LECTURE 4

Welfare economics

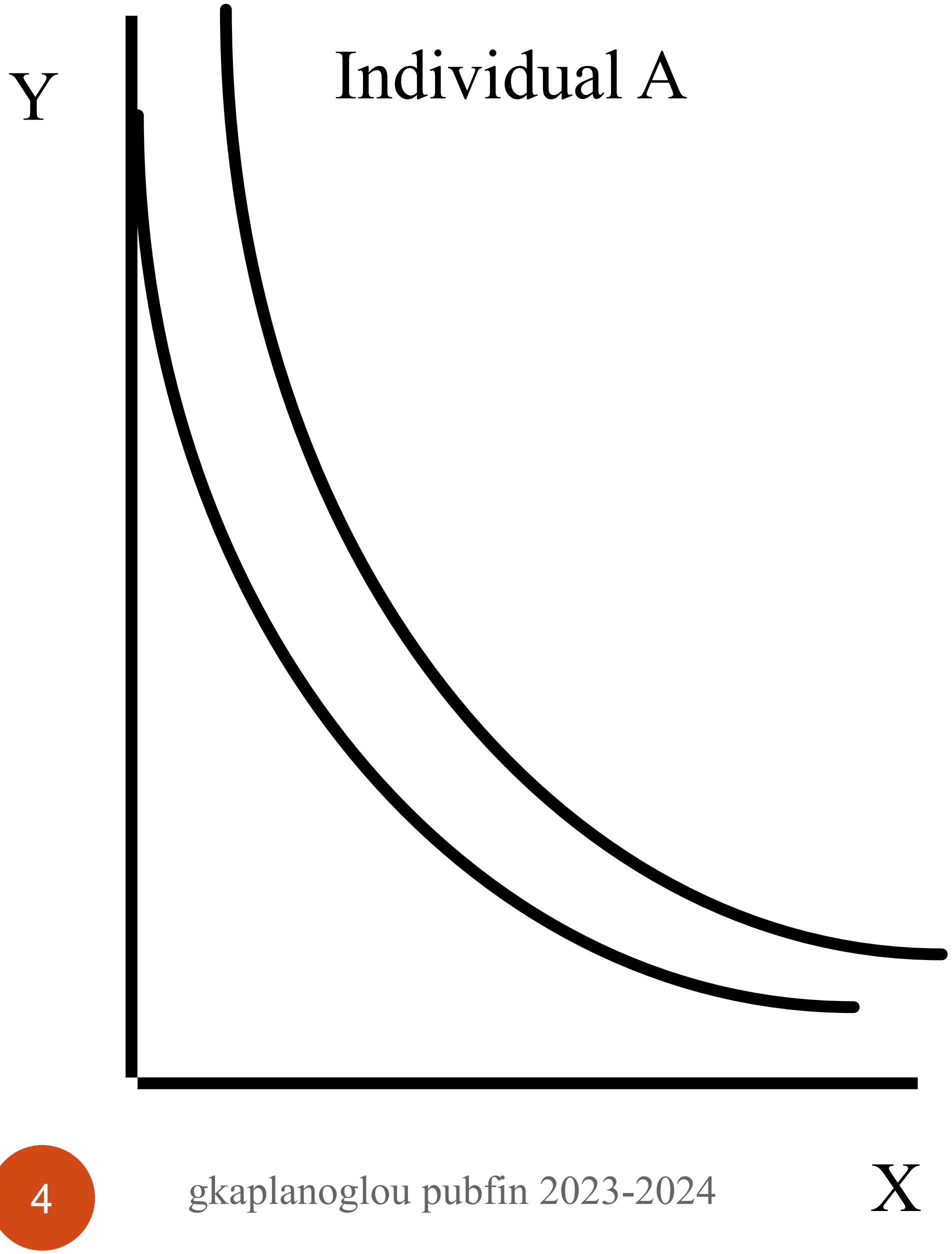
Welfare economics

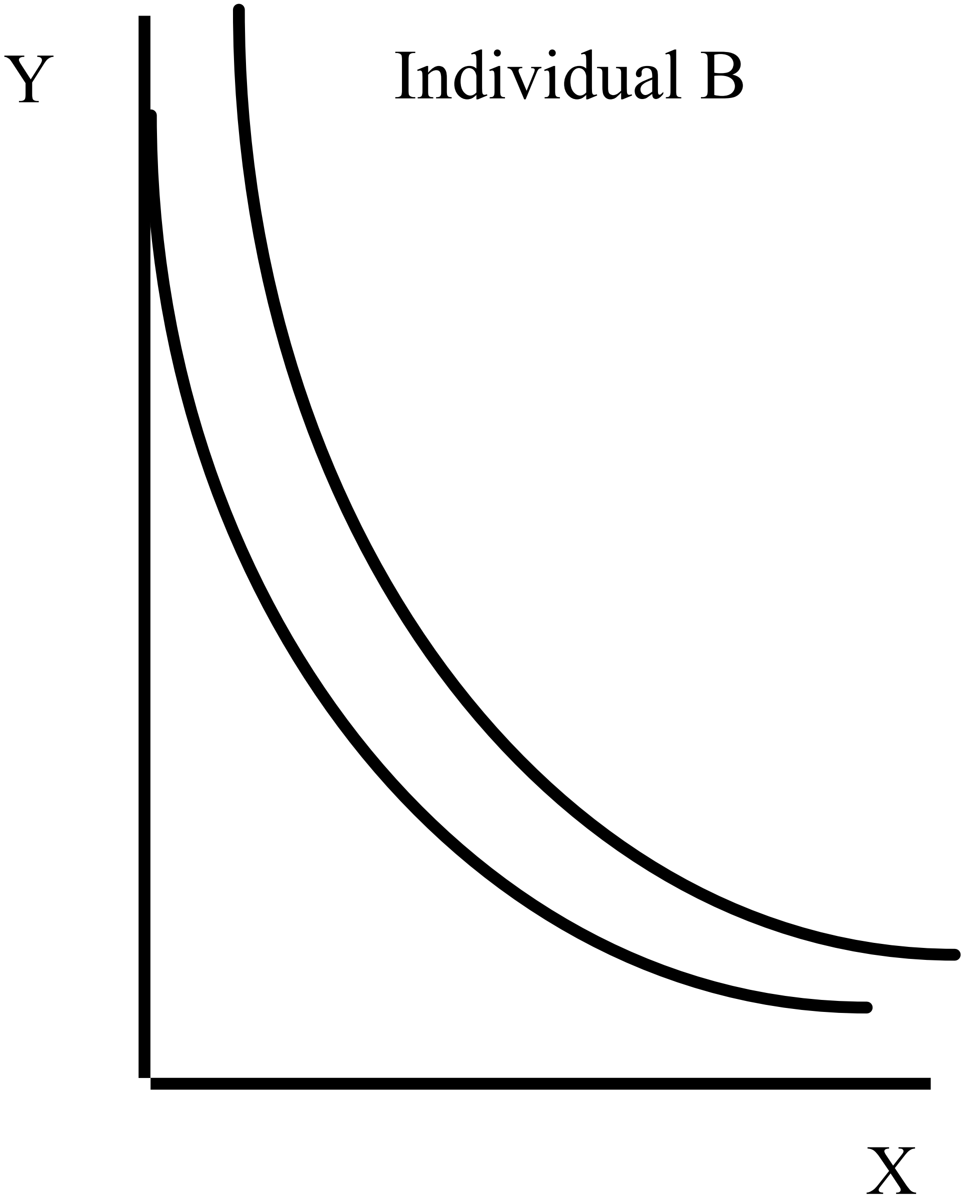
INTERACTIONS AMONG INDIVIDUALS IN A COMPETITIVE SOCIETY

Welfare economics

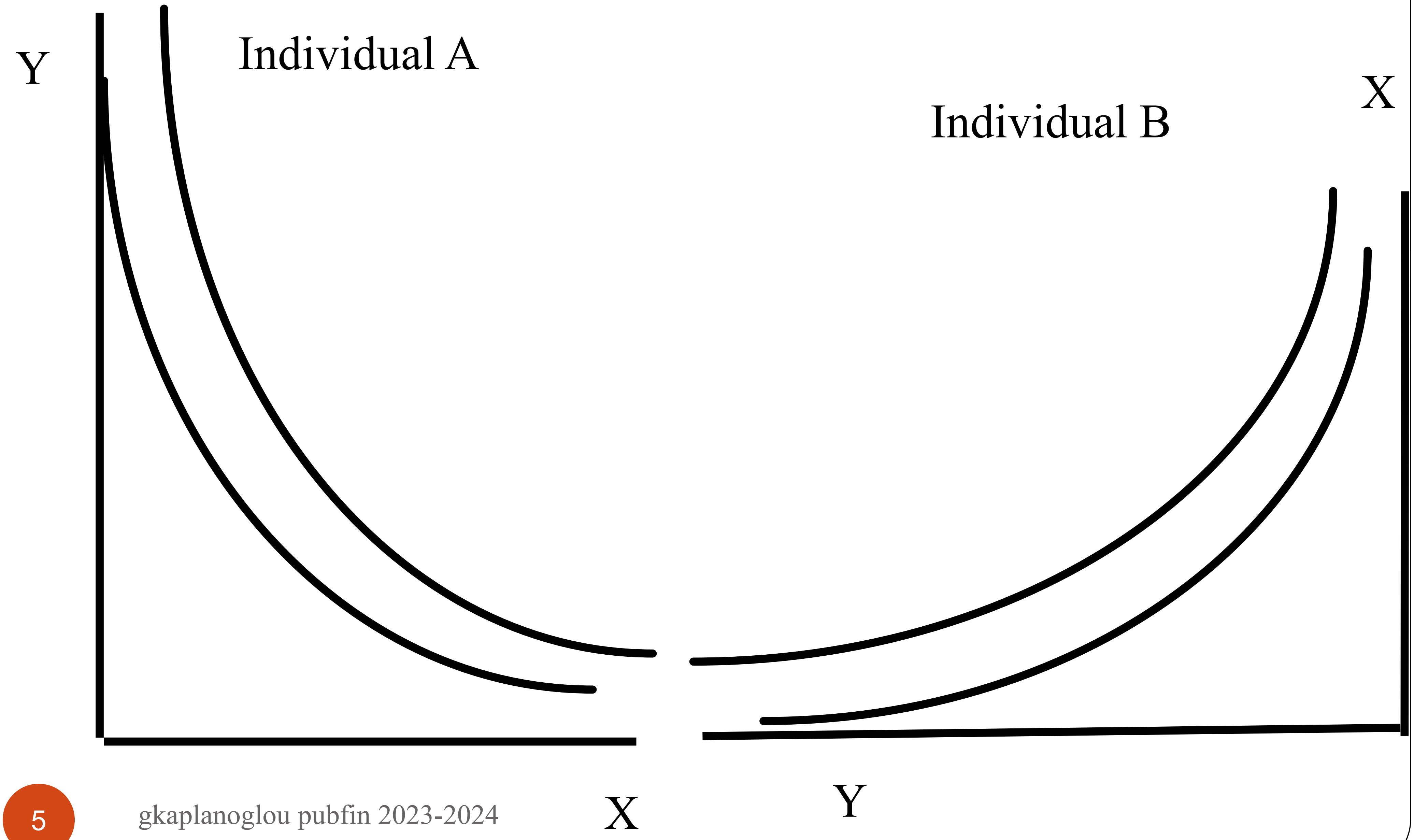
- Welfare economics is that branch of economic theory that deals with the social desirability of alternative economic states.
- We begin with the Edgeworth exchange box which was invented by Francis Edgeworth. The box depicts an economy where two isolated individuals freely trade two **private** goods.

Exchange box diagram

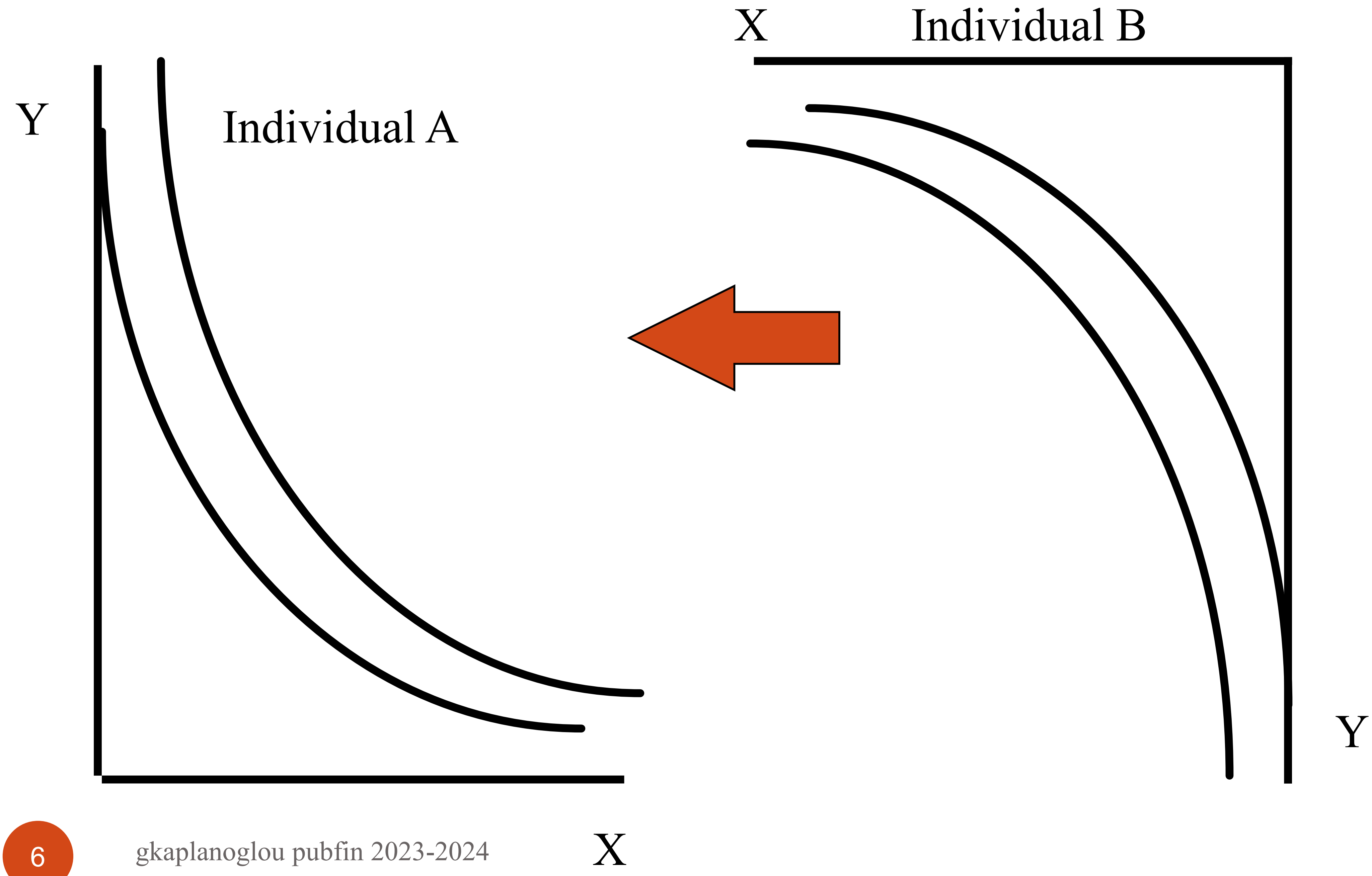

Y
Individual A
X


Y
Individual B
X

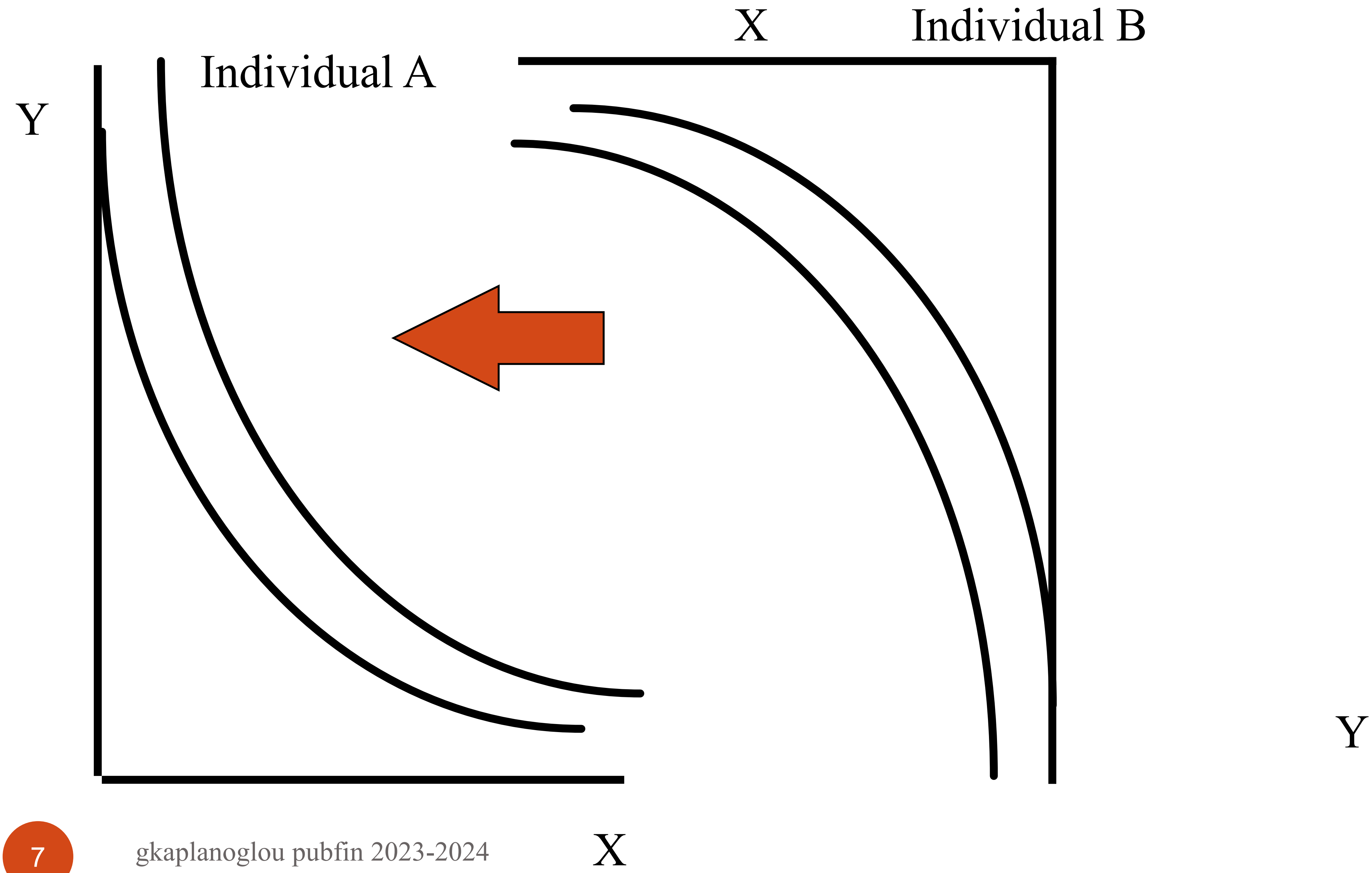
Exchange box diagram


Y
Individual A
X
Individual B
X
Y

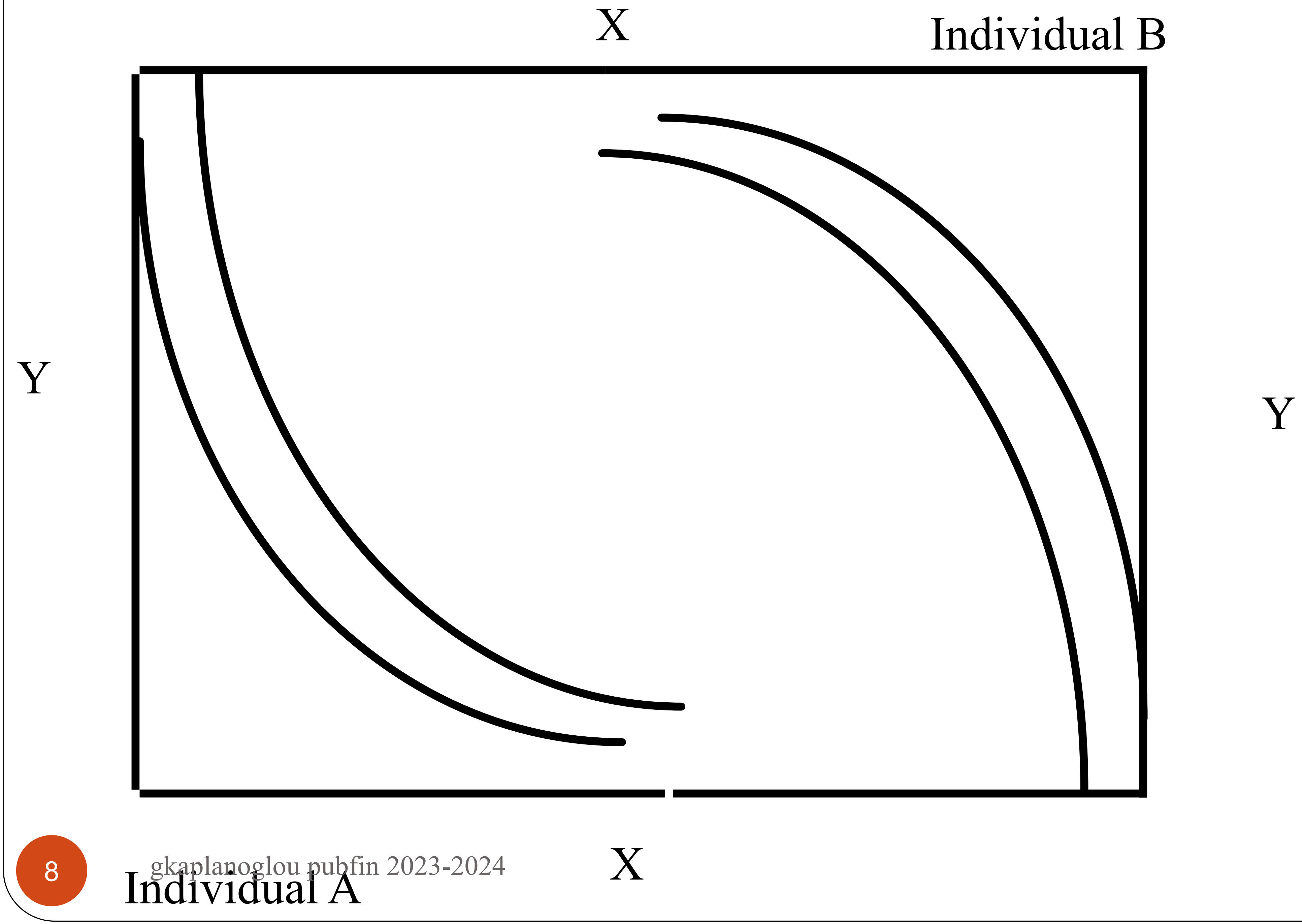
Exchange box diagram


X
Individual B
Y
Individual A
Y
X

Exchange box diagram


X
Individual B
Individual A
Y
Y
X

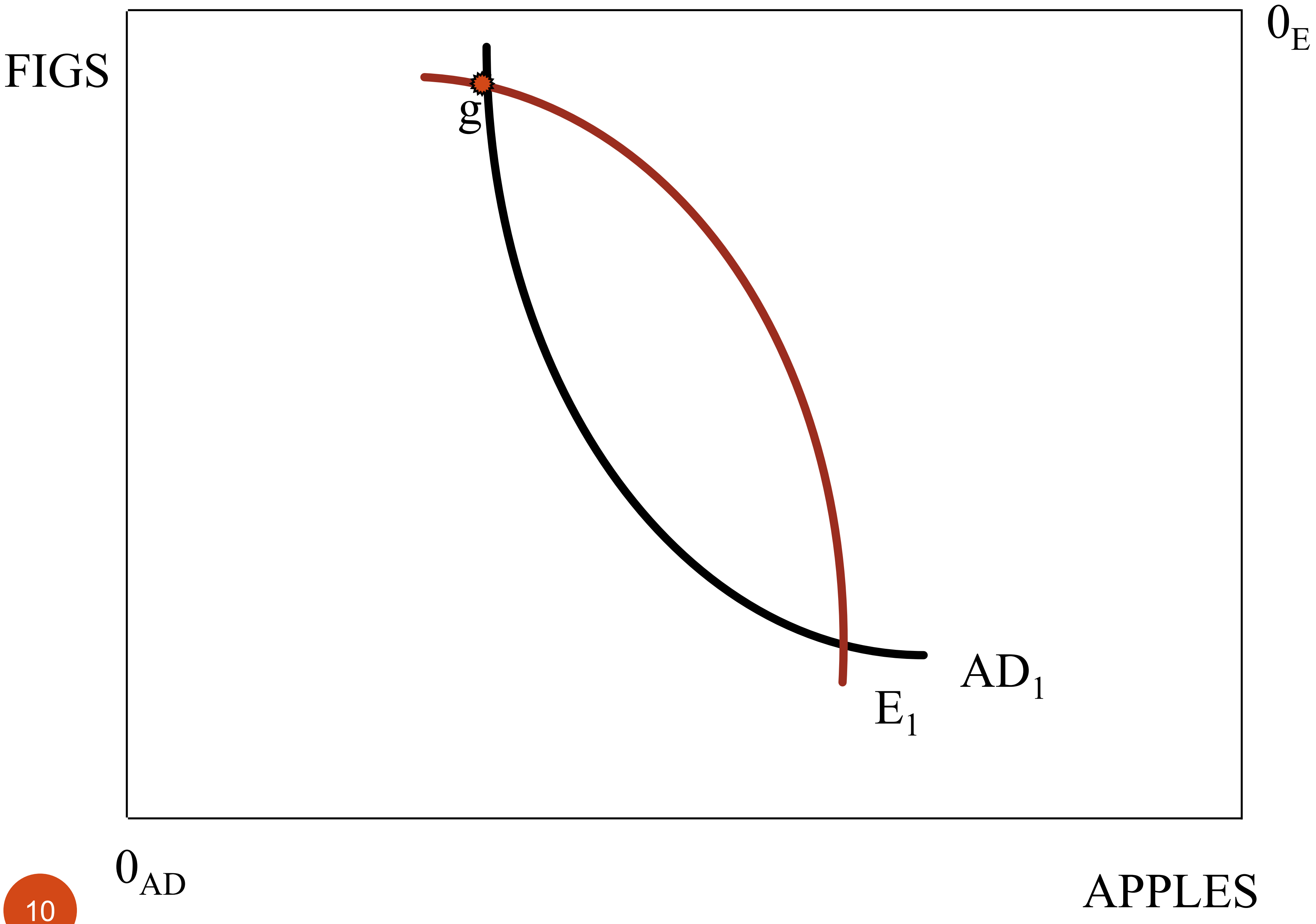
Exchange box diagram


X
Individual B
Y
Y
X
Individual A

PARETO OPTIMAL IN A TWO-PERSON TWO-GOODS ECONOMY

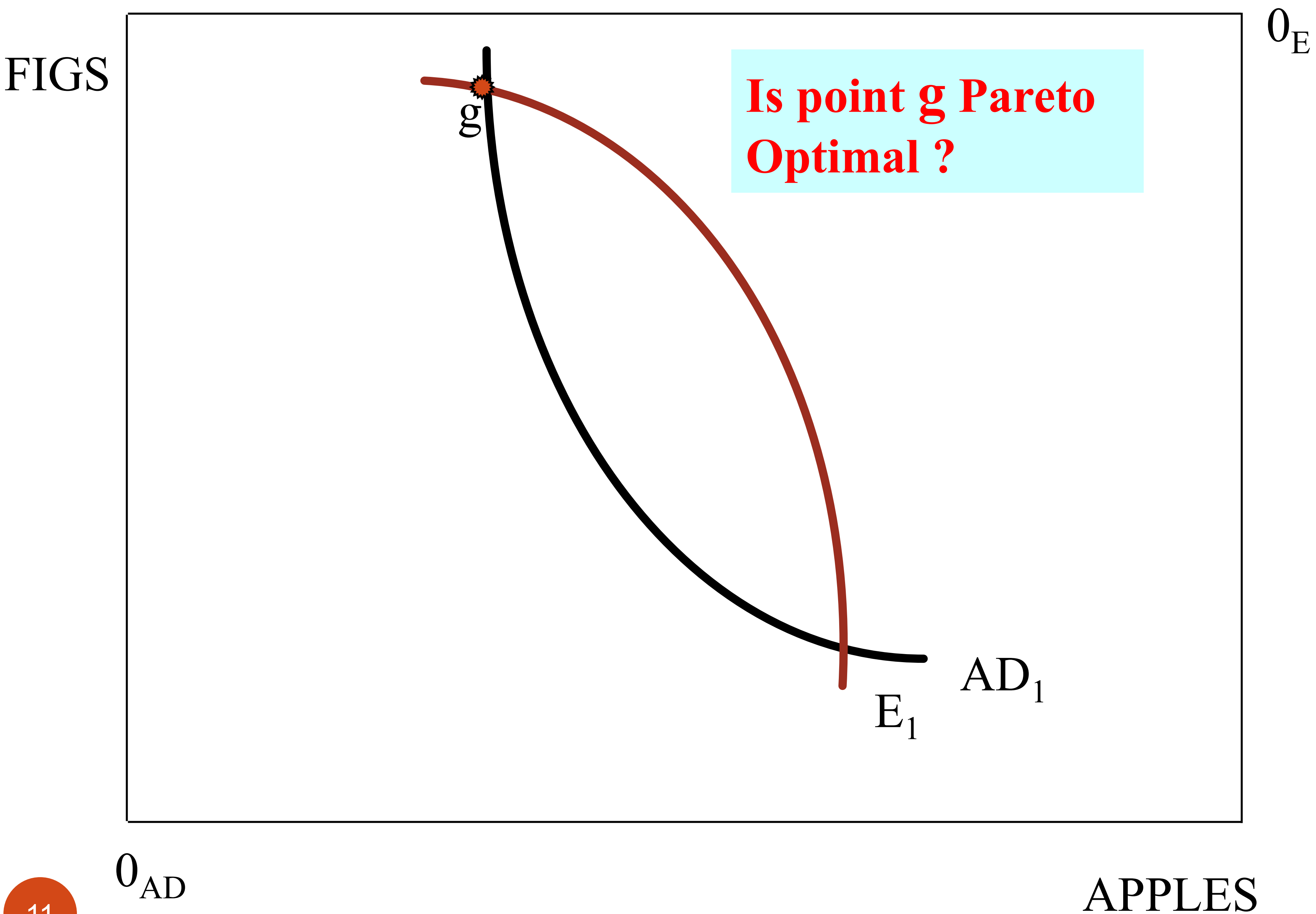
- Graphic presentation

Edgeworth box



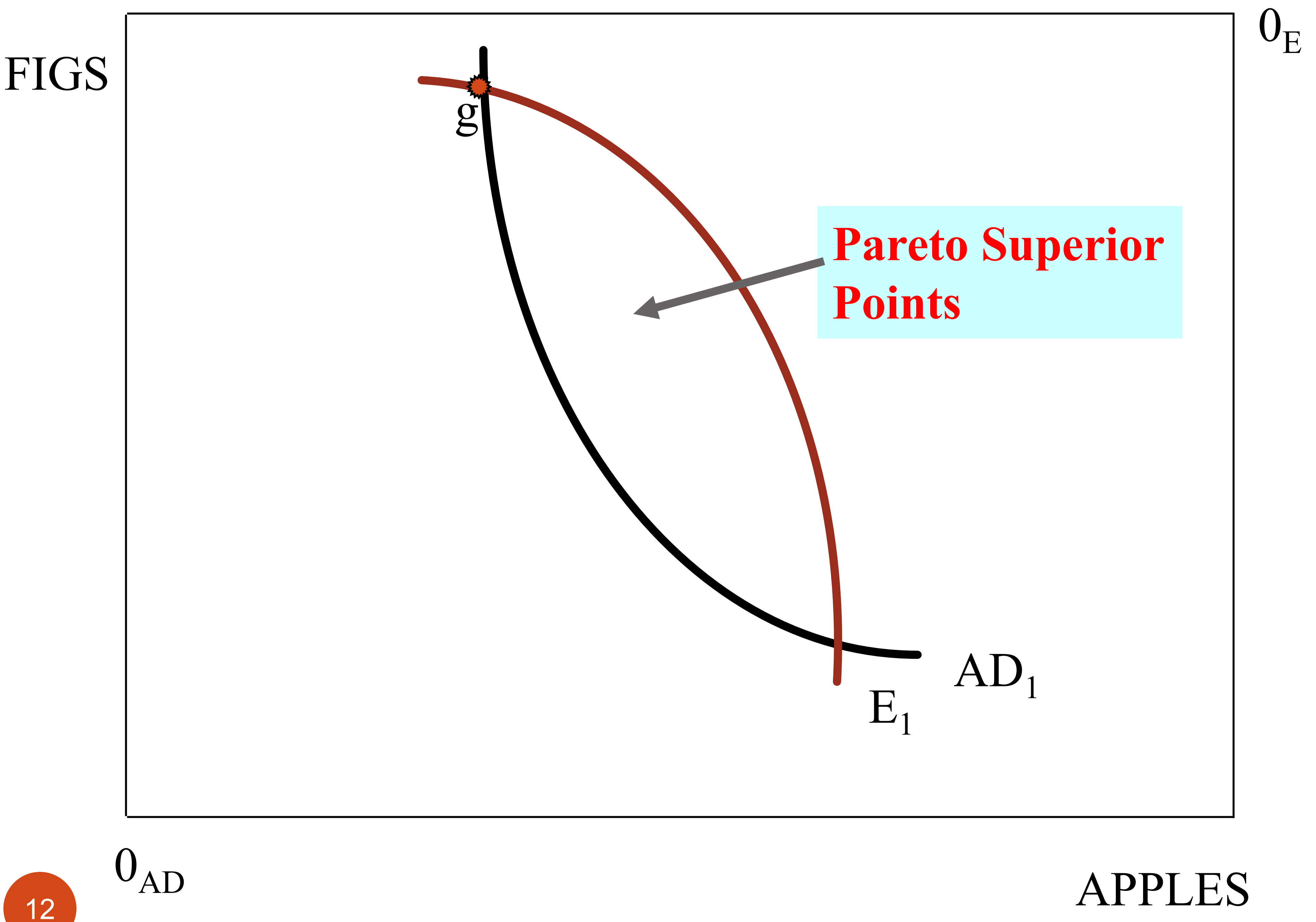
0$_E$
FIGS
g
AD$_1$
E$_1$
0$_{AD}$
APPLES

