In the main model the commodity prices are assumed to be exogenously determined in the world markets. Then, if the economy is incompletely specialized in production the factor prices can be uniquely determined. If, however, there is perfect specialization then factor prices depend upon their supplies. In any given time period the factor prices then determine the rate of investment in savings and training so that the growth of capital and skilled labor in the next time period is given and in turn determines the factor prices in that period. In this chapter we analyze how a change in the commodity price ratio in the current period changes the factor price configuration and hence the amount of investment in human and tangible capital, which in turn exert changes in factor supplies and hence their prices in the next time period.
The correspondence between the wages in periods (t) and (t+1) to changes in the commodity price ratio is two-fold—

1. The 'price effect' acts through the relationship between factor and commodity prices. Assuming there is imperfect specialization, an increase in the commodity price ratio (p = pm/pc and pc is the price of the numeriare c-good) leads to an increase in the price of the factor used more intensively and a decline in the price of the factor used less intensively in the production of the m-good and vice versa for a decline in p. On the other hand, if the change in the commodity price ratio at any given factor endowment ratio produces perfect specialization, then the output of the specializing industry increases as does the demand for the factor used intensively in its production thereby bidding up its price. Thus, irrespective of the pattern of specialization in production an increase in the commodity price raises the price of the factor used relatively intensively in its production through 'reallocating' resources.

Further, an increase in the commodity price ratio raises the real wage rate in terms of the numeriare c-good through a 'revaluation' effect. Price effect is
therefore a composite of the reallocation and revaluation effects described above.

2. Since the factor price configuration changes in the same period as the commodity price ratio, the coefficients of investment in savings and skill-formation change concomitantly. This affects the factor endowment ratio in the next period through an 'accumulation effect'. If there is imperfect specialization at the new factor endowment ratio, then, the commodity price ratio in the second period uniquely determines the factor prices. On the other hand, if perfect specialization results, then the factor supply in that period determines the rate of return on the two factors.

The relationship between the wages in periods \( t \) and \( t+1 \) therefore depends upon the direction and the magnitude of the price and accumulation effects. These effects are analyzed below under differing techniques of production in the two industries.

SECTION I

WHEN THE CONSUMPTION GOOD IS CAPITAL INTENSIVE IN PRODUCTION

For a given factor endowment ratio, figure 8 states
the relationship between the commodity and factor prices under the assumption that the c-good is relatively more capital intensive in production than the m-good. On the vertical axis in the upper quadrant is shown the factor endowment ratio, $k=K/L$. The same axis in the lower quadrant shows the commodity price.

![Diagram](image-url)
ratio, \( p \). The horizontal axis represents the factor price ratio, \( \omega \). At \( p^* \) the range of specialization is given by the two factor endowment ratios, \( k_{\text{max}} \) and \( k_{\text{min}} \), which correspond with specialization in the c- and m-goods respectively. For \( k_{\text{max}} > k > k_{\text{min}} \) there is imperfect specialization in production.

Assuming there is imperfect specialization at the equilibrium commodity price \( p^* \) the unique factor price ratio is \( \omega^* \). Now if the commodity price ratio rises from \( p^* \) to \( p^{**} \) the output of the m-good increases while that of the c-good declines. The shrinking c-industry releases less labor than is required by the labor-intensive m-industry, hence an excess demand for labor raises its price and an excess supply of capital lowers its price. At the new equilibrium commodity price ratio, \( p^{**} \), the wage-rental ratio increases from \( \omega^* \) to \( \omega^{**} \).

