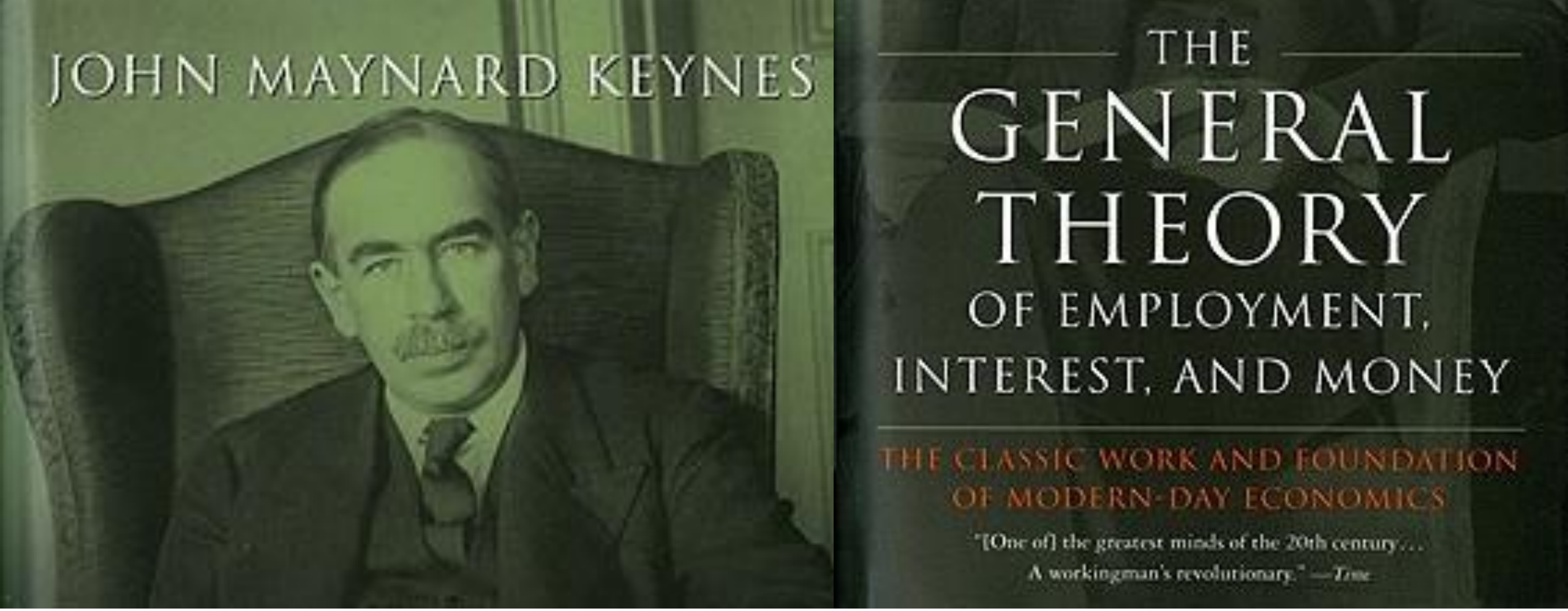


Fluctuations, the Short Run Keynesian Model and Countercyclical Fiscal Policy

EC1101E Macro Lecture 3

MTI MINISTRY OF TRADE AND INDUSTRY SINGAPORE

Singapore's GDP Contracted by 3.8 Per Cent in the Fourth Quarter of 2020

4 January 2021. Based on advance estimates for the fourth quarter of 2020,[1] the Singapore economy contracted by 3.8 per cent on a year-on-year basis, an improvement from the 5.6 per cent contraction recorded in the third quarter. On a quarter-on-quarter seasonally-adjusted basis, the economy grew by 2.1 per cent, following the 9.5 per cent expansion in the third quarter.[2] For the whole of 2020, the Singapore economy contracted by 5.8 per cent.

Ministry of Trade and Industry Press release, 2021 January 04

Budget 2021 $11bn Covid-19 Resilience Package

G elements in the package

- Spending on public health and safe reopening
- Spending on investments in hardest-hit sectors

T elements in the package

- **Job Support Scheme**: paying a portion of workers' salaries
- **Recovery Grant**: financial support for workers who lost jobs or were forced to take no-pay leave
- Grants for workers in hardest-hit sectors

