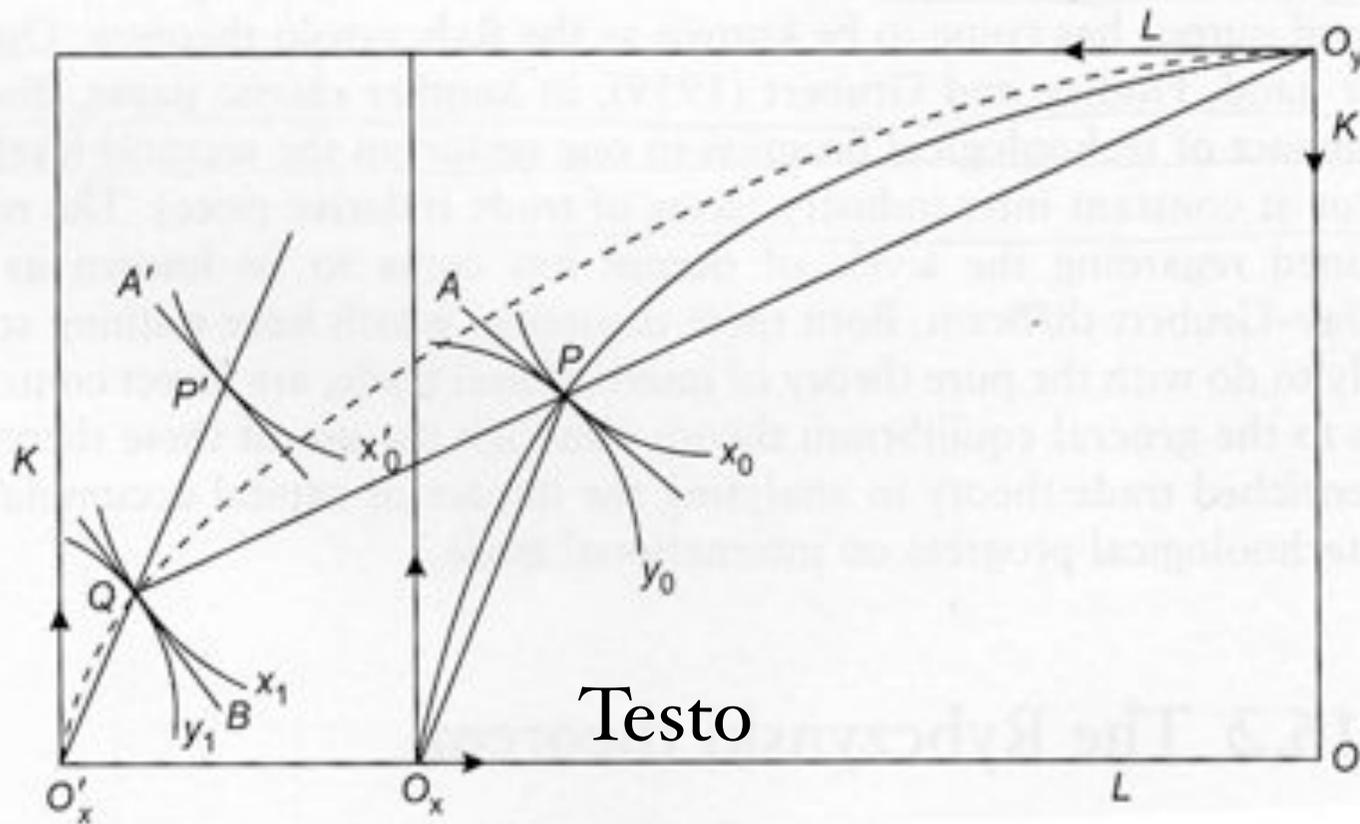


# Growth and trade

# The Rybczynski's theorem

At constant  $W/r$ ,  $P_y/P_x$ , and  $K/L$ , an increase in the quantity of one factors leads to an absolute expansion in production of the good that uses that factor more intensively and to an absolute contraction in the production of the good which uses that factor less intensively.



Testo

Start from an equilibrium such as P  
 When endowment of labour increases by an amount  $OO'_x$   
 equilibrium moves to Q  
 In Q the K/L ratio in both sectors is equal to the one in P  
 but in Q production of Y rises while  
 production of X decreases!

