Aggregate Expenditure and Aggregate Demand

Aggregate Expenditure and Income

The Simple Spending Multiplier

Deriving the Aggregate Demand Curve

Aggregate Expenditure and Income

✦ **Discover the relation between income and total spending**

✦ **Assumptions**
  - ▣ **No capital depreciation**
  - ▣ **No business saving**
  - ▣ **Spent on production translates directly into aggregate income**
    - • **GDP = aggregate income**
  - ▣ **Investment, government purchases, and net exports are independent of the level of income**

Aggregate Expenditures

- **Aggregate expenditures equals the amount spend on U.S. output**
  - **Consumption, C**
  - **Planned investment, I**
  - **Government purchases, G**
  - **Net exports, X – M**

- **Consumption is the only spending component that varies with the level of real GDP**

Table for Real GDP With Net Taxes and Government Purchases (trillions of dollars)

Real GDP (Y) (1)	Net Taxes (NT) (2)	Disposable Income (Y-NT) (3)=(1)-2)	Consumption (C) (4)	Saving (S) (5)	Planned Investment (I) (6)	Government Purchases (G) (7)	Net Exports (X-M) (8)	Planned Aggregate Expenditure (AE) (9)	Unintended Inventory Adjustment (Y-AE) (10)=(1)-(9)
9.0	1.0	8.0	7.5	0.5	0.8	1.0	-0.1	9.2	-.02
9.5	1.0	8.5	7.9	0.6	0.8	1.0	-0.1	9.6	-0.1
10.0	1.0	9.0	8.3	0.7	0.8	1.0	-0.1	10.0	0.0
10.5	1.0	9.5	8.7	0.8	0.8	1.0	-0.1	10.4	+0.1
11.0	1.0	10.0	9.1	0.9	0.8	1.0	-0.1	10.8	+0.2

- **Price level=130 ➔ 30% higher than in the base year**
- **(1) lists a range of possible levels of real GDP (Y)**
- **Real GDP(1)- NT(2)= DI(3)**
- **Two possible uses for disposable income**
  - **Consumption(4), MPC=4/5**
  - **Saving(5), MPS= 1/5**

Table for Real GDP With Net Taxes and Government Purchases (trillions of dollars)

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11.0	1.0	10.0	9.1	0.9	0.8	1.0	-0.1	10.8	+0.2

(6), (7), and (8) list the injections into the circular flow:
   planned investment, government purchases and net exports.
Government purchases= net taxes ➔ government's budget is balanced
(10) lists unplanned inventory adjustment=real GDP(1)-planned aggregate expenditures(9)
If plan to spend equals the amount produced,
➔no unplanned inventory adjustments.
In our example, this occurs as GDP equal 10.0

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Table for Real GDP With Net Taxes and Government Purchases (trillions of dollars)