Since competitive equilibrium requires the equality of unit commodity price with unit cost (equation 34), an increase in the commodity price ratio causes a shift in the isoquant in the m-good industry. This is illustrated in figure 9, where the vertical axis shows the wage rate and the horizontal axis shows rental on physical capital. CC indicates the factor price configuration at which the unit cost is equated.
with the unit price of the c-good; MM depicts a similar condition for the m-good. The point at which the two curves intersect, $A$, denotes the equality of the wage-rental ratio in both industries signifying diversification in production. Any other point on the isoquants CC and MM yields a factor price configuration compatible with the unit price of the c- and m-good respectively. The envelope of these isoquants, CAM, gives the factor price frontier for the economy as a whole. An increase in the commodity price ratio from $p^*$ to $p^{**}$ causes an outward shift of the MM curve along its entire
length, since a higher unit cost isoquant now fulfils equation 34 for the m-industry (CC remains unaffected since the price of the c-good is assumed to be the numerator). The factor price frontier compatible with \( p^{**} \) is given by the outer envelope \( CA'M' \). Segment \( A'M' \) shows perfect specialization in the m-good, while the segment \( A'C \) shows perfect specialization in the c-good. The kink occurs at \( A' \) which is the new point of diversification in production, at which the wage-rental ratio is higher due to the reallocation effect.

**PRICE EFFECT**

From figure 9 it is possible to divide the wage spectrum into four open intervals that correspond with the change in the pattern of specialization before and after the increase in the commodity price.

Wages above \( w^{**} \) are characterized by specialization in the c-good both before and after the rise in the commodity price ratio. This is shown by segment \( CA' \) which remains unchanged. The cut-off point of specialization in the c-good after the commodity price rise is at \( A' \) which is higher than it was initially at \( A \). Therefore, not only does the zone of specialization in the c-good shrink, it now occurs at a higher wage rate and a relatively more
capital-intensive technique of production than it did before the rise in the commodity price ratio. Within this region there is no revaluation effect since the price of the c-good remains constant. As a result, there is no price effect.

2. At wages between \( w^* \) and \( w^{**} \) there is a switch from specialization in the c-good to the m-good as a result of the rise in the commodity price ratio. Along the stretch AA' the m-industry pays higher wages at the new commodity price, \( p^{**} \), so that labor is drawn away from the low-wage c-good to the high-wage m-good industry. The zone of specialization of the m-good increases at the higher commodity price. This accounts for a positive reallocation effect. In addition, since the real wage rate increases in terms of the c-good the revaluation effect is also positive. The overall price effect is positive due to positive reallocation and revaluation effects.

3. Wages below \( w^* \) represent perfect specialization in the m-good both before and after the rise in the commodity price ratio. There is no reallocation effect, but at the higher commodity price ratio the wage rate rises proportionately in terms of the c-good due to a revaluation effect. The overall price effect is positive due to this revaluation effect.
4. At \( w^* \) and \( w^{**} \) there is diversification in 
production at the old price \( p^* \) and the new price \( p^{**} \) 
respectively. Incomplete specialization at A means that 
at the given factor endowment ratio, the initial 
equilibrium commodity price \( p^* \) uniquely determines \( w^* \) 
in both in industries. The effect of a rise in the 
commodity prices on factor prices can be established by 
the Stolper-Samuelson theorem --the price of the 
\text{factor used intensively in the expanding industry} 
increases, while the price of the \text{factor used relatively} 
\text{less intensively in its production} declines. A 
rise in the commodity price here results in a higher 
\text{share of m-good in the commodity mix} and a 
\text{corresponding lower share of the c-good. The} 
\text{shrinking c-good industry releases more capital and less} 
\text{labor than is demanded by the expanding m-good industry.} 
\text{For full employment of both factors, the wage} 
\text{rate would have to increase and the rental on capital} 
\text{would have to decline. At the new factor price} 
\text{ratio both the industries tend to use more capital} 
\text{intensive techniques of production than they initially} 
did. This increases the marginal productivity of 
\text{labor and causes an absolute increase in the price of} 
\text{labor and an absolute decline in the price of capital.} 
The \text{new diversification point is therefore at A'} 
at which the wage rate \( w^{**} \) is higher than at point 
A. The share of the m-industry is also bigger. Here
the price effect is positive because the revaluation and reallocation effects are both positive.

With the exception of specialization in the c-good at both the initial and the changed commodity price ratio, in all the above cases the price effect is positive due to both/either reallocation and/or revaluation effects.