Edgeworth box

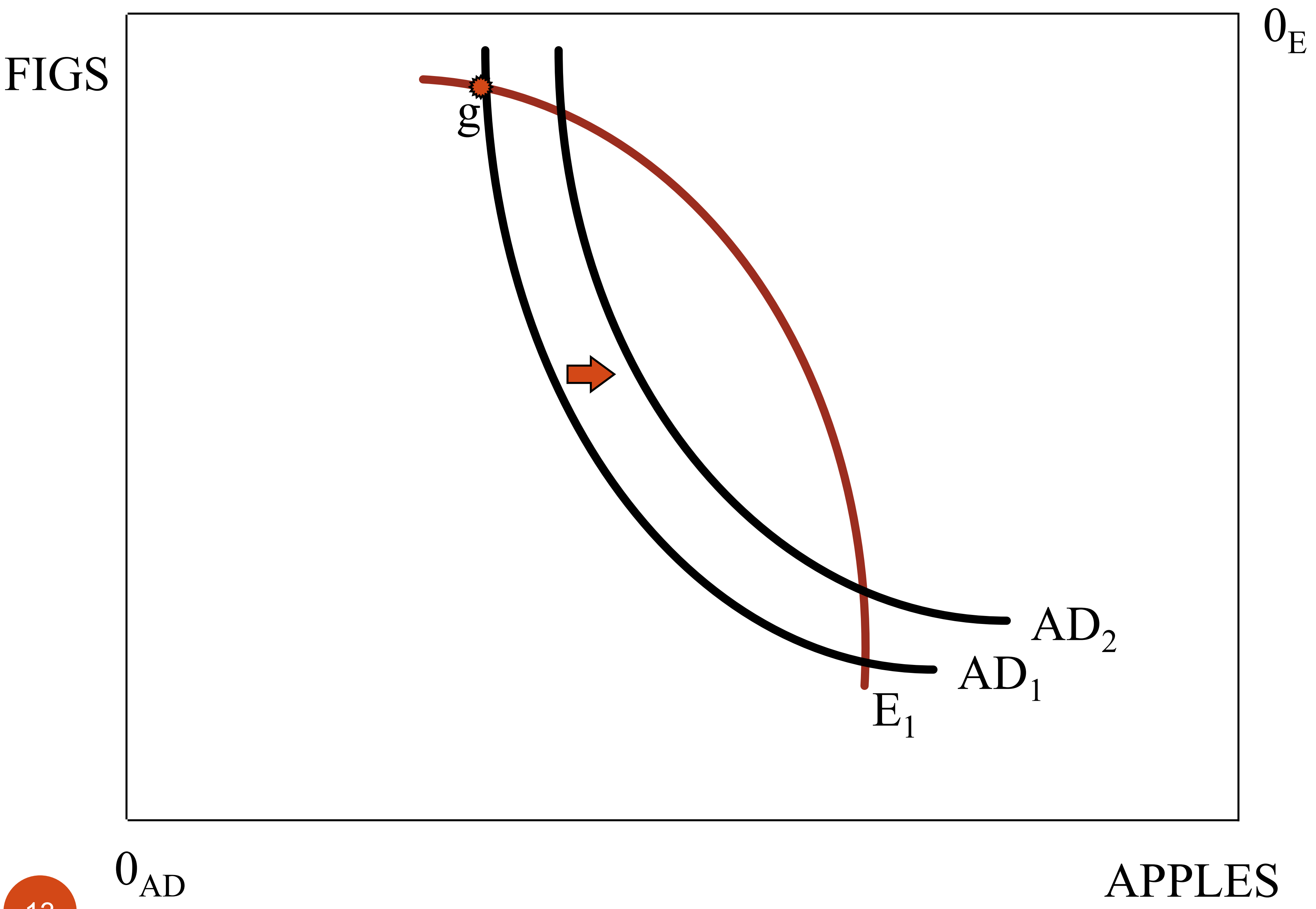

0_E
FIGS
g
AD1
E1
0_AD
APPLES

Is point g Pareto Optimal ?

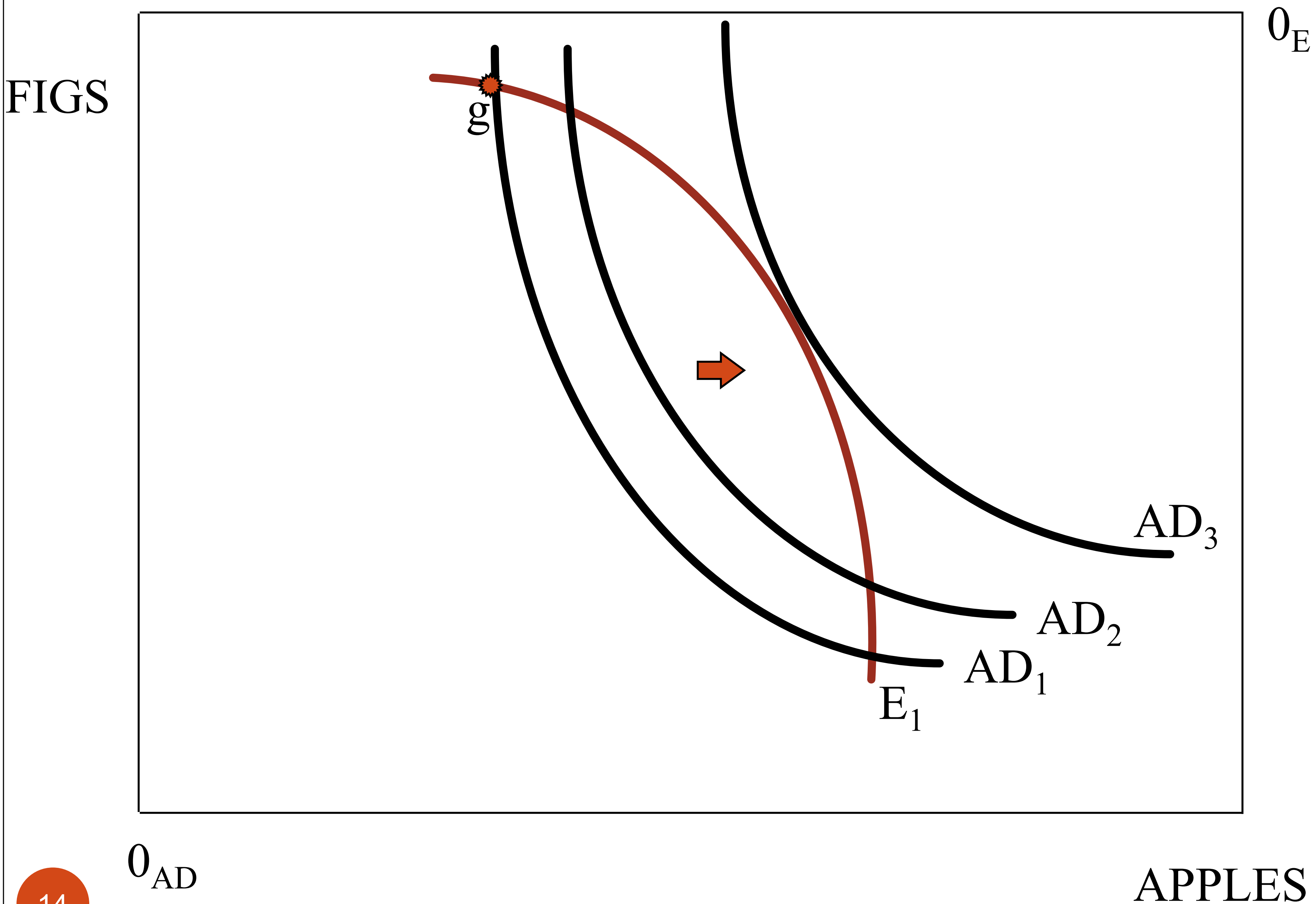
Edgeworth box


FIGS
0_E
g
Pareto Superior Points
AD_1
E_1
0_{AD}
APPLES

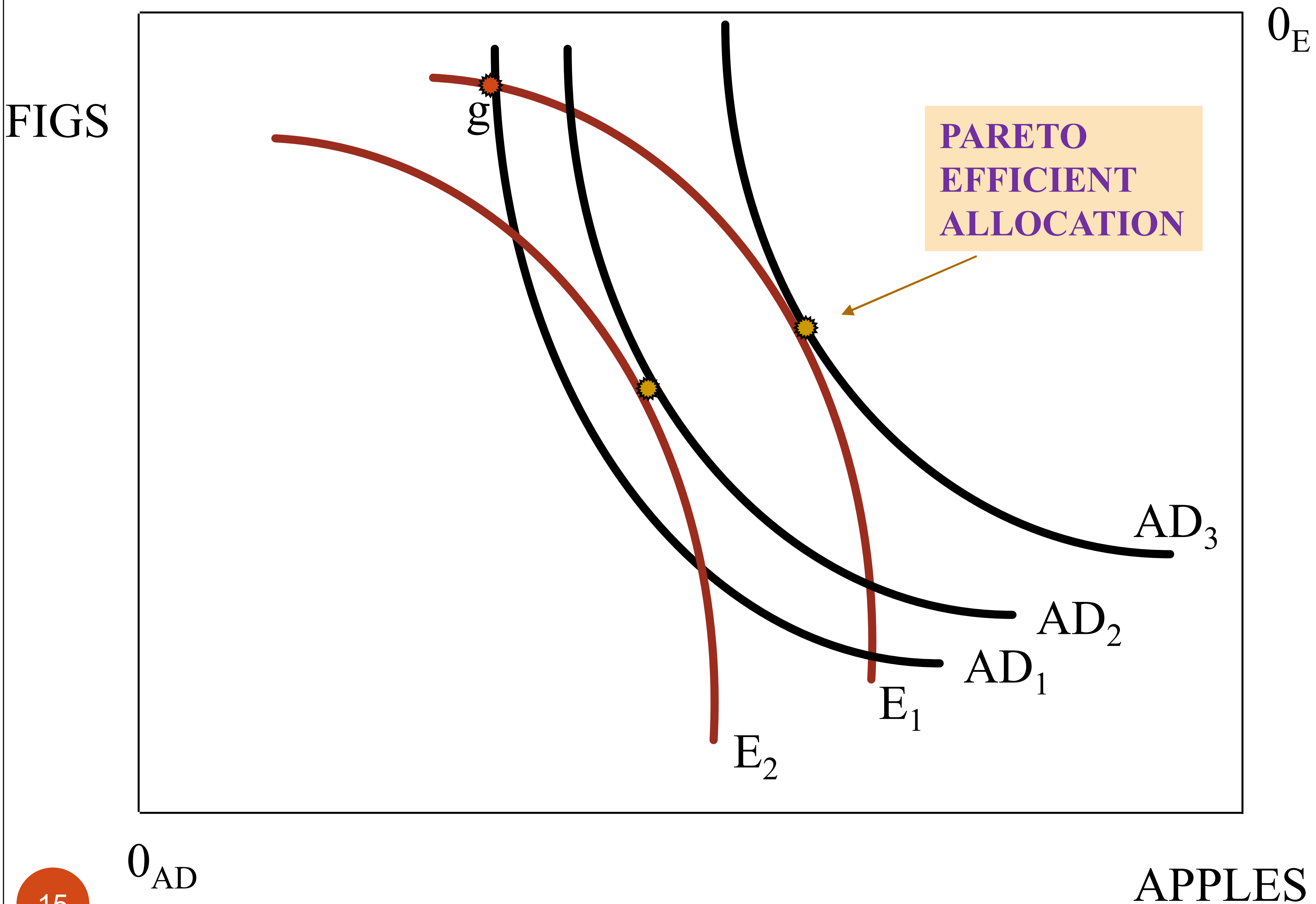
Edgeworth box


FIGS
0_E
g
AD_2
AD_1
E_1
0_{AD}
APPLES

Edgeworth box


0_E
FIGS
g
AD_3
AD_2
AD_1
E_1
0_{AD}
APPLES

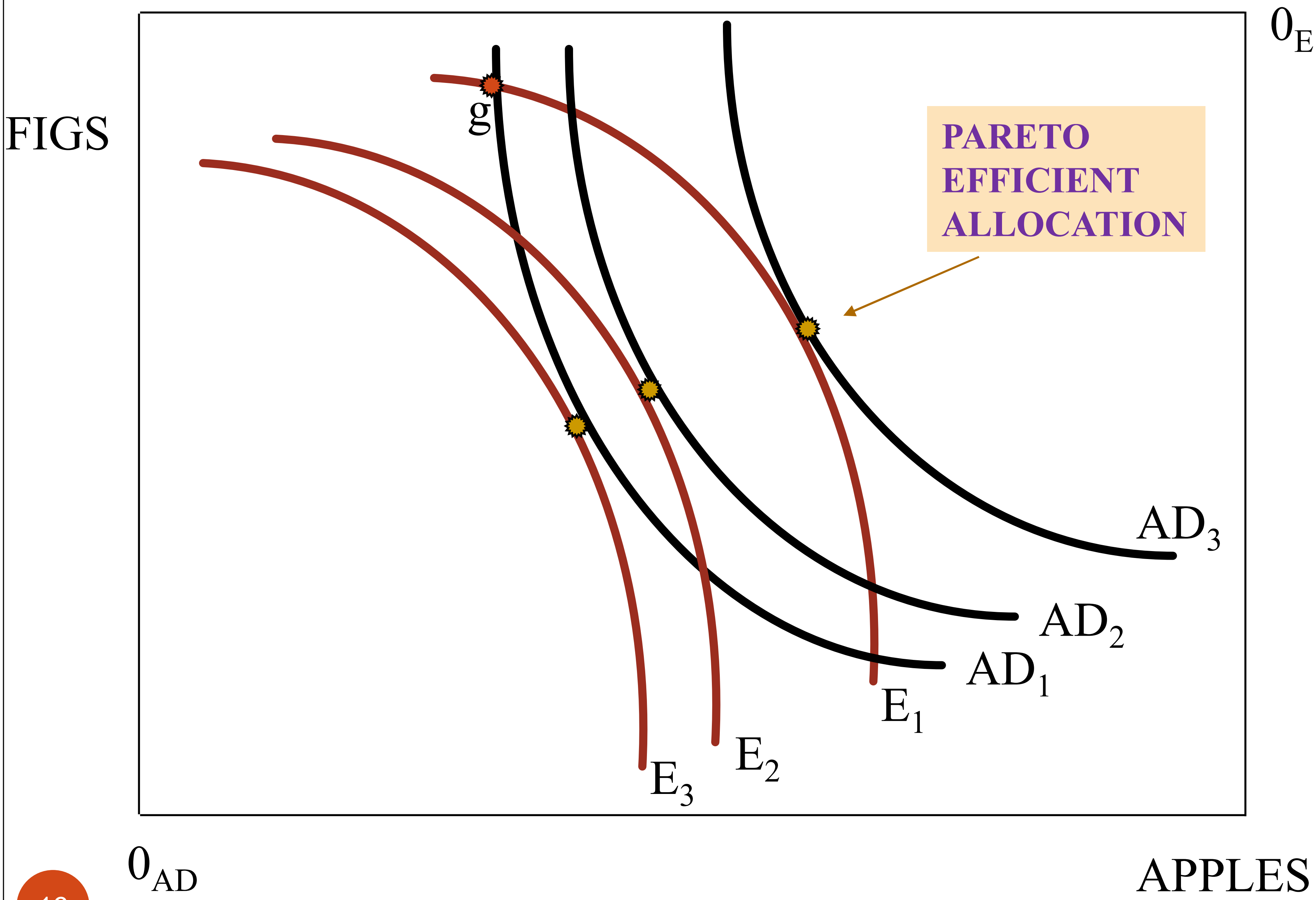
Edgeworth box



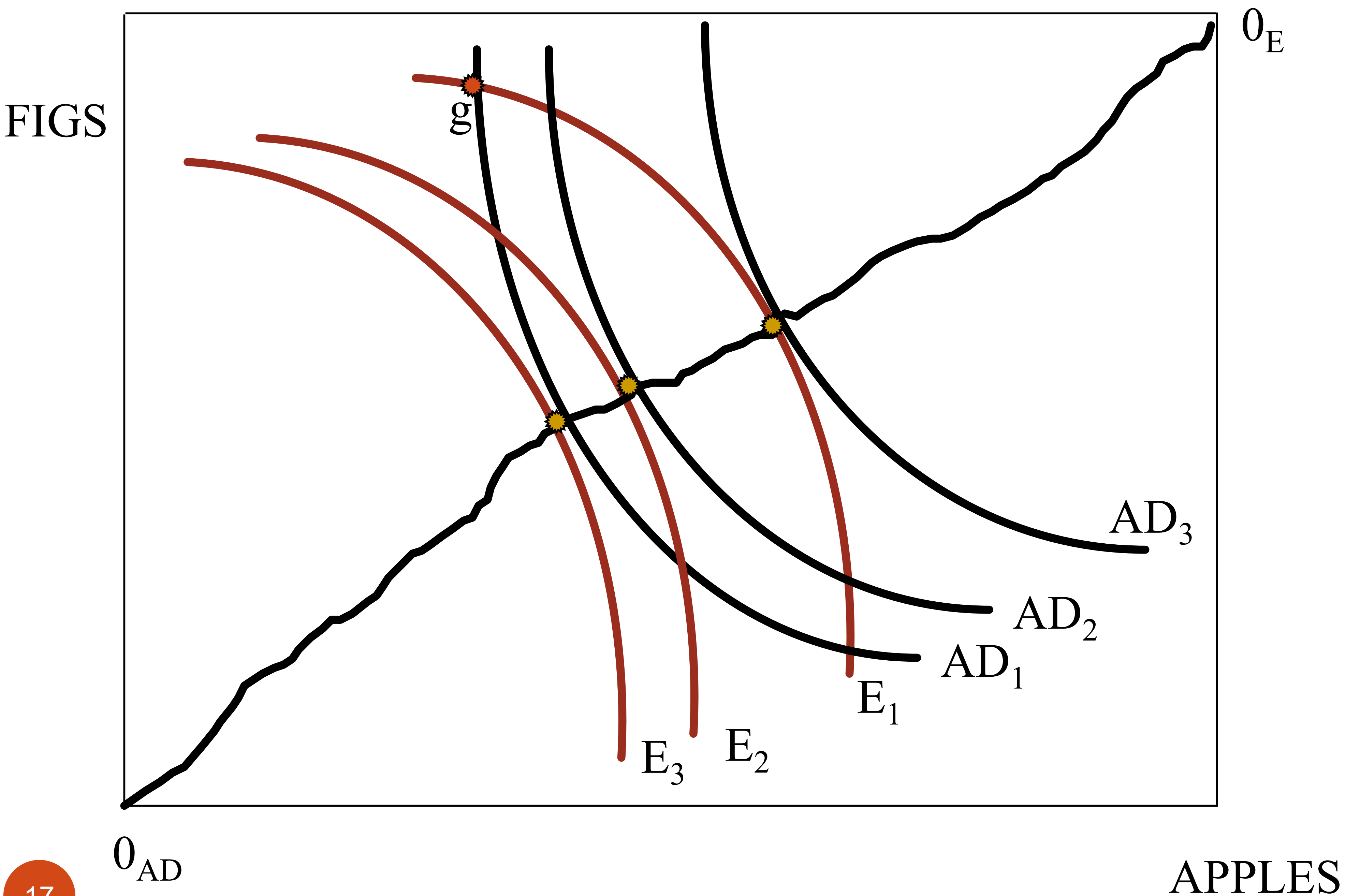
0$_E$
FIGS
g
AD$_3$
AD$_2$
AD$_1$
E$_1$
E$_2$
0$_{AD}$
APPLES

PARETO EFFICIENT ALLOCATION

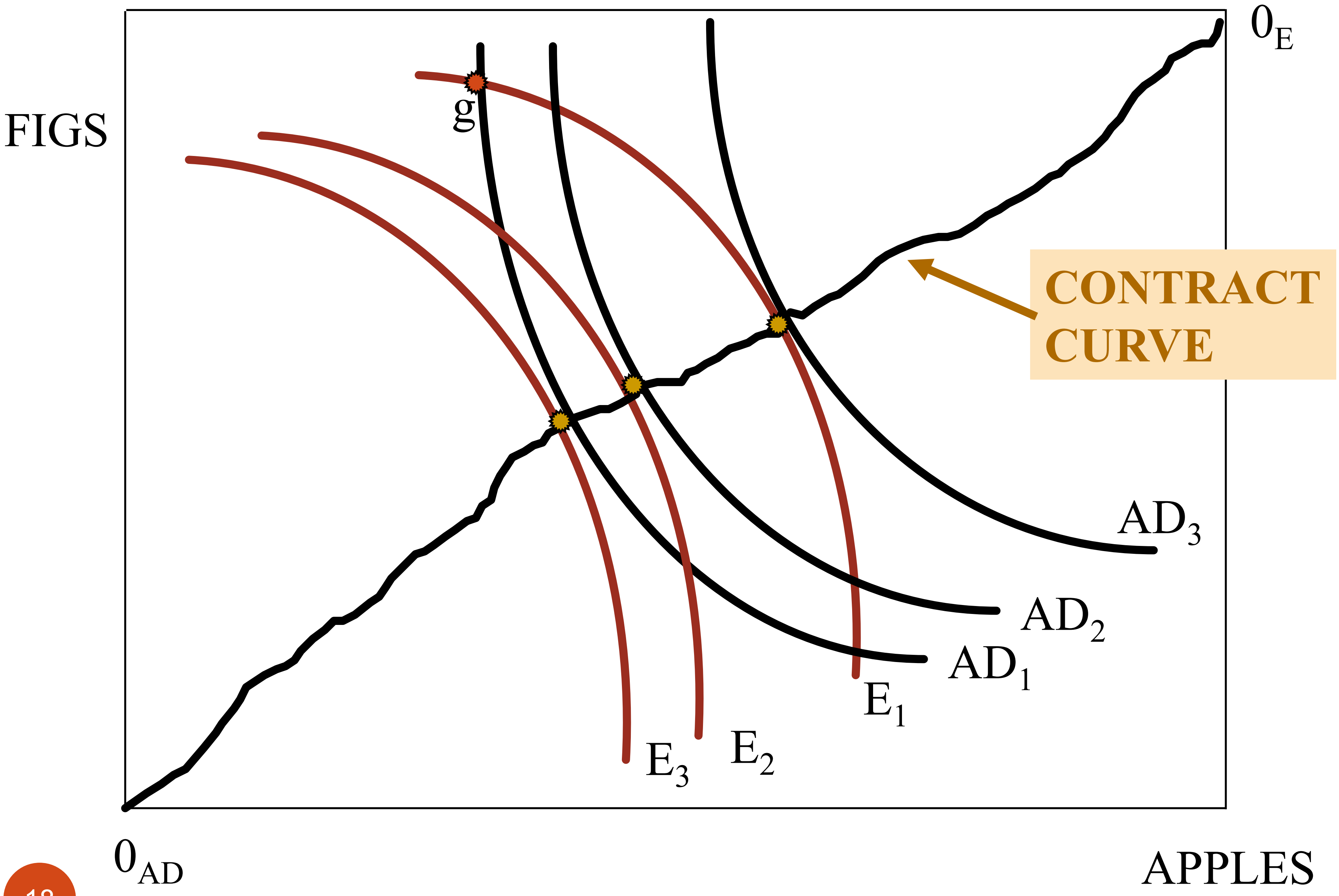
Edgeworth box


0E
FIGS
g
PARETO EFFICIENT ALLOCATION
AD3
AD2
AD1
E1
E2
E3
0AD
APPLES

Edgeworth box


0_E
FIGS
g
AD3
AD2
AD1
E1
E3
E2
0_AD
APPLES

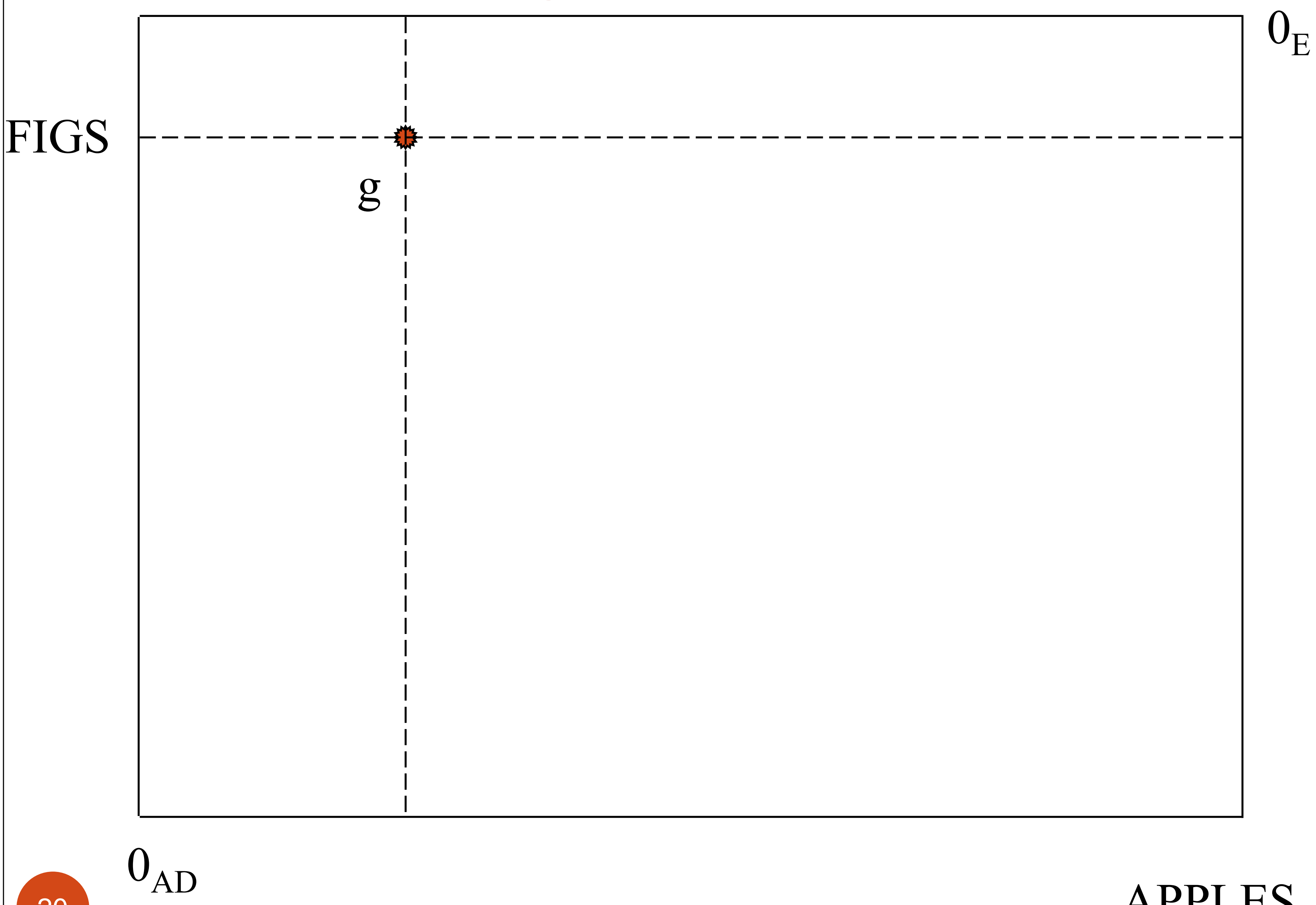
Edgeworth box


0_E
FIGS
g
AD_3
AD_2
AD_1
E_1
E_2
E_3
0_{AD}
APPLES

CONTRACT CURVE

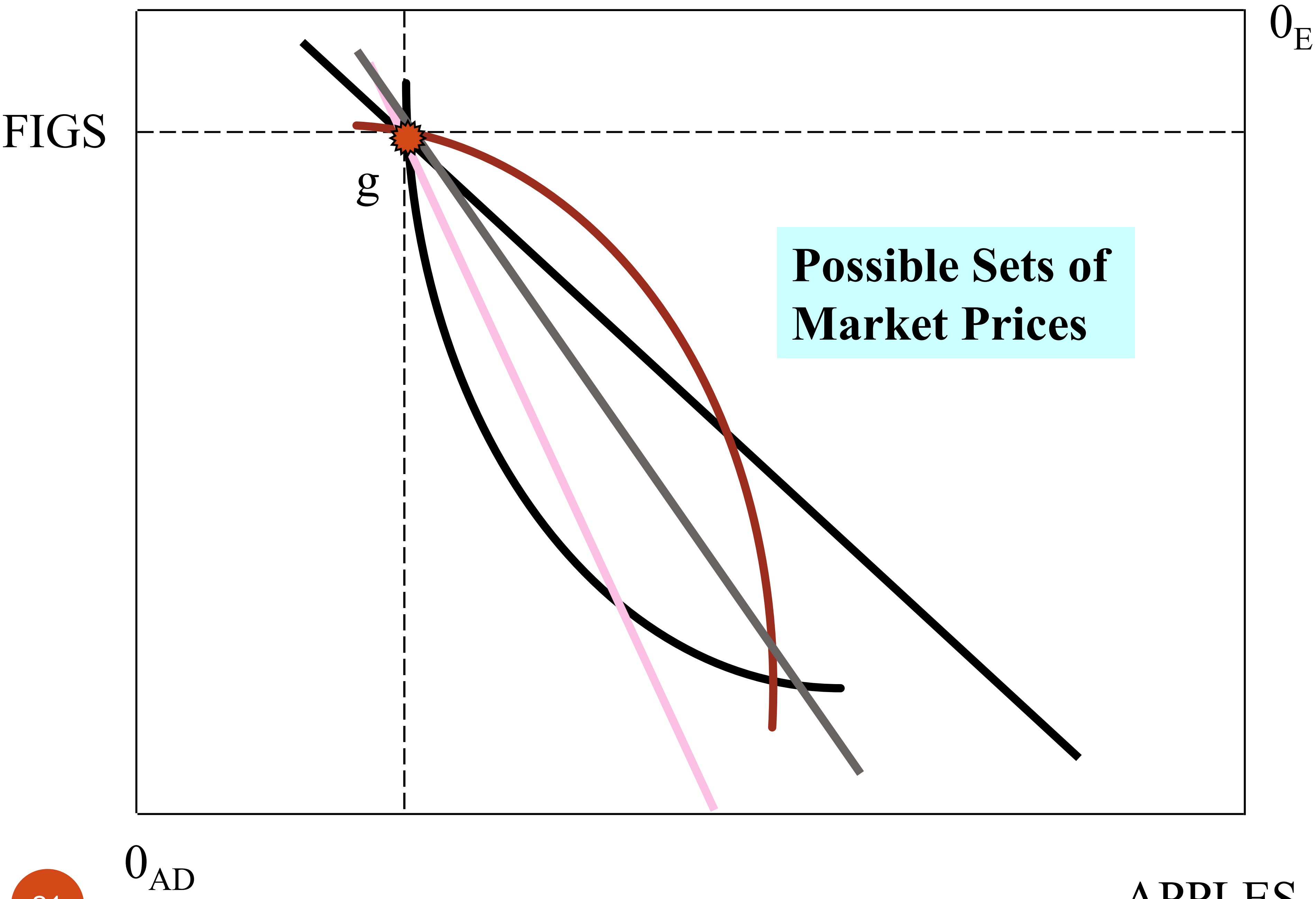
How do the individual’s get to the contract line from point g ?