- **If real GDP is $9.0 trillion**
   - **Planned aggregate expenditure is $9.2 trillion ➔ firms must reduce inventories to make up the shortfall in output**
- **If produced >planned spending➔ unplanned increases in inventories**
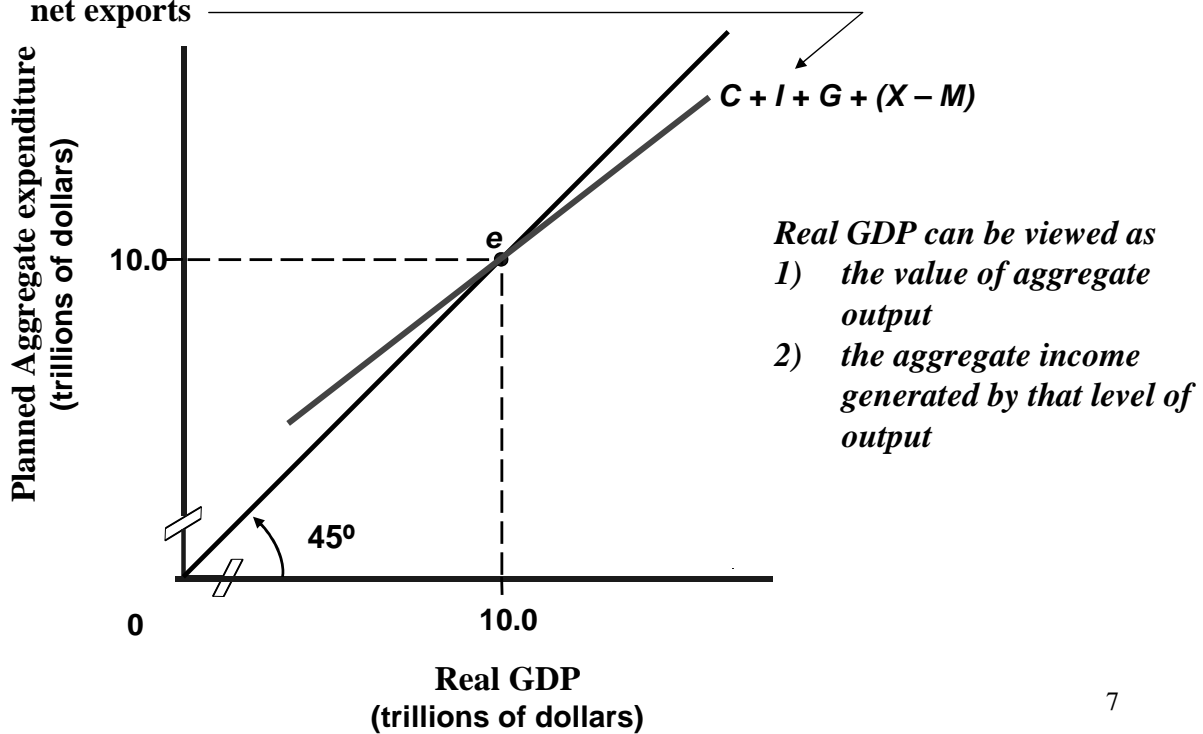   - **If real GDP is $11.0 trillion, planned aggregate expenditure=$10.8 trillion**
      - **➔ $0.2 million in output remains unsold**
      - **➔ Firms reduce output until they produce the amount that people want to buy**
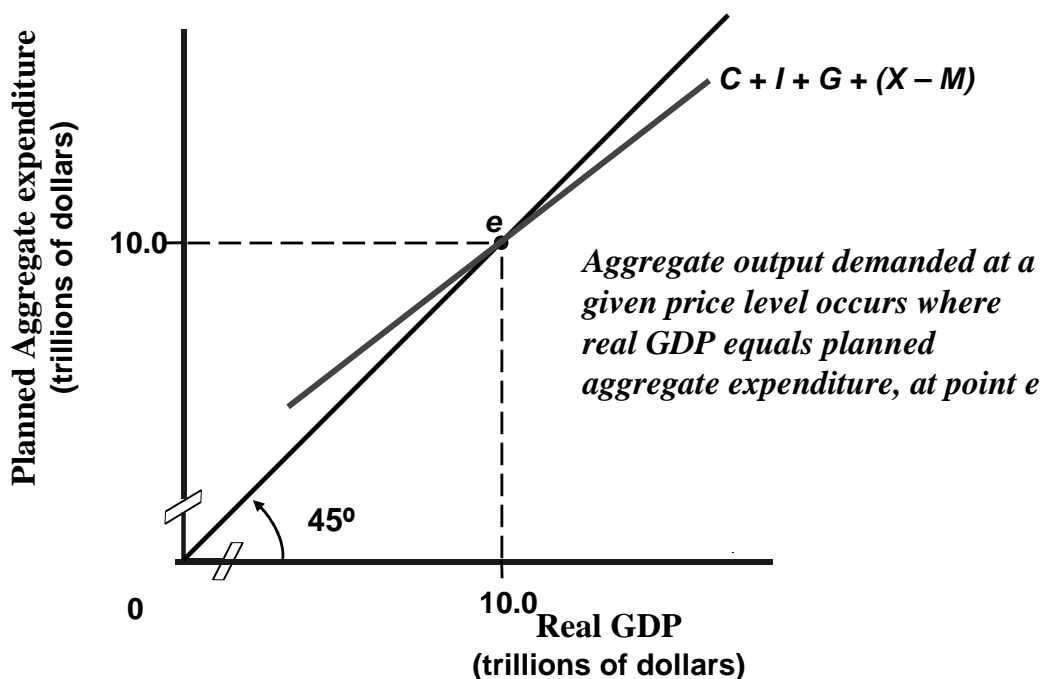
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Deriving Aggregate Output