Agenda

1. Economic Fluctuations

- Economic fluctuations taxonomy
- Economic fluctuations and the Classical Model

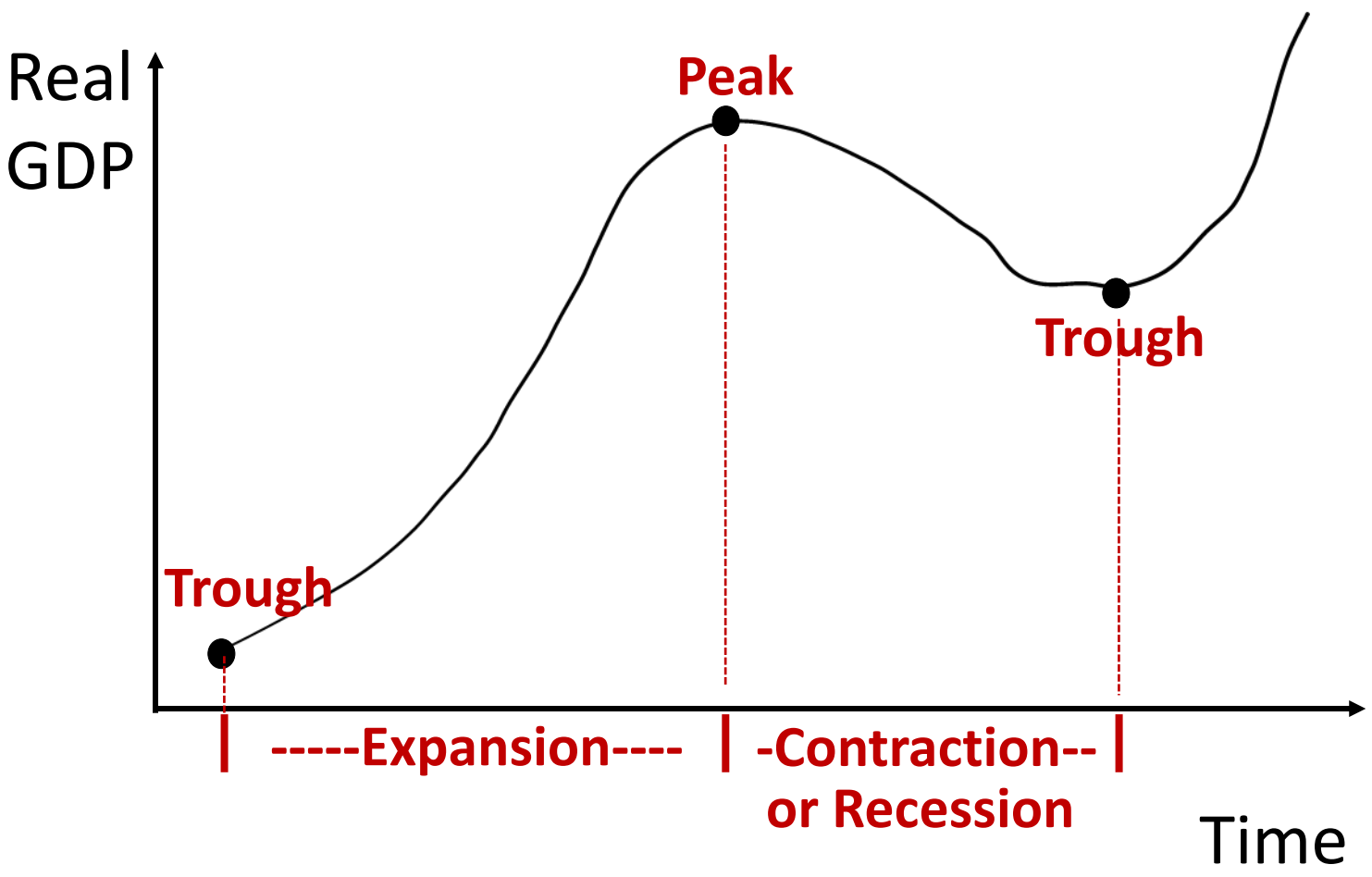
2. The Keynesian model

3. Demand shocks and the expenditure multiplier

4. Countercyclical fiscal policy

5. Problems with countercyclical fiscal policy

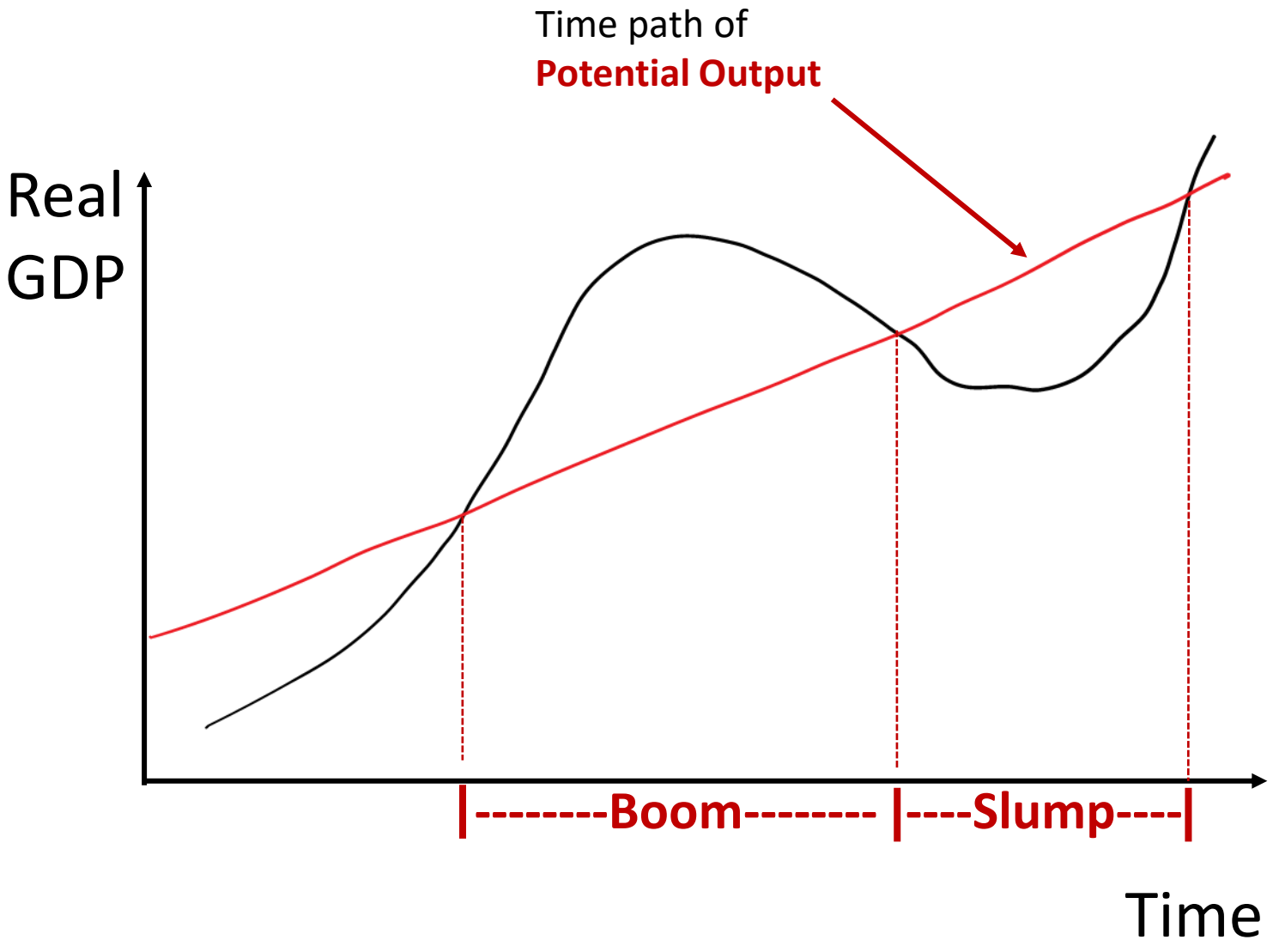
Economic fluctuations taxonomy



Fluctuations are also called **Business Cycles**

Technical Recession
= two consecutive quarters of contraction

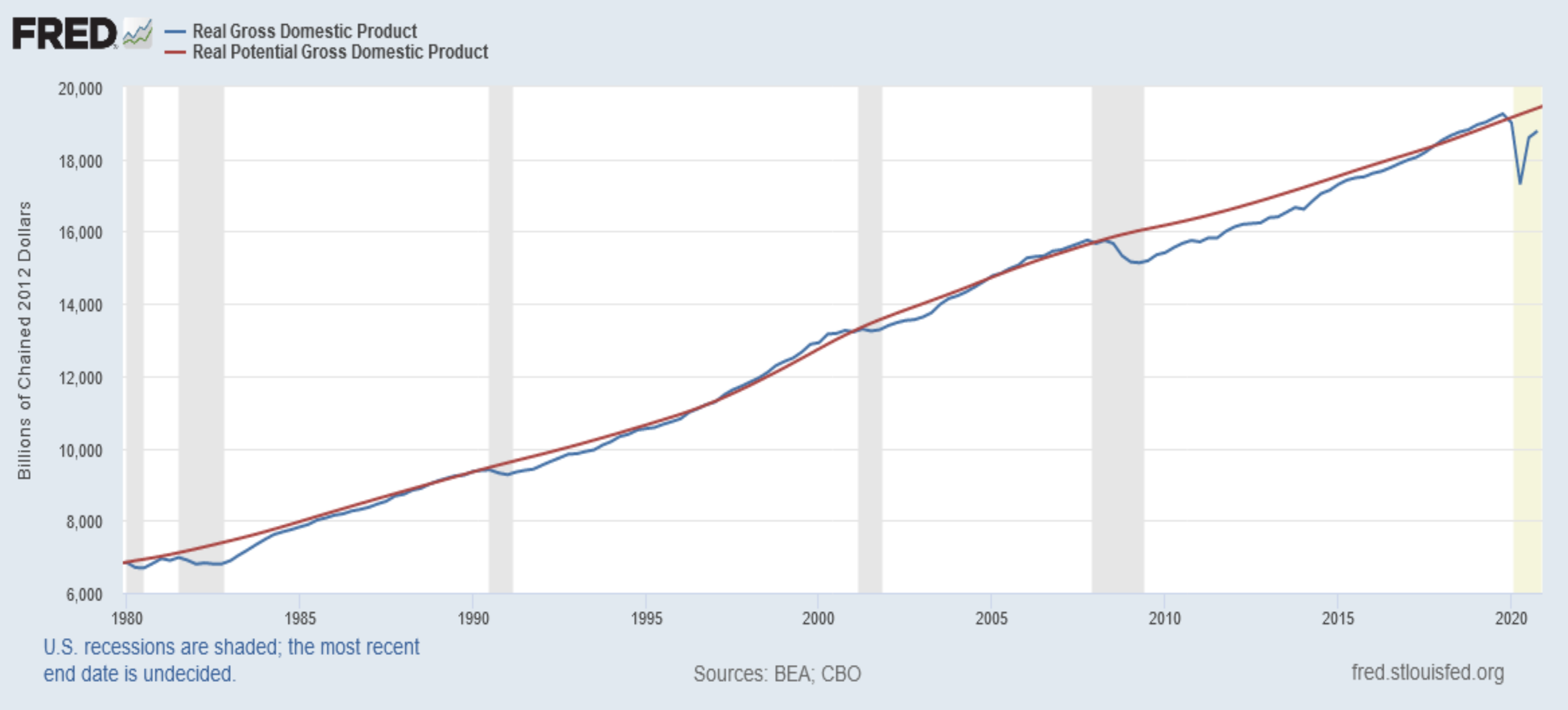
More fluctuations taxonomy



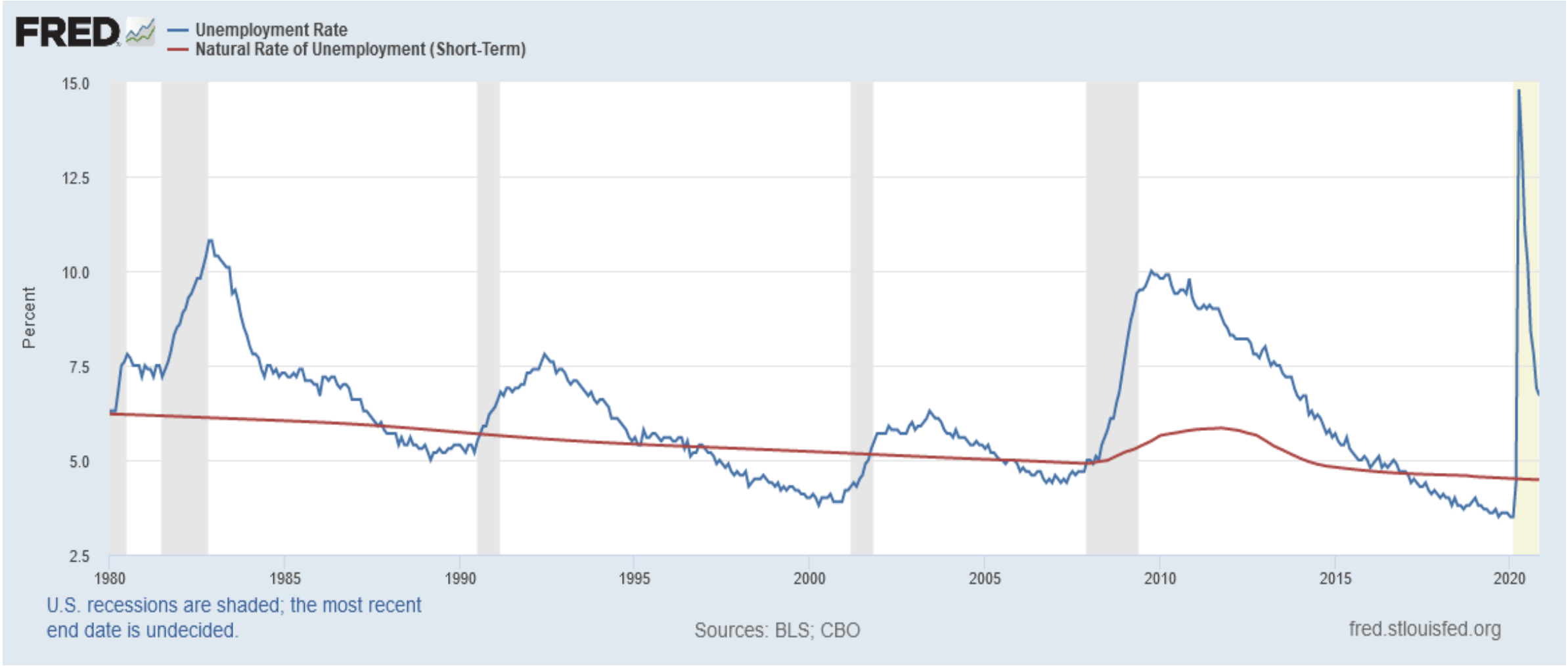
Whether the economy is in a slump depends on estimates of the economy's **Potential Output**

- Not directly measurable
- Economists use models to estimate it

Fluctuations in US RGDP, 1980-2020



Fluctuations in US Unemployment, 1980-2020



Economic fluctuations and the Classical Model

Classical model focuses on factors affecting labour, capital and technology occurring over long time periods

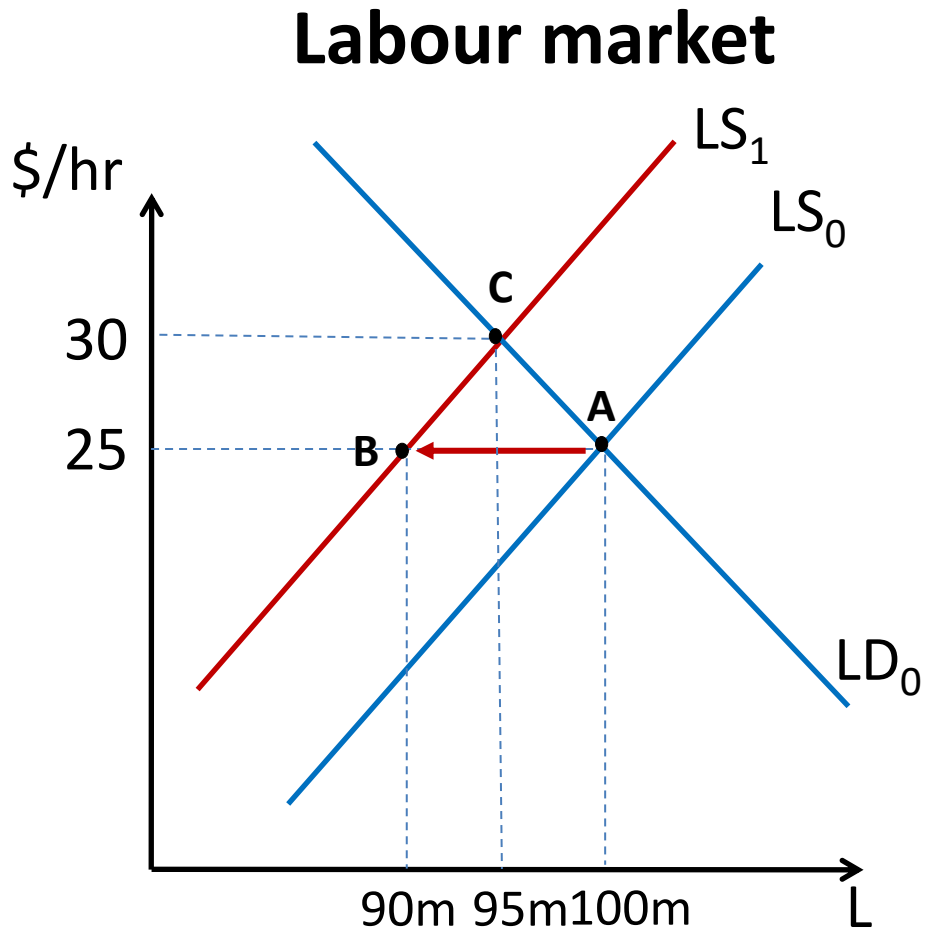
Consider the patterns associated with most recessions

- Onset is relatively rapid (months)
- Accompanied by ↓employment, ↑unemployment rate
- Wage rates tend to fall slowly, if at all (**Sticky Wages**)
  - Due to inertia, long-term contracts, worries about morale
- **Prices** in the g&s markets also exhibit **stickiness**

Fall in Labour supply?

Reduction in employment can occur due to a fall in labour supply

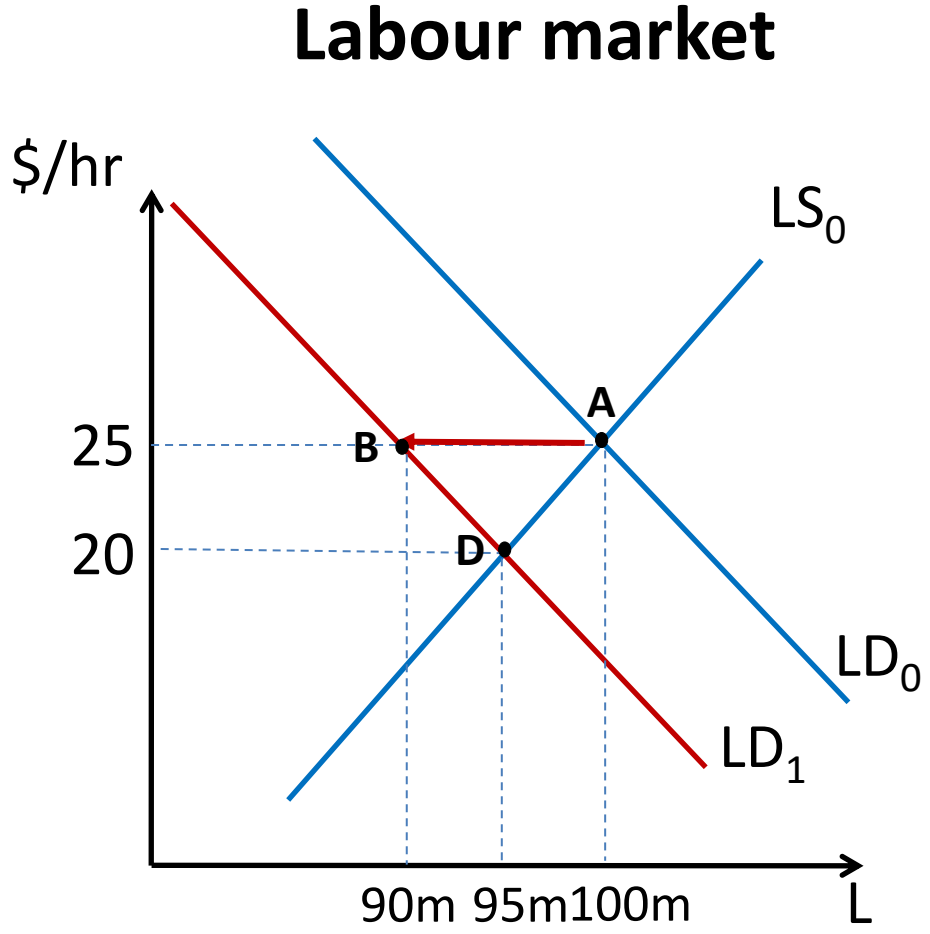
Equilibrium C does not fit the observations of recessions



Fall in Labour demand?