Edgeworth box



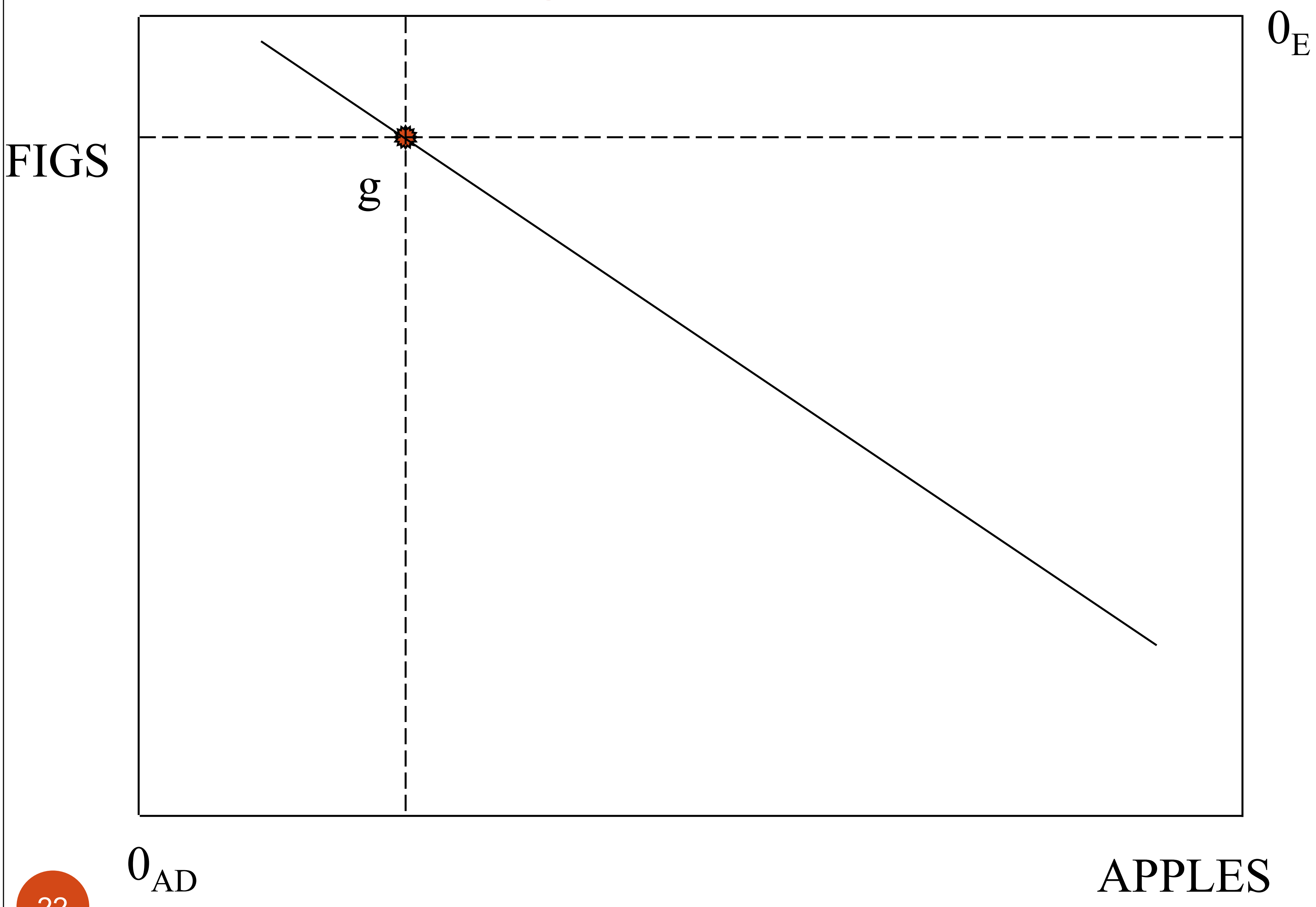
0E
FIGS
g
0AD
APPLES

Edgeworth box

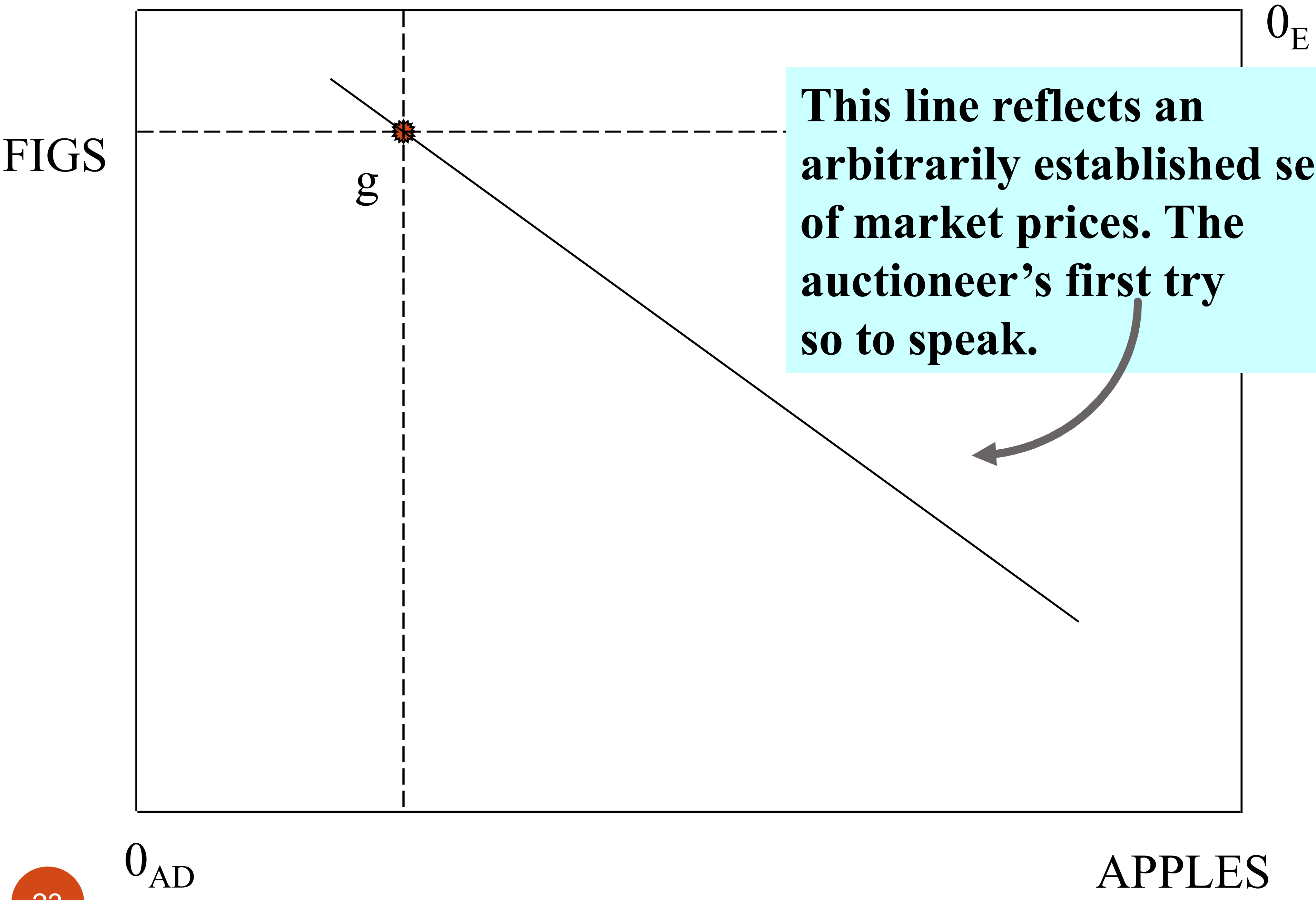

0$_E$
FIGS
g
0$_{AD}$
APPLES

Possible Sets of Market Prices

Edgeworth box

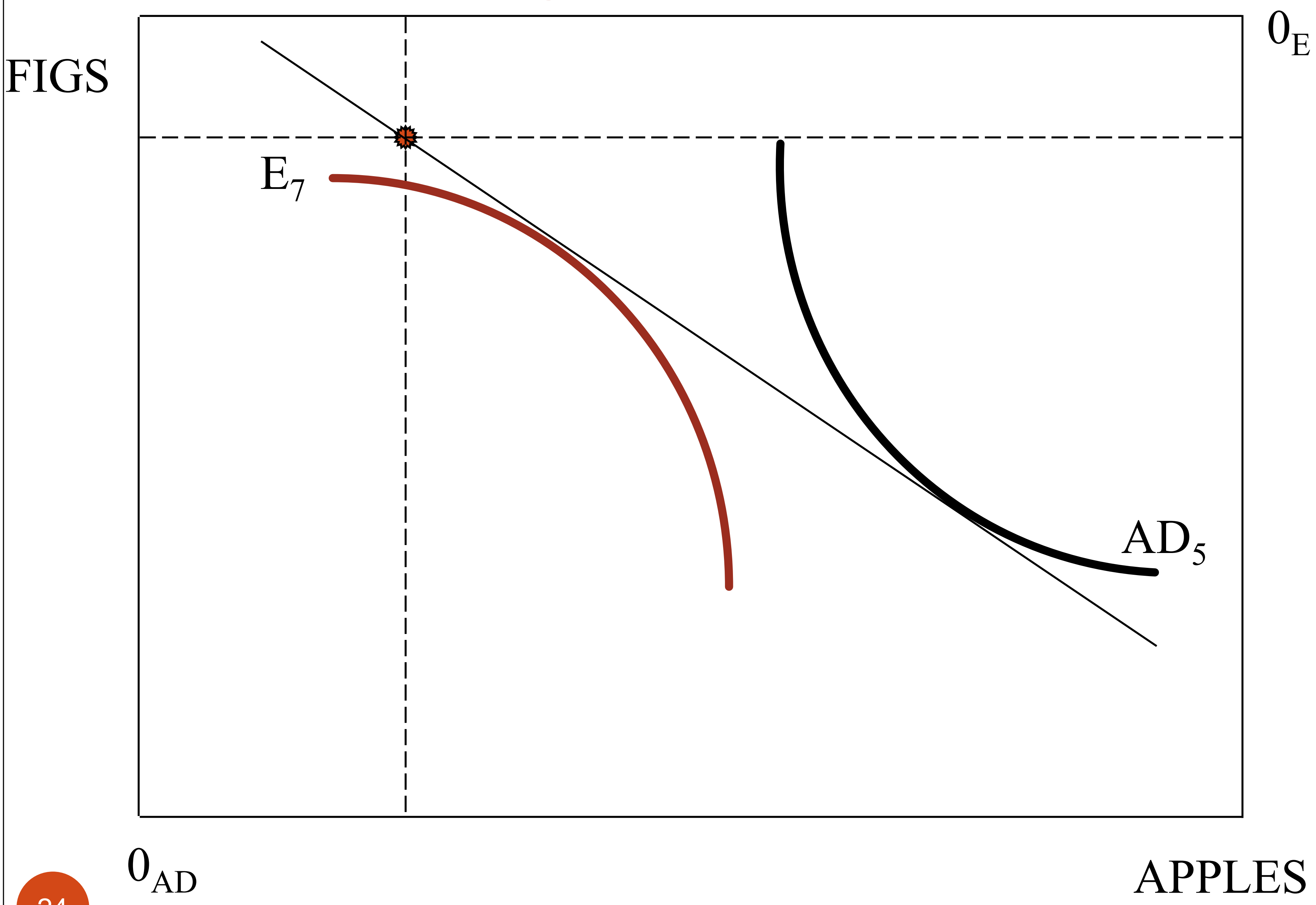

0$_E$
FIGS
g
0$_{AD}$
APPLES

Edgeworth box

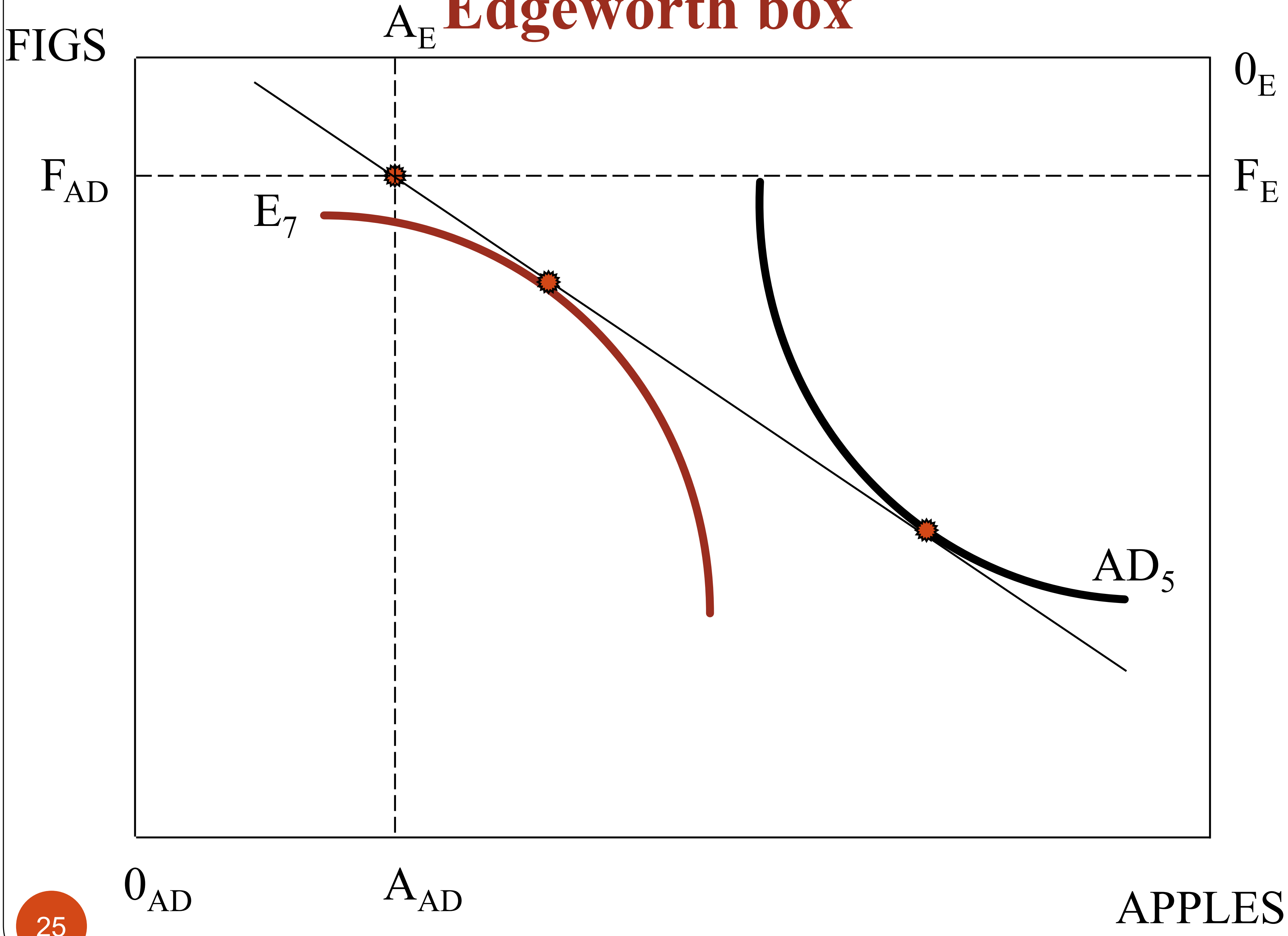

0_E
FIGS
g
0_{AD}
APPLES

This line reflects an arbitrarily established set of market prices. The auctioneer's first try so to speak.

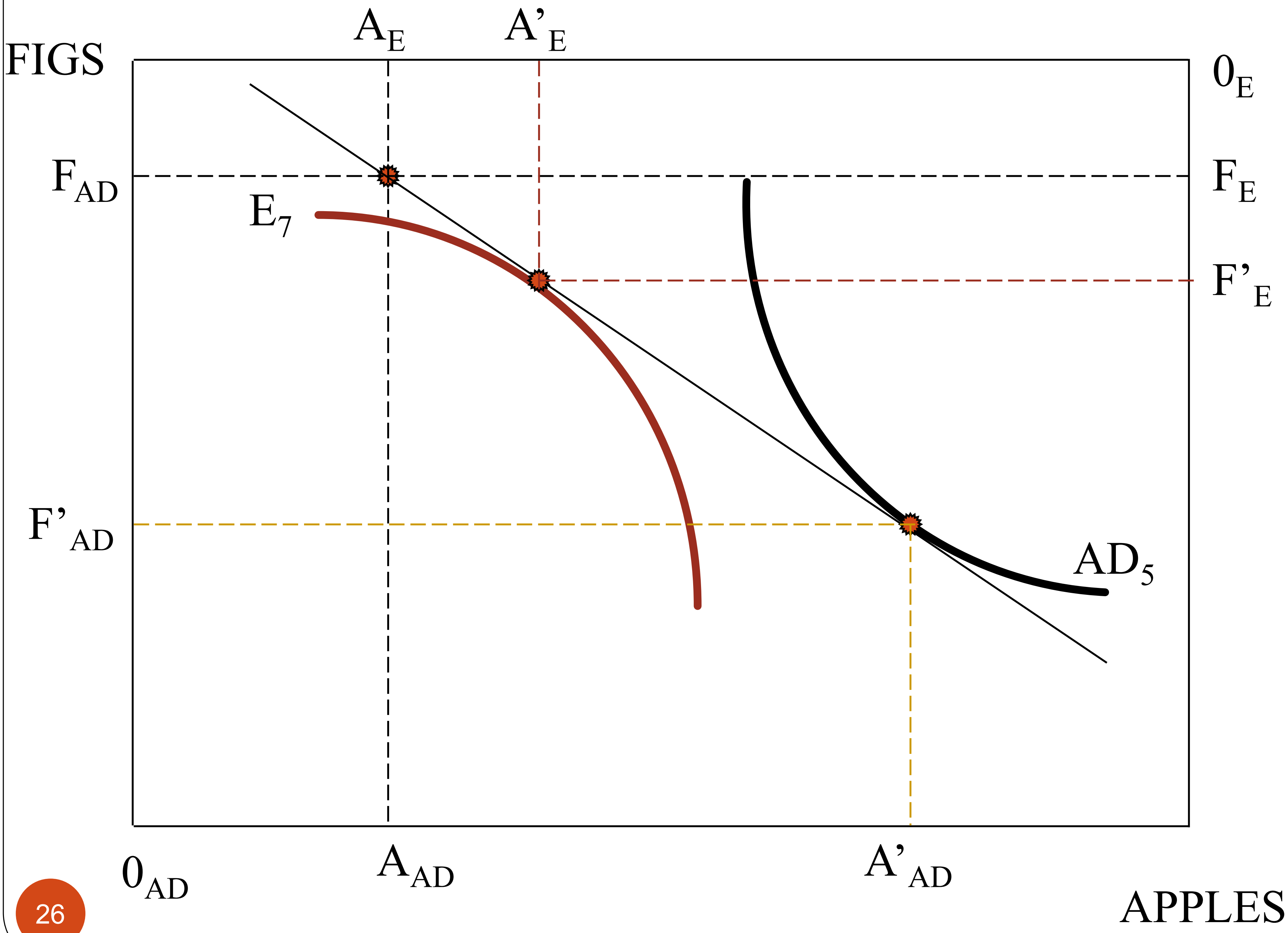
Edgeworth box


FIGS
0_E
E_7
AD_5
0_{AD}
APPLES

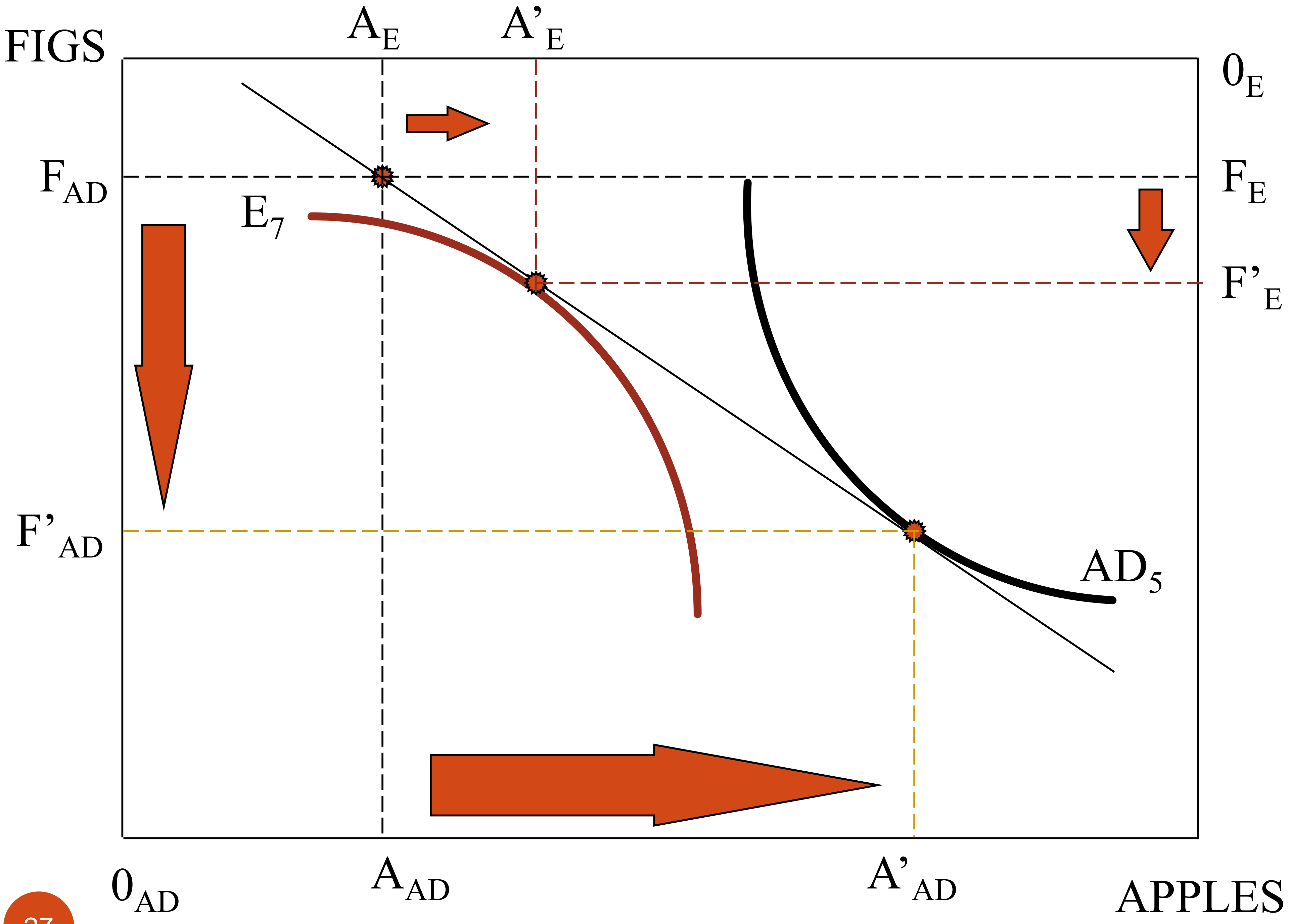
Edgeworth box



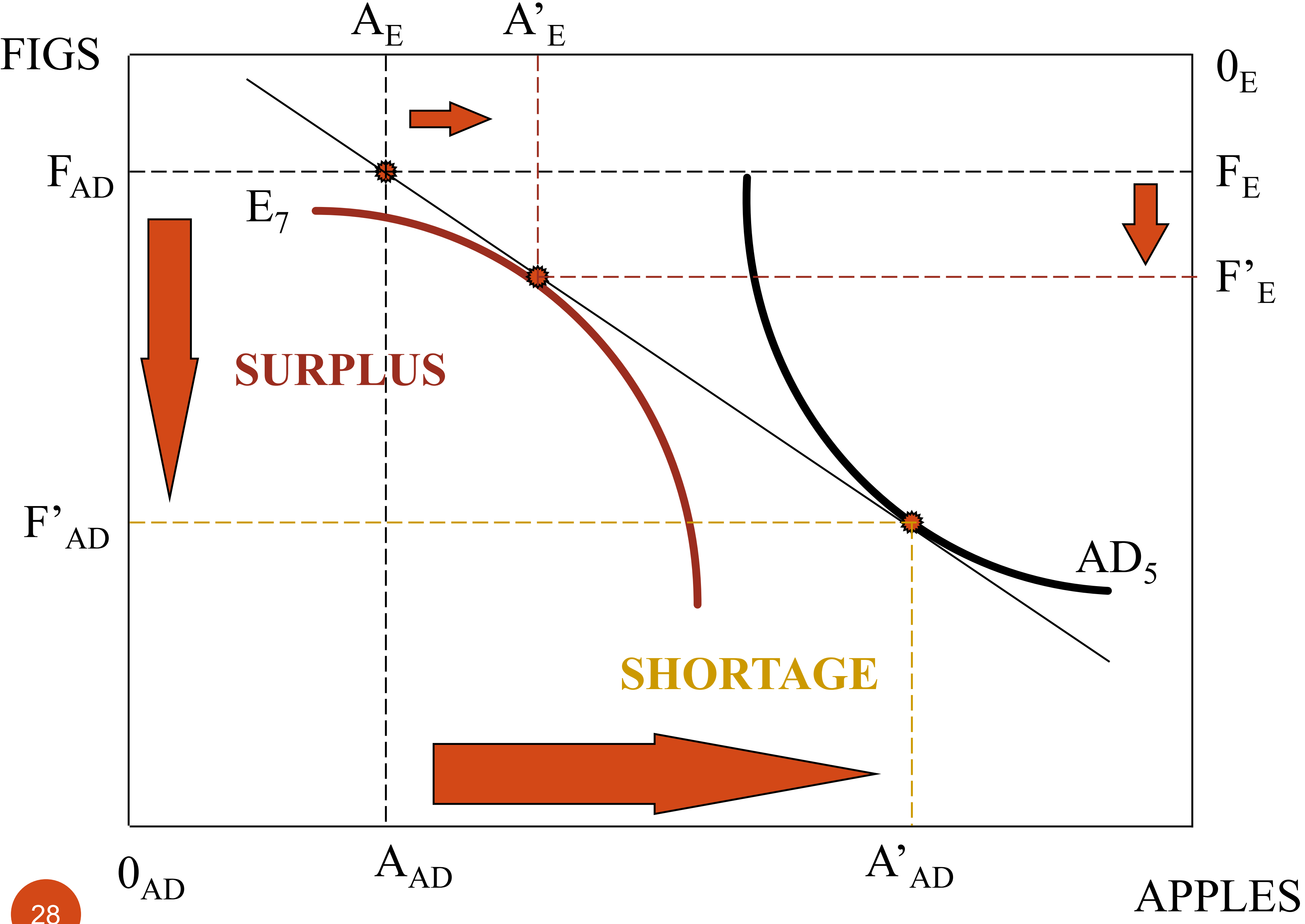
FIGS
A_E
0_E
F_{AD}
F_E
E_7
AD_5
0_{AD}
A_{AD}
APPLES