It is called income-expenditure model. The aggregate expenditure line reflects the sum of consumption, investment, government purchases, and net exports
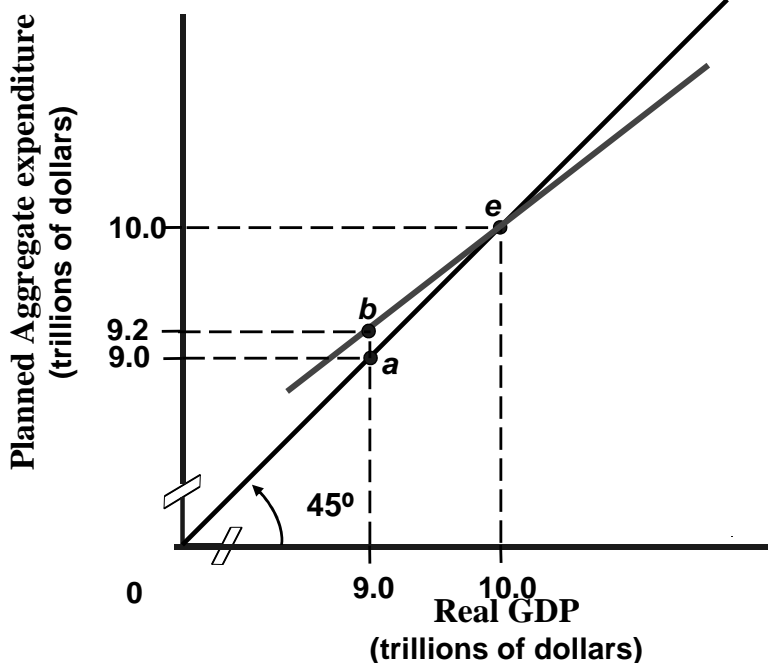
C + I + G + (X − M)

Planned Aggregate expenditure (trillions of dollars)

10.0

e

45⁰

0

10.0

Real GDP (trillions of dollars)

Real GDP can be viewed as
1) *the value of aggregate output*
2) *the aggregate income generated by that level of output*

Deriving Aggregate Output

The 45-degree line identifies all points where planned expenditure equals real GDP.

Planned Aggregate expenditure (trillions of dollars)

C + I + G + (X − M)

10.0

e

45⁰

0

10.0

Real GDP (trillions of dollars)

Aggregate output demanded at a given price level occurs where real GDP equals planned aggregate expenditure, at point e

Planned Aggregate Expenditure> Aggregate Output

C + I + G + (X – M)

Planned Aggregate expenditure (trillions of dollars)

10.0 .... e

9.2 ...... b
9.0 ...... a

45º

0   9.0   10.0

Real GDP (trillions of dollars)

If real GDP = $9.0 trillion.
Planned aggregate expenditures
of $9.2 trillion (point *b*)>9.0

Let price level will remain
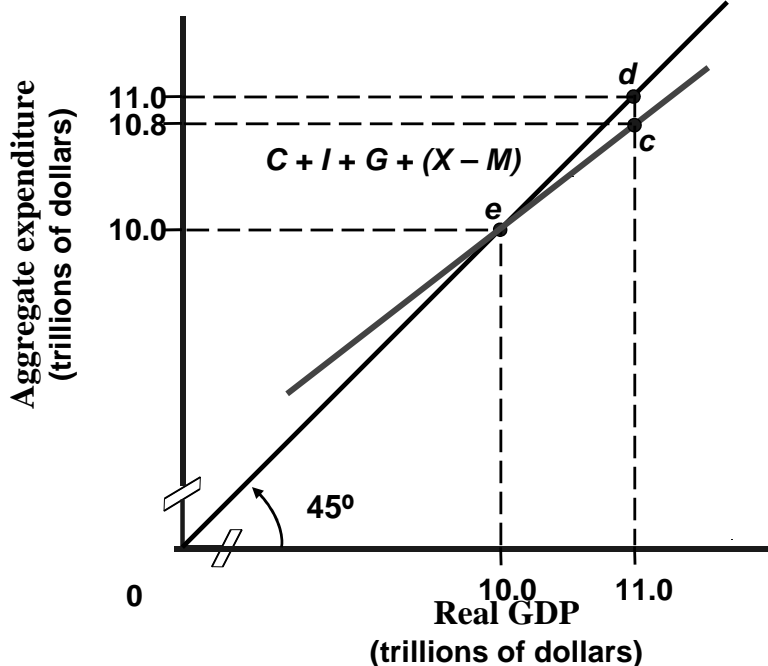constant.
Firms' inventories reduce.
→increase employment
➔ increasing income ➔
increasing consumer spending.
Continue until planned spending
equals real GDP at point *e*