**ACCUMULATION EFFECT**

The above categories show changes in the wages in the various zones of specialization in production on account of an increase in the commodity price ratio irrespective of the time period in which it occurs. However, any change in the factor prices in period (t) arising from a commodity price change in that period has secondary effect on the factor prices in period (t+1) through changes in investment in physical and human capital (see equations 20 and 33). The resultant change in the factor endowment ratio in period (t+1) in turn affects the factor prices of that period. Therefore, the wage rate in period (t+1) is affected cumulatively by the price effect in period (t+1) and an accumulation effect arising from changes in the wage rate in period (t).

Consider the effect of an increase in the commodity
price ratio in period (t) on the wages in period (t+1) on category 1 above. For \( w > w^{**} \) there is specialization in the c-good both before and after the rise in the commodity price ratio. This corresponds with the stretch CA' that remains unaffected by an increase in the commodity price ratio. Since the level of savings and the rate of skill formation are functions of the current wage rate (equation 39 above); constancy of the wage rate implies unchanged investment in human and physical capital. Accordingly, the next period inherits an unchanged factor supply. Therefore so long as there is specialization in the c-good at both the initial and the changed commodity prices in period (t) there is no accumulation effect on the wages in period (t+1). If specialization in period (t+1) is also in the c-good both before and after the commodity price increase there is no price effect in that period either. Wages in both the periods remain unaffected. Hence, for \( w > w^{**} \) the \( \varphi \)-curve remains unchanged from an increase in the commodity price ratio.

Alternatively, consider the case when specialization is in the c-good in period (t) but in period (t+1) there is --

i. Specialization in the m-good at both the old and
the new commodity prices, the marginal productivity of labor remains constant (since the inherited factor endowment remains unchanged in the absence of an accumulation effect). The wage rate, however, increases in proportion with the commodity price due to a revaluation effect in period (t+1).

ii. A switch from specialization in the c-good to the m-good (between \( w^* \) and \( w^{**} \)) or a switch from specialization in the c-good to diversification (at \( w^{**} \)) then the output of the labor intensive m-good increases. Accordingly, the demand for labor increases as does the wage rate—from the viewpoint of the numeriare c-industry there is a shift to a more mechanized technique accompanying a rise in the marginal product of labor. Therefore, within the range \( w^* < w < w^{**} \) the \( \varphi \)-curve shifts outwards from a positive price effect.

iii. The outcome is the same as in case (ii) above if there is diversification in period (t+1) both before and after the commodity price rise (at \( w^* \) and \( w^{**} \) respectively). A higher price of the m-good increases its share in the commodity mix, the demand for labor in the m-industry is inadequately met by the release of labor from the shrinking c-industry. The wage rate increases and the interest rate declines from the familiar Stolper-Samuelson results.
Therefore, so long as there is specialization in the numeriare c-good in period (t) at both the initial and new commodity prices there is no accumulation effect on the wages in period (t+1). Further, if it is accompanied by similar specialization in period (t+1) there is no price effect either and the wages remain constant in both the time periods. Any other pattern of specialization in period (t+1) pushes up the wages in that period through a price effect. The φ-curve therefore remains unchanged in the region \( w(t) > w^* \) and \( w(t+1) > w^* \) but shifts outward in the region of \( w(t) > w^* \) and \( w(t+1) \leq w^* \).

The situation changes if the pattern of specialization is not in the c-good in period (t). The factor price frontier now shifts outwards locally at the increased commodity price ratio. At any point on the segment A'M' of the new factor price frontier CA'M', a given wage rate corresponds with a higher interest rate. The implication of this on the investment parameters in period (t) is a decline in investment in training because of higher opportunity cost of training. Assuming positive interest rate elasticity of savings, investment in physical capital increases (equation 27). The next period therefore inherits a larger stock of physical capital and a
smaller stock of labor.

A higher commodity price, \( p^{**} \), in period \((t)\) therefore implies a larger capital-labor ratio in period \((t+1)\); it also means a higher \( w(t+1) \) irrespective of the pattern of specialization in that period. The \( \varphi \)-curve therefore shifts outwards because of an accumulation effect for all \( w(t) \leq w^{**} \).