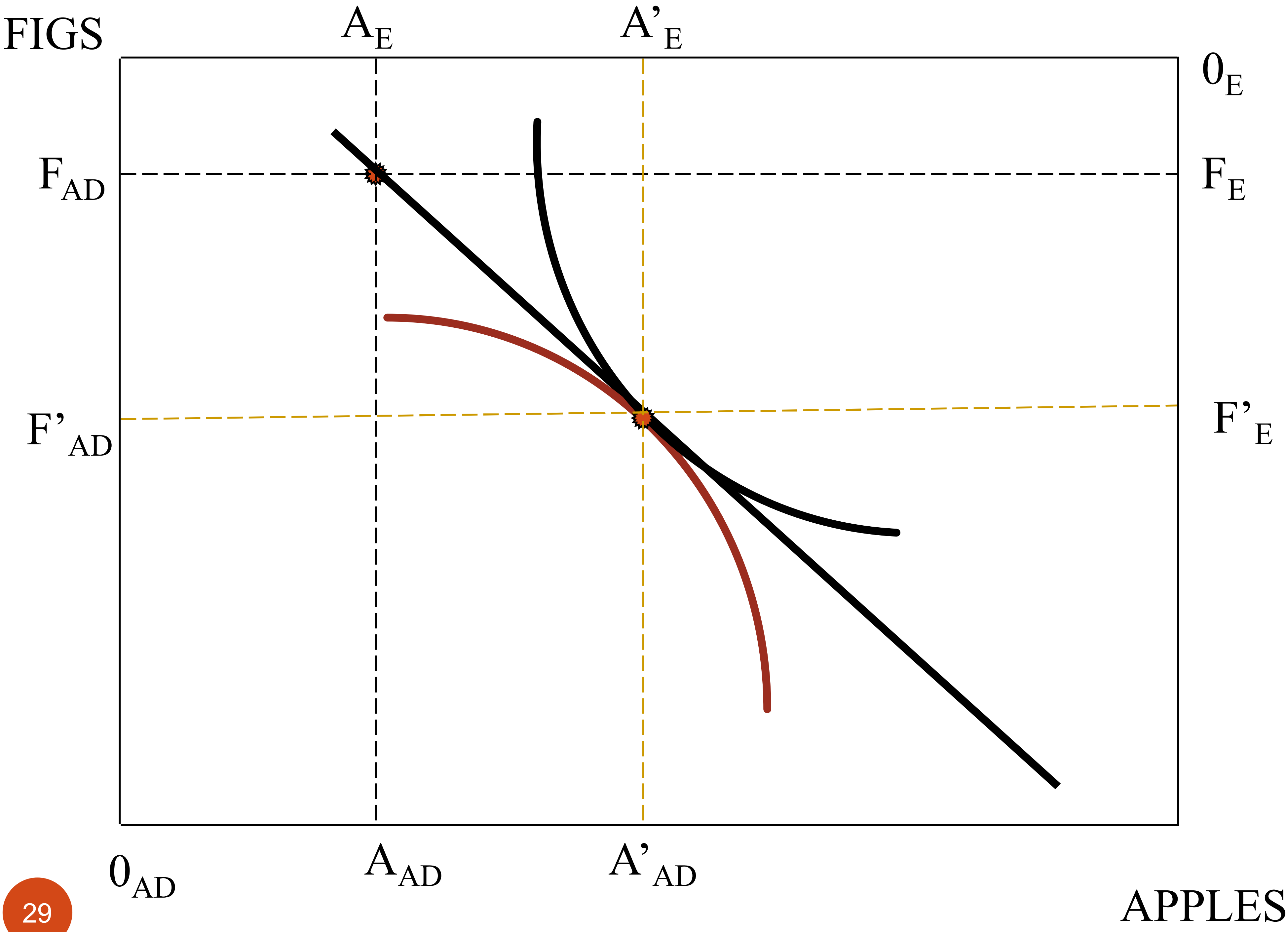


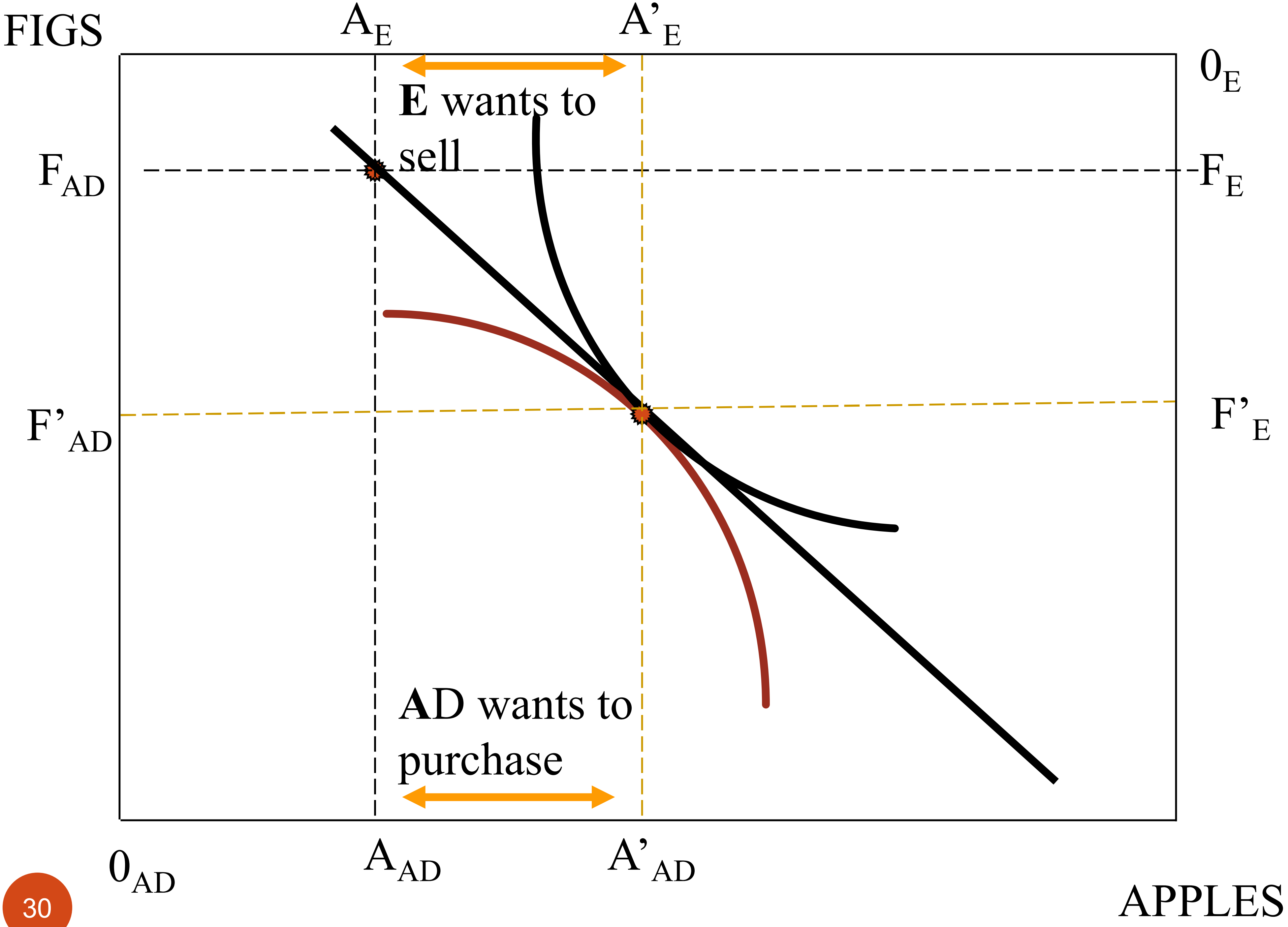
A_E
A'_E
FIGS
0_E
F_{AD}
F_E
E_7
F'_E
F'_{AD}
AD_5
0_{AD}
A_{AD}
A'_{AD}
APPLES



FIGS
A_E
A'_E
0_E
F_AD
F_E
E_7
F'_E
F'_AD
AD_5
0_AD
A_AD
A'_AD
APPLES

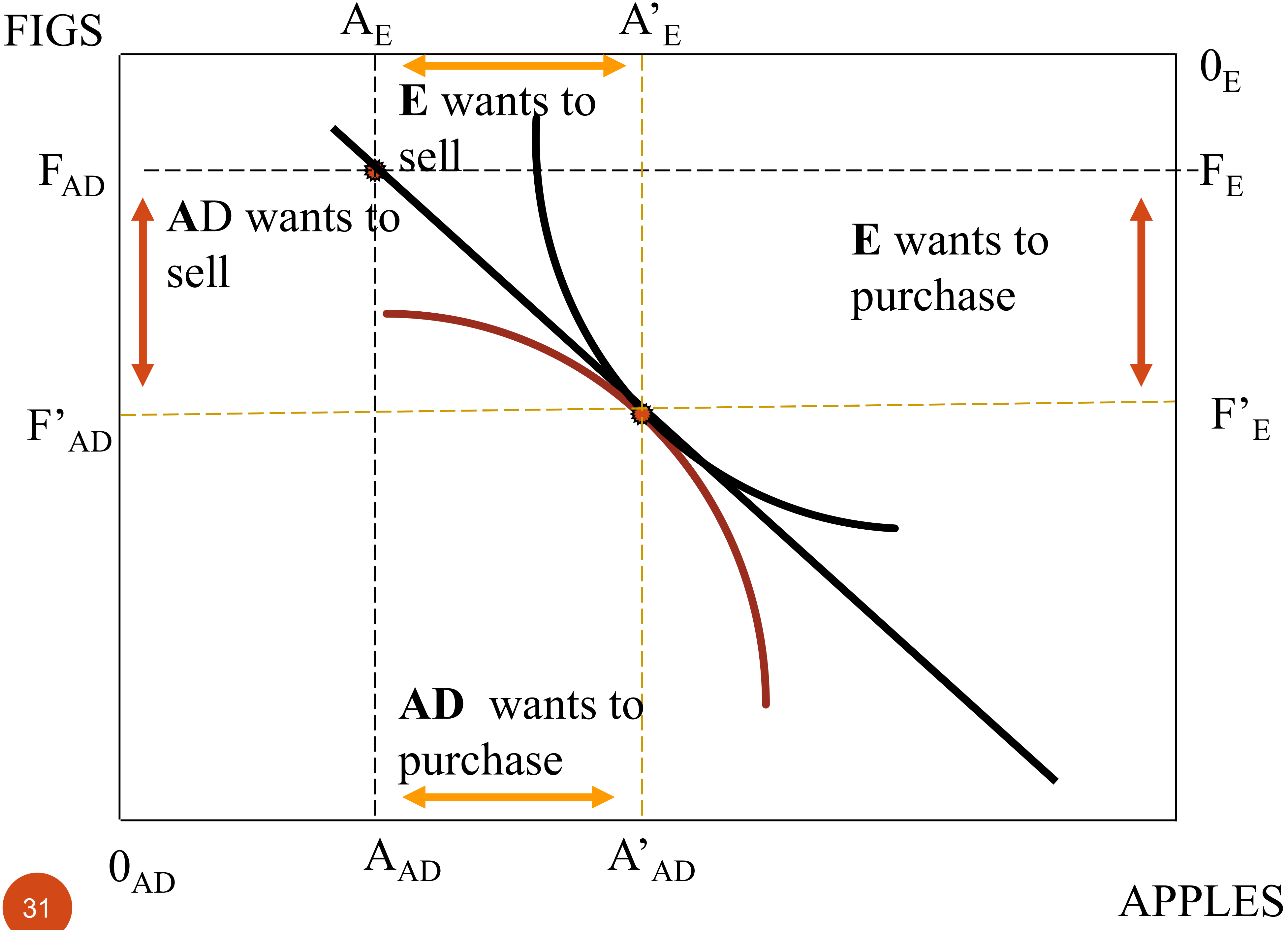

FIGS
A$_E$
A'$_E$
0$_E$
F$_{AD}$
F$_E$
E$_7$
F'$_E$
SURPLUS
F'$_{AD}$
AD$_5$
SHORTAGE
0$_{AD}$
A$_{AD}$
A'$_{AD}$
APPLES


FIGS
A_E
A'_E
0_E
F_AD
F_E
F'_AD
F'_E
0_AD
A_AD
A'_AD
APPLES


FIGS
A_E
A'_E
0_E
F_{AD}
F_E
F'_{AD}
F'_E
0_{AD}
A_{AD}
A'_{AD}
APPLES

E wants to sell

AD wants to purchase


FIGS
A_E
A'_E
0_E
F_{AD}
F_E
F'_{AD}
F'_E
0_{AD}
A_{AD}
A'_{AD}
APPLES

E wants to sell

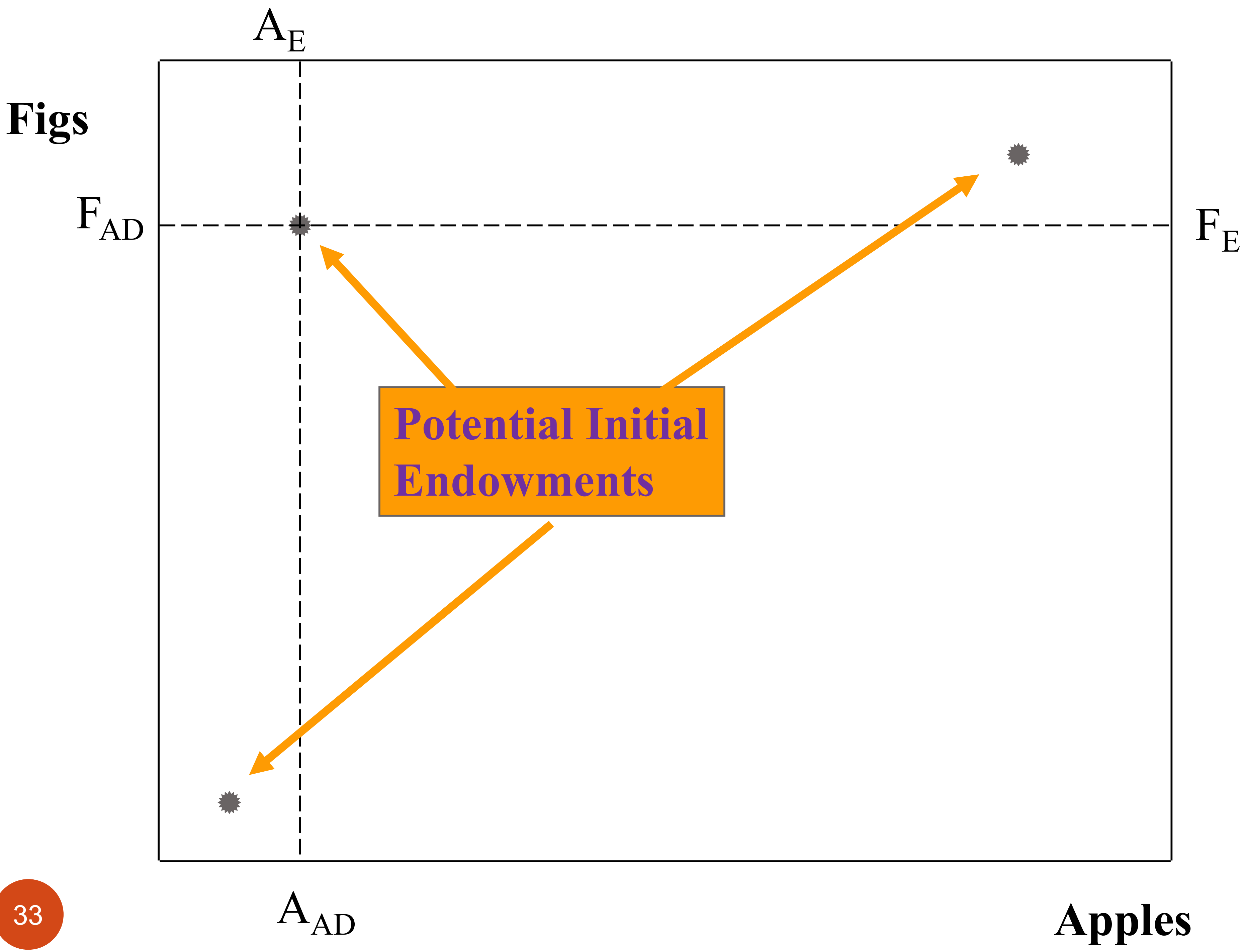
AD wants to sell

E wants to purchase

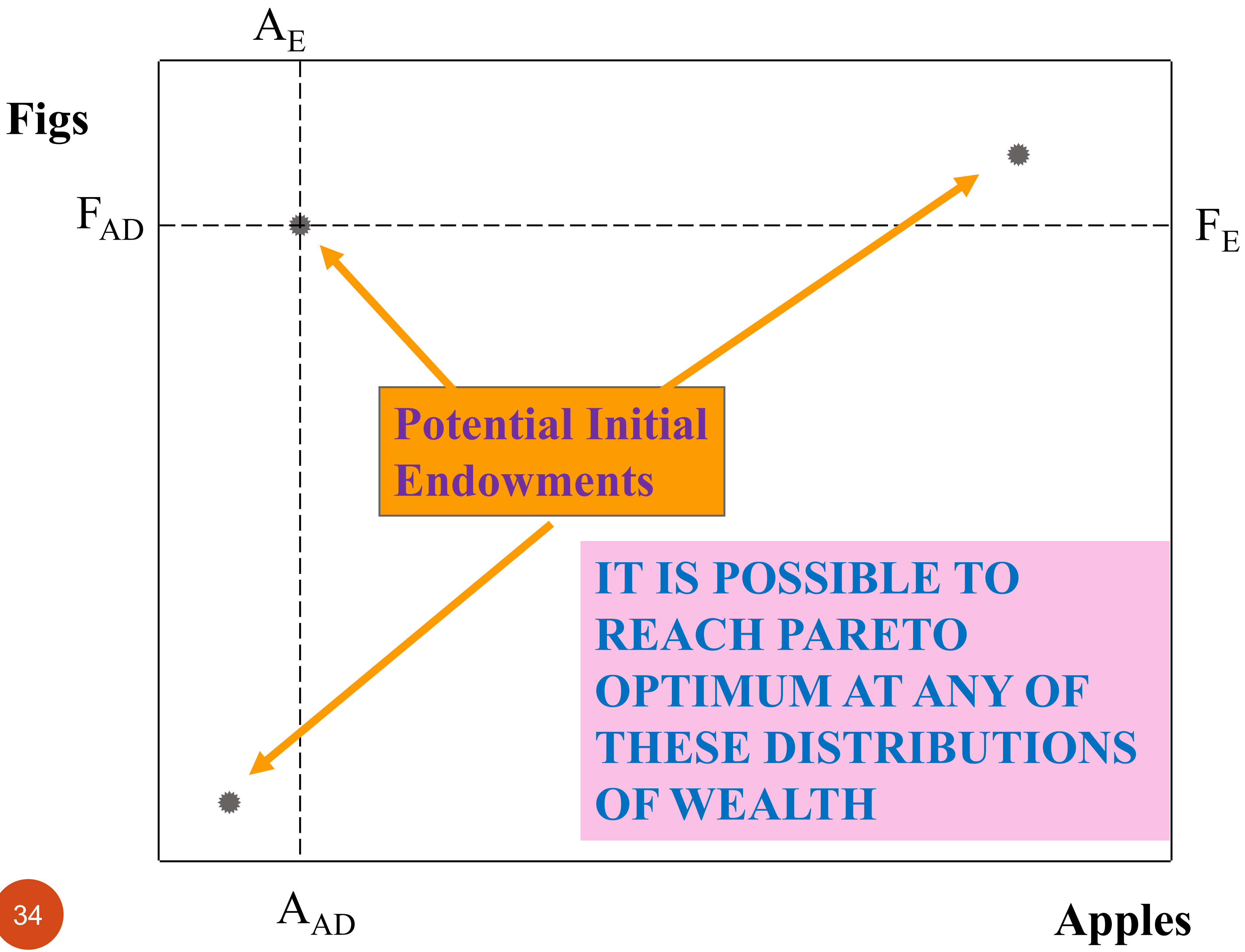
AD wants to purchase

Conditions for competitive equilibrium

- $\underline{\text{MRS}}^{AD} = \underline{\text{MRS}}^{E}$ (Pareto efficient allocation)
- Quantity demanded equals quantity supplied in all markets-- auction prices lead to market clearing

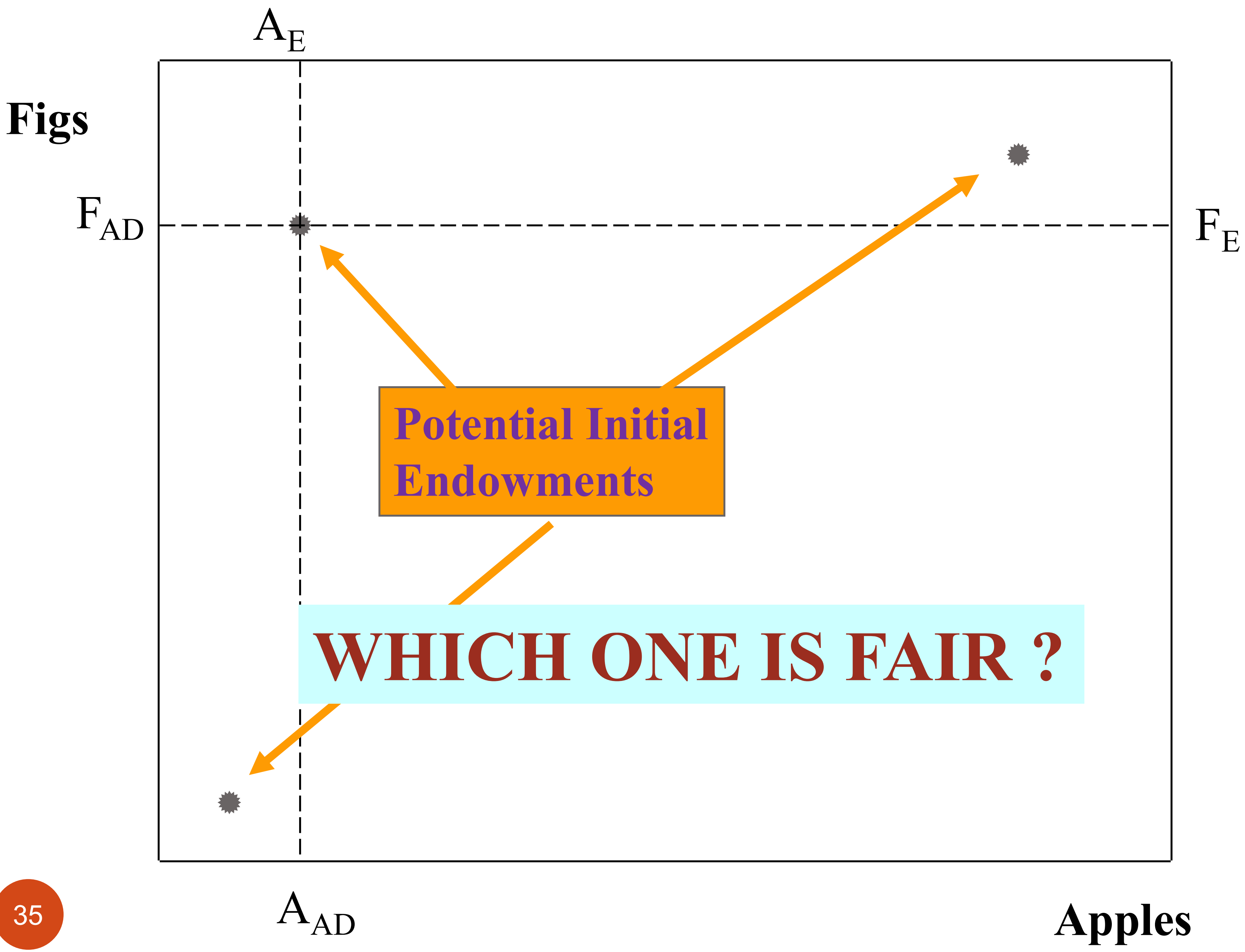

A_E
Figs
F_{AD}
F_E
A_{AD}
Apples

Potential Initial Endowments


A_E
Figs
F_{AD}
F_E
A_{AD}
Apples

Potential Initial Endowments

IT IS POSSIBLE TO REACH PARETO OPTIMUM AT ANY OF THESE DISTRIBUTIONS OF WEALTH


A_E
Figs
F_AD
F_E
A_AD
Apples

Potential Initial Endowments

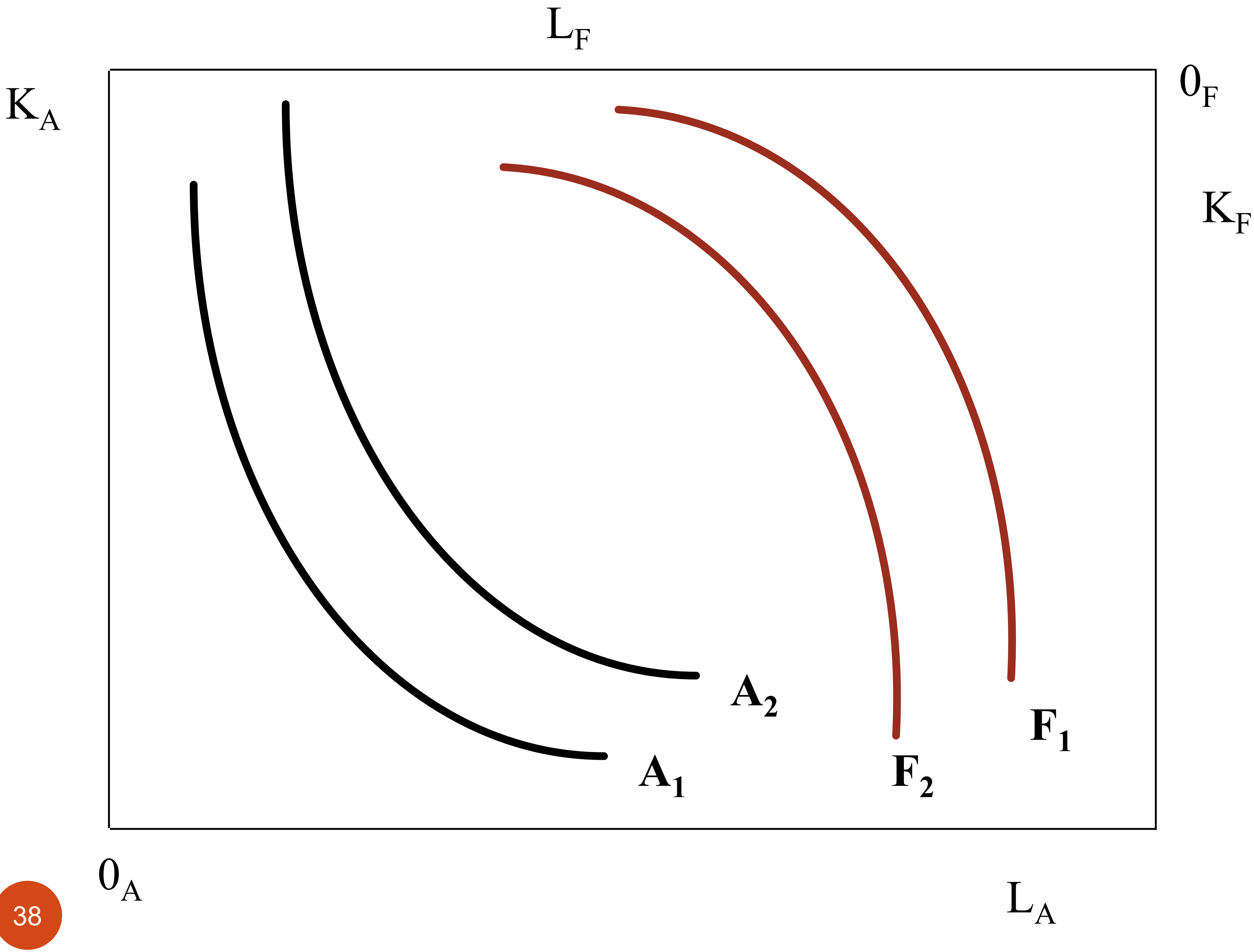
WHICH ONE IS FAIR ?

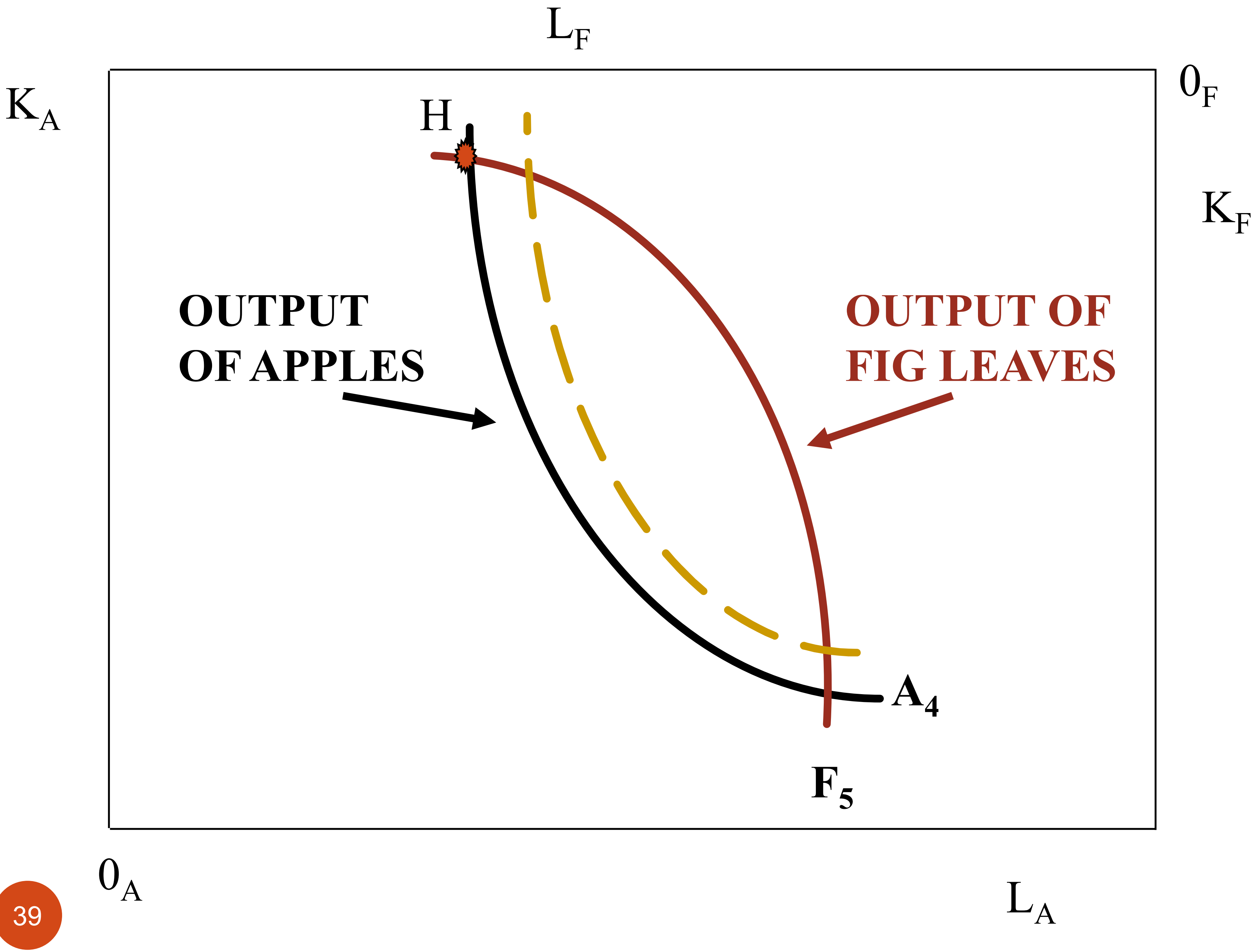
What process assures that consumers achieve a Pareto optimum in exchange ?

- Its the market pricing process that leads consumers to Pareto optimum.
- The prices convey ***correct*** information and consumers equate their subjective evaluations to the objective reality or possibilities reflected in market prices.
- Flexible prices also lead to market clearing; that is a ***pure*** state where no surpluses or shortages exist.

Production side and constrained bliss

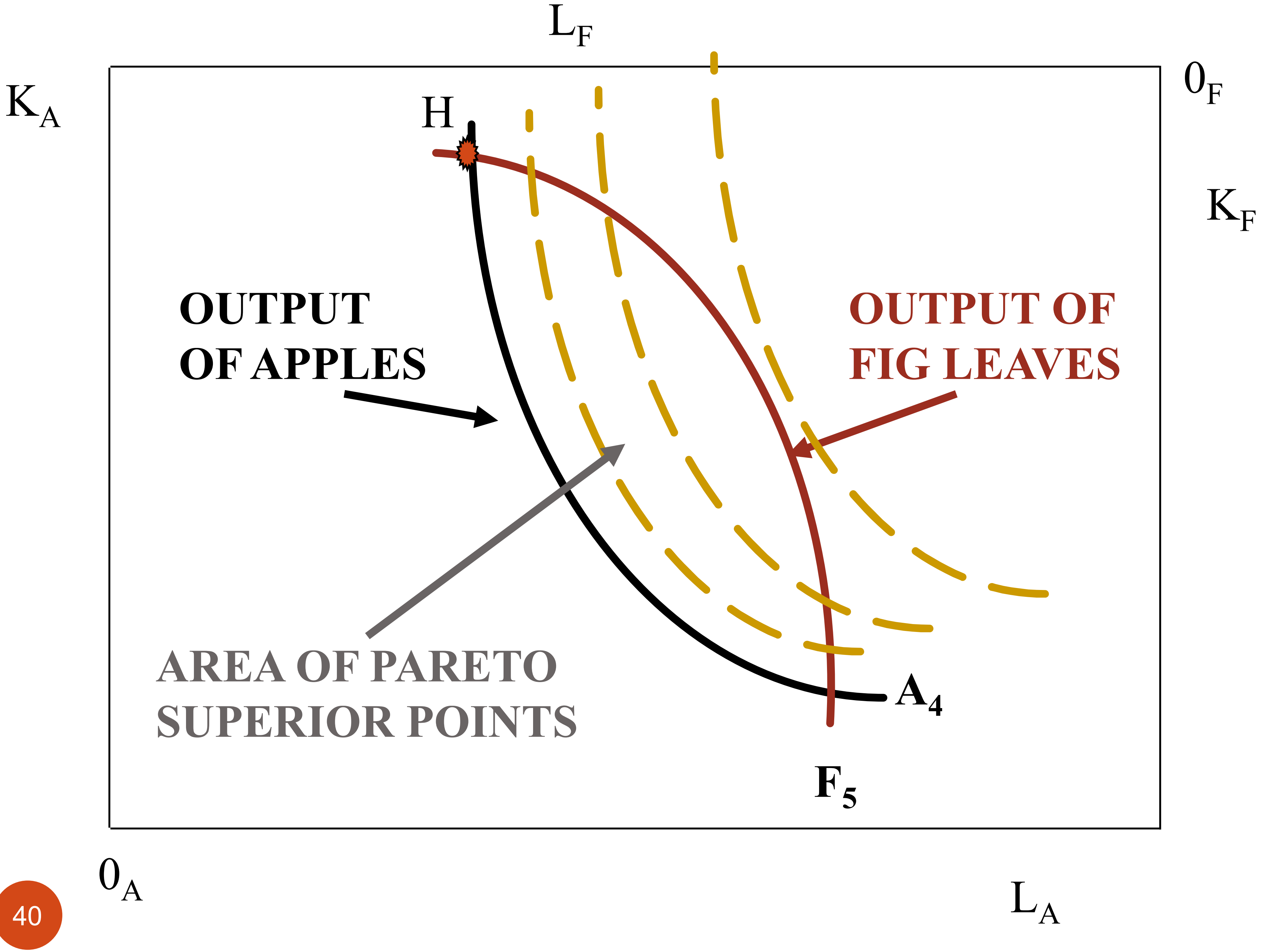
- Optimal use of society's scarce resources in the production of goods.