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Planned Aggregate Expenditure< Aggregate Output

Aggregate expenditure (trillions of dollars)

11.0 .... d
10.8 c

C + I + G + (X – M)

10.0 .... e

45º

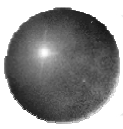0   10.0   11.0

Real GDP (trillions of dollars)

real GDP=11.0
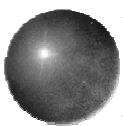*Planned spending=10.8 (point c)*

*Unsold goods accumulate,
Firms reduce production ➔
Reduces employment and
income.*

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Aggregate Expenditure and Aggregate Demand

⬥ Aggregate Expenditure and Income

⬥ The Simple Spending Multiplier

⬥ Deriving the Aggregate Demand Curve

Simple Spending Multiplier

⬥ **Assume that the price level is fixed**

⬥ **Trace the effects of changes in planned spending on aggregate output demanded**

 ⬥ **The effect of shift in planned spending generating changes in aggregate output that may far exceed the initial shift**

Effect of an Increase In Investment
on Real GDP Demanded
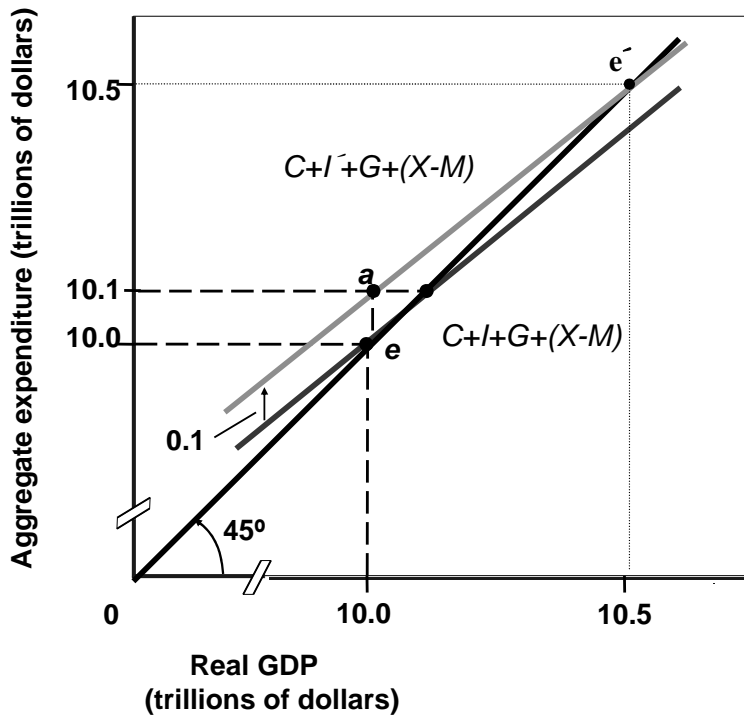
Begin at point e.
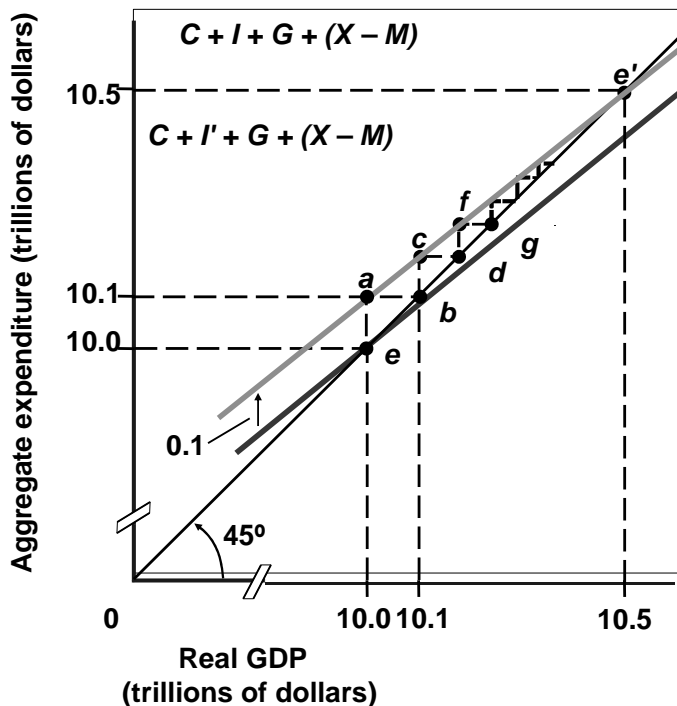Let firms become more
optimistic about future.