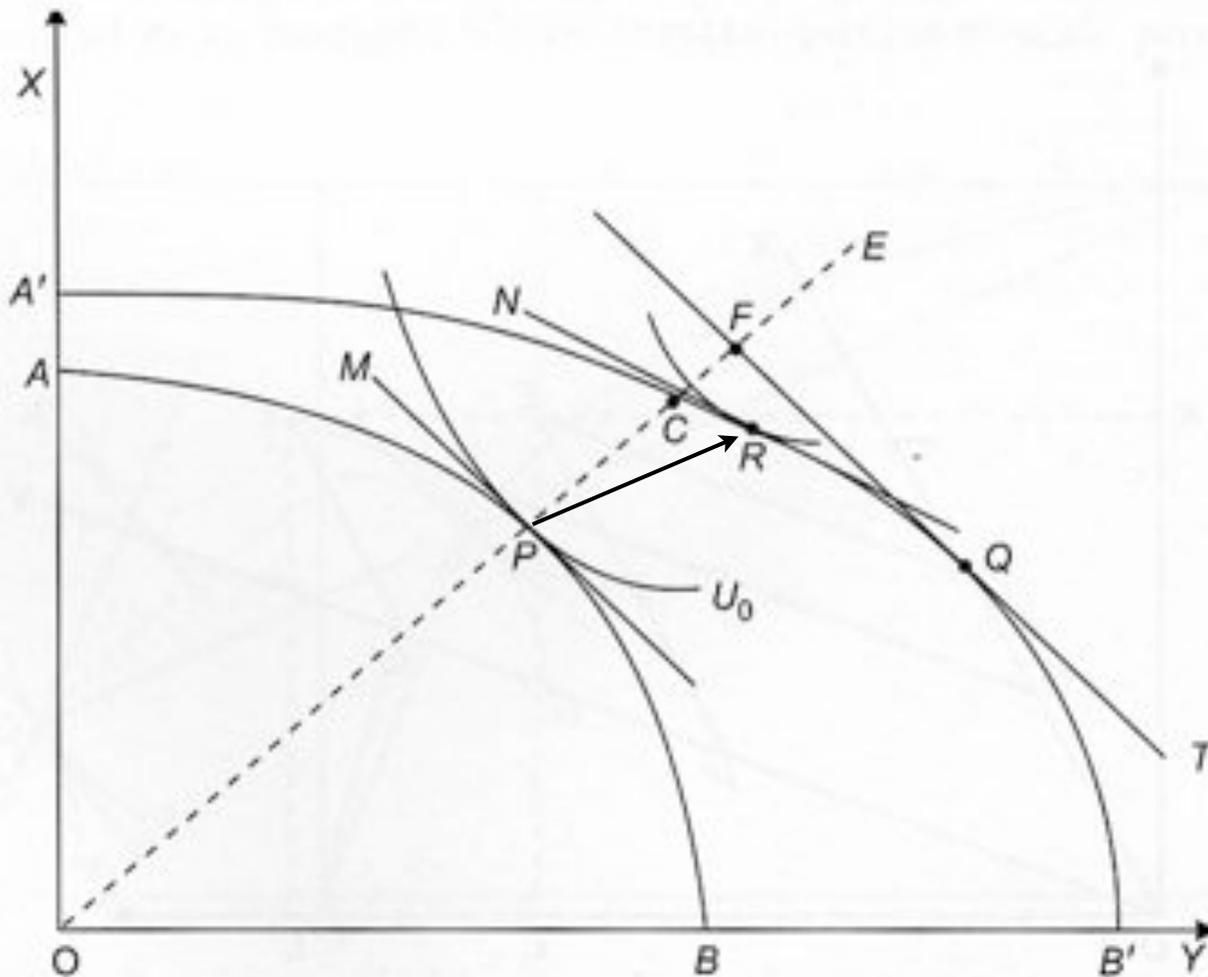
# Consequences:

The increase in labour endowment deteriorates terms of trade of the Y good (cloth) exporter country

Equilibrium moves from P to R

In R the relative price  $P_y/P_x$  is lower than in P!