Reduction in employment can occur due to a fall in labour demand

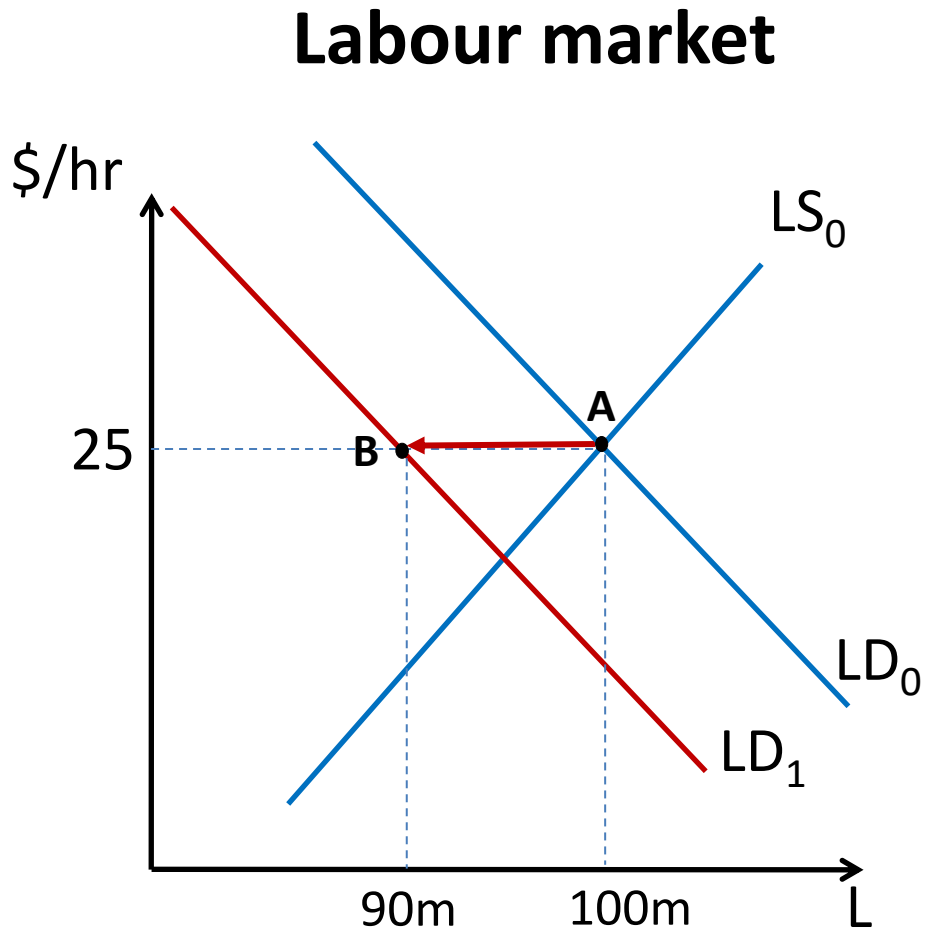
More plausible, but equilibrium D seems inconsistent with the observations of recessions



Sticky wages in the labour market

Sticky wages prevent the labour market from clearing

Most consistent with observations of recessions



Loanable funds market may not clear

A fall in spending is an intuitively plausible candidate explanation for falling labour demand

In the Classical Model, this is ruled out by Say's Law

Say's Law relies on loanable funds market clearing

- But other forces affect interest rates, lending and borrowing, especially within relatively shorter time periods

Short Run and Long Run in Macro

In Macroeconomics,

Long run refers to the time when **all markets clear**

- The Classical Model is then a useful guide

Short run refers to the time period (traditionally thought to be a year or less) where **some markets do not clear**

- Time period for discussing economic fluctuations
- **Classical Model is not suitable**

A preview of the Keynesian Short Run Model

In the Keynesian Short Run Model,

Spending depends on output (= income)

- The more output produced, the more income households receive, the more goods and services they purchase

Output depends on spending

- If spending > output, firms will increase output in response
- If spending < output, firms will reduce output in response
- Firms adjust output, rather than prices

Agenda

1. Economic Fluctuations

2. The Keynesian model

- Spending depends on Output
- Output depends on Spending
- Goods market equilibrium

3. Demand shocks and the expenditure multiplier

4. Countercyclical fiscal policy

5. Problems with countercyclical fiscal policy

Spending depends on Output

The model incorporates the spending decisions of

- Households (C)
- Firms (I^P)
- Government (G)
- External sector (NX)

Assume that r, I^P, G, T, NX, are all **autonomous**, meaning they **do not change when output (Y) changes**

Consumption (C)

We use a simple aggregate model of C: the **consumption function**

$$C = a + b(Y - T), \qquad 0<b<1$$

a is the part of consumption that does not depend on disposable income

a is therefore known as **autonomous consumption**

b(Y – T) is the part of consumption that depends on disposable income

- The bigger b is, the more consumption changes with disposable income

Simplifying assumption:

b is a constant, $0 < b < 1$

C as a function of Y

Rearrange the consumption function:

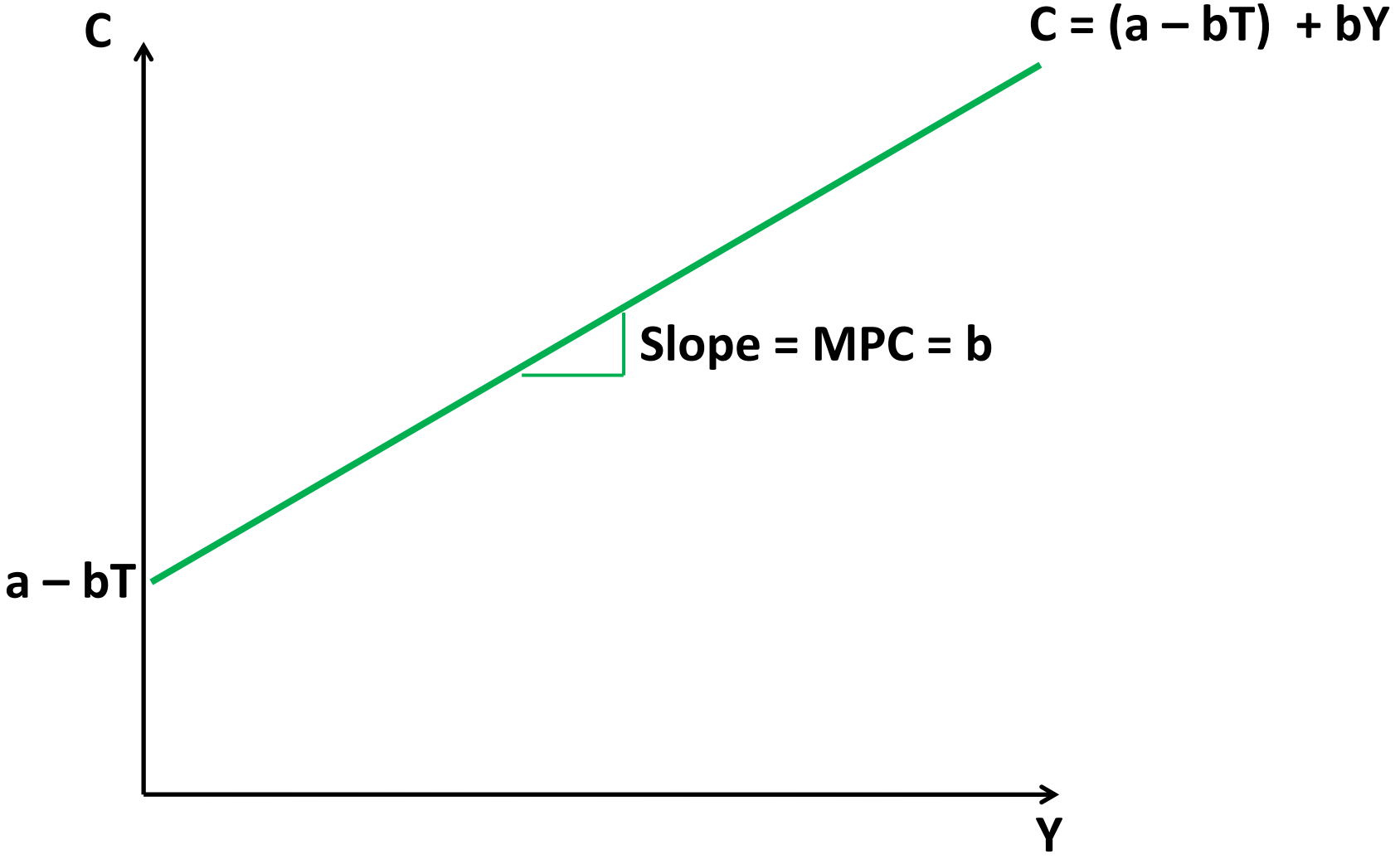
$$C = a + b(Y - T)$$

$$= (a - bT) + bY$$

Thus, $\frac{\Delta C}{\Delta Y} = b$

$\frac{\Delta C}{\Delta Y}$ is known as the **Marginal Propensity to Consume (MPC)**, the amount by which C changes for a one-unit increase in Y

Graph C against Y



Aggregate Expenditure

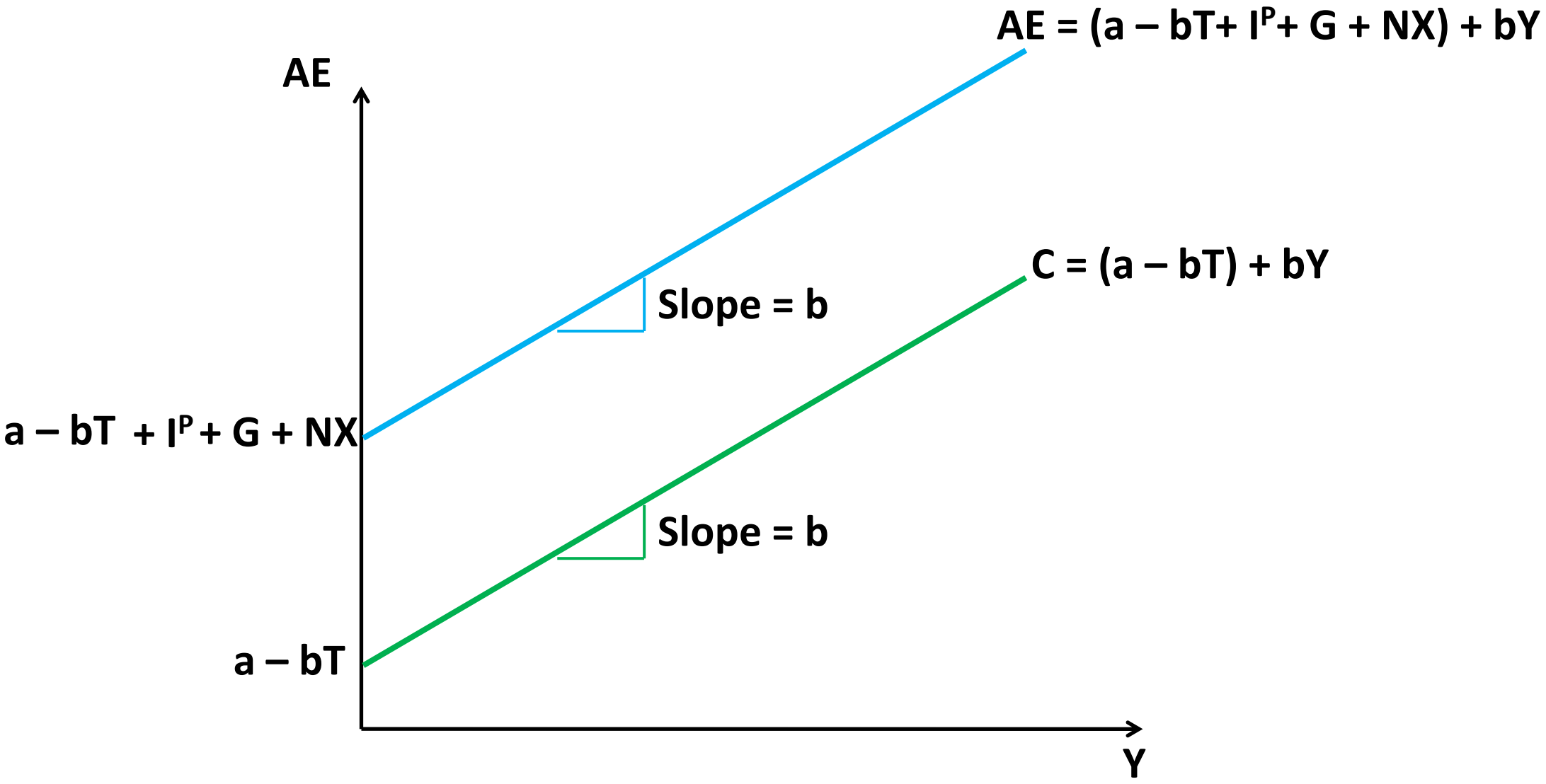
Aggregate Expenditure is then given by

$$AE = C + I^P + G + NX$$

$$= (a - bT) + bY + I^P + G + NX$$

$$= (a - bT + I^P + G + NX) + bY$$

Graph AE line: spending depends on output



Demand shocks (I)