Increase planned
investment from I →I'.

Investment is assumed to
increased by $0.1 trillion.

But real GDP increased
by $0.5 trillion.

(Graph: Aggregate expenditure (trillions of dollars) vs Real GDP (trillions of dollars). Curves labeled C+I´+G+(X-M) and C+I+G+(X-M), with points a, e, e´, 45° angle, values 10.0, 10.1, 10.5, and 0.1 shift.)

Effect of an Increase In Investment
on Real GDP Demanded

Round 1:
Upward shift of AE line →
Planned spending exceeds
output by $0.1 (point e →a)

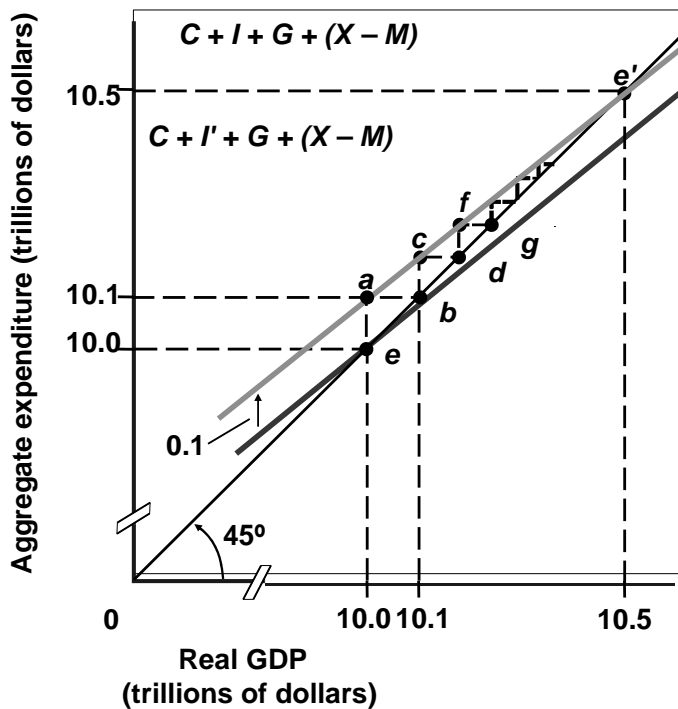*Inventories reduces,*
prompting firms to expand
production: a → b

e → b shows the first round in
the multiplier process.

Those who receive additional
income spend some of it
→Round two of spending and
income.

(Graph: Aggregate expenditure (trillions of dollars) vs Real GDP (trillions of dollars). Curves labeled C + I + G + (X – M) and C + I' + G + (X – M), with points a, b, c, d, e, e', f, g, 45° angle, values 10.0, 10.1, 10.5, and 0.1 shift.)