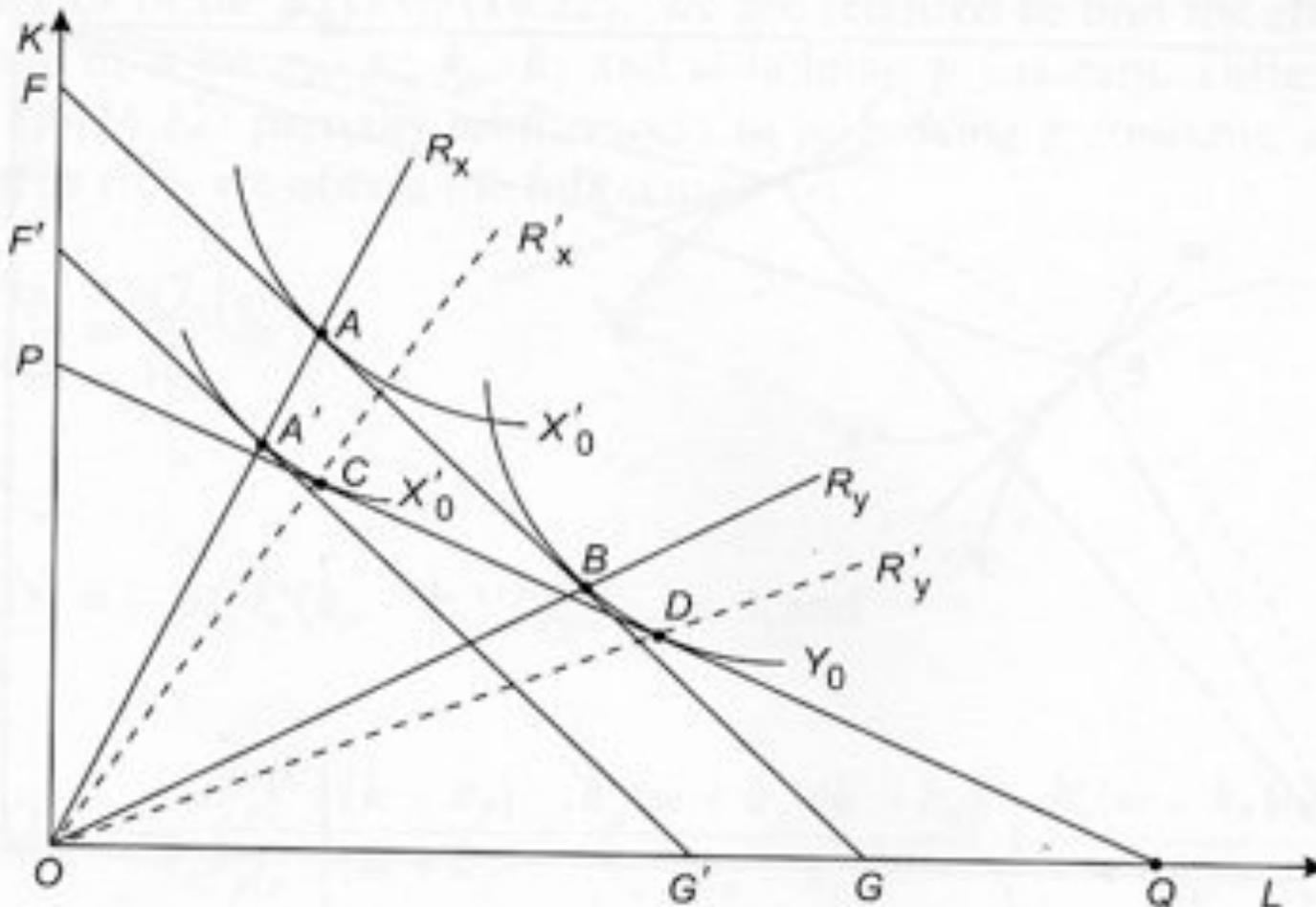
N line is flatter than the M=T lines



# The Findlay-Grubert theorem

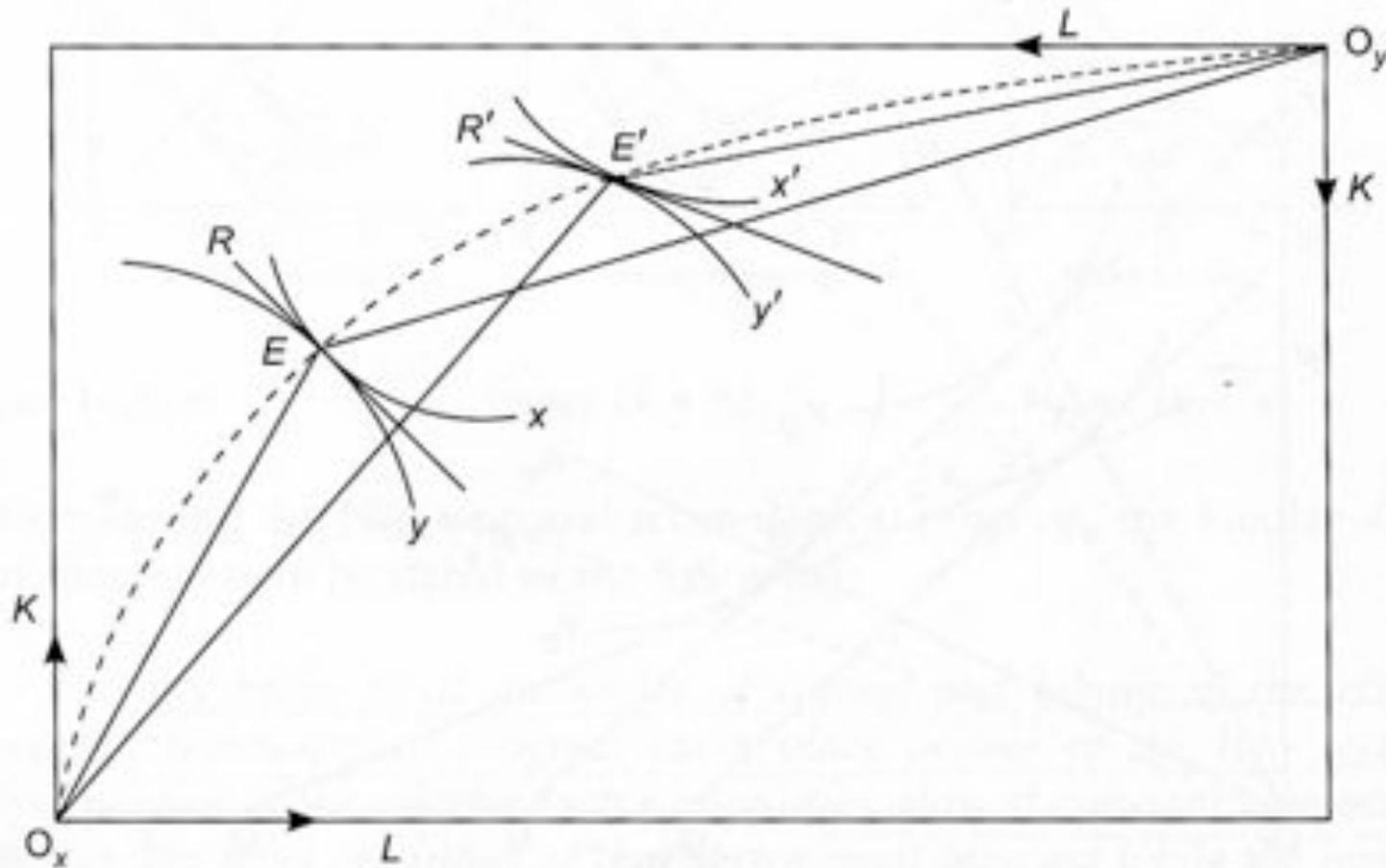
With a fixed amount of capital and labour, when Hicks-neutral technological progress occurs just in one of the two sectors, then at constant relative prices, production in that sector must increase. Production in the other sector decreases.





Because of neutral technological progress in the X sector, equilibrium moves from A and B points to A' and D

Results: the ratio  $W/r$  decreases (PQ line is flatter than  $FG=F'G'$ )