L_F
K_A
0_F
K_F
A_2
F_1
A_1
F_2
0_A
L_A


L_F
K_A
H
0_F
K_F
A_4
F_5
0_A
L_A

OUTPUT OF APPLES

OUTPUT OF FIG LEAVES

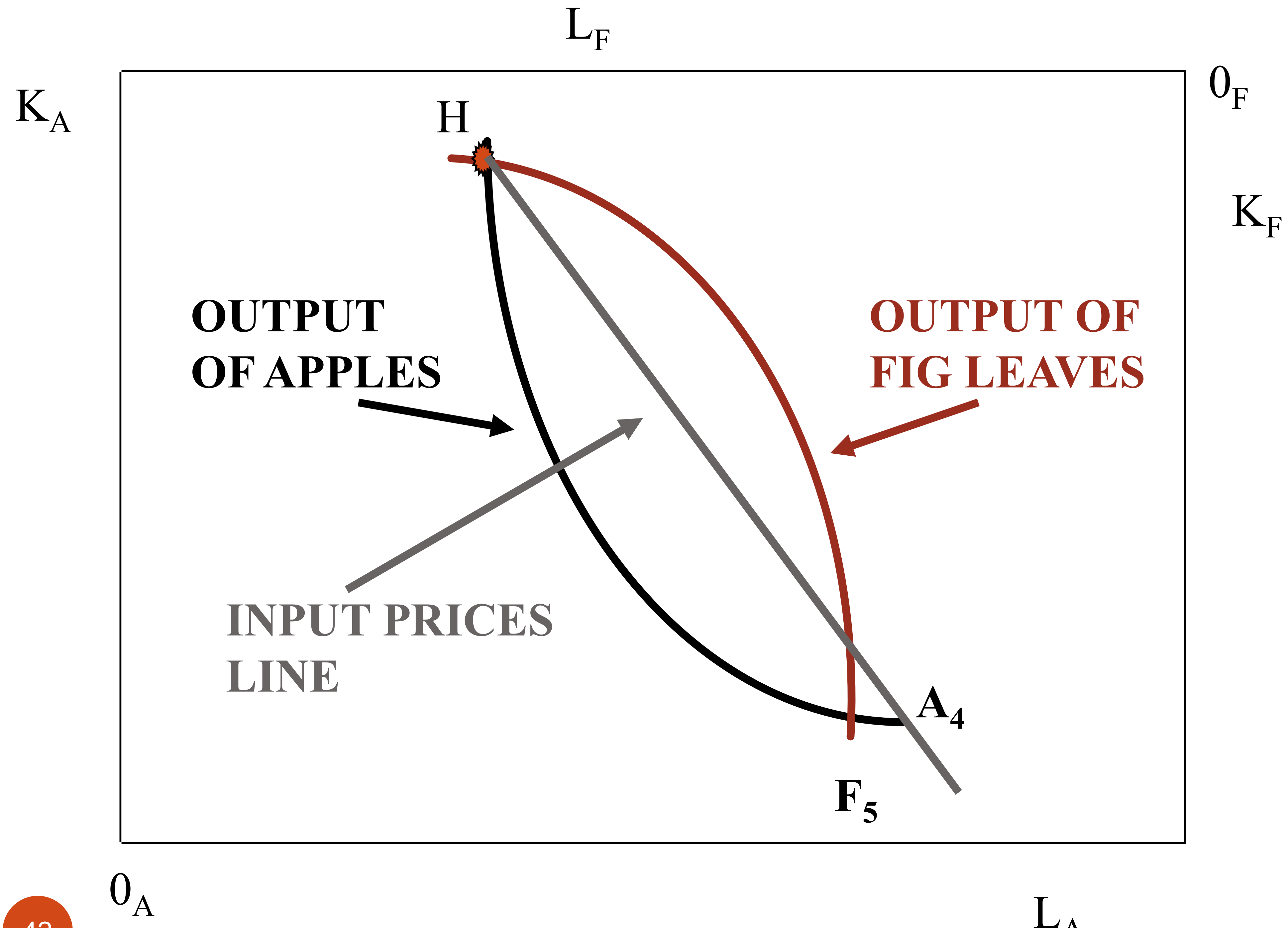

L_F
K_A
0_F
K_F
H
A_4
F_5
0_A
L_A

OUTPUT OF APPLES

OUTPUT OF FIG LEAVES

AREA OF PARETO SUPERIOR POINTS

How do the producers get to the contract line from point H ?



L_F

K_A

0_F

H

K_F

OUTPUT OF APPLES

OUTPUT OF FIG LEAVES

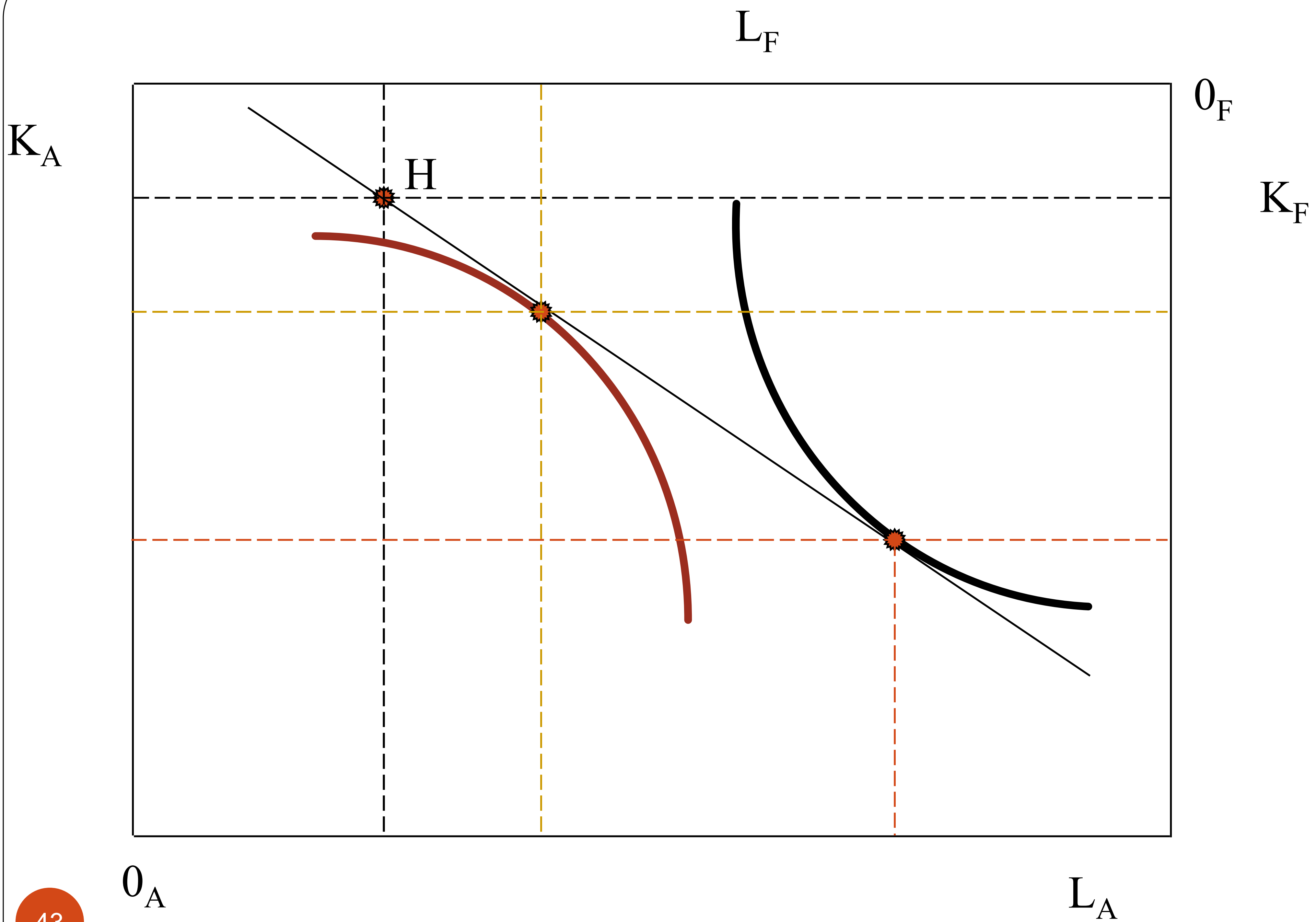
INPUT PRICES LINE

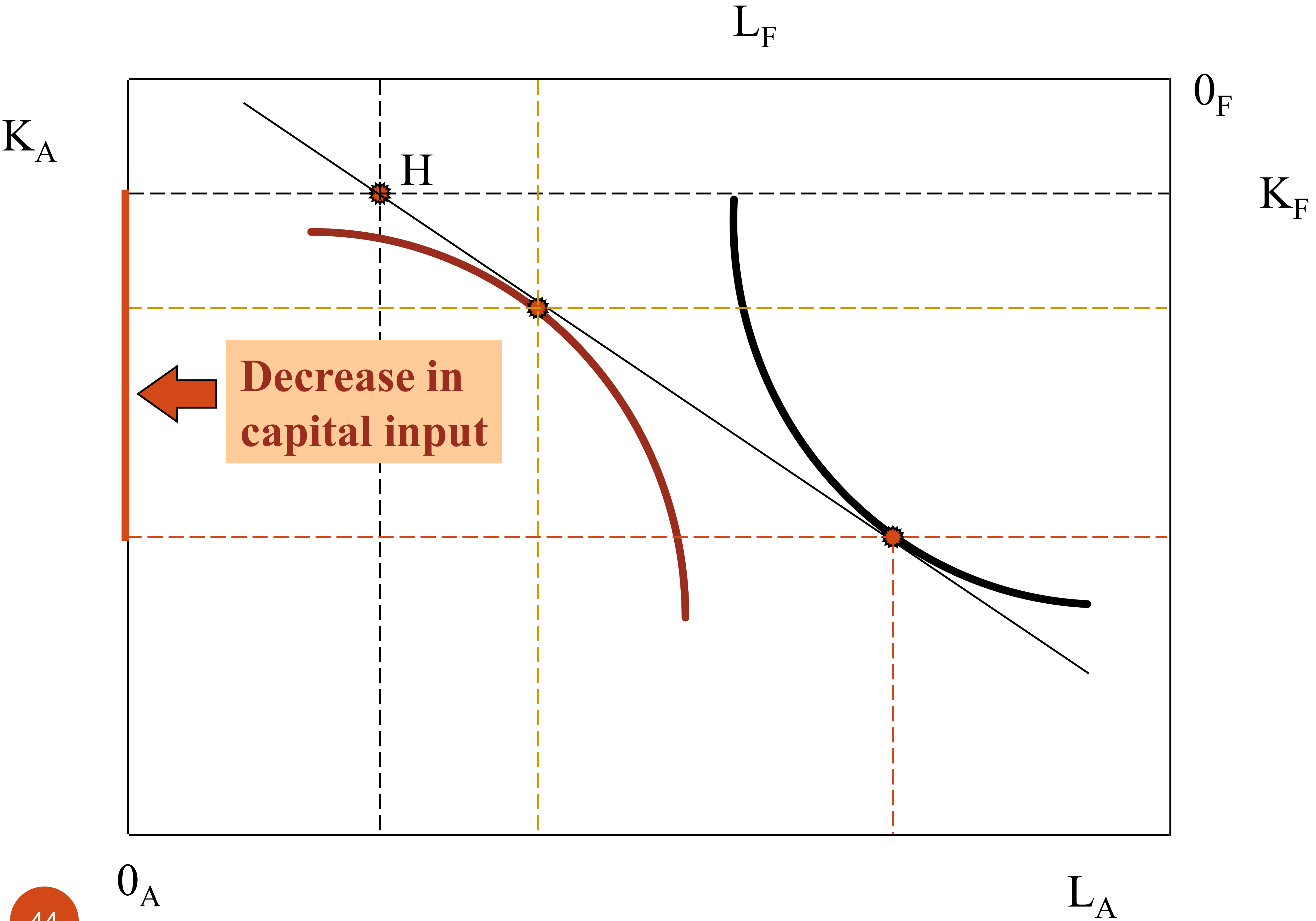
A_4

F_5

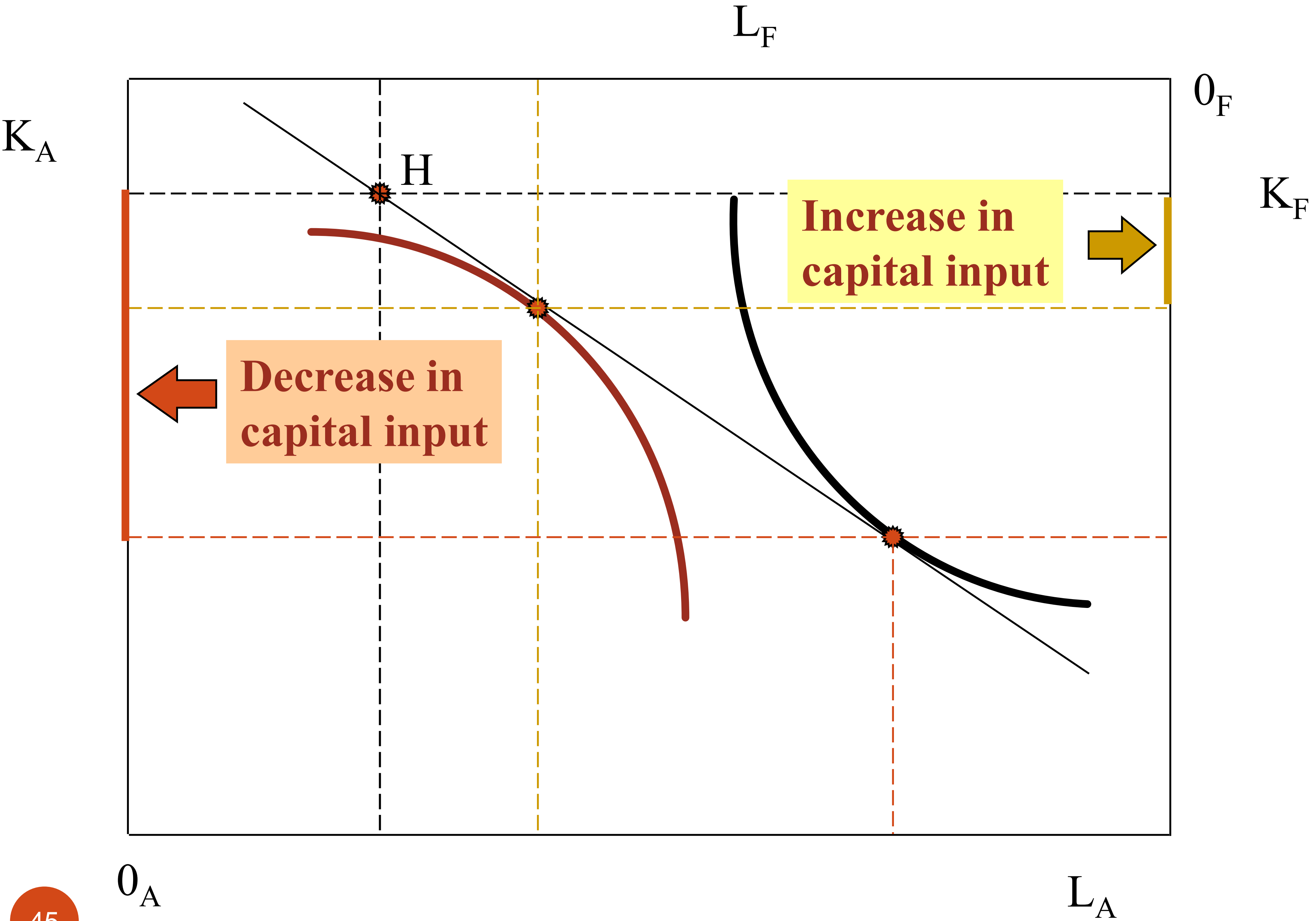
0_A

L_A


L_F
0_F
K_A
H
K_F
0_A
L_A

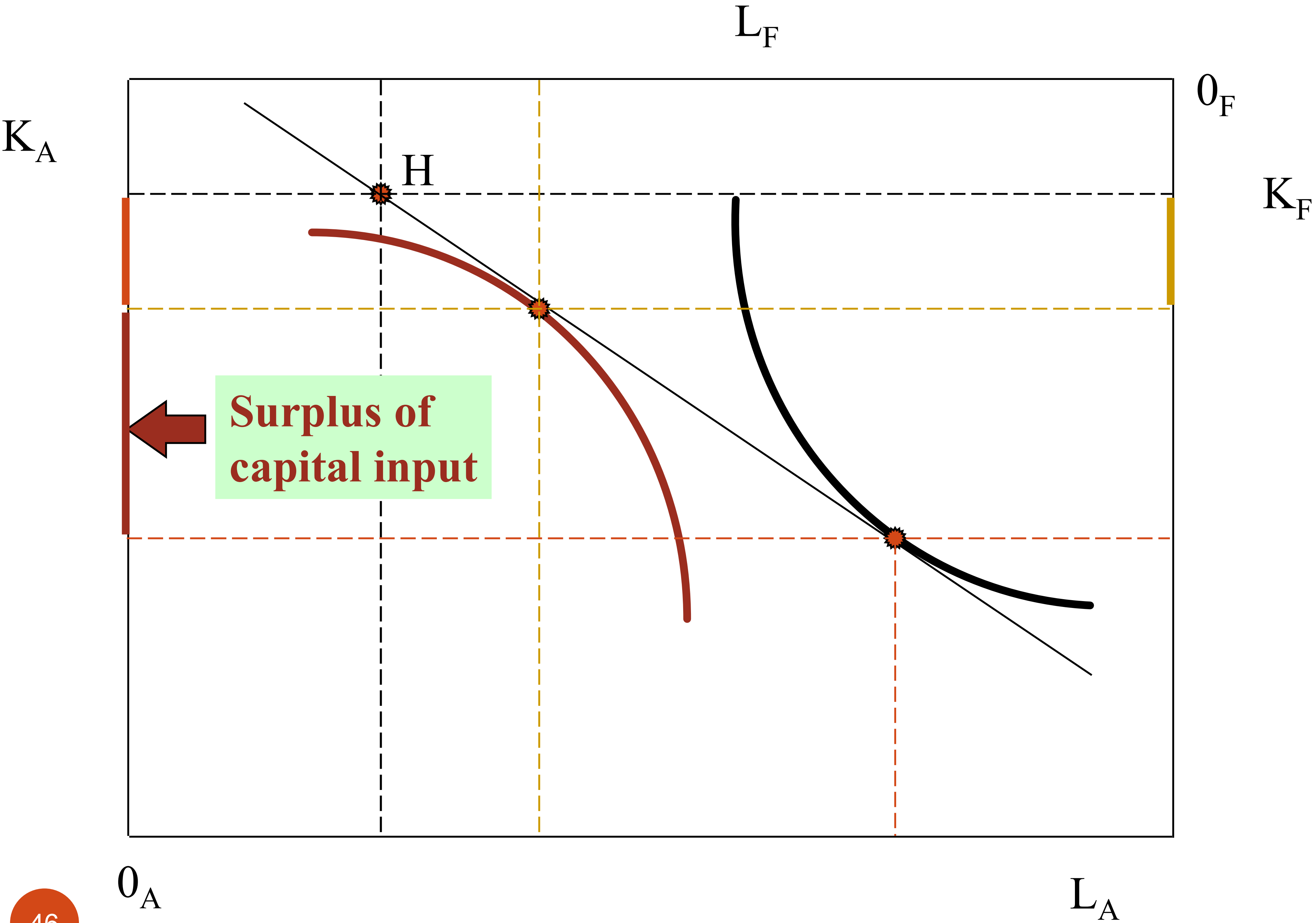

L_F
0_F
K_A
H
K_F
0_A
L_A

Decrease in capital input

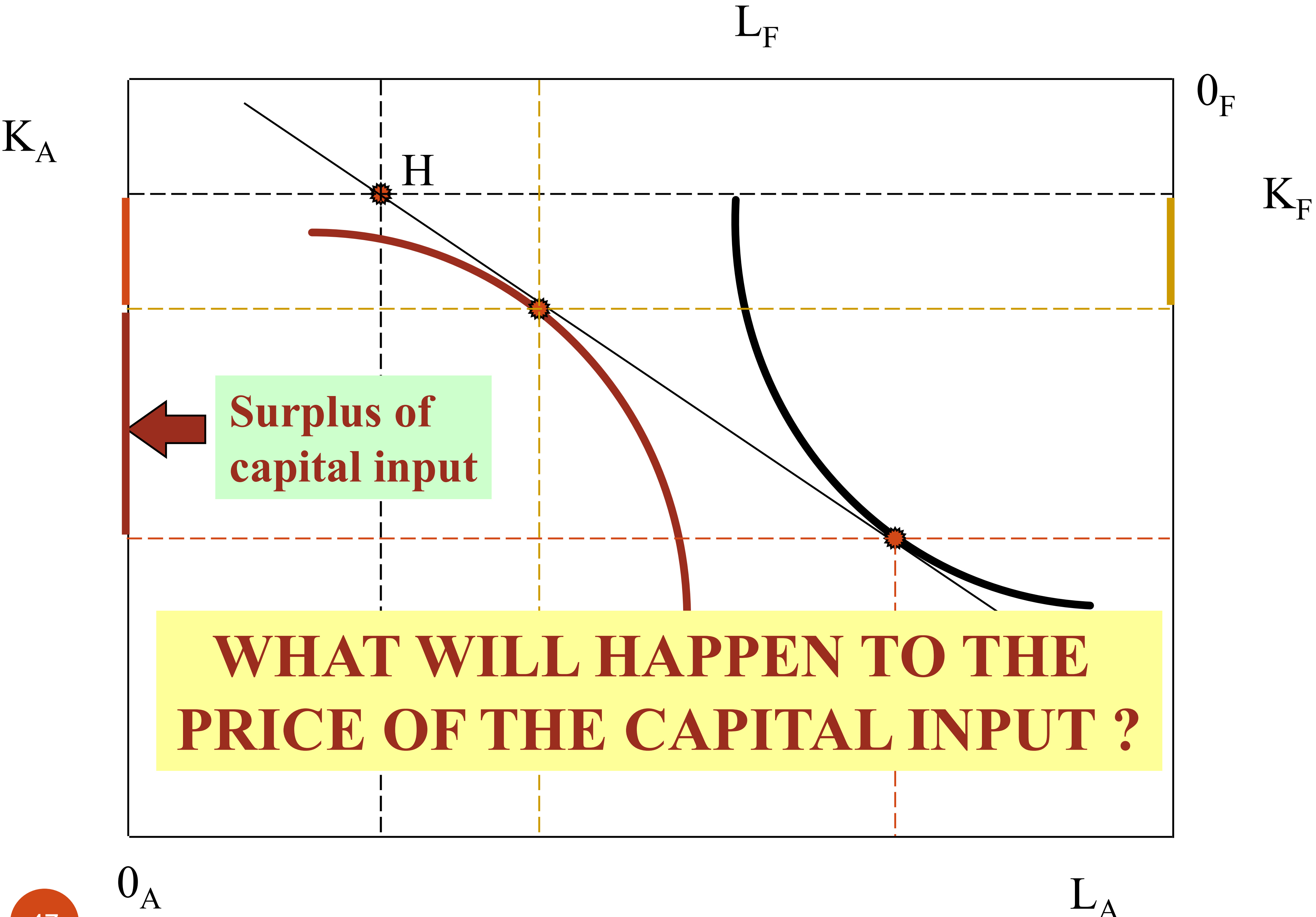

L_F
0_F
K_A
H
K_F
0_A
L_A

Increase in capital input

Decrease in capital input

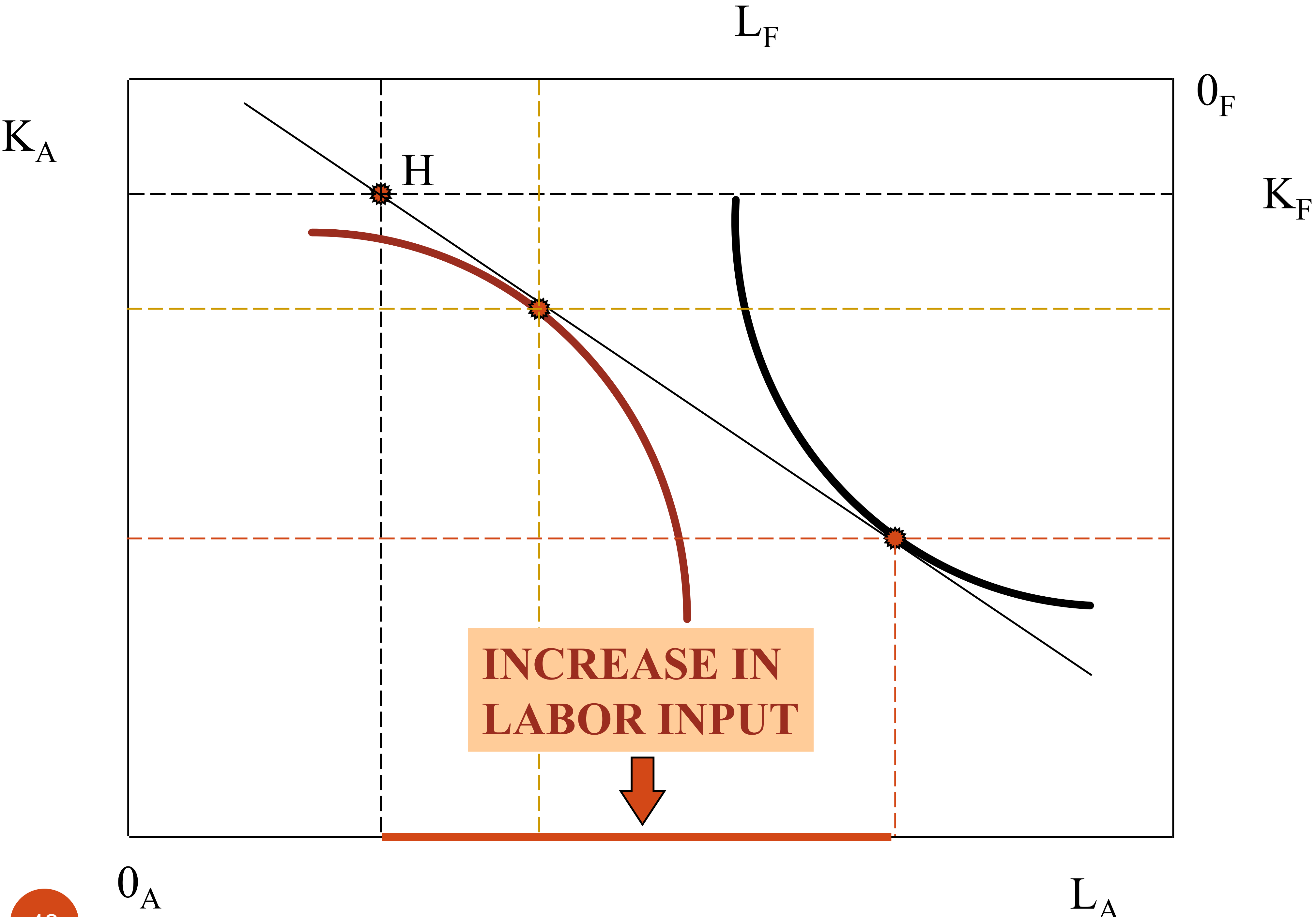

L_F
0_F
K_A
H
K_F
0_A
L_A

Surplus of capital input

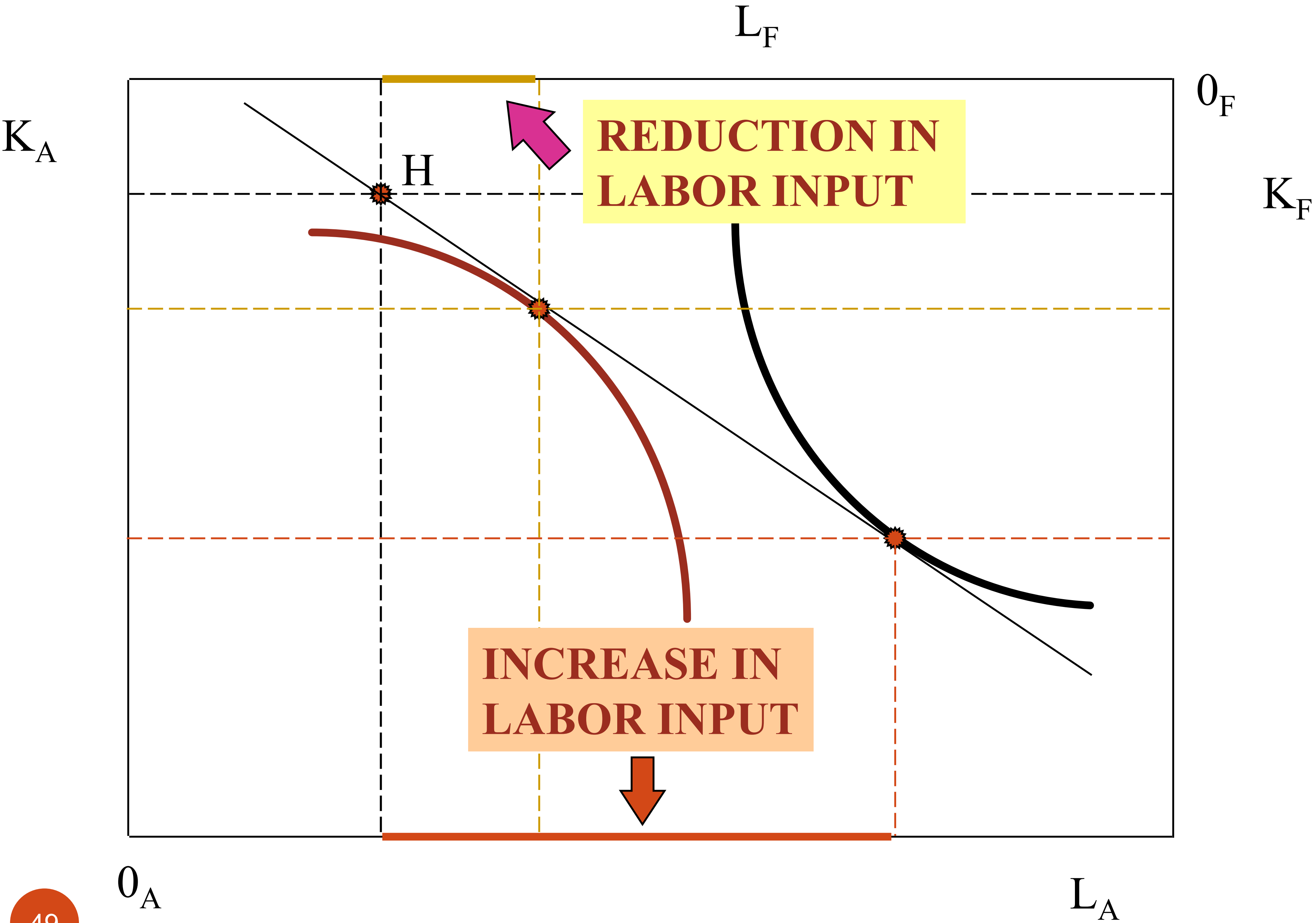

L_F
0_F
K_A
K_F
H
0_A
L_A

Surplus of capital input

WHAT WILL HAPPEN TO THE PRICE OF THE CAPITAL INPUT ?