Effect of an Increase In Investment
on Real GDP Demanded

Aggregate expenditure (trillions of dollars)

C + I + G + (X – M)

C + I' + G + (X – M)

10.5

10.1
10.0

0.1

45°

a
b
c
d
e
e'
f
g

0   10.0 10.1   10.5

Real GDP
(trillions of dollars)

Round Two. Let MPC= 0.8,
Receive additional income of $0.1
Spend $0.08 (point b ➔ c).
Firms increase output by $0.08
(point c ➔ d).

Round Three and Beyond.

Increase of $0.08 becomes income.
$0.064 billion will be spent: f ➔ g.

As planned spending exceeds
output, production will increase,
thereby creating more income,
which will generate still more
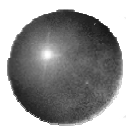*spending*

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Summary of the Multiplier Effect
(In Billion Dollars)

Round	New Spending This Round	Cumulative New Spending	New Saving This Round	Cumulative New Saving
1	100	100	-	-
2	80	180	20	20
3	64	244	16	36
10	13.4	446.3	3.35	86.6
∞	0	500	0	100

- ### Def: Simple spending multiplier
  - Cumulative spending resulting from an infinite series = 1 / (1 – MPC)
  - MPC= 0.8 ➔ 1 / 0.2 ➔ 5

- ### Initial increase in planned investment of $100 billion boost real GDP by $500 billion

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Simple Spending Multiplier

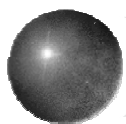◈ **The larger the fraction of income is spent, the larger the simple spending multiplier**

◼ **Ex:**

- **MPC=0.9, the multiplier is 10**
- **MPC=0.75, the multiplier is 4**

◈ **MPC+ MPS=1**

◼ **Simple spending multiplier**

=1 / (1 – MPC)

= 1 / MPS

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Simple Spending Multiplier

◈ **The same impact occurs if any one of the components of aggregate expenditures changed**

◈ **Finally, if the higher level of planned investment is not sustained**

◼ **real GDP would fall back and the multiplier process would work in reverse**

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Aggregate Expenditure and Income

The Simple Spending Multiplier

Deriving the Aggregate Demand Curve

Deriving the Aggregate Demand Curve

- We use the aggregate expenditure line to determine real GDP demanded for a given price level

- For each price level→
  - determine a specific aggregate expenditure line
  - yields a unique real GDP demanded

- By altering the price level, we can derive the aggregate demand curve

A Higher Price Level

- ### reduces consumption
  - it reduces the real value of dollar-denominated assets held by households

- ### increases the market rate of interest which reduces investment

- ### makes domestic goods relatively more expensive abroad
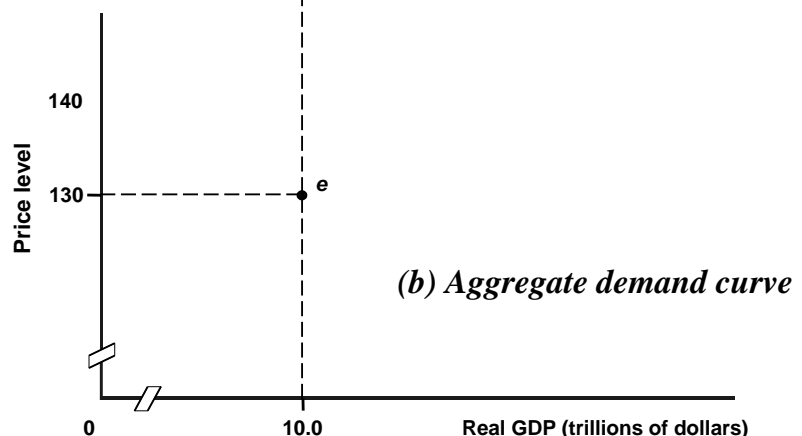 - imports rise and exports fall
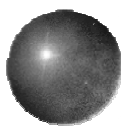