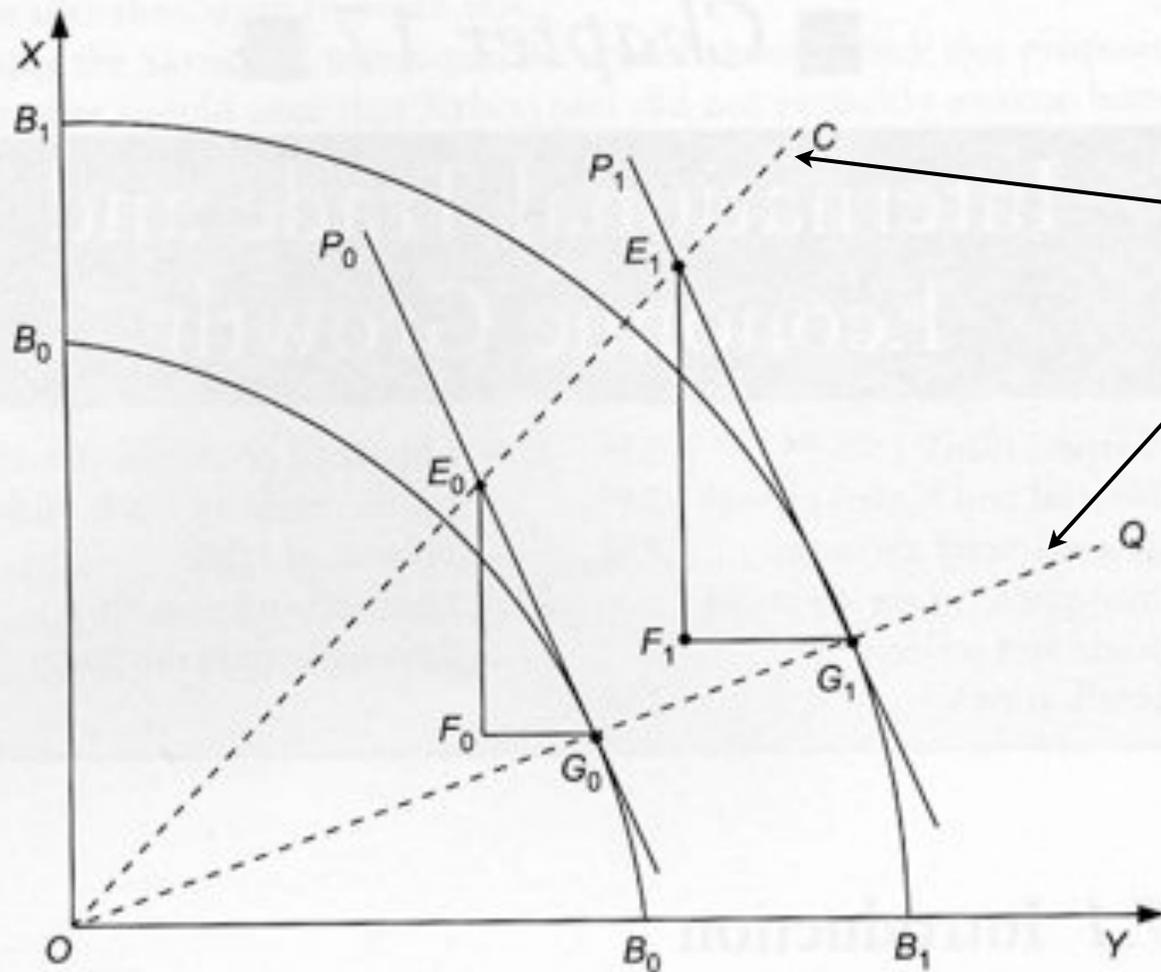


Since  $W/r$  decreases, capital intensity goes down in both X and Y sectors

General equilibrium moves from E to E'

**More of the X good is produced at the expenses of Y production!**

# Neutral growth



The economy growth  
along two paths:

consumption path OC

production path OQ

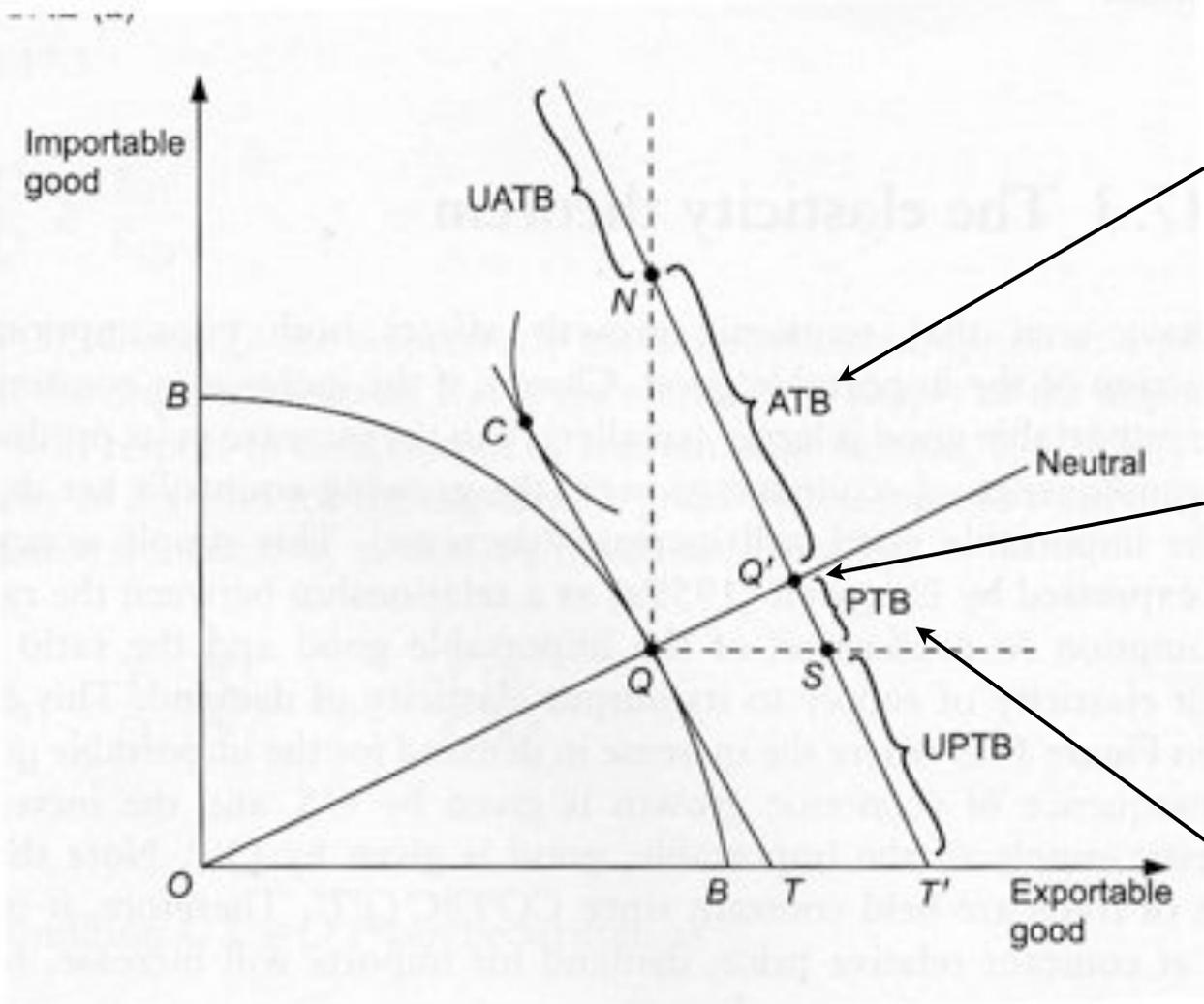
Relative equilibrium  
price (terms of trade)  
does not change:

$P_0$  line is parallel to  $P_1$

If factors endowment arises in the same proportion ( $dK=dL$ ) or if technological change occurs with the same intensity in both X and Y industries, than terms of trade do not change



# Growth and production



On the T' line between Q' e N production of importable good increases more rapidly than production of exportable good ("anti trade" growth)

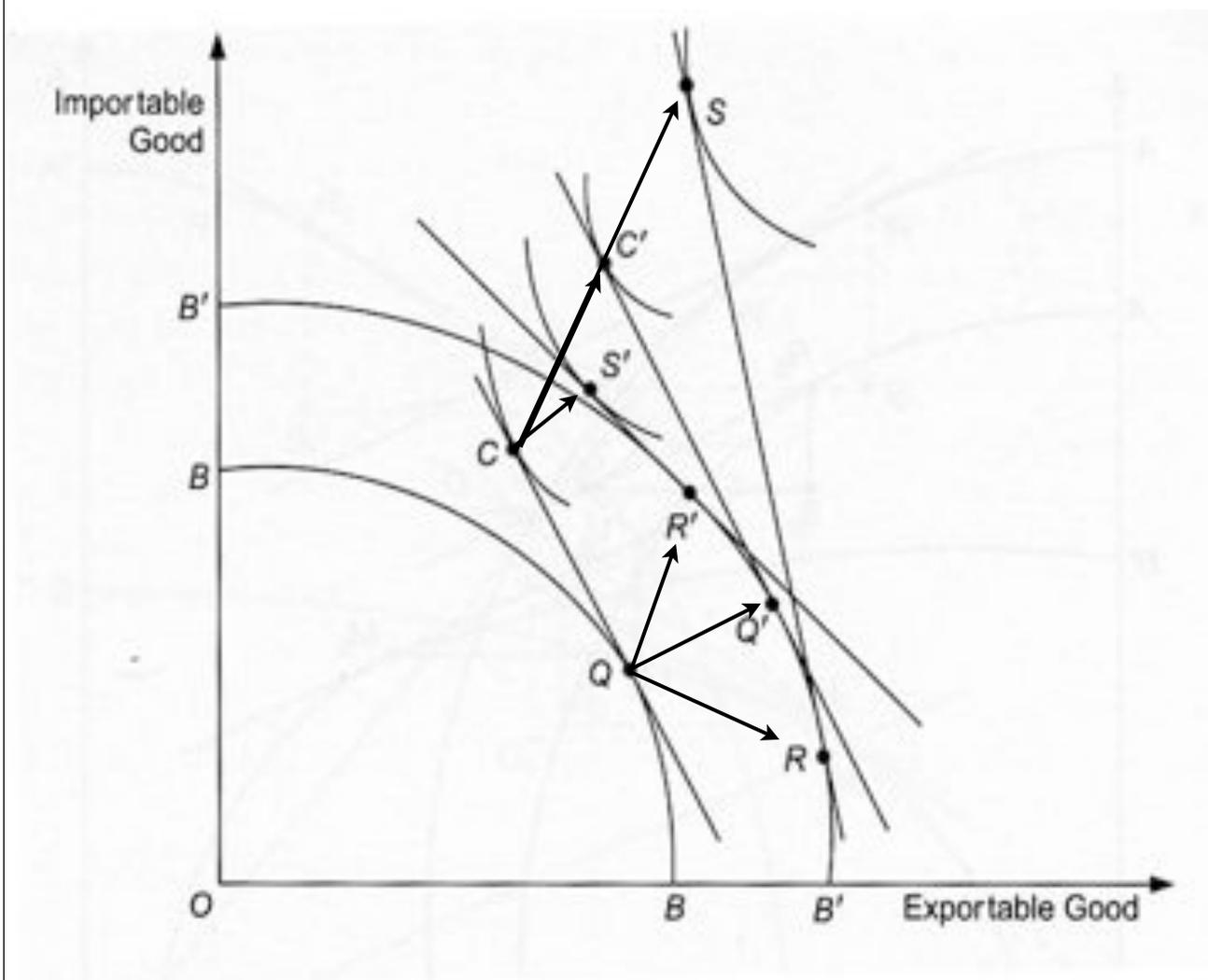
In Q', production of both goods increases in the same proportion (neutral growth)