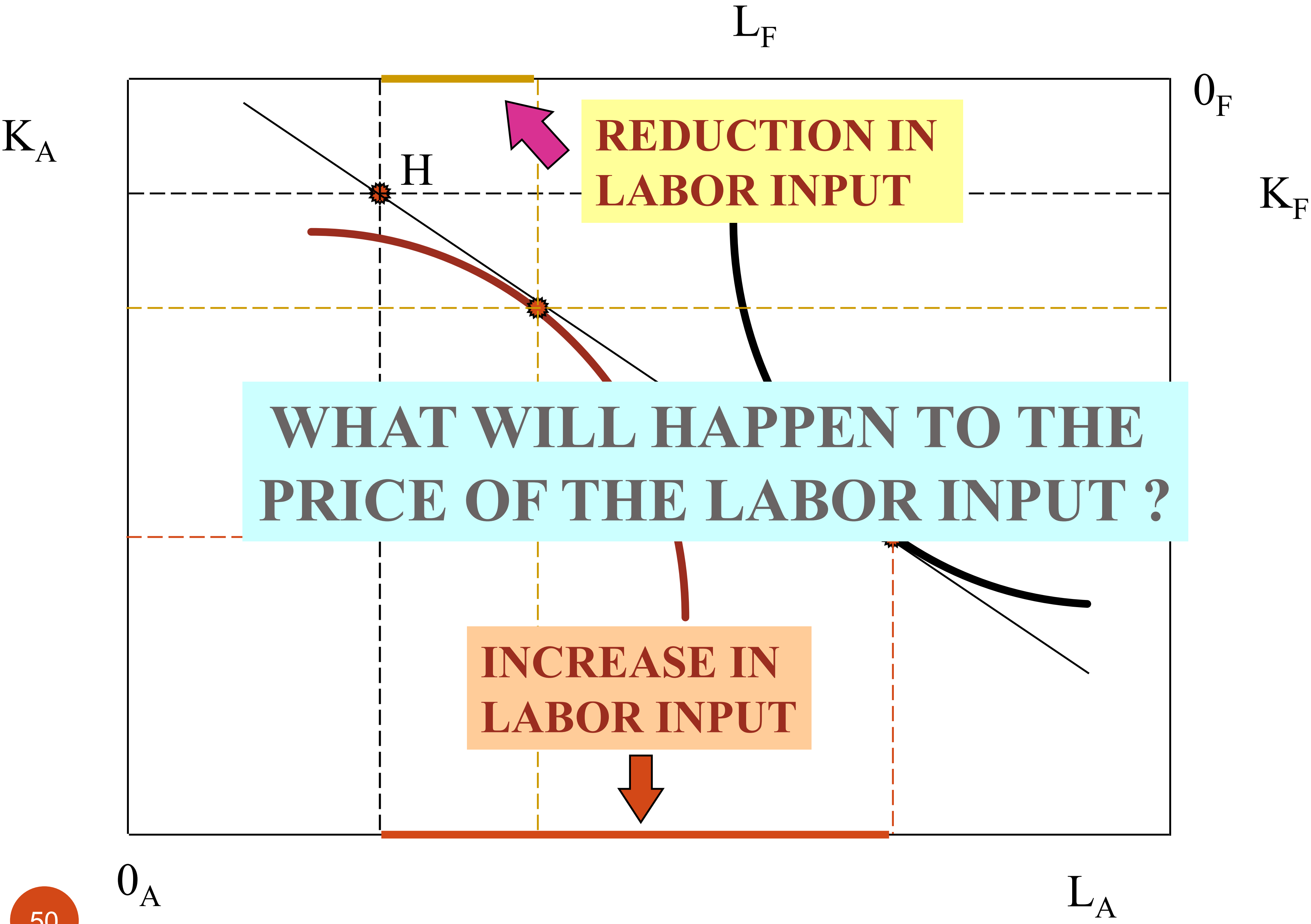

L_F
0_F
K_A
H
K_F
0_A
L_A

INCREASE IN LABOR INPUT


L_F
0_F
K_A
H
K_F
0_A
L_A

REDUCTION IN LABOR INPUT

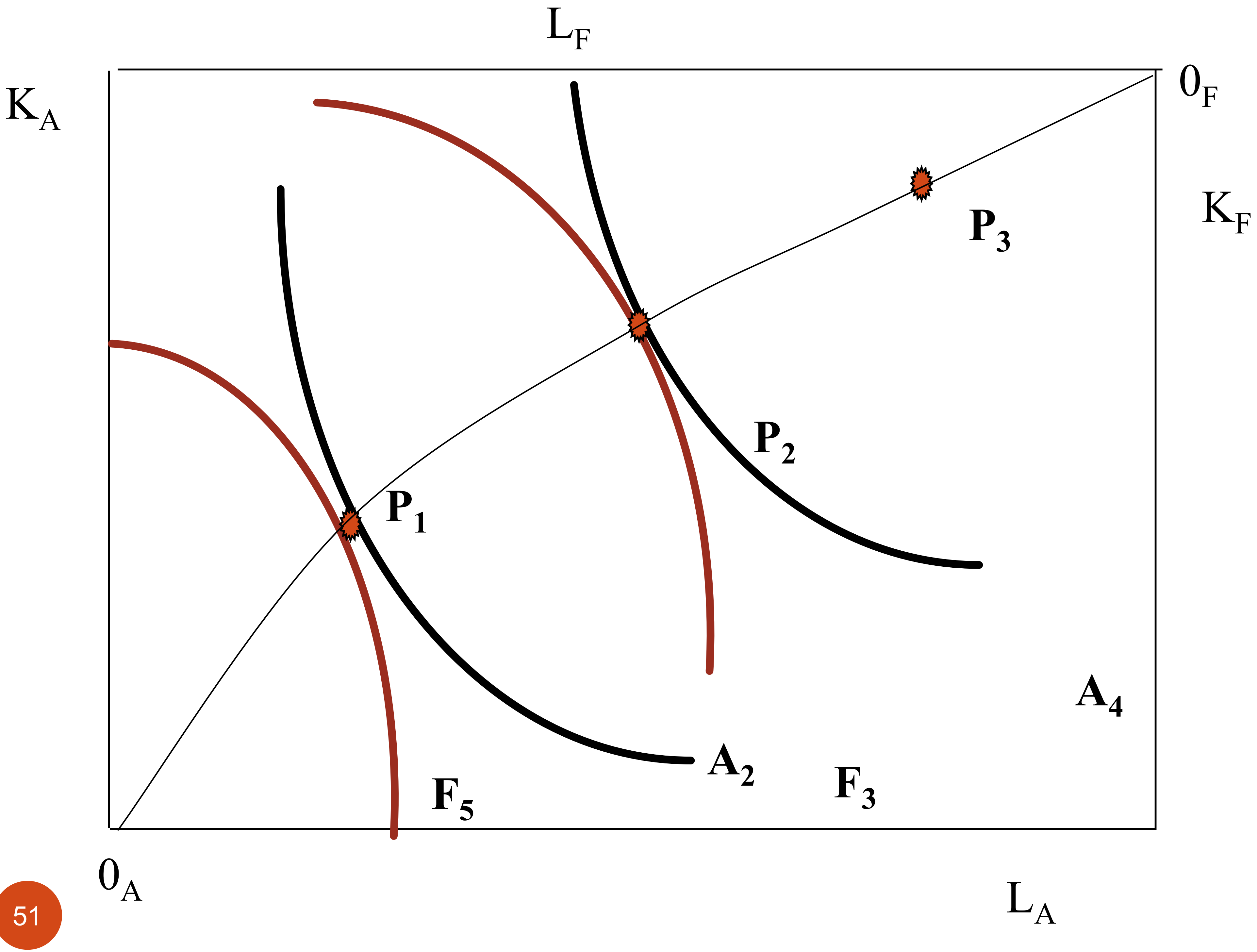
INCREASE IN LABOR INPUT


L$_F$
0$_F$
K$_A$
H
K$_F$
0$_A$
L$_A$

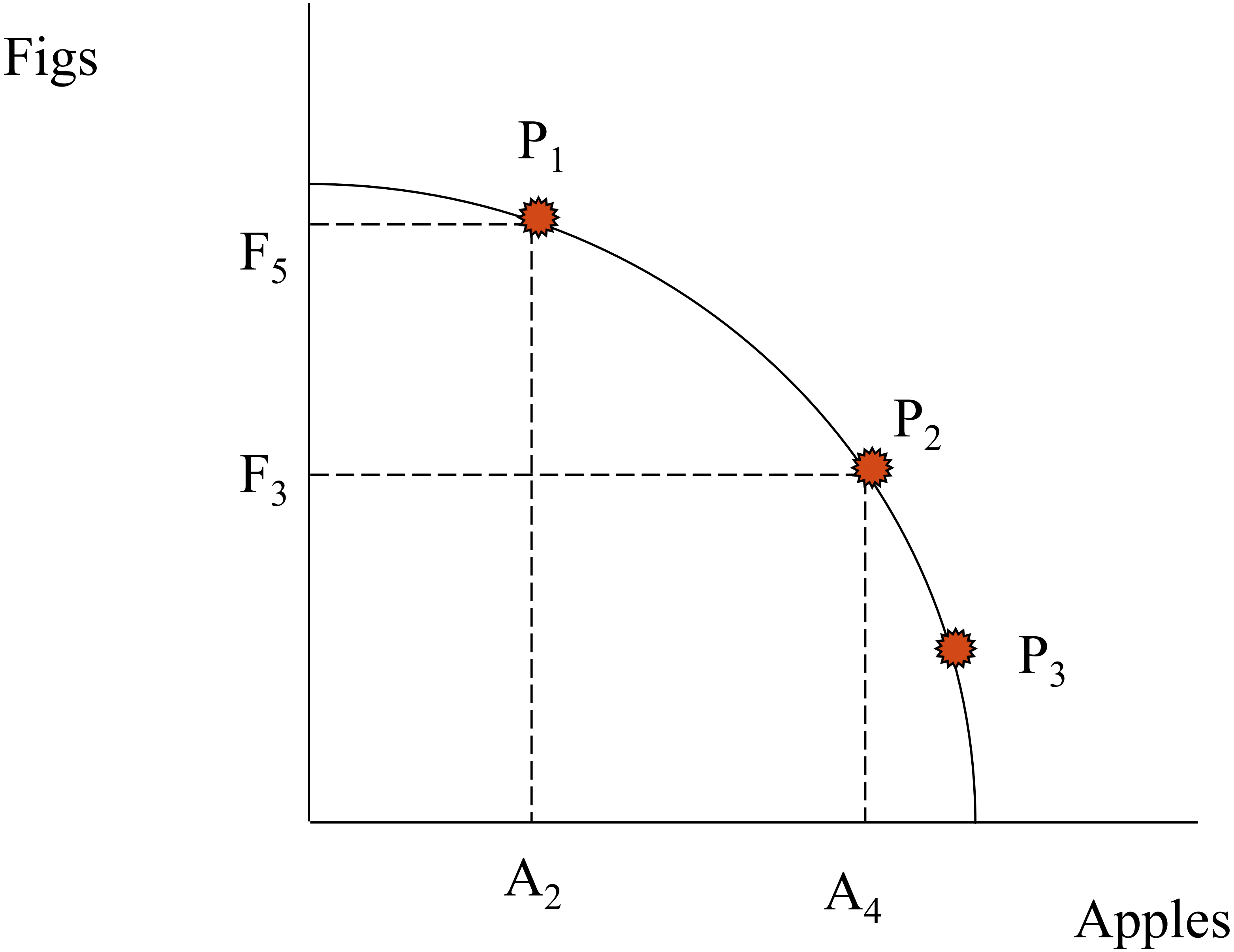
REDUCTION IN LABOR INPUT

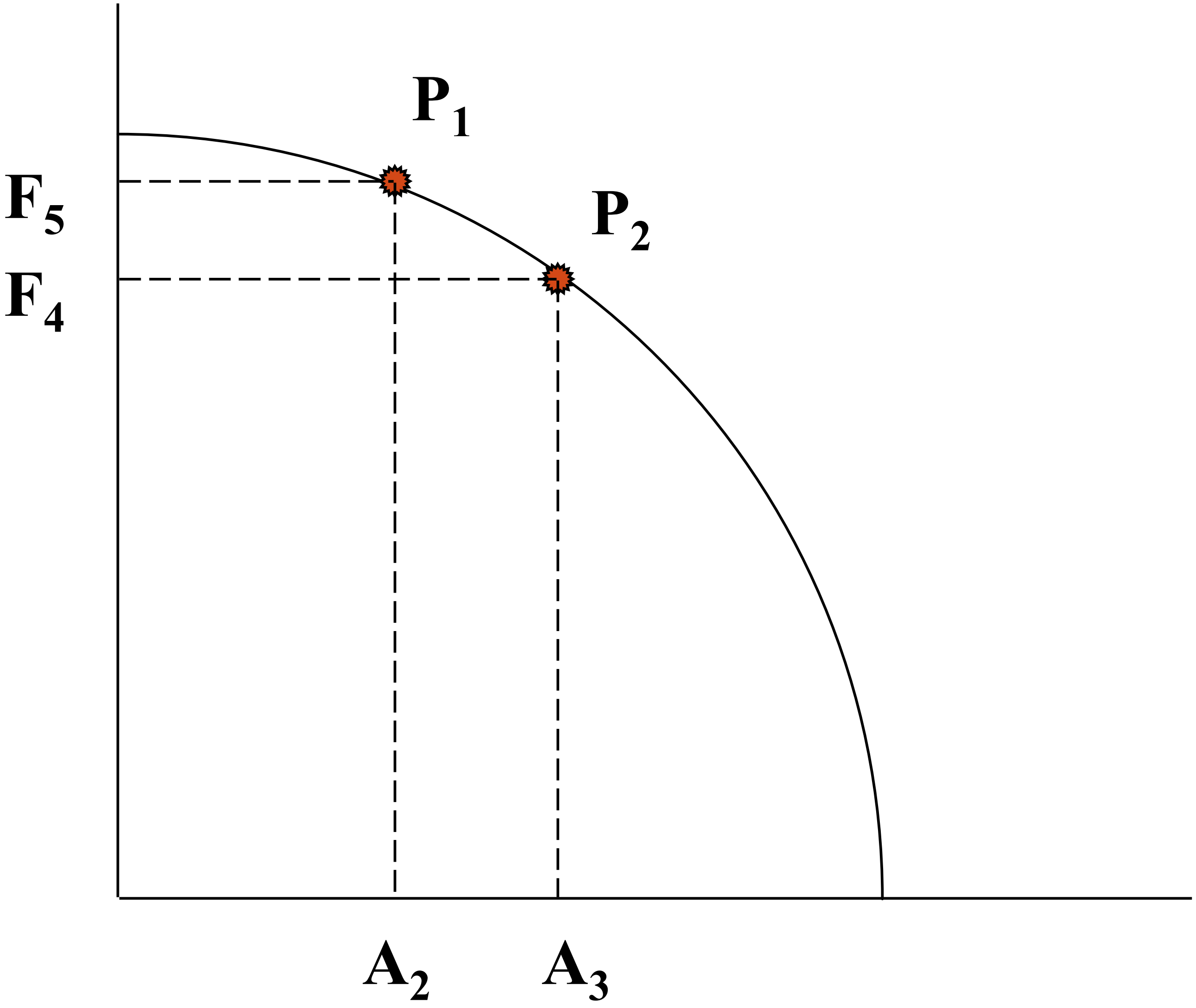
WHAT WILL HAPPEN TO THE PRICE OF THE LABOR INPUT ?

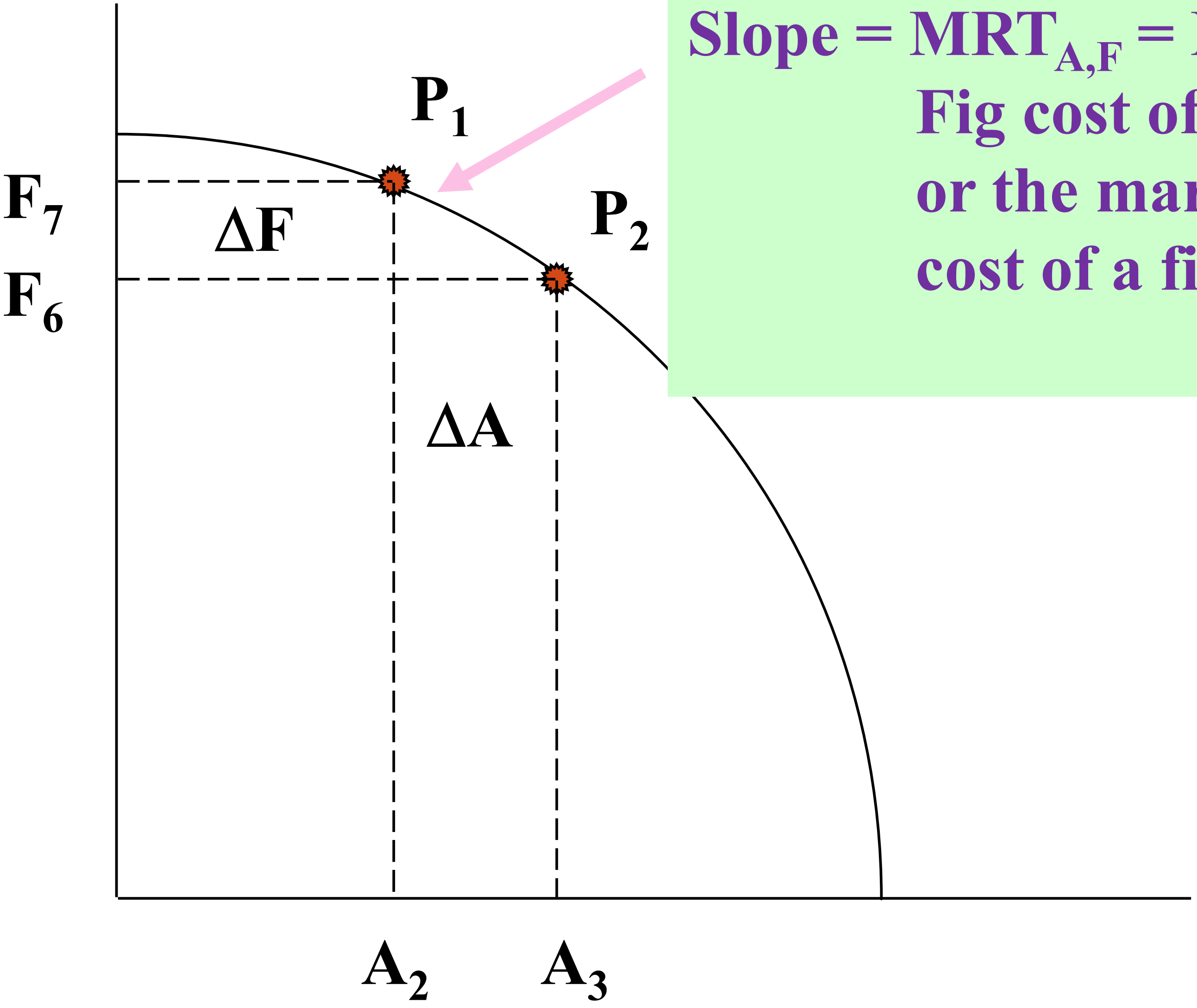
INCREASE IN LABOR INPUT



L_F
K_A
0_F
K_F
P_3
P_2
P_1
A_4
A_2
F_3
F_5
0_A
L_A


Figs
P1
F5
P2
F3
P3
A2
A4
Apples


P1
P2
F5
F4
A2
A3


P_1
F_7
ΔF
P_2
F_6
ΔA
A_2
A_3

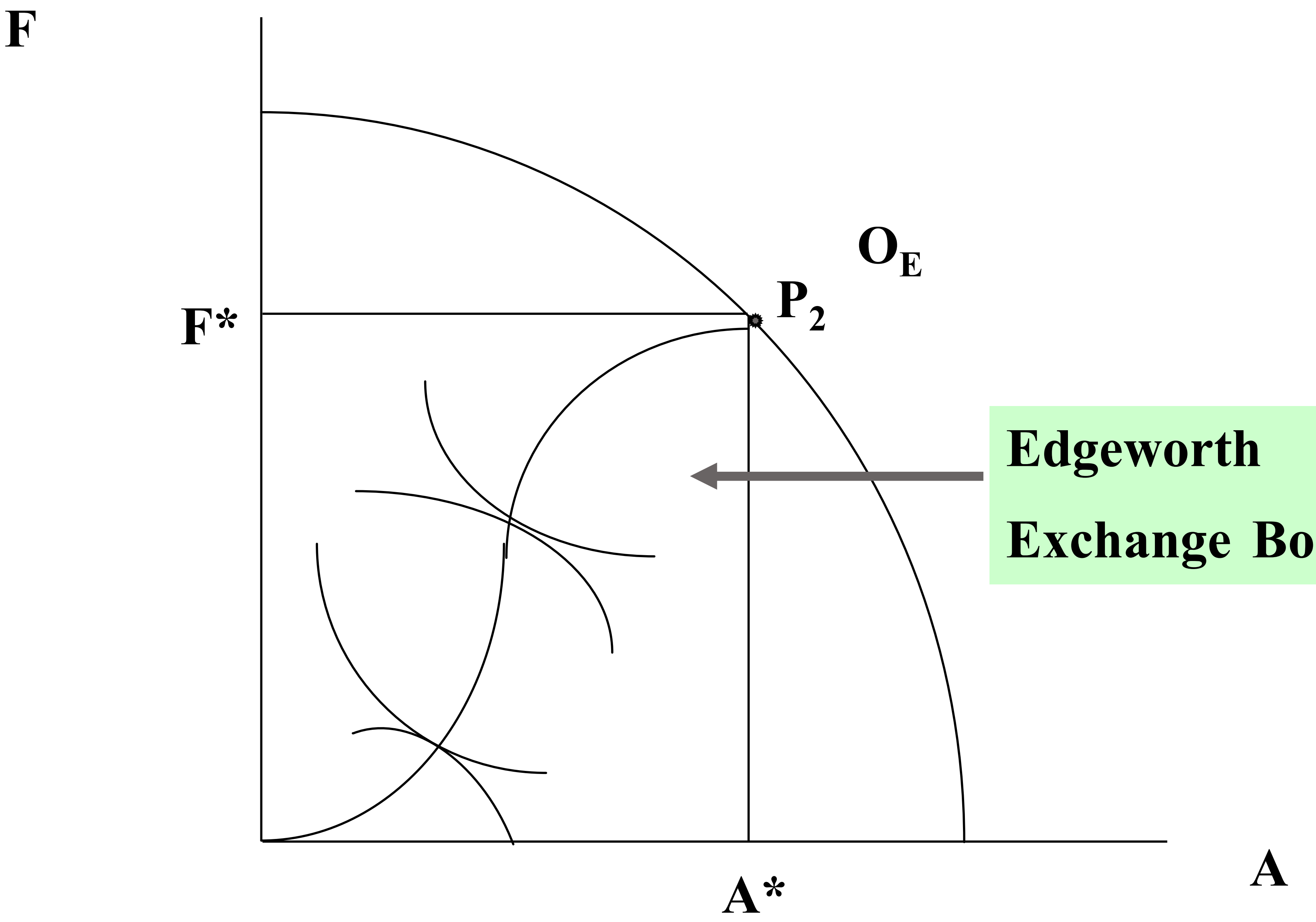
Slope = $MRT_{A,F}$ = Marginal
Fig cost of an apple
or the marginal apple
cost of a fig leave

Intuitive interpretation of the MRT $_{A,F}$

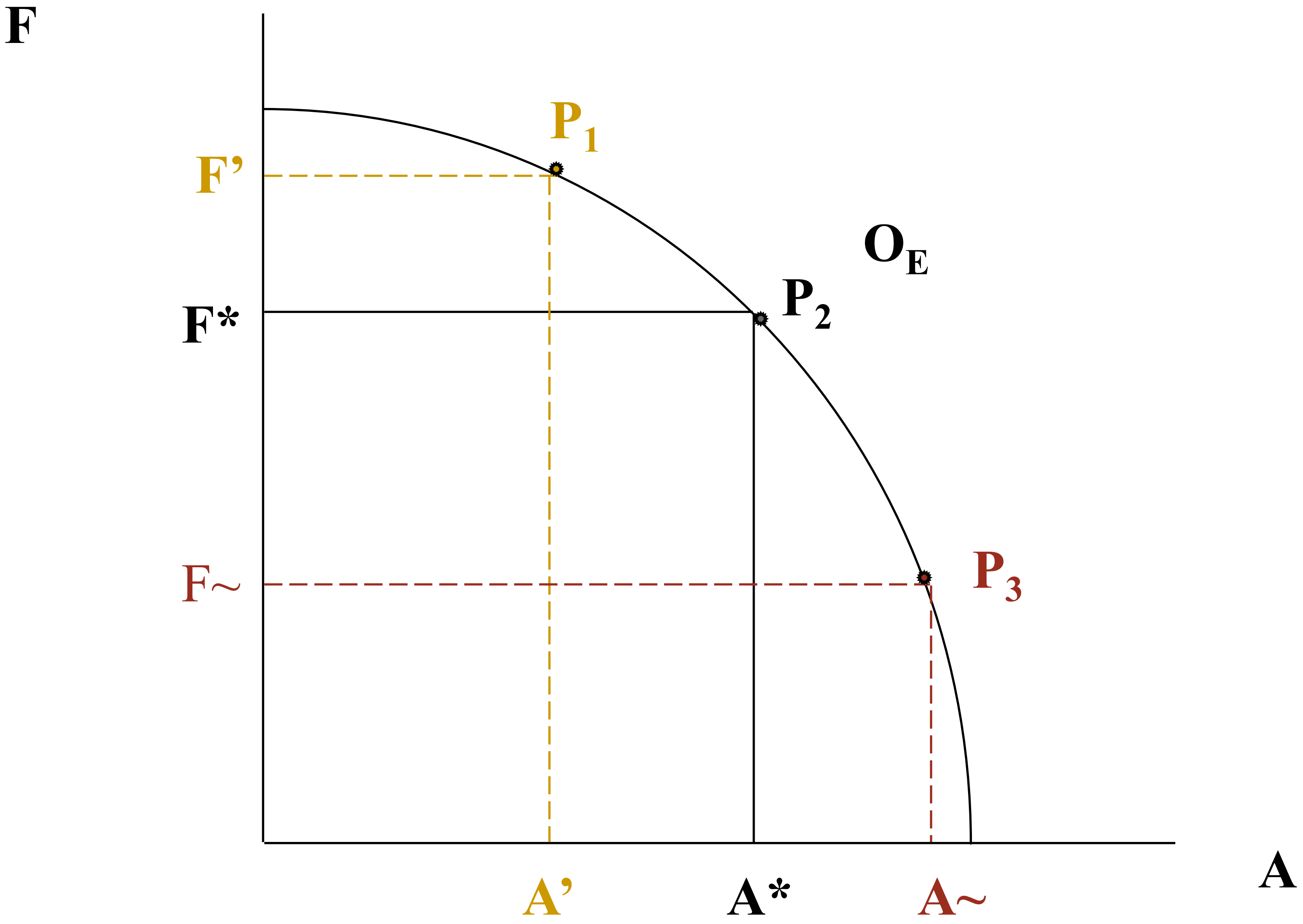
- Suppose it takes **2** labor hours to produce one more unit of **A**. Then we might say that the MC_A is equal to 2. If it takes **1** hour of labor to produce an extra **F**, MC_F is equal to 1.
- What is the MRT $_{A,F}$ in this case ?
- For $\Delta A = 1$, MRT $_{A,F} = (\Delta F / \Delta A) = 2/1$ or $\Delta F = 2 \Delta A$ and if $\Delta A = 1$, $\Delta F = 2(1) = 2$

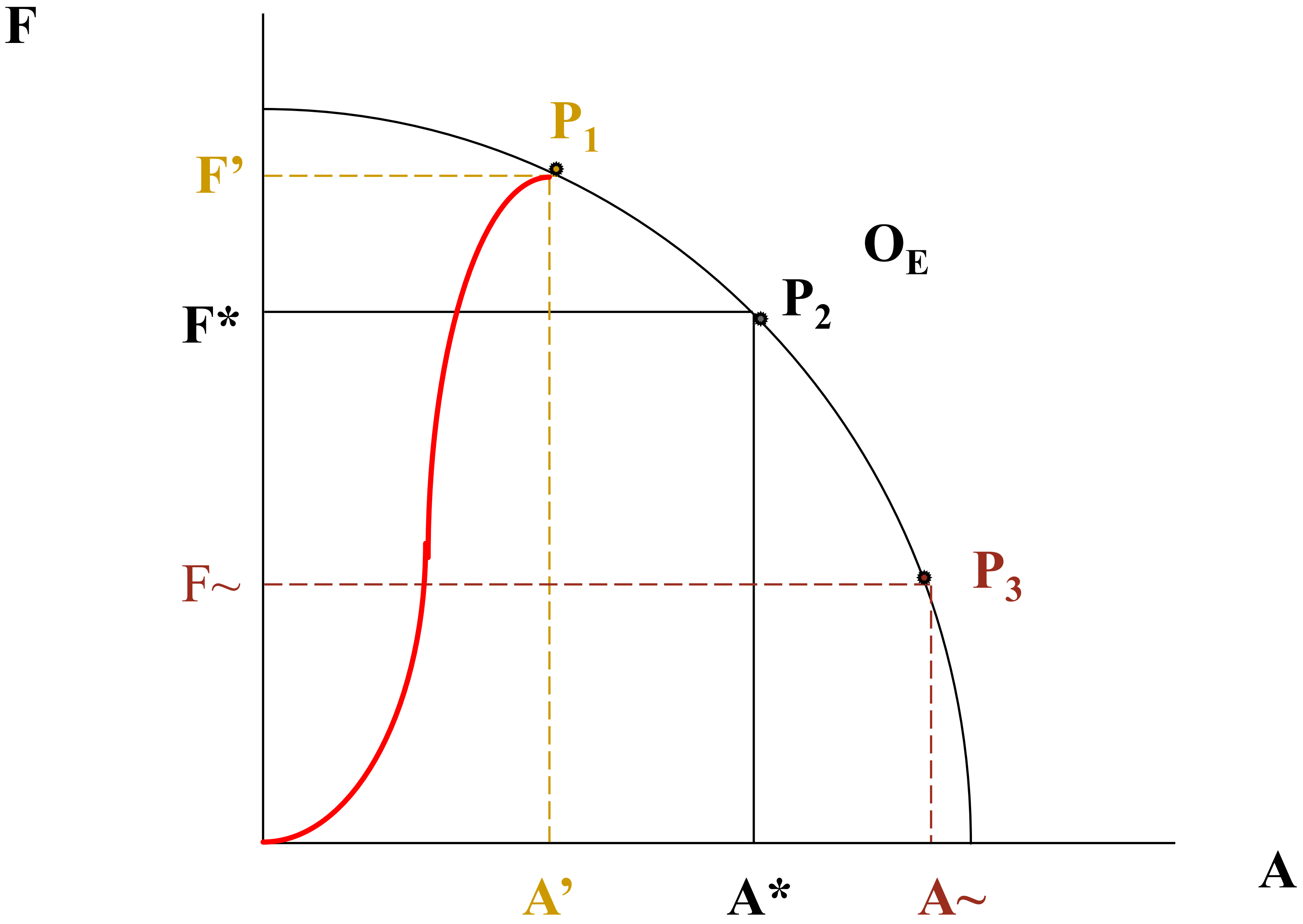
Intuitive interpretation of the MRT $_{A,F}$

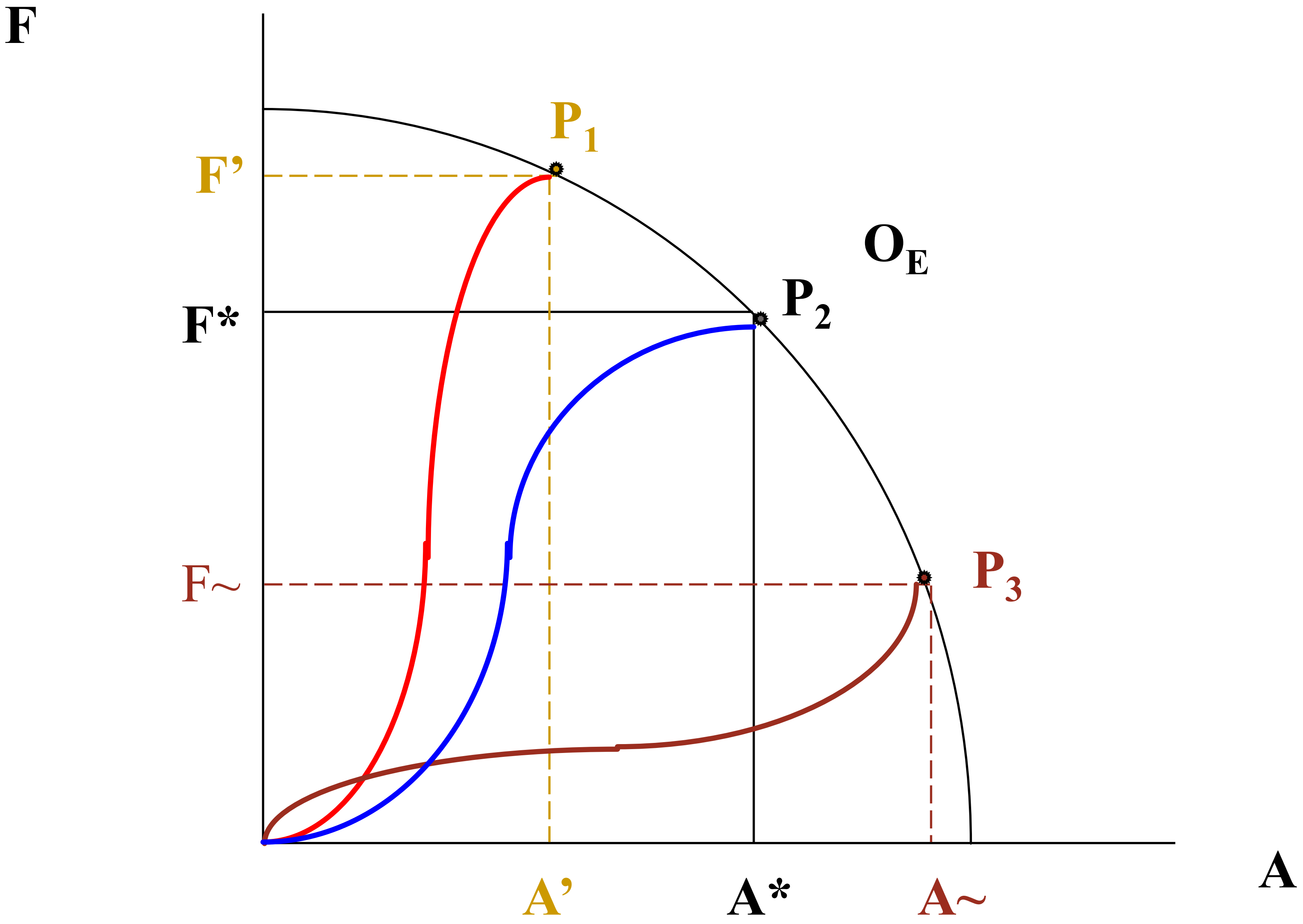
- Two units of **F** must be foregone to provide enough labor to increase **A** by one unit. Hence the MRT$_{A,F}$ is equal to the ratio of the marginal cost of the two goods.
- MRT $_{A,F}$ = $(\Delta F / \Delta A) = (MC_A / MC_F)$