When the AE line shifts, economists say there is a **demand shock**

Demand shocks are caused by factors that affect **a, I^P, G, T and NX**

a

- Expected future income (+)
- Wealth (+)
- Real interest rate (-)

I^P

- Business optimism (+)
- Real interest rate (-)

Demand shocks (II)

When the AE line shifts, economists say there is a **demand shock**

Demand shocks are caused by factors that affect **a, I^P, G, T and NX**

G and T

- Fiscal policy decisions

NX

- Other countries' spending (+)
- Exchange rate (-)

Output depends on Spending

Recall from Macro 2: $I = I^P + \Delta$inventories

If Y > AE
• Inventories ↑ • In other words, $I > I^P$ • **Firms ↓Y to ↓inventories**

If Y < AE
• Inventories ↓ • In other words, $I < I^P$ • **Firms ↑Y to ↑inventories**

Firms adjust Y to eliminate any gaps between Y and AE

Key assumption: price level is fixed

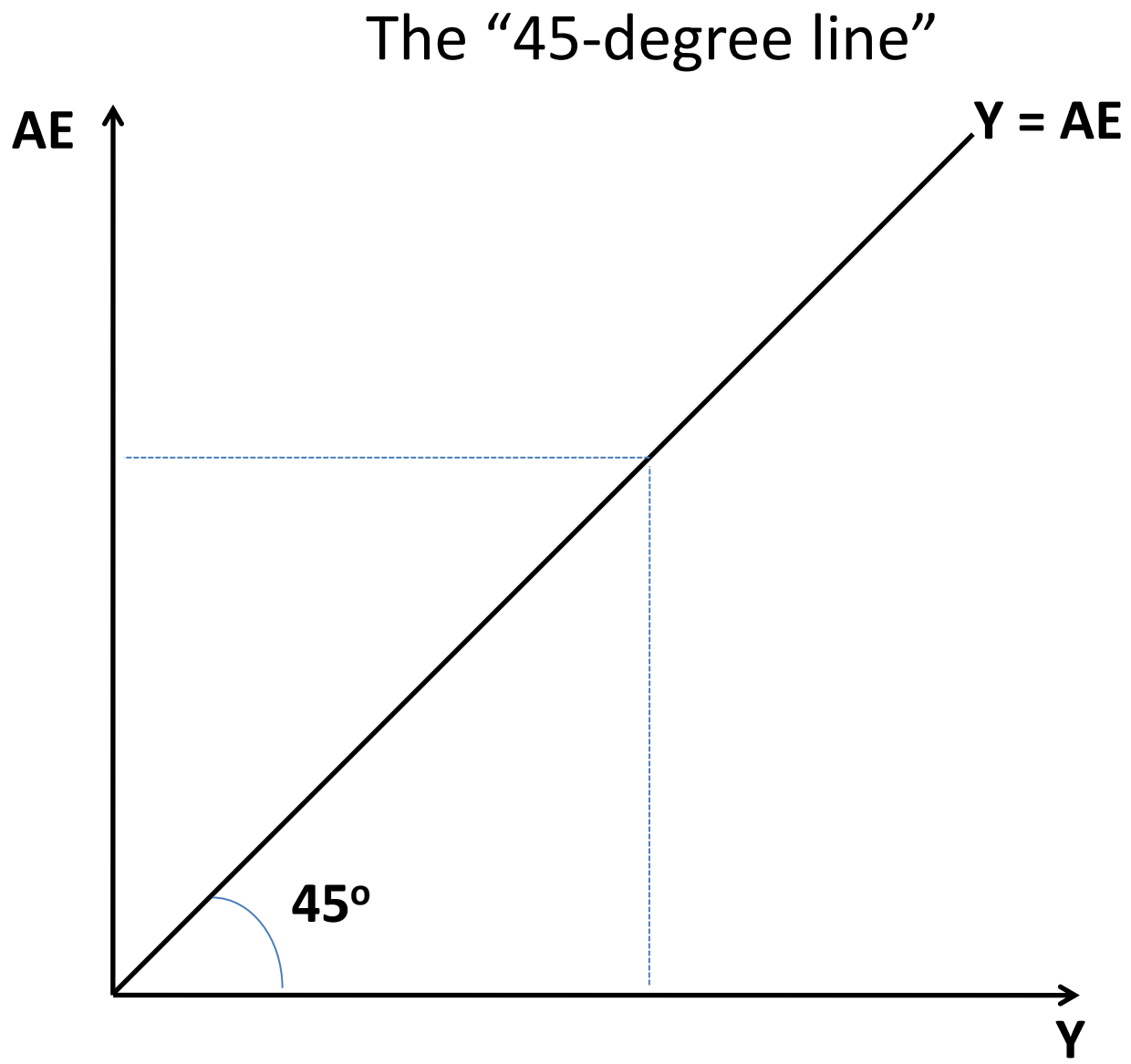
Note that firms respond by changing output, but not changing prices

The economy's price level is assumed to be fixed

This captures real-world short-run stickiness in wages and prices

More elaborate models that relax this assumption will be covered at Level 2000

Graph Firms' response: output depends on spending



Goods market equilibrium

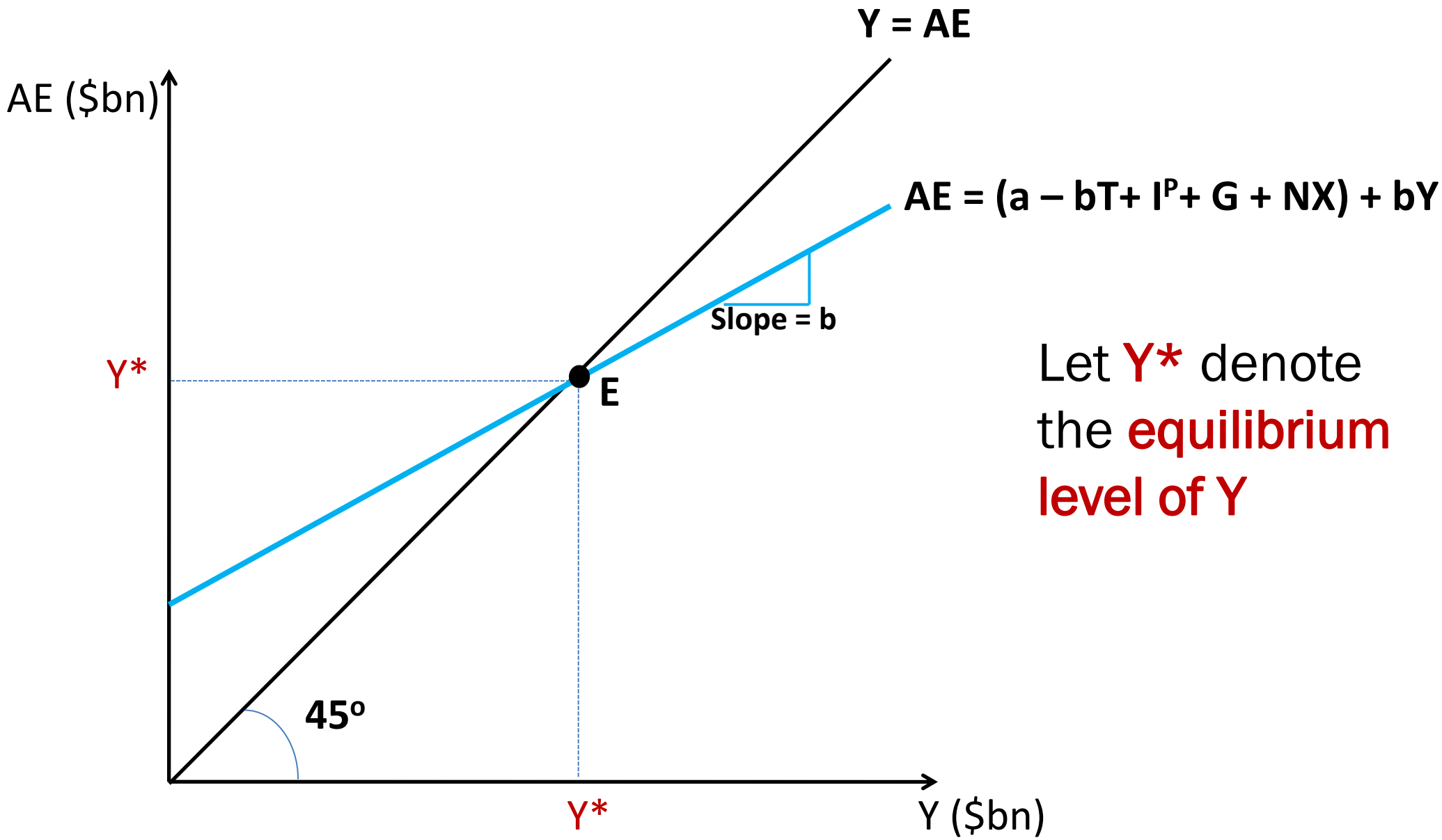
Recall from Macro 2:

The equation $Y = C + I^P + G + NX$ is the **goods market equilibrium condition**

In the Keynesian Model, spending depends on output, and output depends on spending

Equilibrium occurs when **each side is satisfied with their decisions, given the decisions of the other side**

The "Keynesian Cross" depicts equilibrium at point E



Let **Y*** denote the **equilibrium level of Y**

Finding the equilibrium output

Mathematically, two simultaneous linear equations:

$$AE = (a - bT + I^P + G + NX) + bY$$

$$Y = AE$$

Let Y* denote the equilibrium level of Y:

$$Y^* = (a - bT + I^P + G + NX) + bY^*$$

$$(1 - b)Y^* = (a - bT + I^P + G + NX)$$

$$Y^* = \frac{1}{(1 - b)} (a - bT + I^P + G + NX)$$

Active Learning: equilibrium output in the Keynesian model

Suppose an economy has the following data:

$C = \$2{,}000\text{bn} + 0.6(Y - T)$

$I^P = \$800\text{bn}$

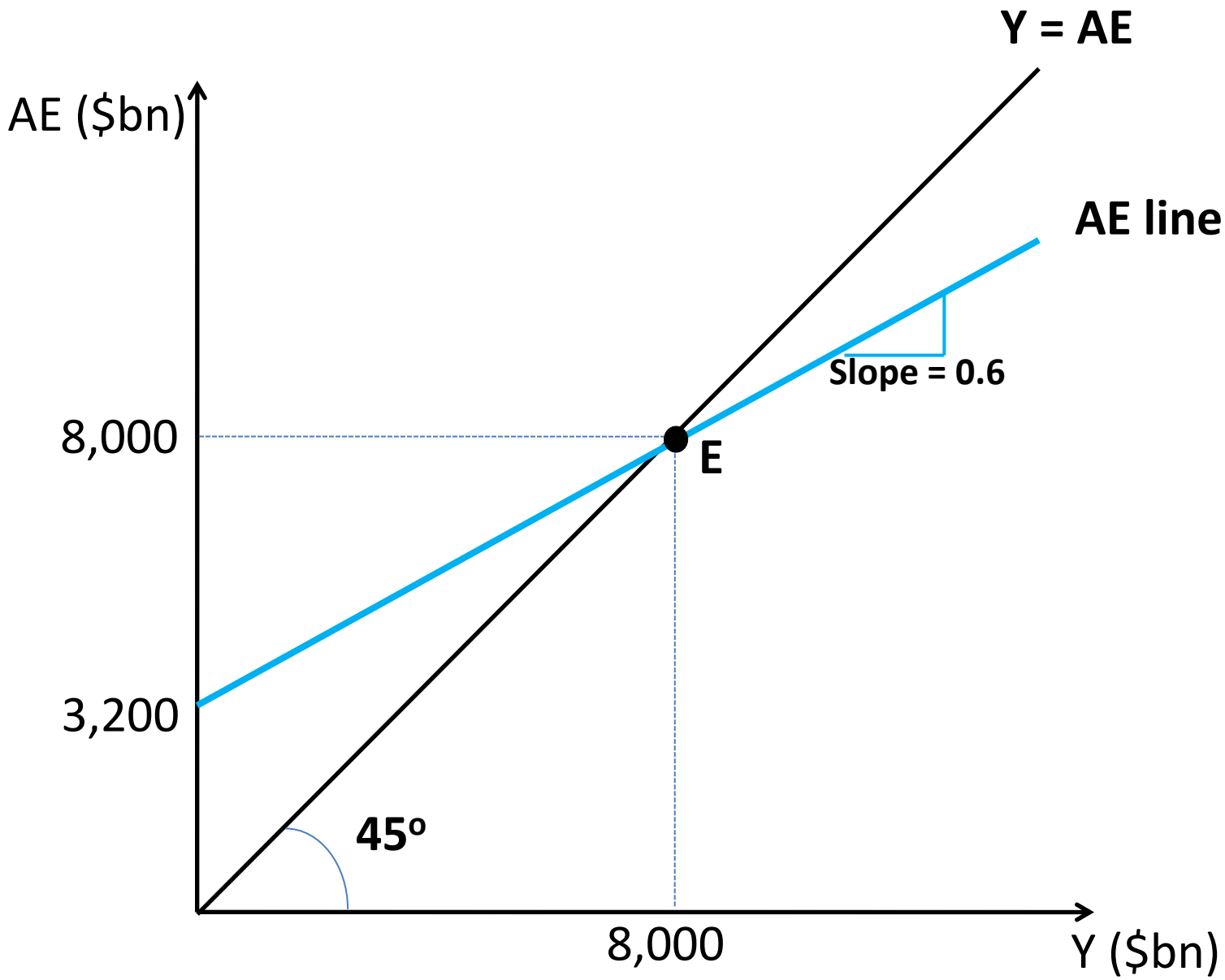
$G = \$1{,}000\text{bn}$

$T = \$2{,}000\text{bn}$

$NX = \$600\text{bn}$

Find Y*, the equilibrium output level

Numerical example of the Keynesian Cross



Agenda

1. Economic Fluctuations

2. The Keynesian model

3. Demand shocks and the expenditure multiplier

- The expenditure multiplier
- Automatic stabilizers and destabilizers

4. Countercyclical fiscal policy

5. Problems with countercyclical fiscal policy

The Expenditure Multiplier

Suppose firms become more optimistic: I^P rises by ΔI^P

We call a rise in autonomous spending a **positive demand shock**

Solve for new Y*

$$\text{New } Y^* = (a - bT + I^P + \Delta I^P + G + NX) + bY^*$$

$$= \frac{1}{(1 - b)} (a - bT + I^P + \Delta I^P + G + NX)$$

$$\Delta Y^* = \frac{1}{(1 - b)} \Delta I^P$$

Active Learning: Effect of a demand shock

Suppose an economy has the following data:

$C = \$2{,}000bn + 0.6(Y - T)$

$I^P = \$800bn$

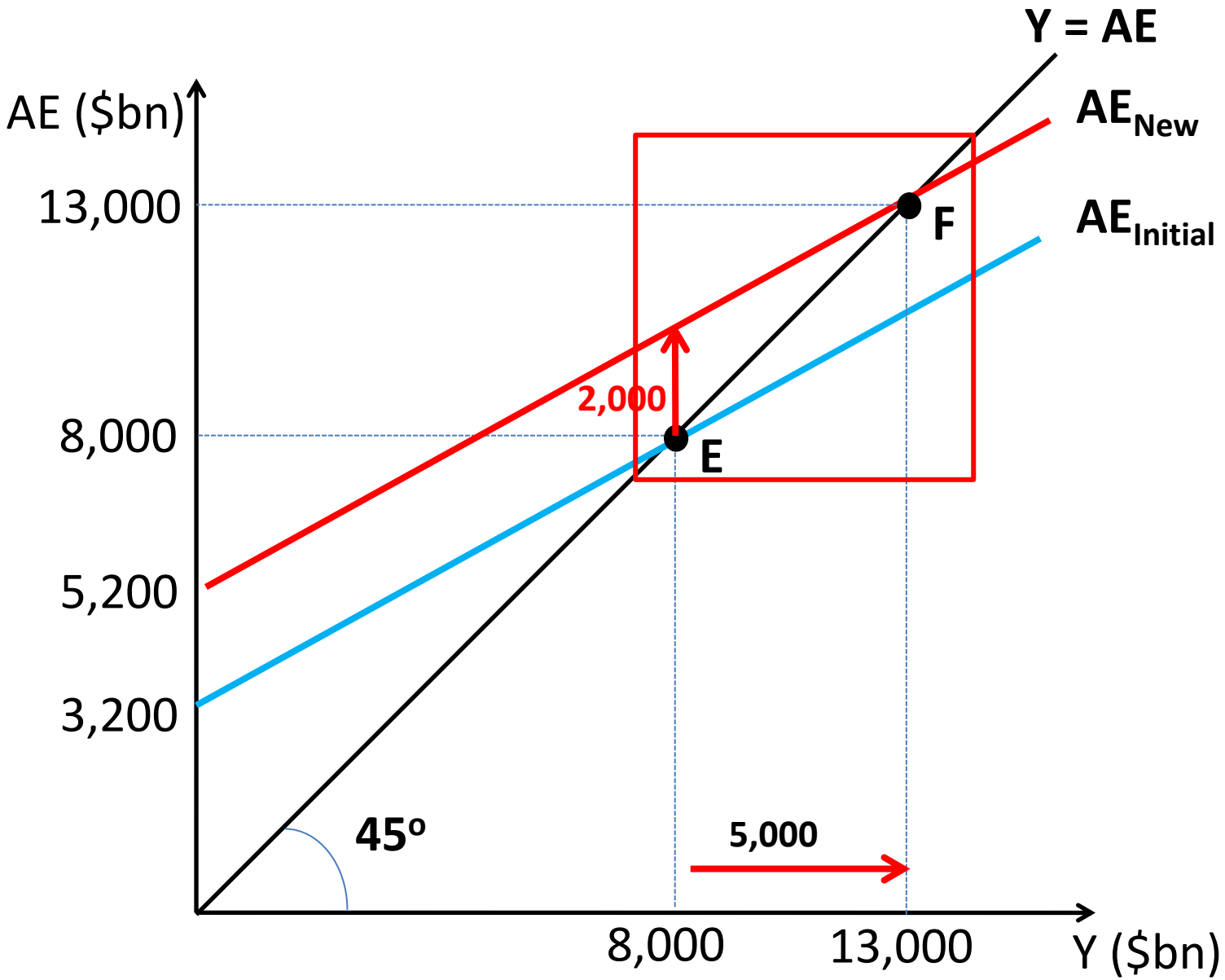
$G = \$1{,}000bn$

$T = \$2{,}000bn$

$NX = \$600bn$

Suppose business expectations improve and I^P rises to $2,800bn. By how much does Y* rise?

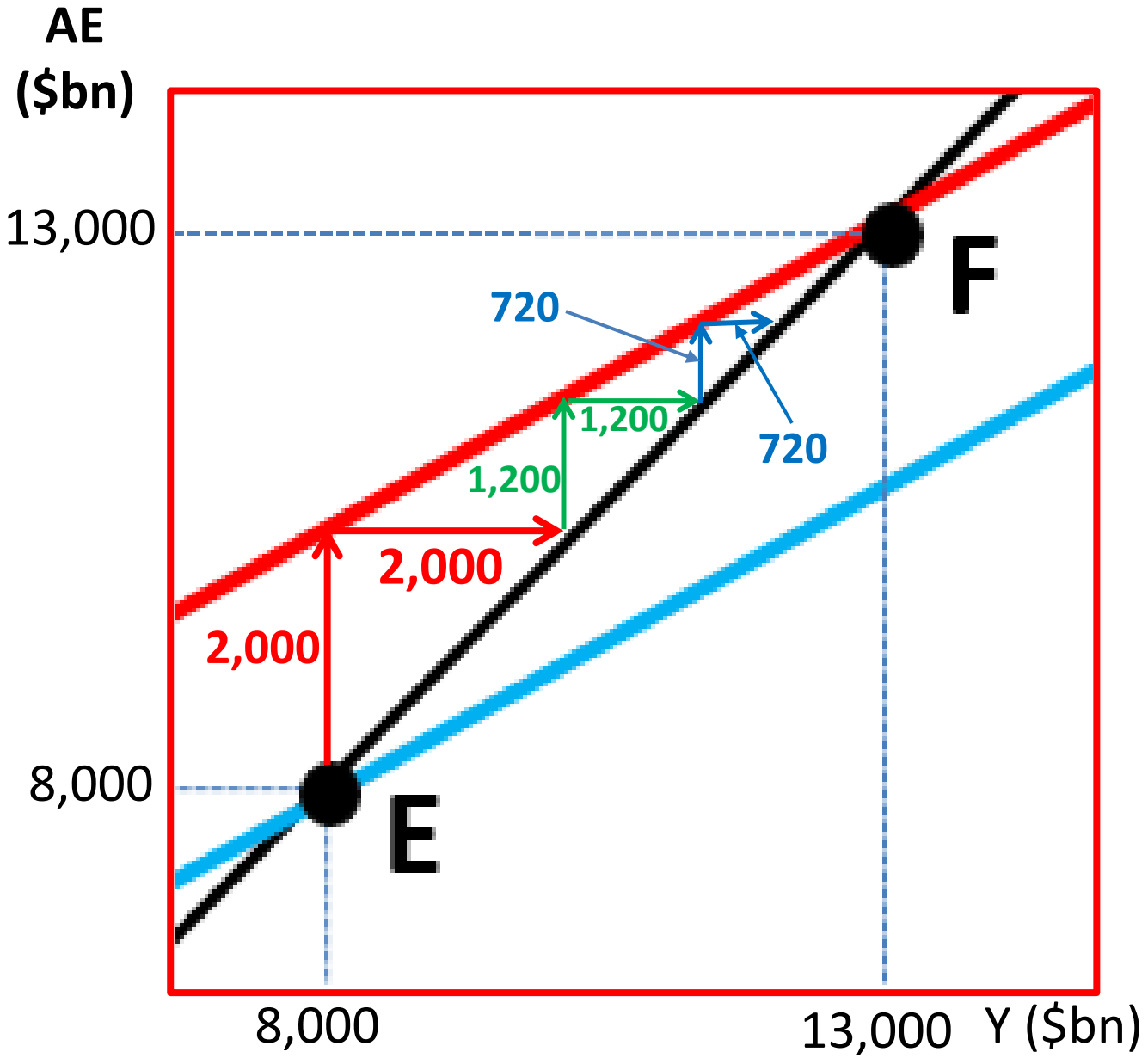
Effect of demand shock



Initially at E

- Rise in I^P → AE shifts up by $2 tr
- Economy reaches new equilibrium at F
- Y rises by $5 tr

The equilibrating process



Initially at E

- AE↑ by $2 tr
- Firms respond: Y↑ by $2tr
- Households respond: AE↑ by 0.6 x$2tr = $1.2tr
- Firms respond: Y↑ by $1.2tr
- Households respond: AE↑ by 0.6 x $1.2tr = $720bn
- Firms respond: Y↑ by $720bn…

The process continues ...