On the T' line, between Q' e S production of the exportable good grows more rapidly ("pro trade" growth)

Above N, production of importable good **INCREASES** and production of exportable good decreases.

The opposite occurs below the S point

# Growth and terms of trade

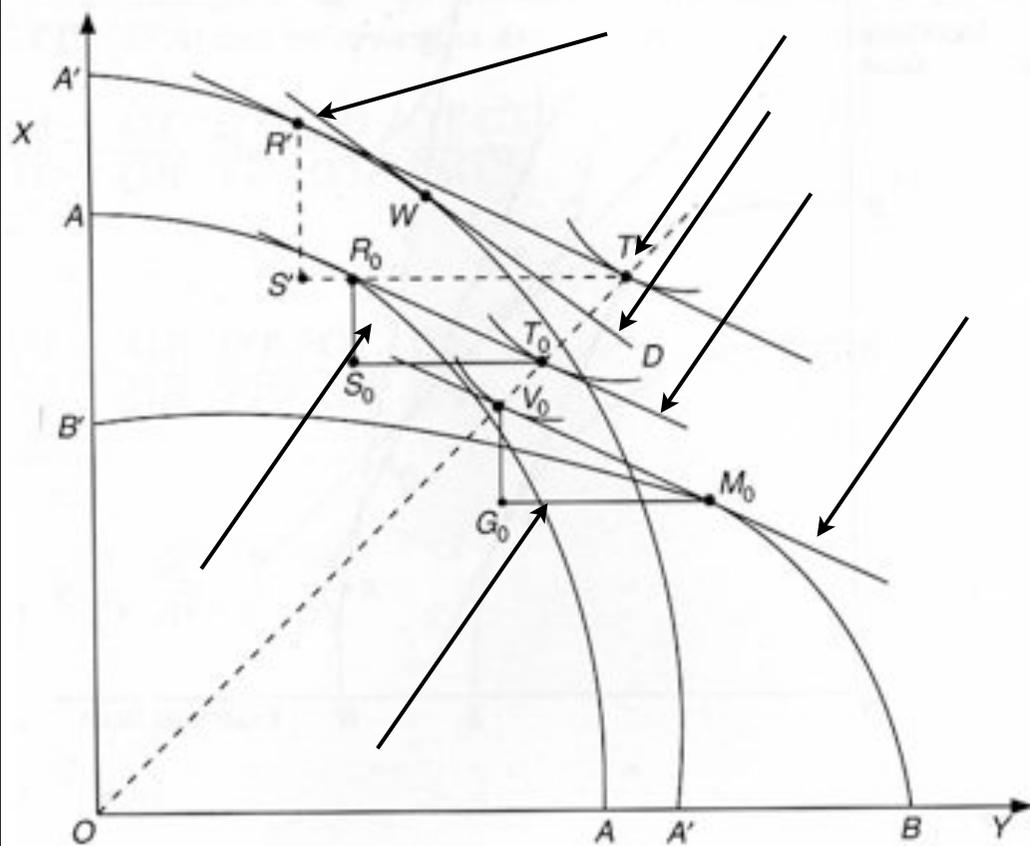


If growth does not modify terms of trade, the change in **real income** is directly proportional to the higher output (from Q to Q' and from C to C')

If growth **improves** terms of trade, then the change in **real income exceeds** output improvement (from Q to R and from C to S)

If terms of trade deteriorates because of growth, change in **real income is smaller** than output improvement (from Q to R' and from C to S')

# Growth and terms of trade movements



**Before** an increase in the capital stock, the slope of parallel lines  $R_0T_0$  or  $V_0M_0$  measures terms of trade.