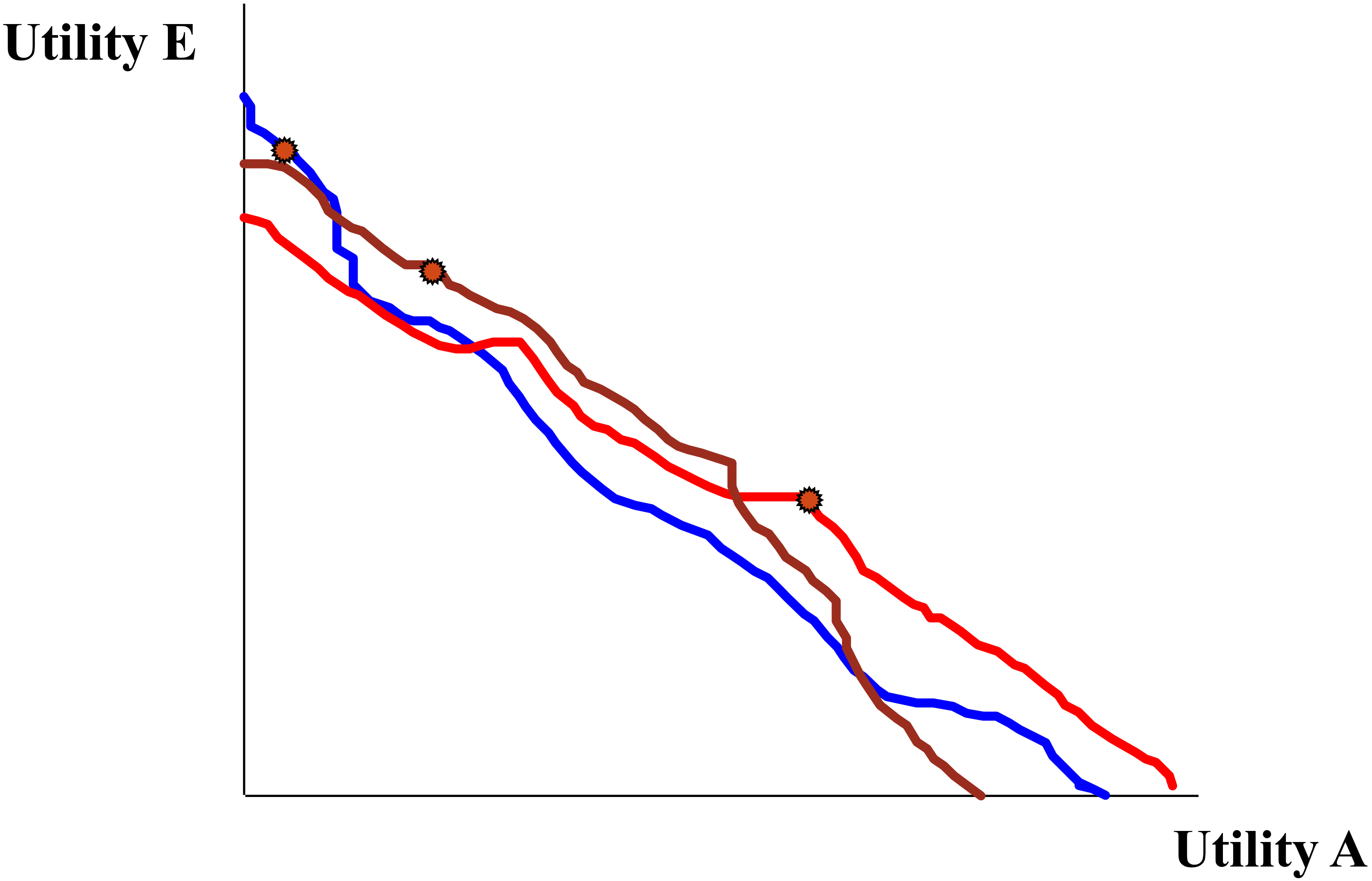


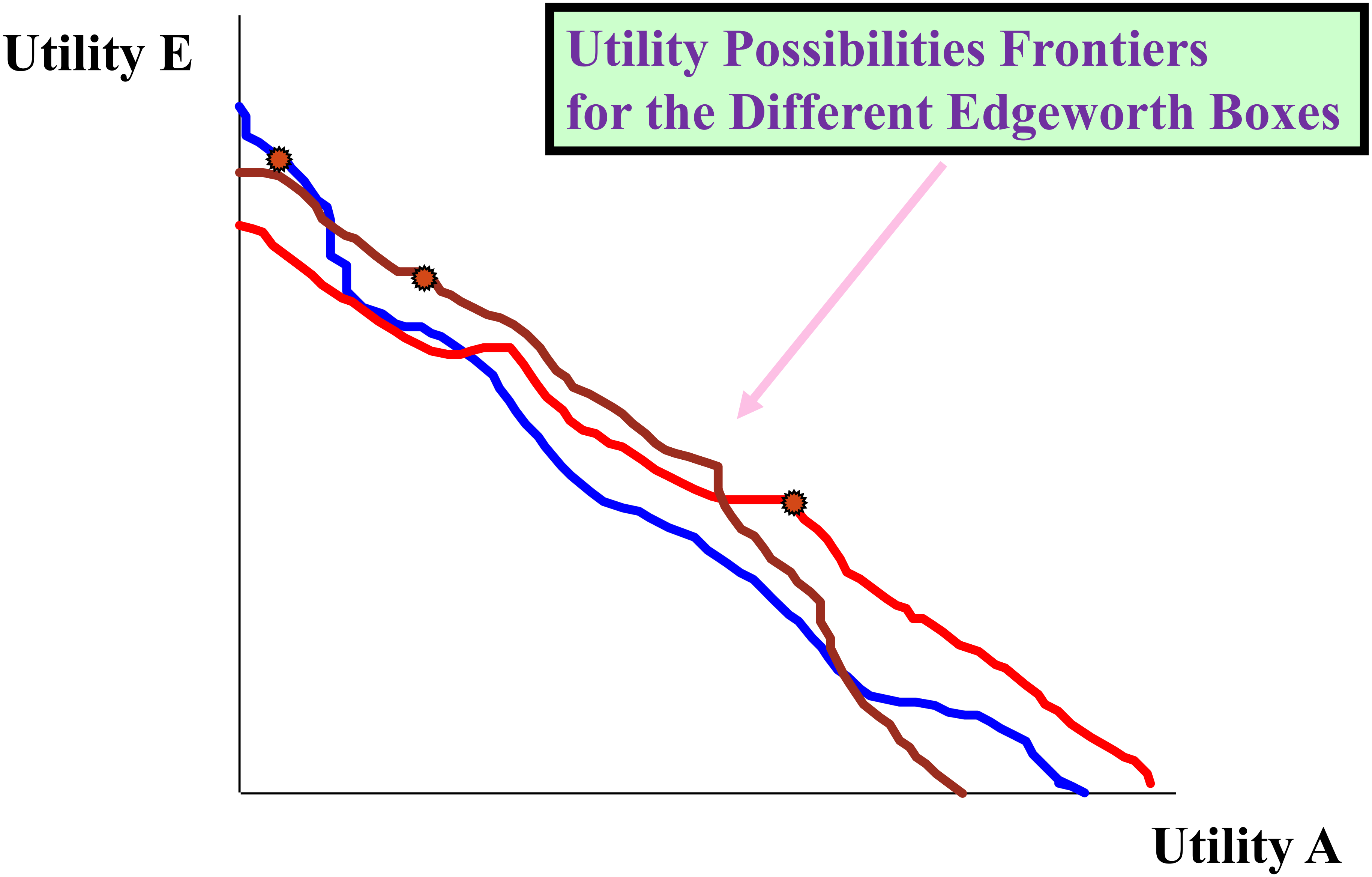
Edgeworth Exchange Box

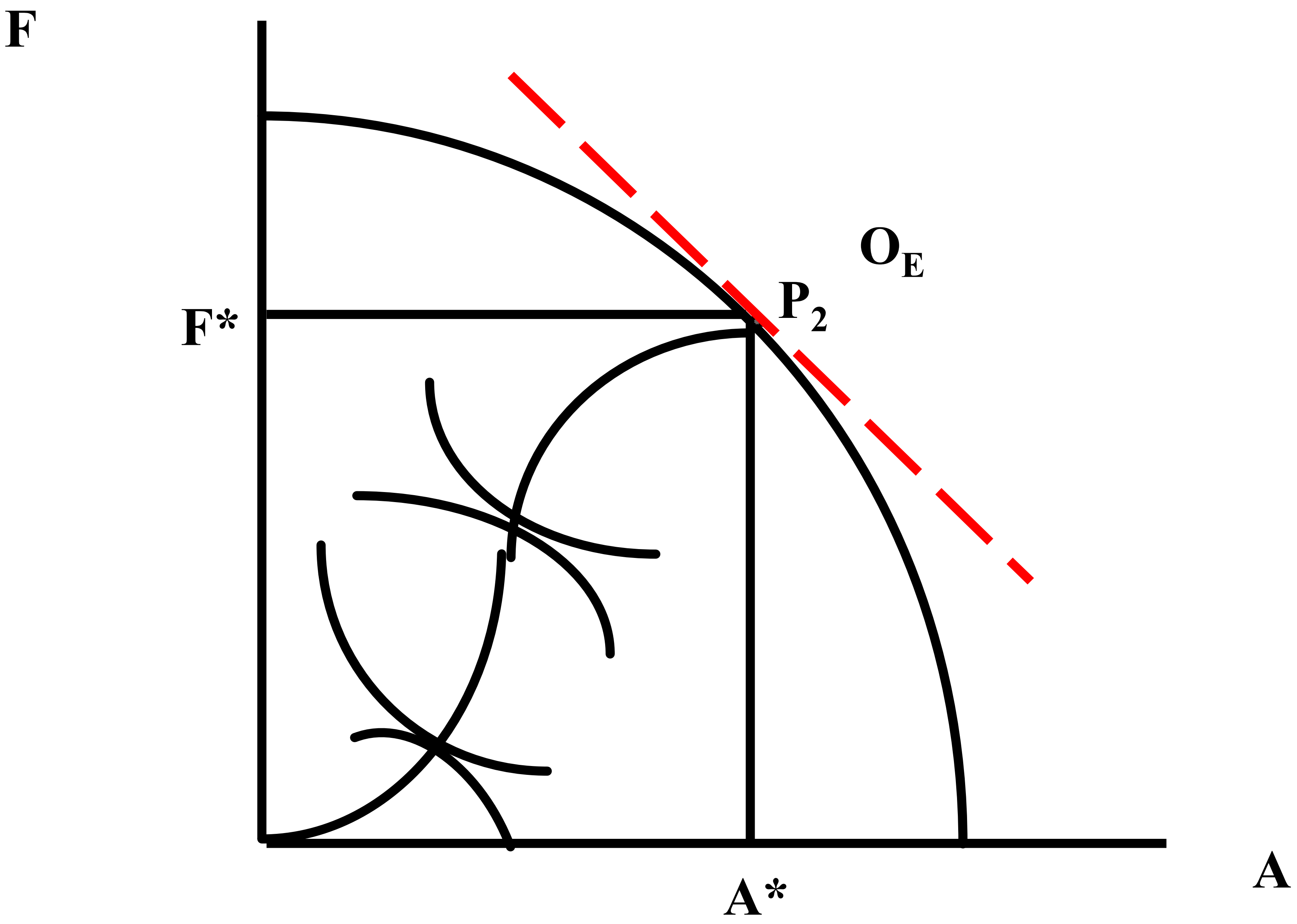

F
P1
F'
OE
F*
P2
F~
P3
A
A'
A*
A~

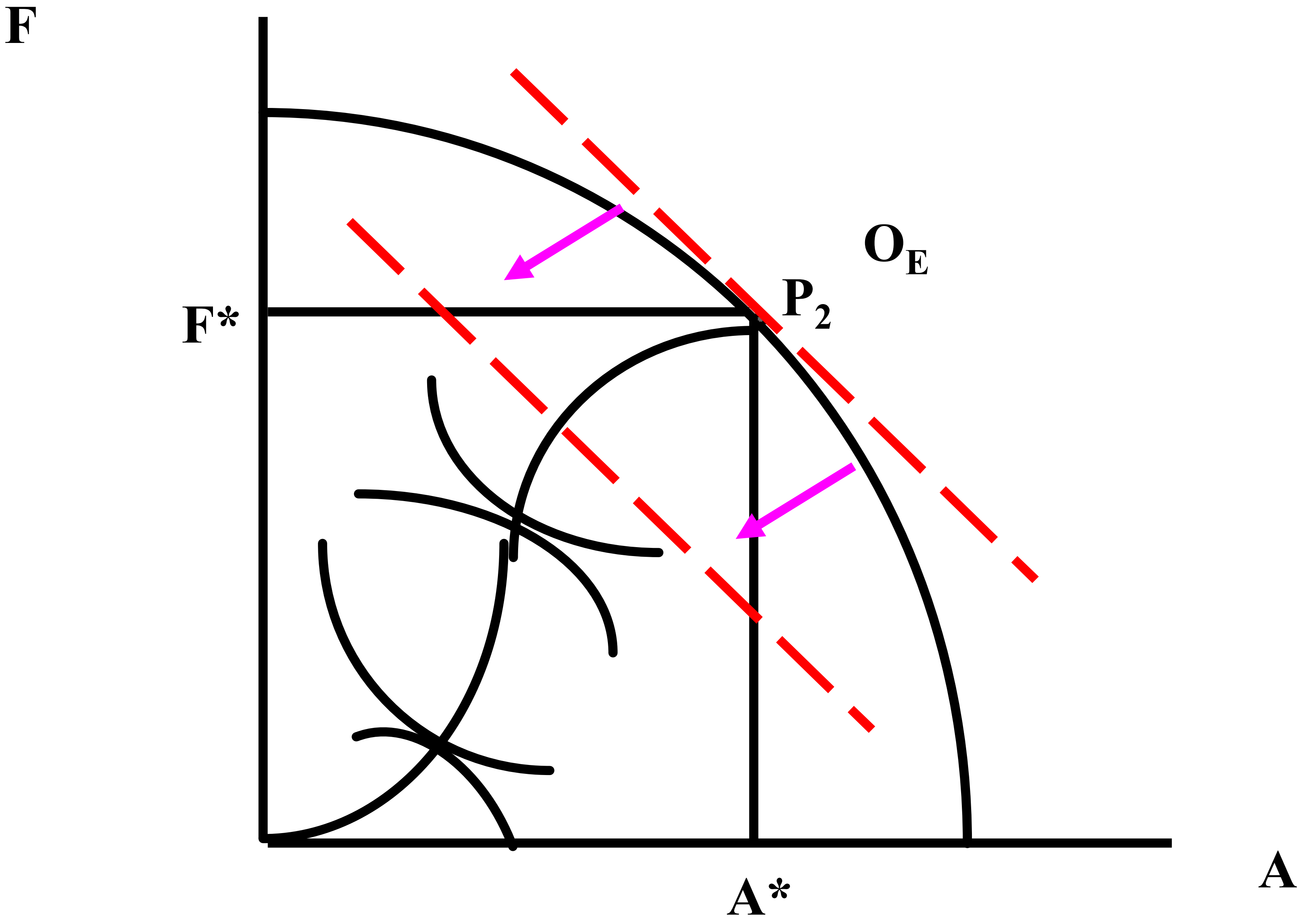

F
P1
F’
OE
P2
F*
F~
P3
A
A’
A*
A~

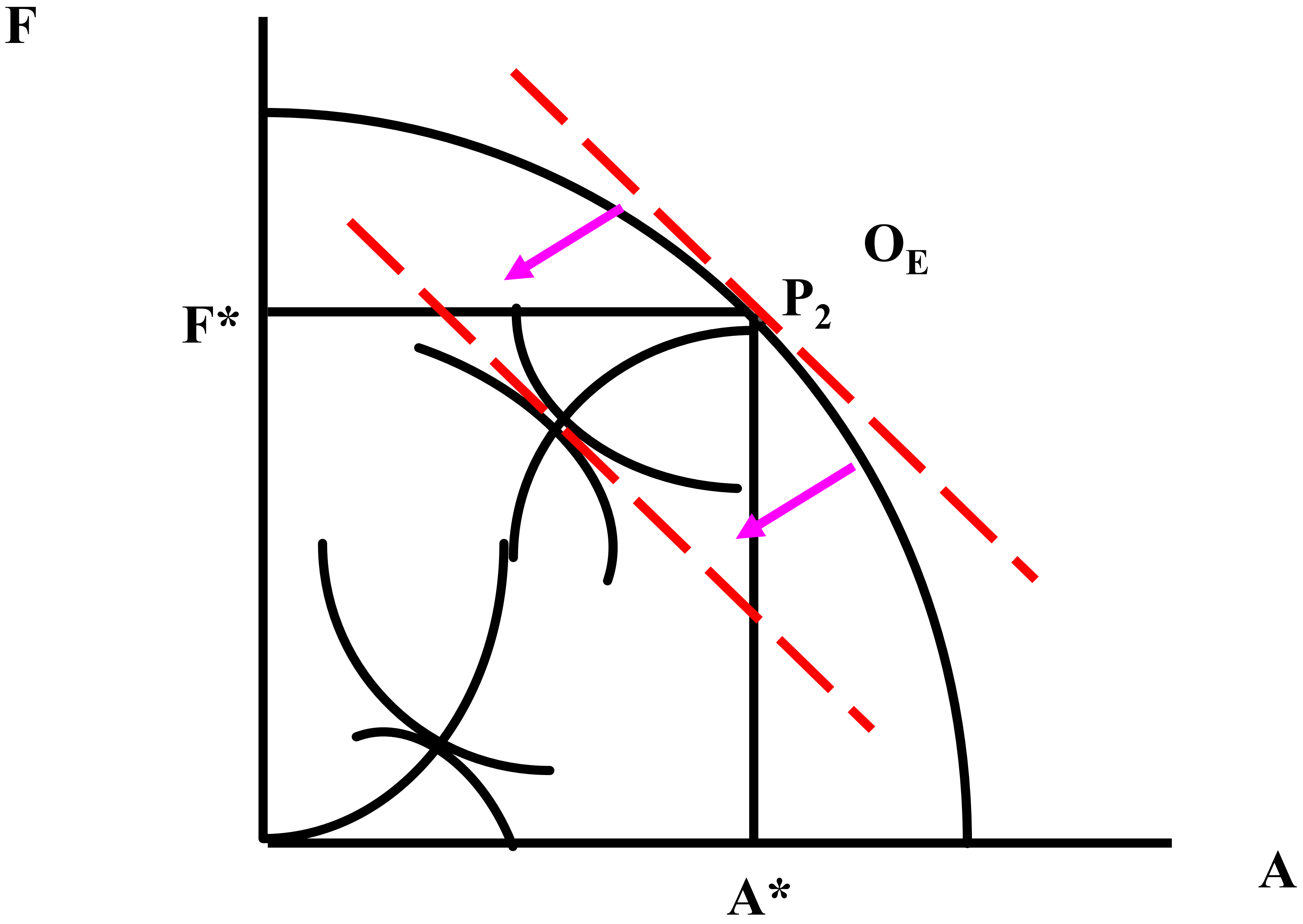

F
P1
F'
OE
F*
P2
F~
P3
A'
A*
A~
A

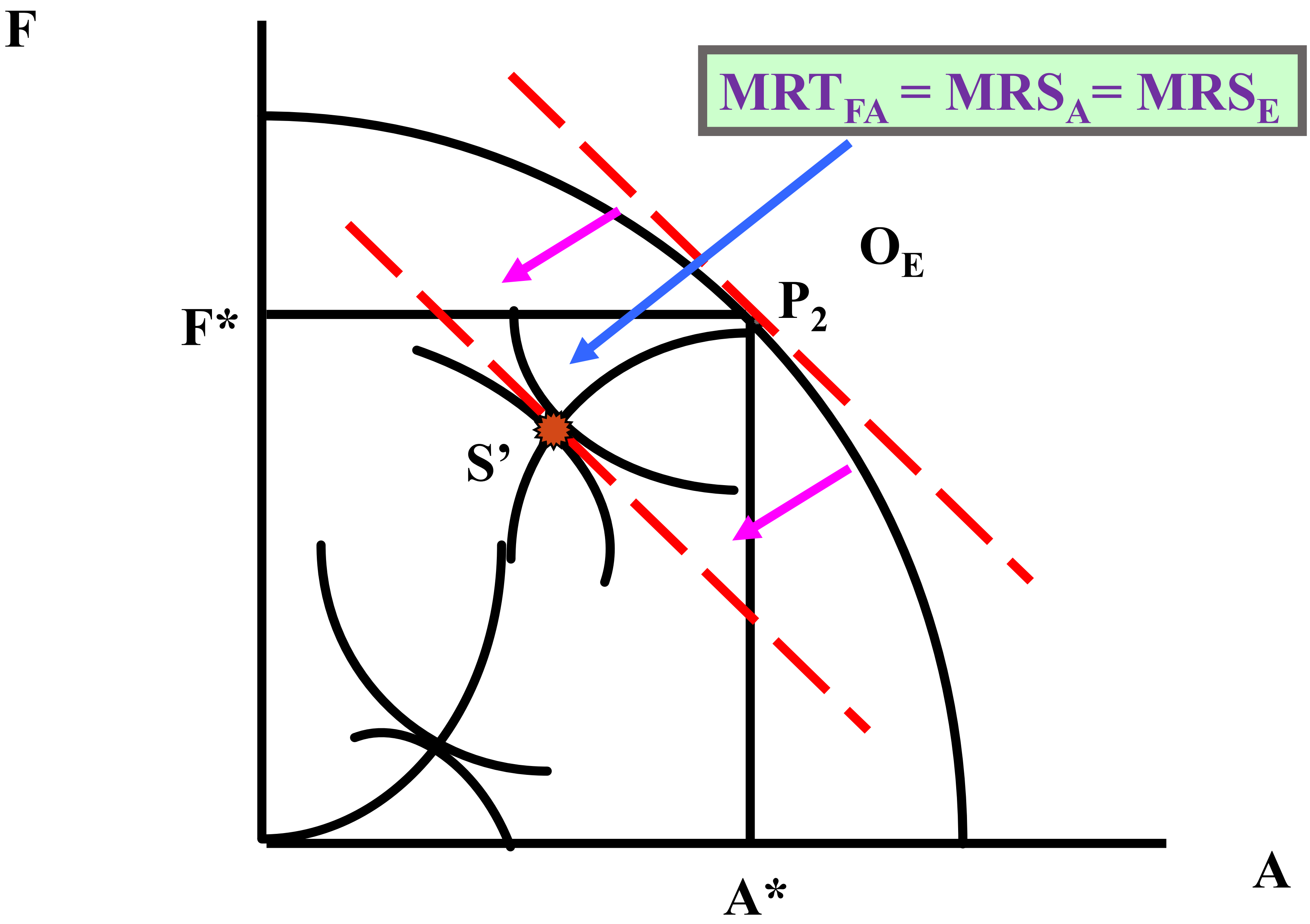

Utility E
Utility A


Utility E
Utility Possibilities Frontiers
for the Different Edgeworth Boxes
Utility A