Income-Expenditure and Aggregate Demand

AE function intersects the 45 degree line at point *e* to yield $10.0 trillion in real GDP demanded.
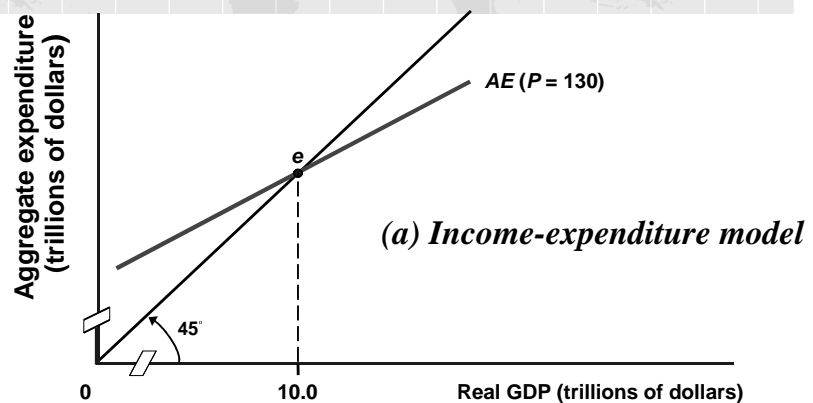
Panel (b) shows the link between real GDP demanded and the price level.
Price level=130,
real GDP demanded=$10.0 trillion.

(a) Income-expenditure model

(b) Aggregate demand curve

Income-Expenditure and Aggregate Demand

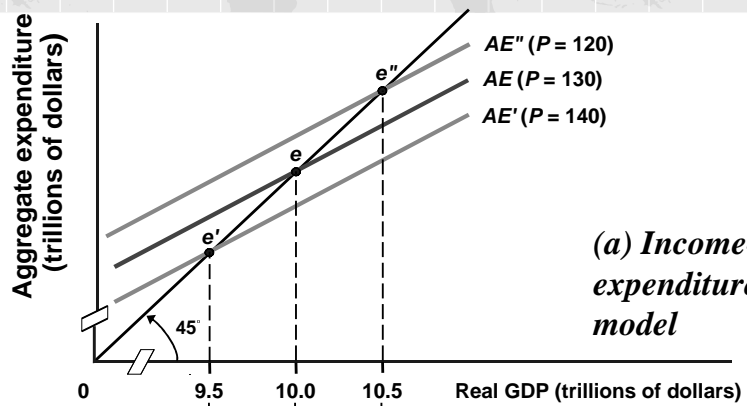*If the price level increases to 140?*

It reduces consumption, investment, and net exports, as reflected in panel (a) by the downward shift from AE to AE'

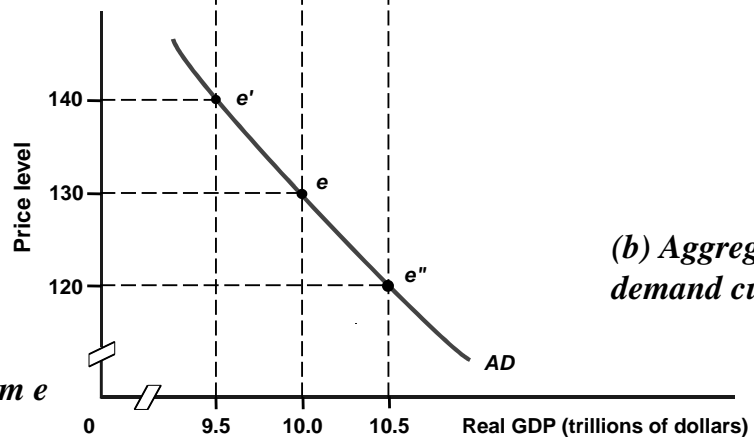*Decrease in planned spending, real GDP demanded declines from e ➔ e'*

If the price level declines to120?