... until the system reaches its new equilibrium

Summing up all the steps:

$$\Delta Y^* = \$2{,}000\text{bn} + \$1{,}200\text{bn} + \$720\text{bn} + \ldots$$

$$= \$2{,}000\text{bn}\,(1 + 0.6 + 0.6^2 + \ldots)$$

$$= \frac{1}{(1 - 0.6)}\ \$2{,}000\text{bn}$$

$$= \$5{,}000\text{bn}$$

This **multiplier process amplifies a demand shock**

The Expenditure Multiplier

$\frac{\Delta Y^*}{\Delta I^P}$, $\frac{\Delta Y^*}{\Delta a}$, $\frac{\Delta Y^*}{\Delta G}$, and $\frac{\Delta Y^*}{\Delta NX}$ are called **expenditure multipliers**

In our model, they are all given by $\frac{1}{(1 - b)}$

In our numerical example, the multiplier is $\frac{1}{(1 - 0.6)} = 2.5$

Explaining economic fluctuations

Fluctuations are mostly due to **demand shocks**, which are **amplified by the multiplier process**

Main sources of demand shocks

- I^P is the most volatile because it depends on business optimism and expectations, which are volatile
- Keynes described investment as being driven by "**animal spirits**"
- For small open economies, **NX** can also be highly volatile

Equilibrium output vs Potential output

In the Keynesian model, there is no relationship between equilibrium output (Y^*) and potential output (Y_{FE})

The economy can be in a slump ($Y^* < Y_{FE}$), or a boom ($Y^* > Y_{FE}$) for a protracted amount of time

The **output gap** is given by $Y^* - Y_{FE}$,

It can also be expressed in percentage terms: $100\% \times \frac{Y^* - Y_{FE}}{Y_{FE}}$

Automatic stabilizers and destabilizers

In the Keynesian model presented so far, the parameter b alone determines the multiplier's size

When assumptions are relaxed, other factors can affect the multiplier's size

Automatic Stabilizers

Automatic stabilizers = features of the economy that *automatically dampen* the spending response in the multiplier process

Automatic stabilizers make the multiplier smaller , and thus make the economy ***more stable*** in the short run

Net taxes as automatic stabilizers

Suppose there is a positive demand shock and Y↑

Relax the assumption that T is autonomous

- More realistically, when Y↑, **Income tax** revenue ↑

  Sales tax revenue ↑

  Transfers to unemployed & poor ↓

  Thus, T↑

But T↑ means disposable income↓ → C↓

This partially counteracts the initial Y↑

The multiplier becomes smaller

Imports as automatic stabilizers

Suppose there is a positive demand shock and Y↑

Relax the assumption that imports are autonomous

- More realistically, when Y↑, C↑ but part of this is spent on purchasing imports

Thus, firms' output response in the multiplier process is smaller

The multiplier becomes smaller

Automatic Destabilizers

Automatic destabilizers: features of the economy that *automatically strengthen* the spending response during the multiplier process

Automatic destabilizers make the multiplier bigger , and thus makes the economy ***less stable*** in the short run

Examples of Automatic Destabilizers

Household wealth may rise with income

- Stock prices, prices of homes rise rapidly during booms
- Thus, when Y↑, a↑ (i.e. a isn't autonomous!)

Planned Investment may rise with income

- Firms become more optimistic as economy booms
- Thus, when Y ↑ , I^P↑ (i.e. I^P isn't autonomous!)

Agenda

1. Economic Fluctuations
2. The Keynesian model
3. Demand shocks and the expenditure multiplier
4. Countercyclical fiscal policy
5. Problems with countercyclical fiscal policy

Is “Austerity” good policy in a slump?

“During this period of economic emergency, families are tightening their belts, and so should Washington.”

2009 January

“Small businesses and families are tightening their belts. Their government should too.”

2010 November

Countercyclical Fiscal Policy

Countercyclical fiscal policy = fiscal policy aiming to dampen economic fluctuations

If $Y^* < Y_{FE}$, countercyclical fiscal policy should be **expansionary**

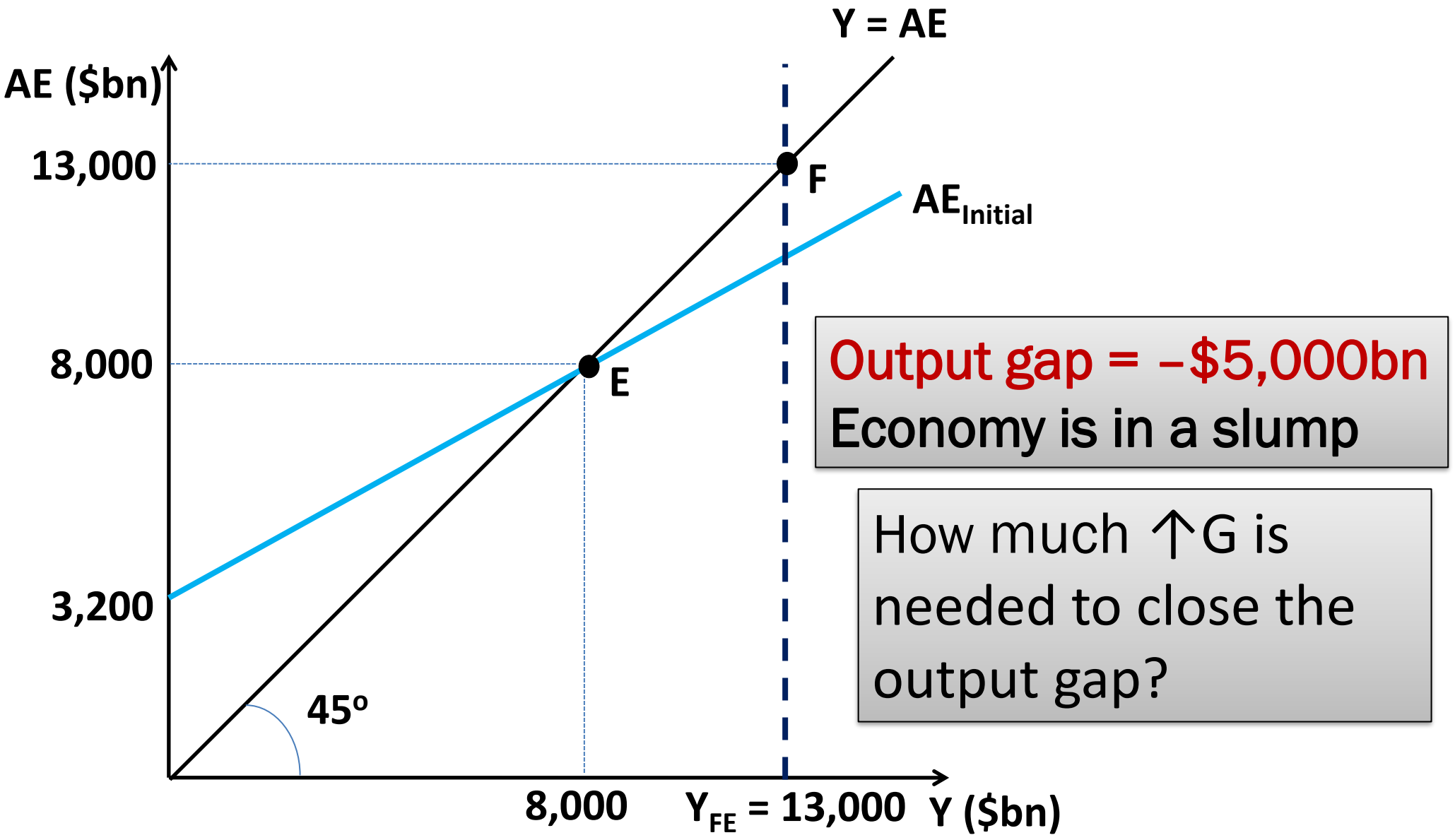
- Aim to ↑AE, by ↑G and/or ↓T

If $Y^* > Y_{FE}$, countercyclical fiscal policy should be **contractionary**

- Aim to to ↓AE, by ↓G and/or ↑T

By contrast, **fiscal austerity** during a slump is **procyclical**

Same numerical example, but add Y_{FE} = $13,000bn



Output gap = –$5,000bn
Economy is in a slump

How much ↑G is needed to close the output gap?

Government Purchases Multiplier

G-Multiplier: $\dfrac{\Delta Y^*}{\Delta G} = \dfrac{1}{(1 - MPC)}$

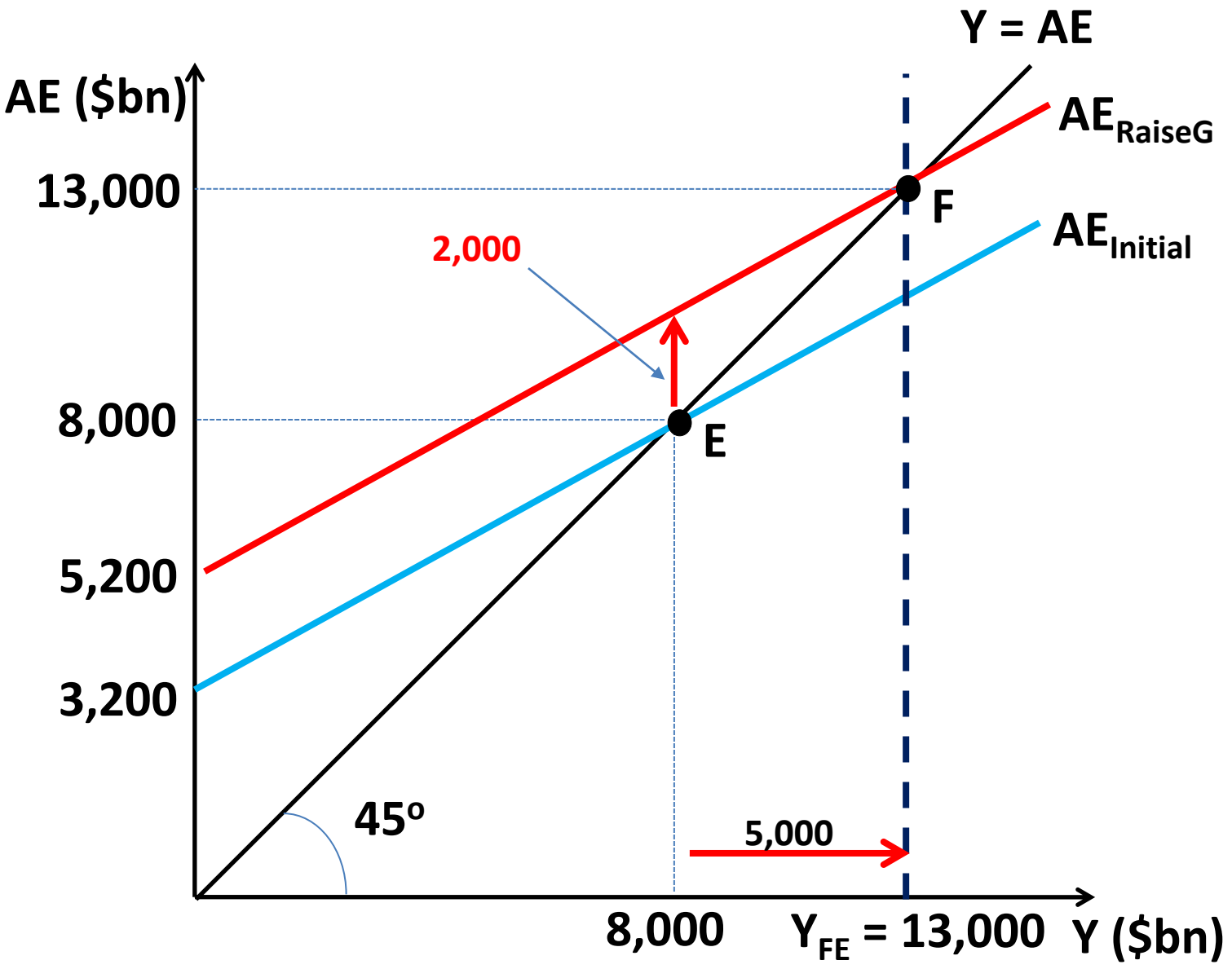
In our numerical example, recall MPC = 0.6

Hence, G-multiplier = $\dfrac{1}{1-0.6} = 2.5$

Thus, to counter a \$5,000bn slump, ↑G by \$5,000bn/2.5

= \$2,000bn

To counter slump: ↑G by $2,000 bn



Active Learning: Lowering T to fight a slump

Suppose the government uses $2,000bn ↓T to combat the slump. Is this sufficient to get Y* to $13,000bn?