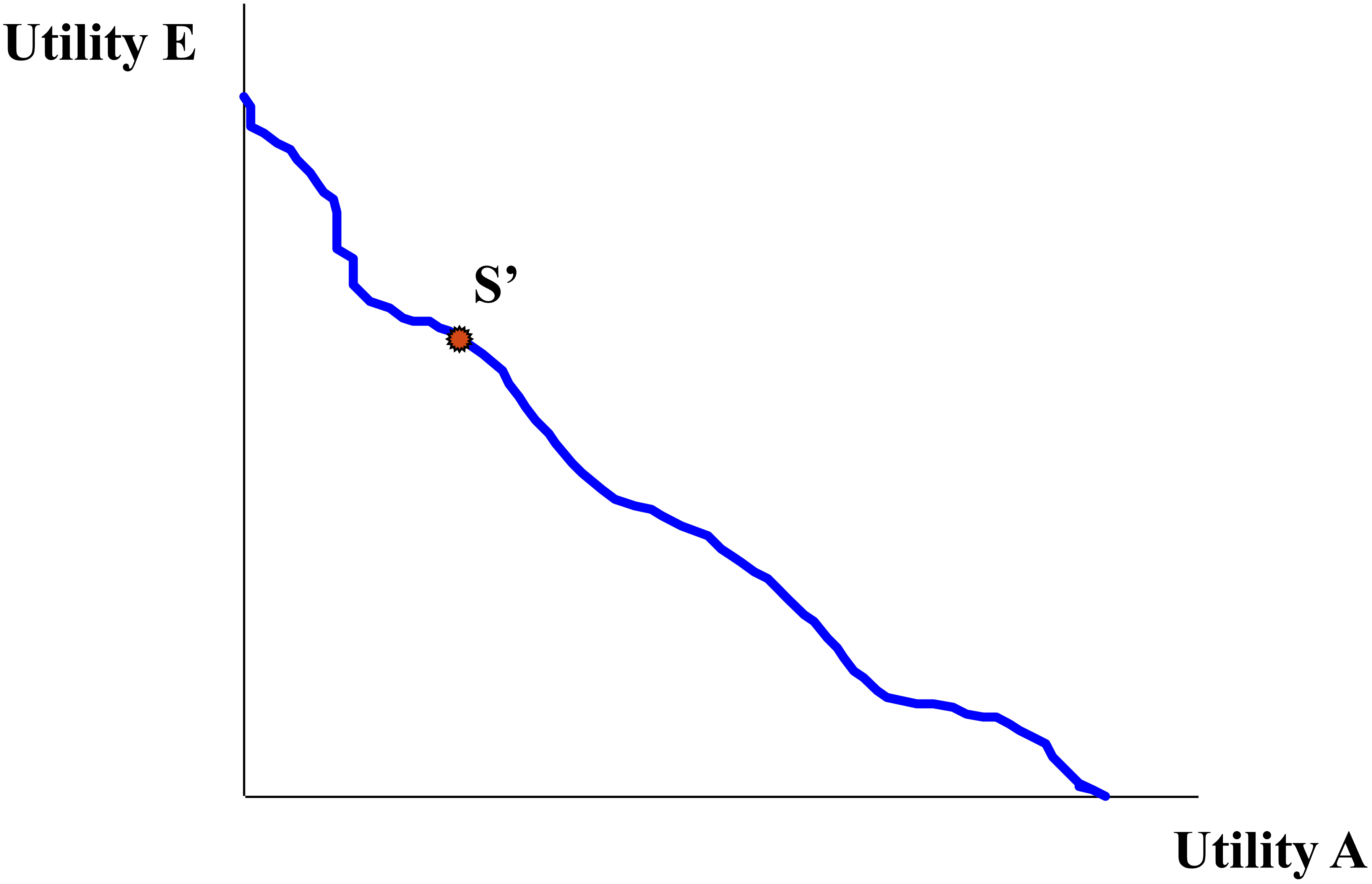

F
F*
O_E
P_2
A*
A

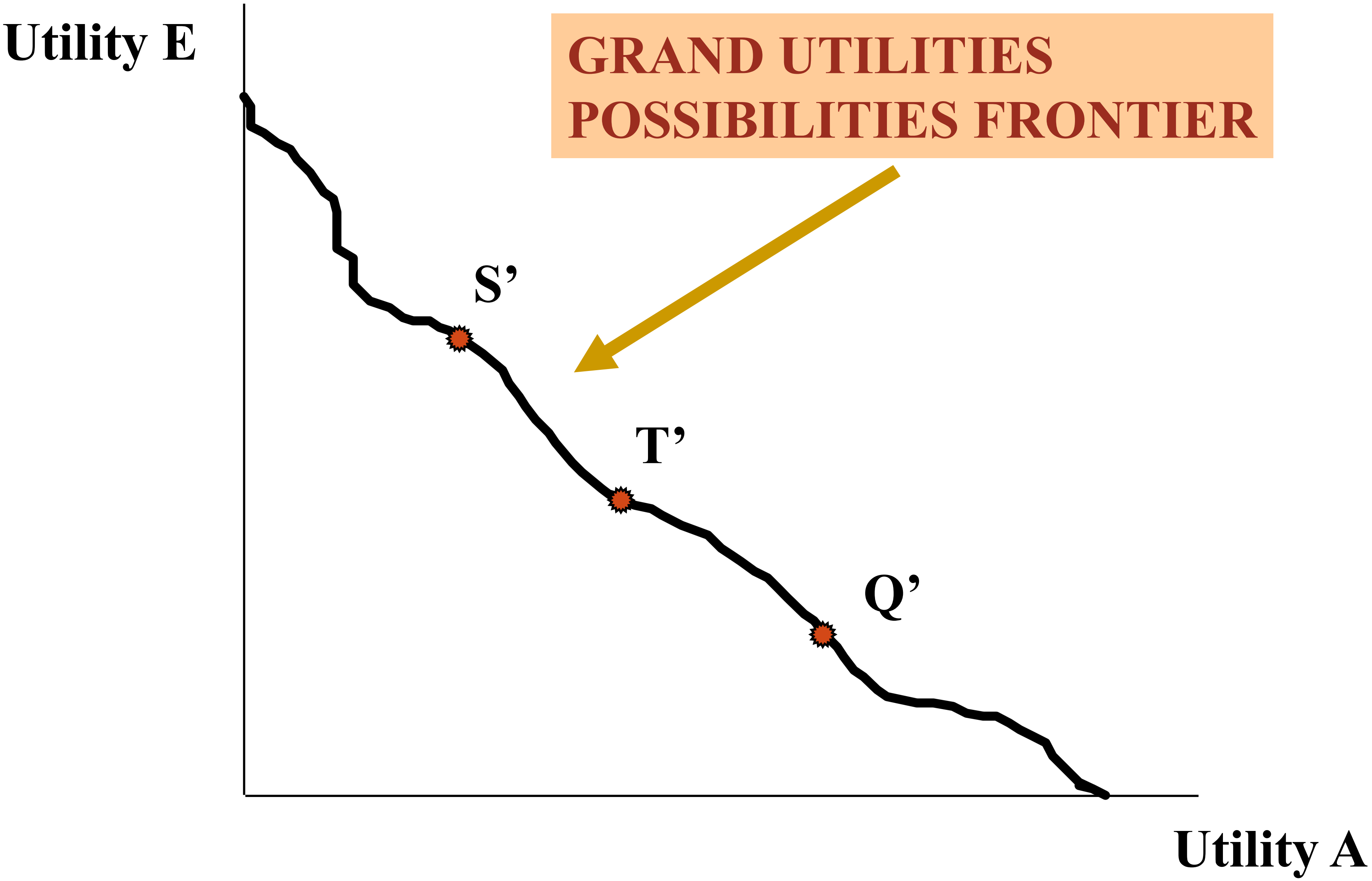

F
F*
P₂
O_E
A*
A


F
F*
O$_E$
P$_2$
A*
A

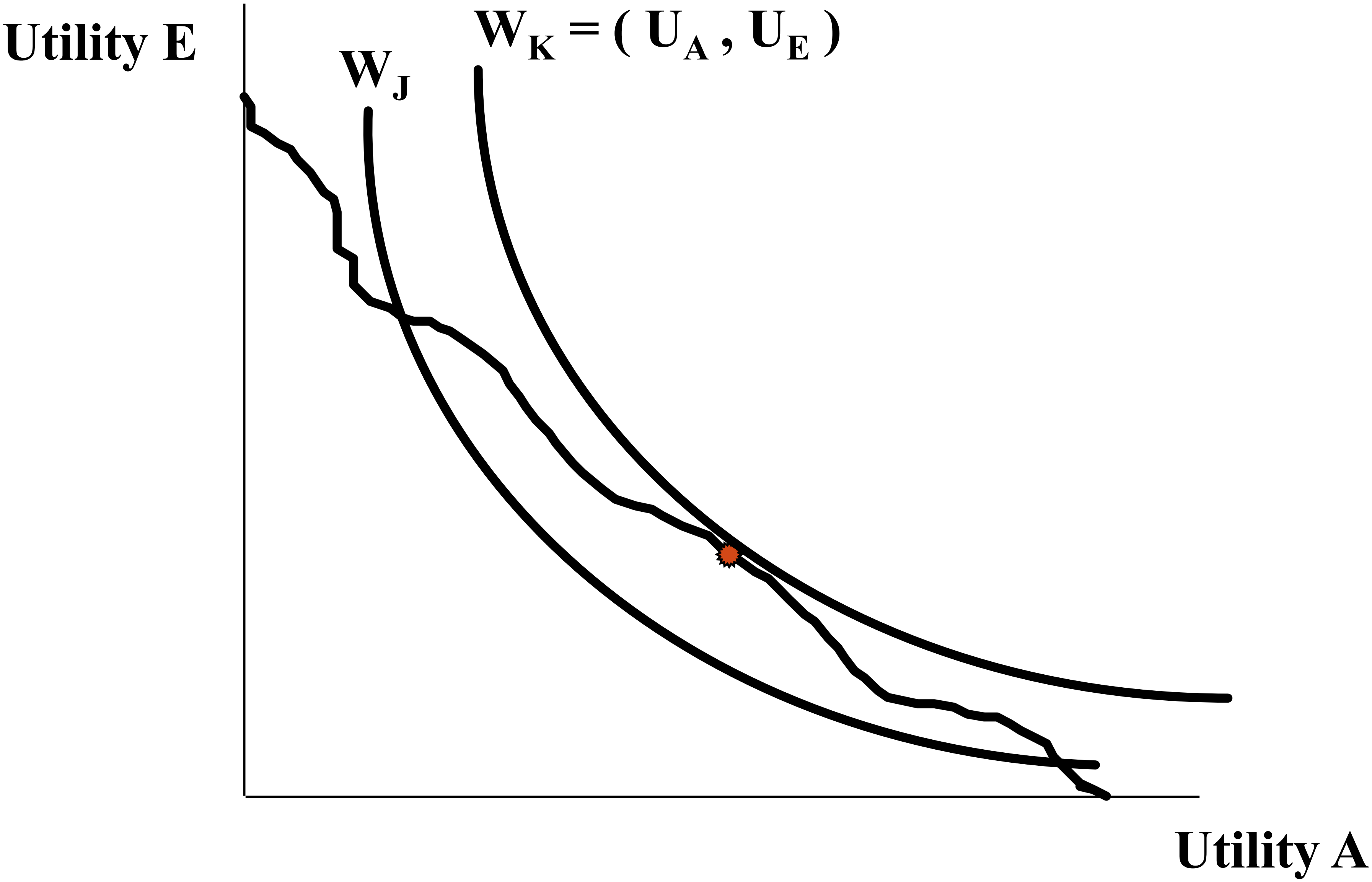


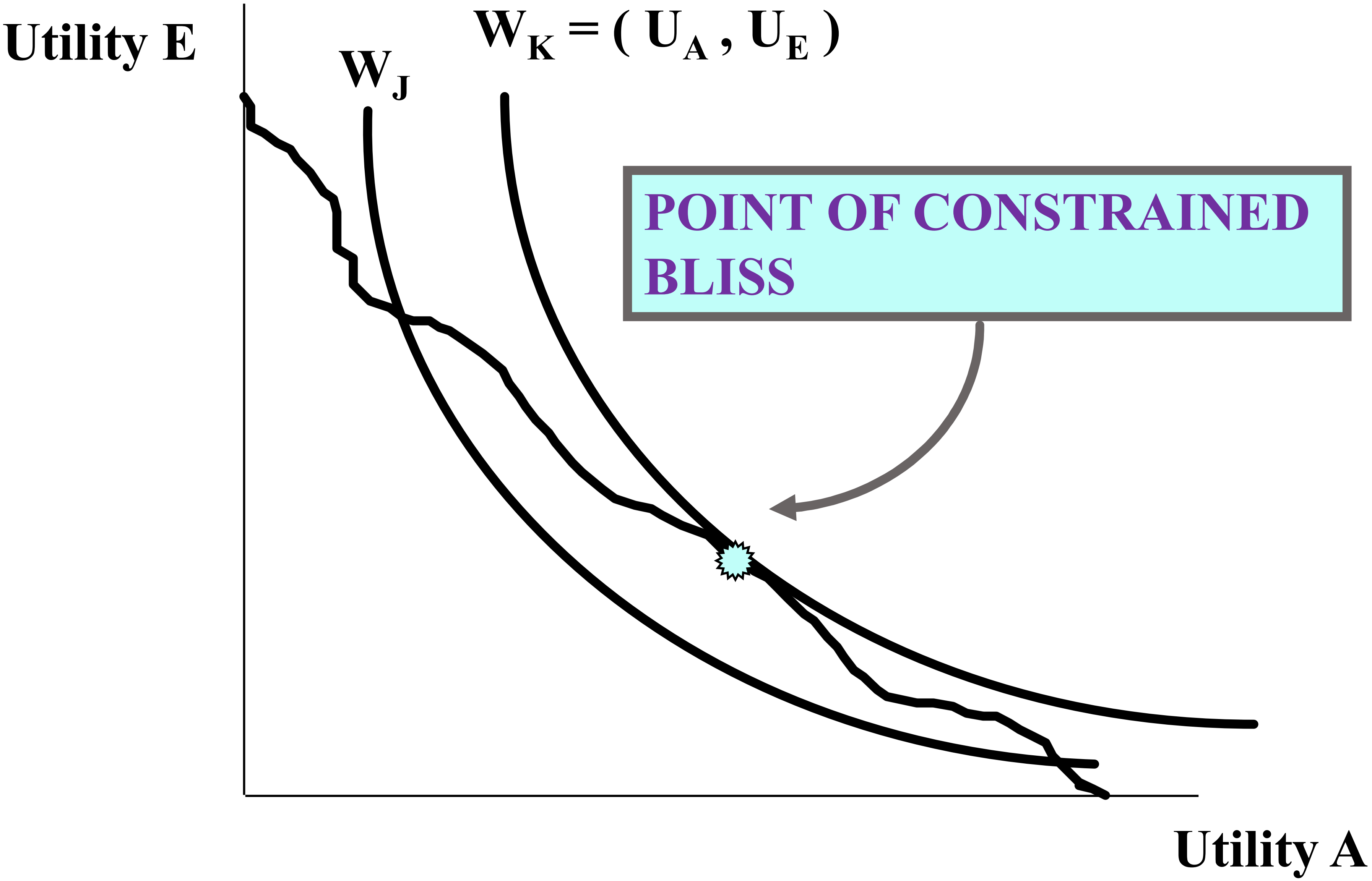
$MRT_{FA} = MRS_A = MRS_E$


Utility E
S'
Utility A

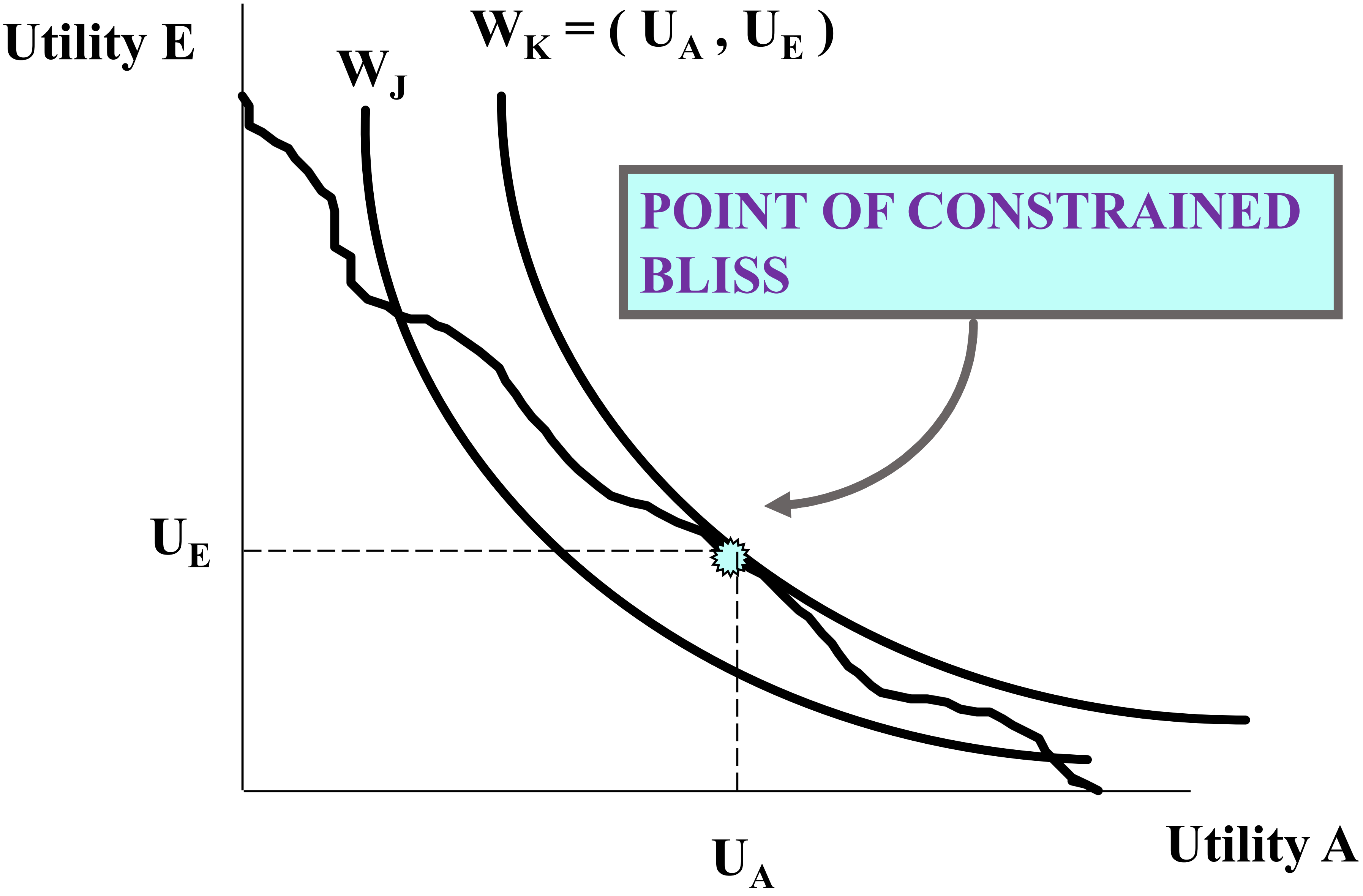


GRAND UTILITIES POSSIBILITIES FRONTIER


Utility E
W_J
$W_K = (U_A , U_E)$
Utility A


Utility E
W_J
$W_K = (U_A, U_E)$
Utility A

POINT OF CONSTRAINED BLISS


Utility E
W_J
$W_K = (U_A , U_E)$
U_E
U_A
Utility A

POINT OF CONSTRAINED BLISS

Requirements for welfare maximization

- ***Marginal rate of substitution*** between every pair of goods must be the same for all consumers. In a pure market setting, this occurs when consumers equate the MRS's to the common market determined output ratio.

Requirements for welfare maximization

- ***Marginal rate of technical substitution*** between every pair of inputs must be the same for all producers . in a pure market setting, this occurs when producers maximize profit by equating MRTS's to the common market determined input price ratio.

Requirements for welfare maximization

- ***Marginal rate of transformation*** must be equal to the marginal rate of substitution in consumption for each pair of goods. In a pure market setting, this condition occurs when producers set marginal cost

  (MC) equal to the output price.

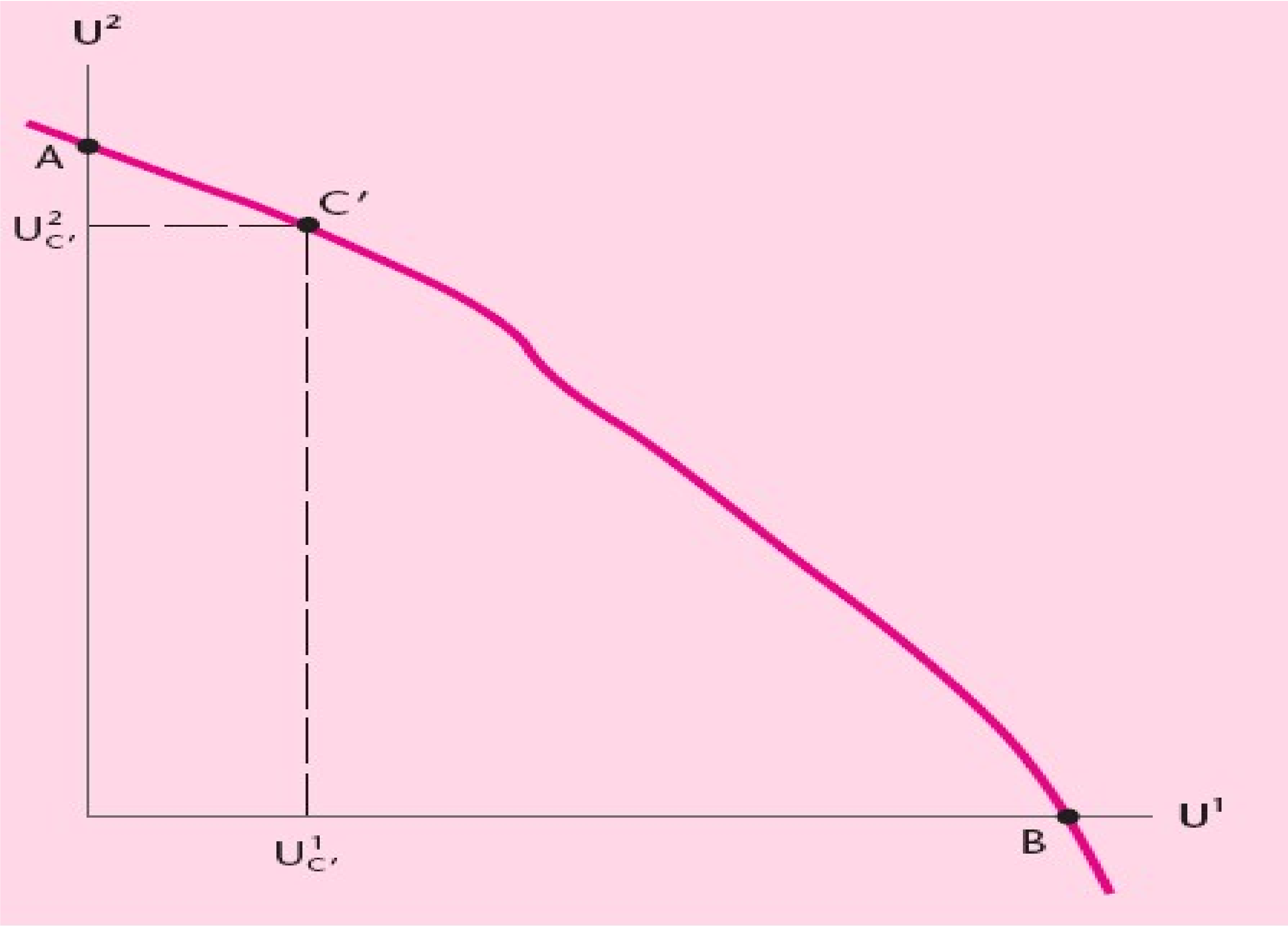
The First Fundamental Theorem of Welfare Economics

A competitive economy can achieve a Pareto optimal allocation of resources

Necessary conditions for a Pareto optimum:

1. **Consumption**: Marginal rates of substitution between X & Y must be equal for 1 & 2
2. **Production**: Marginal rates of technical substitution between K & L must be equal for production of X & Y
3. **Consumption-production**: Marginal rates of substitution between X & Y must also equal Marginal rates of transformation between X & Y

Every point on the Utility possibilities frontier is Pareto efficient


U^2
A
C'
$U^2_{C'}$
$U^1_{C'}$
B
U^1

Efficiency and equity

- In the above diagram the distribution of utility is very unequal.
- If society is interested in a more equal distribution of utility can this be achieved through the free markets mechanism?
- The answer is given by the second fundamental theorem of welfare economics

The Second Fundamental Theorem of Welfare Economics

- Second welfare theorem says that a new Pareto-optimal outcome can be achieved given existing resources, without government intervention.
- Any point on the UPF can be achieved through the functioning of decentralized markets, by an appropriate initial distribution of resources.

Review Questions

- What will happen in our two goods, two-person world if **prices** do not reflect true marginal benefits and all increment costs to society are not included in **marginal costs** ?
- The market will still generate an equilibrium but it will not be Pareto optimal.
- True marginal benefits will not equal marginal costs or vice versa.
- When the market or price system gets the wrong signals we say that there has been a **market failure**.

Market failures

- Imperfect competition
- Public goods
- Externalities
- Incomplete markets
- Imperfect information
- Unemployment, inflation and other macroeconomic disturbances

Prerequisites for Pareto Optimality

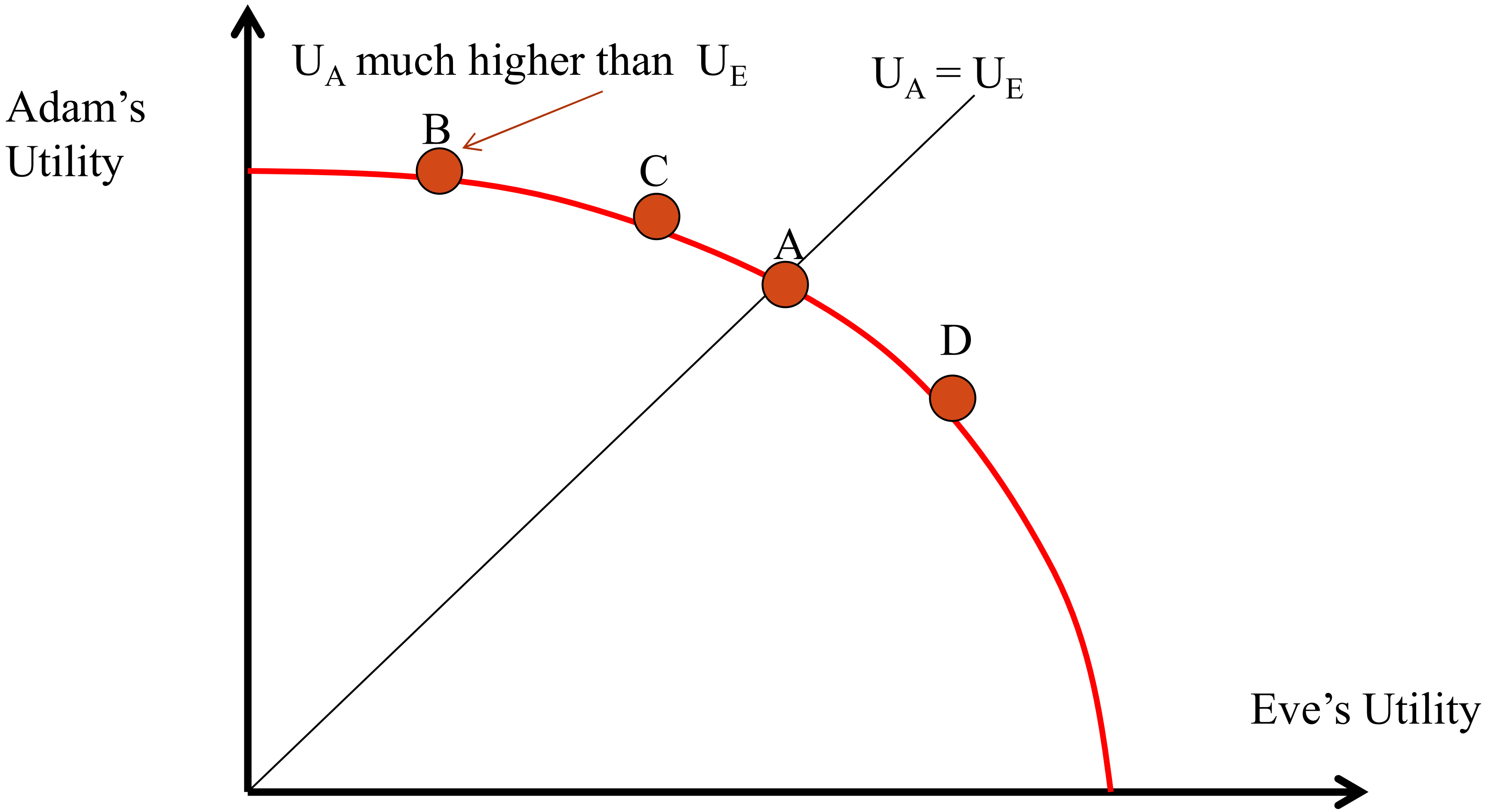
- Now that we have described the necessary conditions for Pareto efficiency, we may ask whether a given economy will achieve this apparently desirable state.
- It depends on what assumptions we make about the operations of that economy. Assume that:

1. All producers and consumers act as perfect competitors; that is, no one has any market power;
2. A market exists for each and every commodity.

Prerequisites for Pareto Optimality

- Under these assumptions, the so-called *First Fundamental Theorem of Welfare Economics* states that a Pareto efficient allocation of resources emerges.
- However, if properly functioning competitive markets allocate resources efficiently, what role does the government have to play in the economy? Only a very small government would appear to be appropriate.
  - Its main function would be to protect property rights so that markets can work. Government provides law and order, a court system, and national defense. Anything more is superfluous.
- But in reality things are much more complicated. For one thing, it has implicitly been assumed that efficiency is the only criterion for deciding if a given allocation of resources is good. It is not obvious, however, that Pareto efficiency by itself is desirable.

Prerequisites for Pareto Optimality


Adam's Utility
U_A much higher than U_E
$U_A = U_E$
B
C
A
D
Eve's Utility

Prerequisites for Pareto Optimality

- Now that we have described the necessary conditions for Pareto efficiency, we may ask whether a given economy will achieve this apparently desirable state.
- It depends on what assumptions we make about the operations of that economy. Assume that:

1. All producers and consumers act as perfect competitors; that is, no one has any market power;
2. A market exists for each and every commodity.

Prerequisites for Pareto Optimality

- If markets lead to a point such as B that is not desirable by the society, does the government have to intervene directly in markets in order to move the economy to a point such A, C or D? For example, does it have to impose ceilings on the prices of commodities consumed by the poor?
- The answer is no. According to the *Second Fundamental Theorem of Welfare Economics,* society can attain any Pareto efficient allocation of resources by making a suitable assignment of initial endowments and then letting people freely trade with each other

Prerequisites for Pareto Optimality

- However, in addition to distributional issues, there is another reason why the First Welfare Theorem need not imply a minimal government.
- This relates to the fact that the certain conditions required for its validity may not be satisfied by real-world markets.
- As we now show, when these conditions are absent, the free-market allocation of resources may be inefficient as well as unfair.

Markets failures

- It is quite likely that the assumptions on which the first and second fundamental theorems are based do not hold in reality. In other words
- There may not be perfect competition in all markets, and
- In many instances markets may not exist for certain commodities and services.
- In such cases how can we achieve maximization of social welfare?

Markets failures:
Market power

- The First Welfare Theorem holds only if all consumers and firms are price takers.
- If some individuals or firms are price makers (they have the power to affect prices) then the allocation of resources is generally inefficient.
- Why?
- A firm with market power may be able to raise price above marginal cost by supplying less output than a competitor would.
- Thus, efficiency conditions are violated, and there is no maximization of social welfare.

Markets failures:
Market power

- Price-making behavior can arise in several contexts.
- An extreme case is a **monopoly,** where there is only one firm in the market, and entry is blocked.
- Even in the less extreme case of oligopoly (a few sellers), the firms in an industry may be able to increase price above marginal cost.
- Finally, some industries have many firms, but each firm has some market power because the firms produce differentiated products.
- For example, a lot of firms produce running shoes, yet many consumers view Reeboks, Nikes, and Adidas as distinct commodities.

Markets failures:

Nonexistence of Markets

- The proof behind the First Welfare Theorem assumes a market exists for every commodity.
- After all, if a market for a commodity does not exist, then we can hardly expect the market to allocate it efficiently.
- In reality, markets for certain commodities may fail to emerge.
- Consider, for instance, insurance, a very important commodity in a world of uncertainty. Despite the existence of many and large insurance firms, there are certain events for which insurance simply cannot be purchased on the private market.

Markets failures:

Nonexistence of Markets

- For example, suppose you wanted to purchase insurance against
- the possibility of becoming poor.
- Would a firm in a competitive market ever find it profitable to supply “poverty insurance”?
- The answer is no, because if you purchased such insurance, you might decide not to work very hard.
- To discourage such behavior, the insurance firm would have to monitor your behavior to determine whether your low income was due to bad luck or to goofing off.
- However, to perform such monitoring would be very difficult or impossible.
- Hence, there is no market for poverty insurance—it simply cannot be purchased.

Markets failures:

asymmetric information

- Basically, the problem here is **asymmetric information**
- It means that one party in a transaction has information that is not available to another.
- One rationalization for governmental income support programs is that they provide poverty insurance that is unavailable privately.
- The premium on this “insurance policy” is the taxes you pay when you are able to earn income. In the event of poverty, your benefit comes in the form of welfare payments.

Asymmetric information:

Full information

- Imagine that there are two groups, each with 100 persons. One group is careless and absentminded and doesn’t pay attention when crossing the street. As a result, members of this group have a 5% chance of being hit by a car each year.
- The other group is careful and always looks both ways before crossing the street. Members of this group have only a 0.5% chance of being hit by a car each year. What effect would the existence of these two different types of pedestrians have on the insurance market?
- The effect depends on what we assume about the relative information available to the individuals and to the insurance company.

Asymmetric information:

Full information

- Suppose that the insurance company and the street crossers have full information about who is careful and who is not.
- In this case, the insurance company would charge different actuarially fair prices to the careless and careful groups.
- The people in the careless group would each pay 5 cents per euro of
- insurance coverage, while those in the careful group would each pay only 0.5 cents per euro of insurance coverage.
- At these actuarially fair prices, individuals in both groups would choose to be fully insured, with the careless paying €30,000 x 0.05 = €1500 per year in premiums and the careful paying € 30,000 x 0.005 = € 150 per year in premiums.
- The insurance company would earn zero profit, and society would achieve the optimal outcome (each group is fully insured).

Asymmetric information:
incomplete information

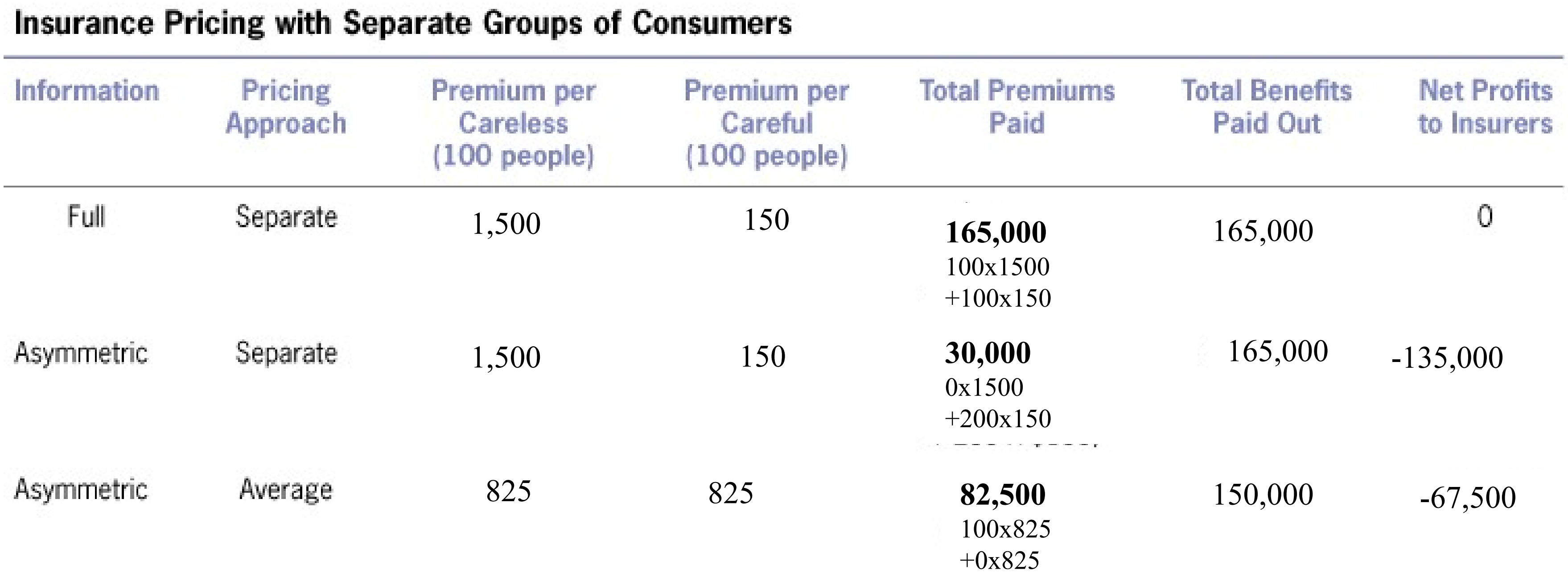
- Now suppose that the insurance company knows that there are 100 careless consumers and 100 careful consumers, but it doesn't know which category any given individual belongs in.
- In this case, the insurance company could do one of two things.
- First, the insurance company could ask individuals if they are careful or careless, and then offer insurance at separate premiums, as in the second row of Table below:
  - the premium would be only €150 if you say you are careful when you cross the street, and €1,500 if you say you are careless.
- In this case, however, *all consumers* will say that they are careful so that they can buy insurance for €150 per year: why voluntarily pay ten times as much for insurance?

Asymmetric information:

incomplete information

- From the consumers' perspective this is a fine outcome, because everyone is fully insured and paying a low premium.
- But what about the insurer? The company is collecting €30,000 in total premium payments (200 persons × €150 per person).
- It is, however, expecting to pay out 5 claims to the careless and 0.5 claims to the careful, for a total cost of 5.5 × 30,000, or €165,000.
- So the insurance company, in this example, loses €135,000 per year.
- Companies will clearly not offer *any* insurance under these conditions. Thus, the *market will fail:* consumers will not be able to obtain the optimal amount of insurance because the insurance will not be offered for sale.
- This outcome is summarized in the second row of the table below.

Asymmetric information:
incomplete information



Insurance Pricing with Separate Groups of Consumers

Information	Pricing Approach	Premium per Careless (100 people)	Premium per Careful (100 people)	Total Premiums Paid	Total Benefits Paid Out	Net Profits to Insurers
Full	Separate	1,500	150	**165,000** 100x1500 +100x150	165,000	0
Asymmetric	Separate	1,500	150	**30,000** 0x1500 +200x150	165,000	-135,000
Asymmetric	Average	825	825	**82,500** 100x825 +0x825	150,000	-67,500

Asymmetric information:

incomplete information

- Alternatively, the insurance company could admit that it has no idea who is careful and who is not, and then offer insurance at a *pooled,* or average, cost.
- That is, on average, the insurer knows that there are 100 careless and 100 careful consumers, so that on average in any year the insurer will pay out €165,000 in claims.
- If it charges each of those 200 persons €825 per year, then, in theory, the insurance company will break even.

Asymmetric information:

incomplete information

- Or will it? Consider the careful consumers, who are faced with the decision to buy insurance at a cost of €825 or to not buy insurance at all.
- Careful consumers would view this as a bad deal, given that they have only a 0.5% chance of being hit. So they would not buy insurance.
- Meanwhile, however, all of the careless consumers view this as a great deal, and they would all buy insurance. The insurance company ends up collecting €82,500 in premium payments (from the 100 careless customers), but paying out €30,000 x 5 = €150,000 in benefits to those careless customers. So the insurance company again loses money.
- Moreover, half the consumers (the careful ones), who would ideally choose to fully insure themselves against getting hit by a car, end up with no insurance.
- Once again, the *market has failed* to provide the optimal amount of insurance to both types of consumers. This outcome is shown in the third row of the table.

Asymmetric information:

Adverse selection

- ***Adverse selection*** is the fact that insured individuals know more about their risk level than does the insurer might cause those most likely to have the adverse outcome to select insurance, leading insurers to lose money if they offer insurance.
- In our example, only those for whom the insurance is a fair deal will buy that insurance. With one price that averages the high - and low - expense groups, only those in the high -expense group will find the insurance to be a fair deal. (For them it's actually better than a fair deal.)

Asymmetric information:

Adverse selection

- If only the high - expense (highest risk of adverse outcome) group buys (selects) the insurance, the insurance company loses money because it charges the average price but has to pay out the high expected expenses of careless individuals.
- If the insurance company knows that it will lose money when it offers insurance, it won't offer that insurance.
- As a result, in this case no insurance will be available to consumers of any type. Adverse selection can therefore lead to failure in the insurance market, and perhaps the eventual collapse of the market.

Asymmetric information:

Moral hazard

- ***Moral hazard*** we have when adverse actions taken by individuals or producers in response to insurance against adverse outcomes.
- Moral hazard is a central feature of insurance markets: if families buy fire insurance for their homes, they may be less likely to keep fire extinguishers handy;
- if individuals have health insurance, they may be less likely to take precautions against getting ill;
- if workers have unemployment insurance, they may be less likely to search hard for a new job

Asymmetric information:

Moral hazard

- The existence of moral hazard means that it may not be optimal for the government to provide the full insurance that is demanded by risk -averse consumers.
- By trying to insure against an adverse event (for example true injury), the insurer may encourage individuals to pretend that the adverse event has happened to them when it actually hasn’t.

Markets failures:

Nonexistence of Markets

- Another type of inefficiency that may arise due to the nonexistence of a market is an **externality**
- **Externality** is a situation in which one person’s behavior affects the welfare of another in a way that is outside existing markets.
- For example, suppose your roommate begins smoking large cigars, polluting the air and making you worse off.
- The most characteristic example is pollution.

Markets failures:

Nonexistence of Markets

- Closely related to an externality is a **public good,** a commodity that is *nonrival and nonexcludable in consumption*.
- Nonrival means that the fact that one person consumes it does not prevent anyone else from doing so as well.
- Nonexcludable means that it is either very expensive or impossible to prevent anyone from consuming it.
- The classic example of a public good is a lighthouse. When the lighthouse turns on its beacon, all ships in the vicinity benefit.
- The fact that one person takes advantage of the lighthouse's services does not keep anyone else from doing so simultaneously, and it is very difficult to prevent others from using the lighthouse.