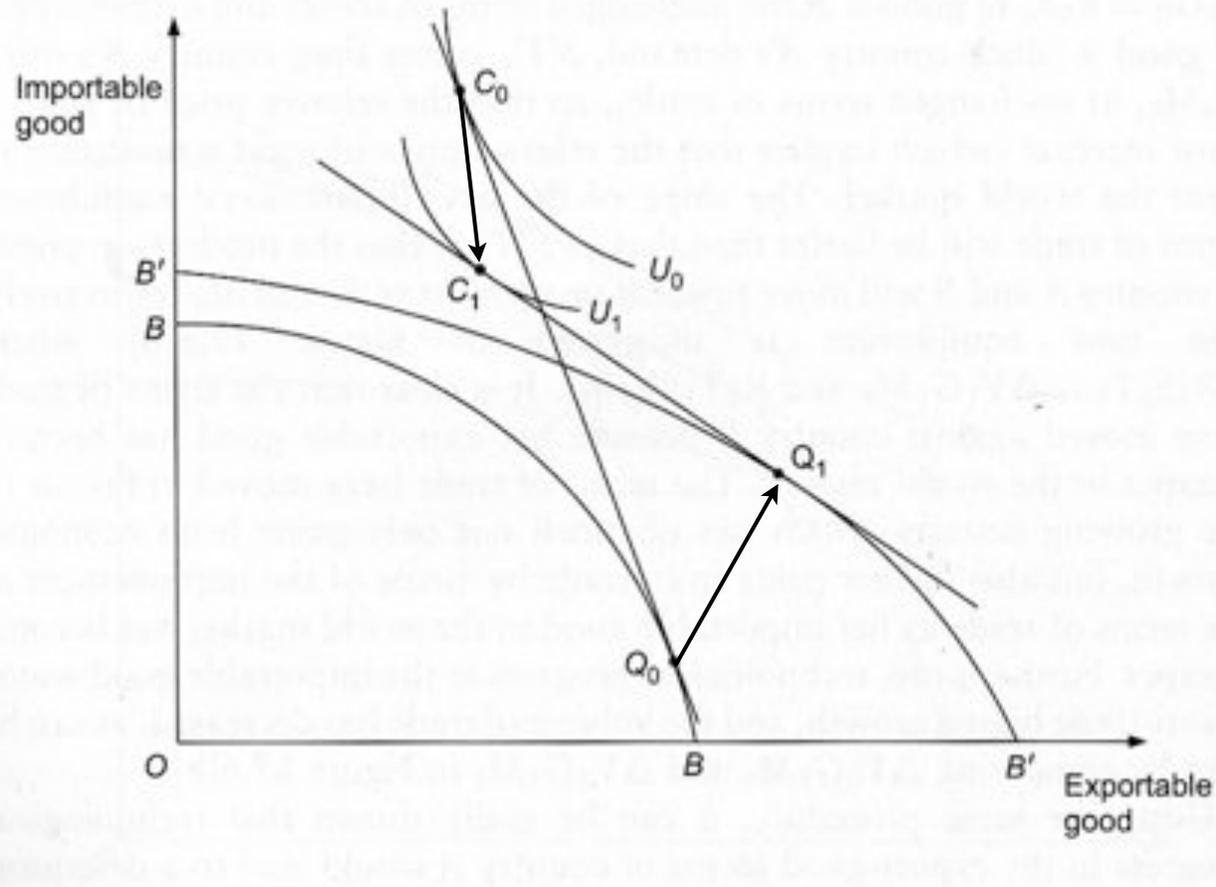
Triangles  $R_0T_0S_0$  and  $V_0M_0G_0$  represent balance trade between country A and B

**After** an increase in the capital stock, A produces in  $R'$  and consumes in  $T'$ . Supply of exports (X) and demand for imports (Y) go up

As a consequence, the relative price of imported good rises

TERMS OF TRADE OF COUNTRY A DETERIORATE (WD line)

# Immiserizing growth



In an extreme case growth biased toward exportable goods may deteriorate terms of trade so much that **real income decreases** in absolute terms

Output rises from  $Q_0$  to  $Q_1$   
but consumption **diminishes** from  $C_0$  to  $C_1$