- T↓ affects spending not directly, but through its effect on d_____ income
- When T↓ by $2,000bn, C↑ by $_____bn
- The AE line shifts up by $_____bn
- Therefore Y*↑ by $_____bn x $\frac{1}{1-0.6}$ = $_____bn
- Verdict: $2,000bn is sufficient | insufficient

Tax multiplier

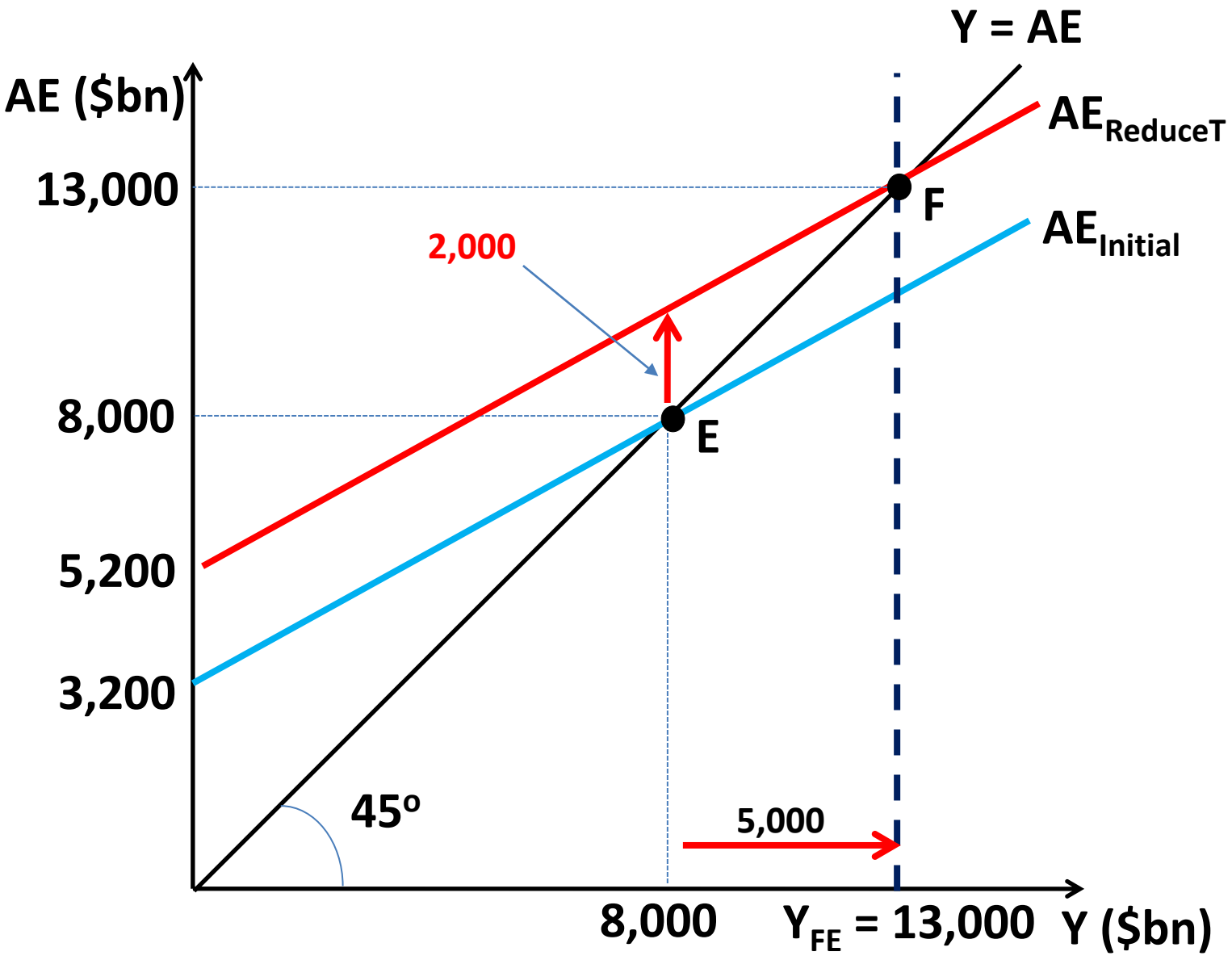
T-Multiplier : $$\frac{\Delta Y^*}{\Delta T} = - \text{MPC} \times \frac{1}{(1 - \text{MPC})}$$

- Has negative sign because a **fall** in T leads to a **rise** in Y*
- Smaller in magnitude than G-multiplier

In our numerical example with MPC = 0.6

- T-multiplier = –0.6 / (1 – 0.6) = –0.6 x 2.5 = –1.5
- Thus, for +$5,000bn ΔY*, **– $3,333bn** of ΔT is needed

To counter slump: ↓T by $3,333bn



Active Learning: Simultaneous changes in G and T

An economy is initially in equilibrium. Suppose the government raises its purchases by $100bn, lowers taxes by $50bn, and increases transfers by $100bn. If MPC = 0.75, by how much does equilibrium output increase?

a. $1,250bn

b. $850bn

c. $550bn

d. None of the above

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Problems with countercyclical fiscal policy

Automatic stabilizers already provide counter-cyclical impulse in fiscal policy without any overt government action

Should govts, in addition, use **discretionary** (i.e. **deliberately enacted**) **fiscal policy** for counter-cyclical purposes?

Economists have generally been skeptical

- Problems of **timeliness** and **irreversibility**
- Availability of **monetary policy**

Timeliness Problems

Time is used up to …

- Collect and interpret macroeconomic data
- Formulate the fiscal plan
- Get legislative approval for the spending plan

Thus, discretionary fiscal policy is prone to lags

- Impact happens later than intended

Irreversibility problems

Counter-cyclical policy should be **reversible**

- Stimulus is appropriate during recessions
- But one should **withdraw stimulus** after recovery

However, discretionary fiscal policy can be **difficult to reverse**

- Voters like tax reductions and increase in transfers, but hate tax increases and reduction in transfers
- Businesses that benefit from govt spending will lobby the govt to keep spending

Monetary Policy is available

The Central Bank (e.g. the Fed, ECB) may already have used monetary policy to stabilize the economy

Monetary policy is fast to enact and easy to reverse

In many countries, central banks are independent from govt, to insulate monetary policy from political considerations

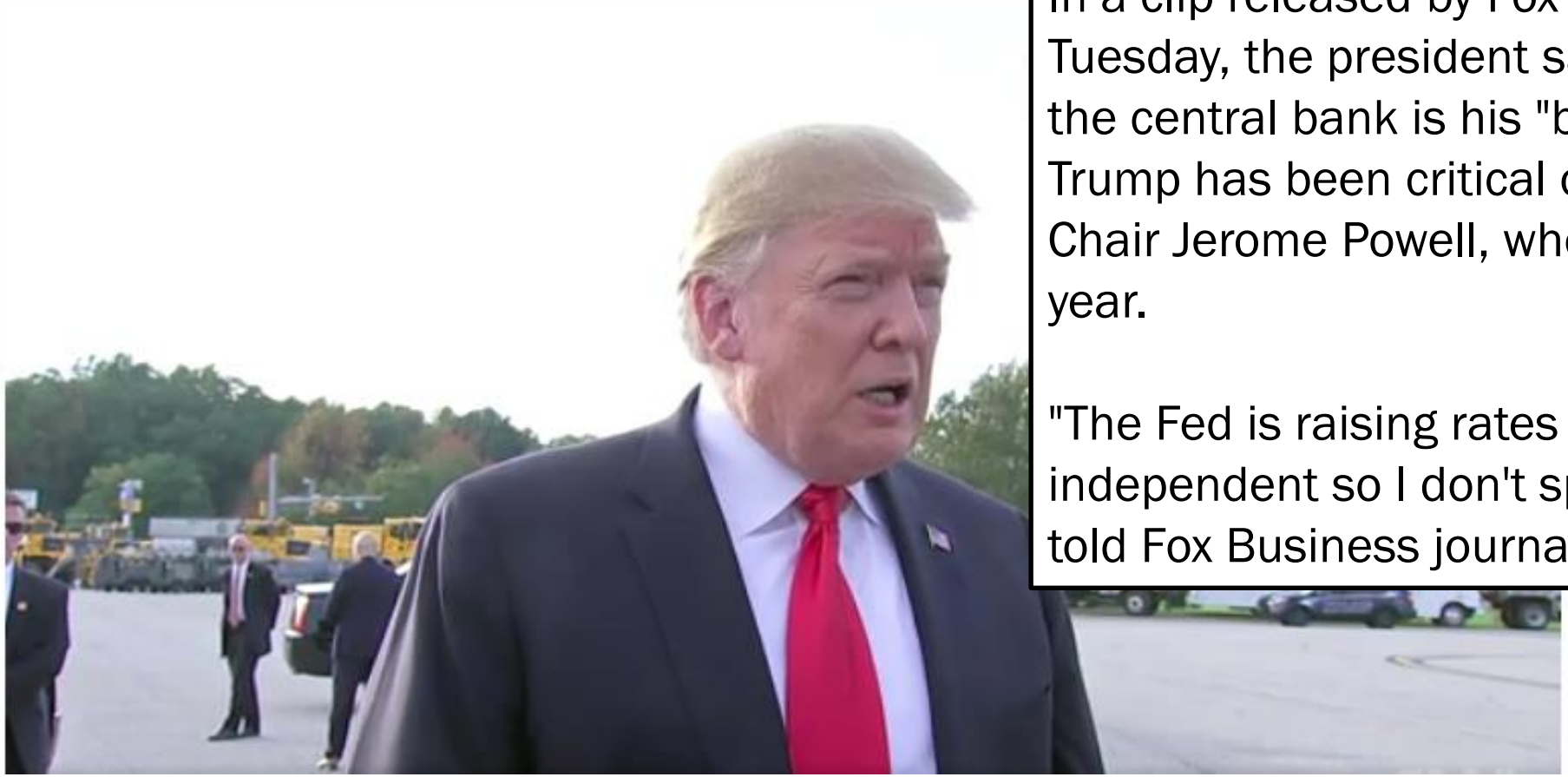
- An independent central bank may use monetary policy to neutralize fiscal policy

President Trump: 'My biggest threat is the Fed'

CNN, October 17, 2018

By Danielle Wiener-Bronner, CNN Business

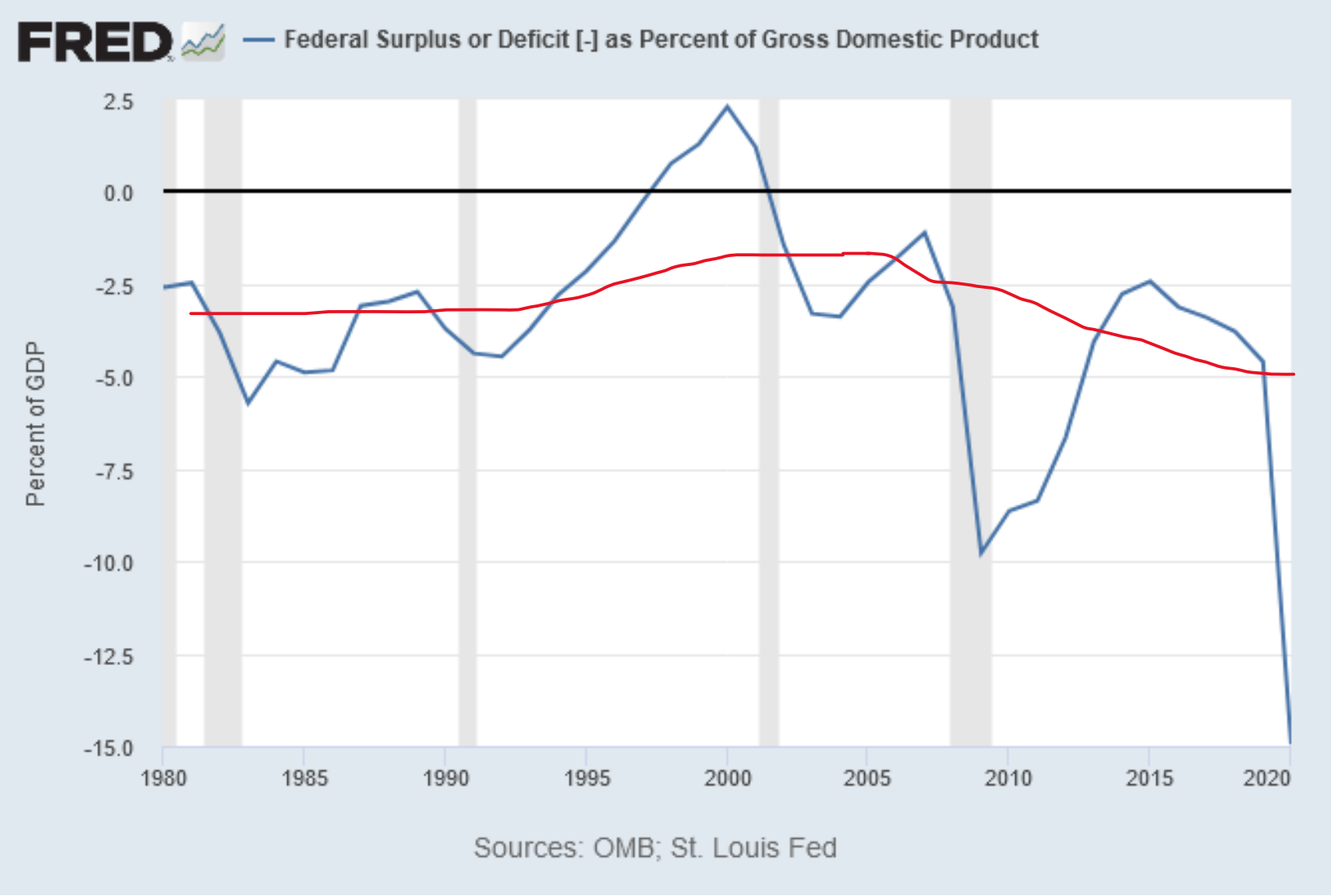
Updated 0051 GMT (0851 HKT) October 17, 2018



