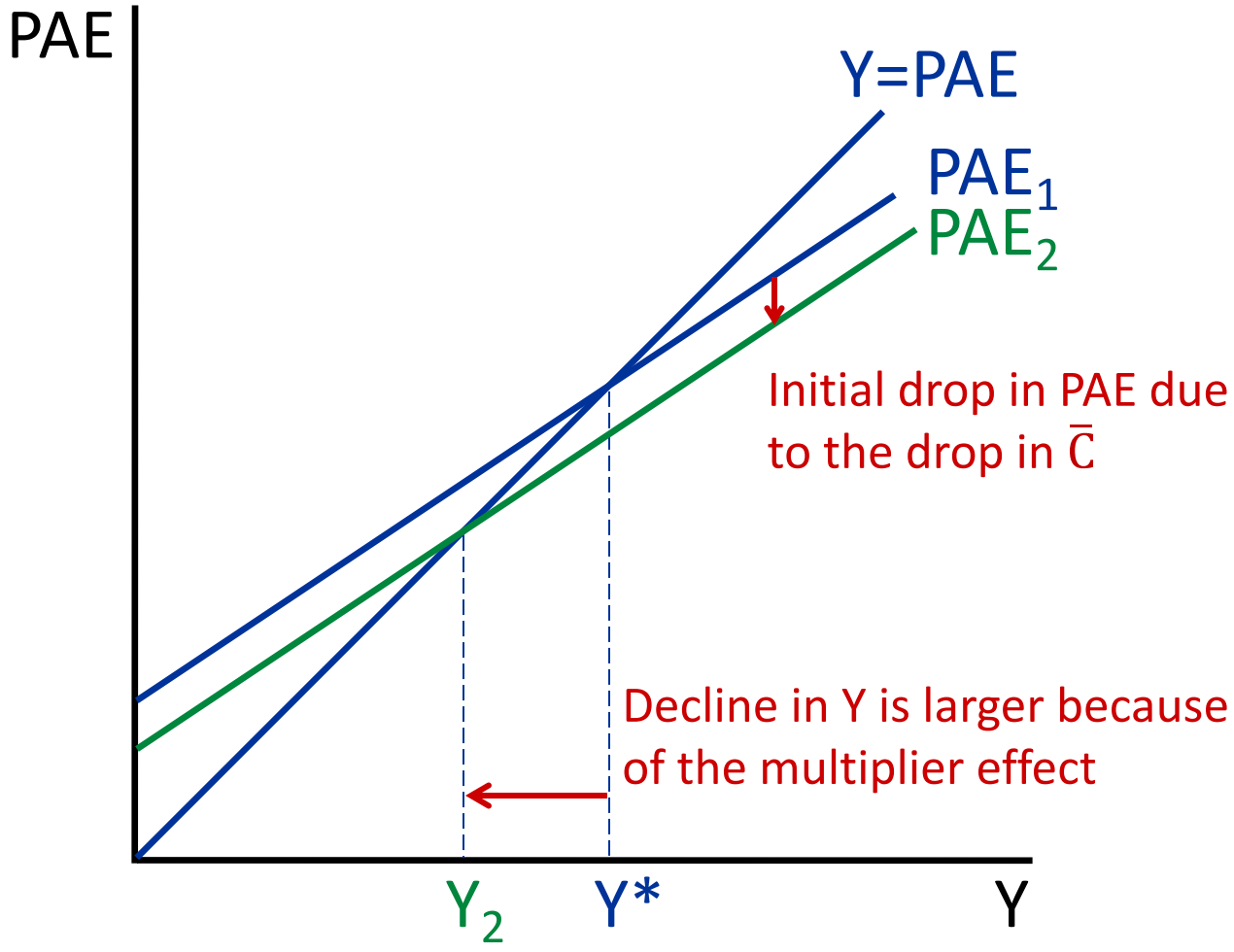

The initial drop in PAE is magnified by the fact that as Y declines, C declines further.

Multiplier Effect

- A change in PAE changes output by more than the initial change in PAE.
- Why? Because changes in output affect consumer spending and reinforce (or multiply) the initial change in PAE.
- Existence of the multiplier effect explains why moderate changes in planned spending cause more substantial changes in output.

The analytics of the multiplier

$$Y = (\bar{C} - c \cdot T + I^p + G + NX) / (1-c)$$

If $\bar{C}$ increases by 1, then in equilibrium Y increases by $1/(1-c) > \$1$

Intuition: $Y = (\bar{C} - c \cdot T + I^p + G + NX) + c \cdot Y$

1st round: $\bar{C}$ increases by 1 => Y increases by 1

2nd round: $c \cdot Y$ increases by c => Y increases further by c

3rd round: $c \cdot Y$ increases further by c^2 => Y increases further by c^2

….

All rounds: Y increases by $1+c+c^2+.. = 1/(1-c)$

References

- CORE-The Economy, Chapter 13.
- Principles of Economics, Chapter 24.