If specialization is not in the c-good in period \((t+1)\) also, then the above results stand reinforced. Like in period \((t)\), a rise in the commodity price ratio in period \((t+1)\) produces an outward shift in the factor price frontier along \( A'M' \) so that any \( w(t+1) \) corresponds with a higher \( r(t+1) \). Here the accumulation effect (for \( w(t) \leq w^{**} \)) and the price effect (for \( w(t+1) \leq w^{**} \)) work in the same direction producing an outward shift in the \( \varphi \)-curve within the specified region.

If there is specialization in the c-good in period \((t+1)\) a rise in the commodity price in that period leaves the wages unchanged since there is no price effect. Nevertheless, the wages in period \((t+1)\) increase on account of an accumulation effect in period \((t)\).
The overall effect of a rise in the commodity price on the $\varphi$-curve is an outward shift along its entire stretch except in the zone of specialization in the c-good (for $w(t) \leq w^{**}$ and $w(t+1) \leq w^{**}$).

Figure 10 illustrates the effect of an increase in the commodity price on the $\varphi$-curve--quadrant A shows no change, quadrant B shows accumulation effect, quadrant C represents both accumulation and price effects and quadrant D shows only price effect. The effect on wages below the 45° line will be identical with the changes above it.
The shape of the $\phi$-curve can now be defined in terms of the pattern of specialization in production at the various wage rates--initially diversification occurs at $w^*$ so that the flat segment is necessarily at $w^*$. It also demarcates between specialization in the c-good and the m-good respectively for wages above and below $w^*$. Equilibrium may occur at $w^*$ or at any other wage rate.

Figure 1.1
In figure 11, assume there is imperfect specialization at the equilibrium wage rate, $w^*$. Then an increase in the commodity price ratio increases the wage rate in both the periods (through diverse accumulation and price effects discussed above) so that the $\varphi$-curve shifts outwards everywhere except for wages above $w^{**}$ (dashed line). The flat segment now intersects the 45° line at a higher equilibrium wage rate, $w^{**}$, such that diversification in production continues even after the commodity price rise. The economy moves along a steady state growth path, but at a different factor price ratio than before the commodity price rise.

Figure 12
Of the various other equilibrium possibilities of a shift in the $\varphi$-curve two are illustrated below. In figure 12 is shown the case where due to a change in the commodity price ratio the economy shifts from stable equilibrium to no equilibrium and vice versa in figure 13.

Figure 13
SECTION II

WHEN THE INVESTMENT GOOD IS CAPITAL-INTENSIVE IN PRODUCTION

The above results change significantly when the capital intensity condition is reversed, that is, if the m-good is assumed to be capital intensive and the c-good is relatively labor-intensive in production. Under this assumption there is a negative association between the wage-rental ratio and the commodity price ratio. An increase in the price of the m-good results in an increase in its production and a corresponding decline in the production of the c-good. The latter being more labor-intensive releases more labor and less capital than is required by m-good at the given technique of production. The resulting excess supply of labor depresses the wage rate, while an excess demand for capital raises rental. At the new factor price ratio both industries operate at a more labor-intensive technique of production than they did initially. The marginal product of labor declines to cause both a relative and an absolute decline in the wage rate on account of reallocation of factors in the two industries.

The wage rate however increases in terms of the numeriare c-good. Thus, while the reallocation effect
depresses wages, this tendency is off-set by a positive revaluation effect on the wage rate at the higher commodity price. The net price effect on the wage rate is dependent upon the relative magnitudes of the reallocation and revaluation effects.