It increases consumption, planned investment, and net exports, as reflected panel (a) by the upward shift in the spending line from AE to AE"

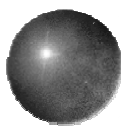*Increase in planned spending real GDP demanded increases from e ➔ e"*

(a) Income-expenditure model

- AE" (P = 120)
- AE (P = 130)
- AE' (P = 140)

Aggregate expenditure (trillions of dollars)

45°

0   9.5   10.0   10.5   Real GDP (trillions of dollars)

(b) Aggregate demand curve

Price level

140 — e'
130 — e
120 — e"

AD

0   9.5   10.0   10.5   Real GDP (trillions of dollars)
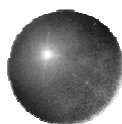

Aggregate Demand and Expenditures

- ✦ **The aggregate expenditure line:**
  - ▣ **For a given price level,**
 - ▣ **planned spending relates to the level of real GDP in the economy**

- ✦ **The aggregate demand curve:**
  - ▣ **For various price levels,**
  - ▣ **the quantities of real GDP demanded**

- ✦ **Consider the shift of the aggregate demand curve**
  - ▣ **through the effects of a shift in any of the components of spending on aggregate demand**
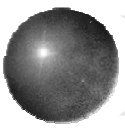
Shift of Aggregate Demand Curve

(a) Income-expenditure model

Aggregate expenditure (trillions of dollars)

$C + I' + G + (X - M)$
$C + I + G + (X - M)$

e'

0.1

e

0.1

45°

0   10.0   10.5   Real GDP (trillions of dollars)

When one component of aggregate expenditure increases, the AE function shifts upward. Because the price level is assumed constant, the aggregate demand shifts from AD →AD' and the new point of equilibrium is shown as e' in both panels.

(b) Aggregate demand curve

Price level

130

e   e´

AD'
AD

0   10.0   10.5   Real GDP (trillions of dollars)

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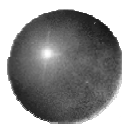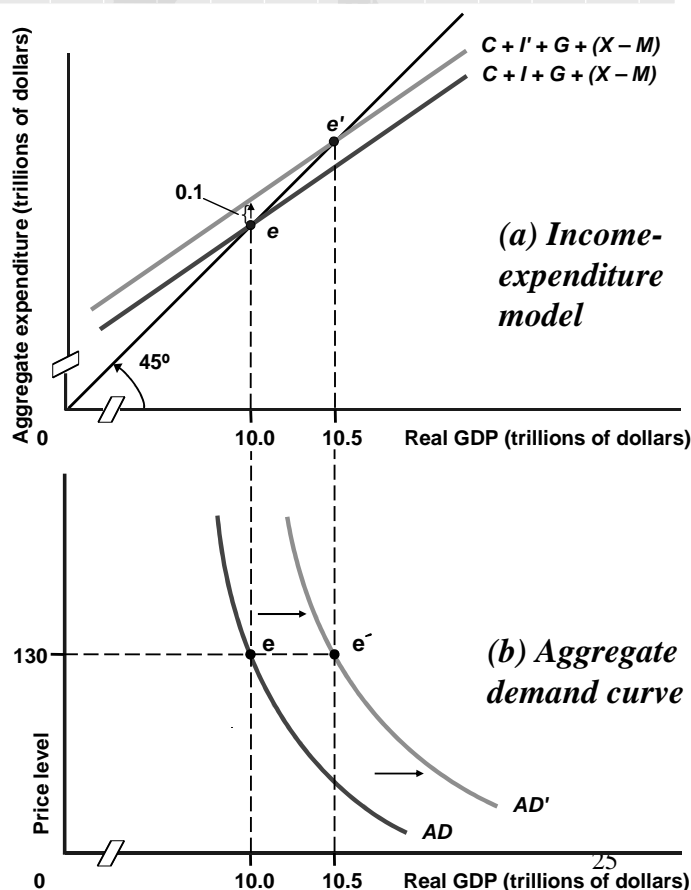

Simple Spending Multiplier Exaggerates the Actual Effect

- We assumed that the price level remains constant.
  - However, changes in the price level reduce the impact of the multiplier

- Leakages such as higher income taxes and increased spending on imports all reduce the size of the multiplier

- The spending multiplier takes time to work itself out
  - the process does not occur instantly

課堂報告

- 請解釋何謂Income expenditure model
- 請解釋何謂multiplier effect
- 請解釋何謂Simple spending multiplier並推導之
- 請說明如何推導aggregate demand curve
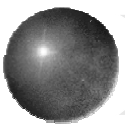
Homework

- 9. Simple spending multiplier
- 12. What if investment increases as if real GDP increases?