In a clip released by Fox Business on Tuesday, the president said in an interview the central bank is his "biggest threat." Trump has been critical of Federal Reserve Chair Jerome Powell, who he appointed last year.

"The Fed is raising rates too fast and it's independent so I don't speak to [him]," Trump told Fox Business journalist Trish Regan.

US budget deficits and recessions, 1980-2020



Deficits worsen during recessions

- Automatic stabilizers
- Discretionary counter-cyclical fiscal policy

Deficit can be split into **structural deficit** and **cyclical deficit**

Real world example: ARRA 2009

Fall in house values → financial crisis → fall in I^P and C → severe recession in 2008-2009

US fiscal policy response: America Recovery and Reinvestment Act (ARRA) 2009

- Approximately $800 billion spread over 3 years
- Part of a wave of counter-cyclical fiscal policies enacted by governments all over the world

What about problems with fiscal policy?

Thus, usual objections to discretionary fiscal policy did not apply

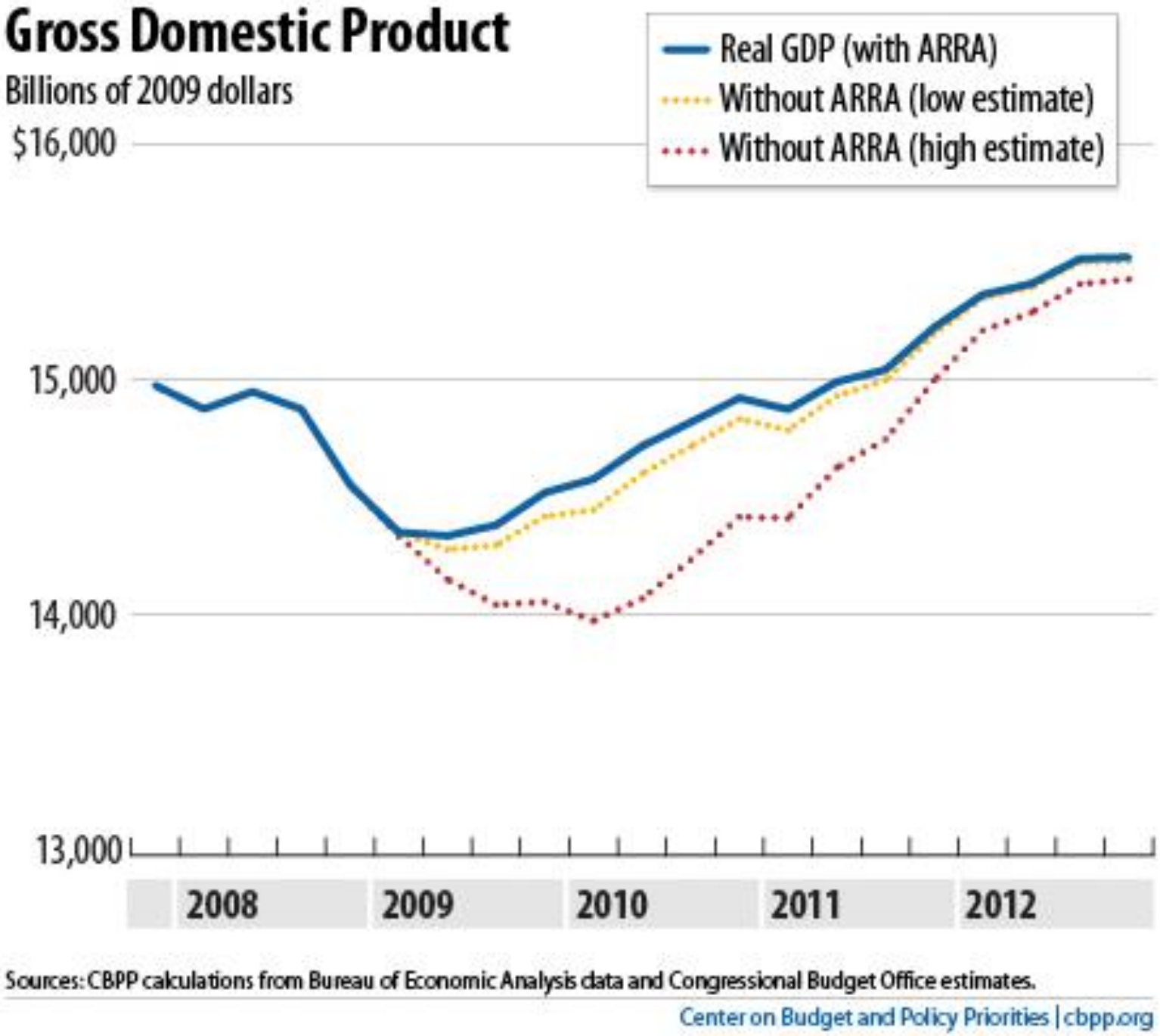
Recession was expected to be deep and prolonged

Automatic stabilizers and monetary policy were insufficient

Political situation allowed for quicker decision-making

Counter-cyclical fiscal policy: theory vs practice

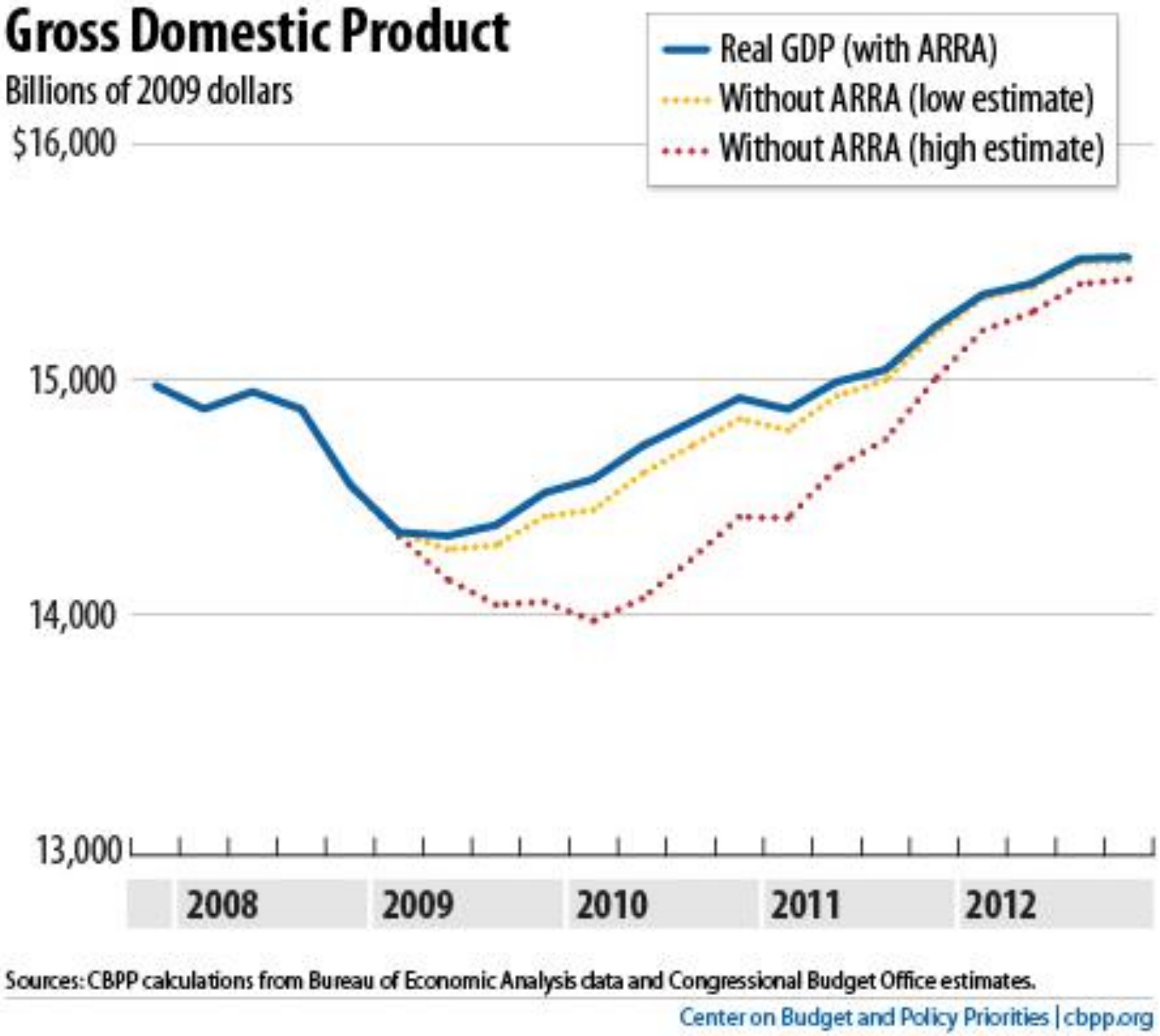
Procedure	Ideal	In practice
Size of output gap	Estimated accurately	Underestimated
Size of multiplier	Known size	Uncertainty about size
Size of stimulus	Technical considerations dominate	Political considerations dominate
Mix of G and T	Technical considerations dominate	Political considerations dominate
Timing of stimulus	Applied ASAP	Only $185bn spent in 2009



Impact of ARRA on RGDP(I)

Blue line depicts actual data

The Counterfactual (what RGDP would have been without ARRA) cannot be observed, can only be estimated



Impact of ARRA on RGDP(II)

Orange dotted line depicts counterfactual estimate with small multipliers

Red dotted line depicts counterfactual estimate with large multipliers

Growing consensus that large multipliers apply during major recessions

SG Countercyclical Fiscal Policy 2020 (I)

2020 Covid-19 recession was

- Extremely sudden, with situation worsening rapidly
- Not just a massive negative demand shock, but a reduction in productive capacity

SG govt budget deficit was 13.9% of GDP!

- Increasing G via accelerated infrastructure spending was not feasible due to construction industry shutdown
- Thus most of discretionary fiscal policy response has been via reduction in T

SG Countercyclical Fiscal Policy 2020 (II)

Jobs Support Scheme

- $20 billion wage subsidy
- Re-run of 2009's $5 billion Jobs Credit Scheme

Covid-19 Support Grant

- A discretionary (rather than automatic) unemployment benefit!

Care and Support Package

- Vouchers for groceries, utilities, conservancy
- Poorer families get more

Solidarity Payment

- $600 for every citizen, $300 for every PR

Government-sponsored traineeships

- To reduce unemployment spell for those entering job market

Industry-specific help

- E.g. $100 credit per household to use on local tourism

Source: Singapore Budget 2020