Figure 14 illustrates the various zones of specialization associated with the commodity price ratio, p*. The horizontal axis shows the wage-rental

Figure 14
ratio, the vertical axis in the upper quadrant shows the capital labor ratio and in the lower quadrant the commodity price ratio, \( p = \frac{p_m}{p_c} \). At commodity price \( p^* \) the zones of specialization are defined thus: for \( k_{\text{max}} > k > k_{\text{min}} \) there is incomplete specialization, for \( k \geq k_{\text{max}} \) there is perfect specialization in the \( m \)-good and for \( k \leq k_{\text{min}} \) there is perfect specialization in the \( c \)-good. An increase in the commodity price from \( p^* \) to \( p^{**} \) results in a decline in the wage rental ratio from \( \omega^* \) to \( \omega^{**} \) on the one hand, and to changes in the zones of specialization on the other. New specialization zones associated with \( p^{**} \) are as follows: imperfect specialization for \( k_{\text{max}} > k > k_{\text{min}} \), perfect specialization in the \( c \)- and \( m \)-good respectively for \( k \geq k_{\text{min}} \) and \( k \leq k_{\text{max}} \). Incomplete specialization at both the commodity prices \( p^* \) and \( p^{**} \) is ensured only between \( k_{\text{min}} > k > k_{\text{max}} \) where the diversification zones overlap.

If \( k > k_{\text{max}} \) there is perfect specialization in the \( m \)-good both before and after the commodity price rise. At full employment an increase in the commodity price does not affect the marginal productivity of either factor, hence the wage-rental ratio remains unchanged. However, at \( p^{**} \) the returns to factors are higher in terms of the \( c \)-good. Therefore an increase in the commodity price raises
the wage rate even with unchanged pattern of specialization due to a revaluation effect.

If $k < k'min$ there is specialization in the c-good before and after a change in the commodity price. The marginal productivity of factors, their prices and the real wage rate remain constant in terms of the numeriare c-good price. There is neither a reallocation nor a revaluation effect.

For $kmin \leq k > k'min$ there is a switch from specialization in the c-good to diversification in production. Reallocation of factors from the c-good to the m-good works towards a decline in the wage rate and an increase in the rental on capital. Since the marginal product of labor in both the industries is lower at a more labor-intensive technique of production, the wage rate does indeed fall. However, real wages may not decline correspondingly due to a positive revaluation effect. Indeed, the wage rate may increase if the revaluation effect more than offsets the reallocation effect.

For $kmax > k \geq kmax$ a rise in the commodity price leads to a switch from diversification in production to specialization in the m-good. This occurs at a relatively more labor-intensive technique of
production so that the marginal product of labor and the wage rate declines on account of an reallocation effect. As in the above case revaluation effect tends to increase the real wage rate. The ultimate price effect would depend upon the relative magnitudes of the reallocation and revaluation effects which work in opposing directions.

Figure 15
The area of ambiguity is larger if the zones of diversification at the two commodity prices do not overlap. This is illustrated in figure 15, the axes of which correspond with figure 14. At the initial price $p^*$ for $k_{\text{max}} > k > k_{\text{min}}$ there is imperfect specialization, whereas for $k > k_{\text{max}}$ and $k < k_{\text{min}}$ there is perfect specialization in the $m$- and $c$-good industries respectively. A rise in the commodity price from $p^*$ to $p^{**}$ results in a shift in the zones of specialization such that $k'_{\text{max}} > k > k'_{\text{min}}$ corresponds with imperfect specialization and $k < k'_{\text{min}}$ and $k > k'_{\text{max}}$ with specialization in the $c$- and $m$-goods respectively. If the factor endowment ratio is within the extremes $k'_{\text{max}}$ and $k_{\text{min}}$ an increase in the commodity price causes a shift from specialization in the $c$-good to specialization in the $m$-good. Since this switch entails a shift from a labor-intensive to a capital-intensive technique of production, at full employment of both factors, marginal product of labor declines. However, since the price of the $m$-good is higher, the decline in the marginal product of labor is offset by an increase in the wages in terms of the numeriare $c$-good. Like the earlier case, the net effect on the wage rate would depend upon the relative magnitudes of the reallocation and revaluation effects.
The factor price configuration associated with specialization in the c- and m-goods is shown in figure 16. Isoquants MM and CC show factor prices at which the unit cost is equated with the unit prices of the m- and c-goods respectively. Diversification in production is at point A at which the wages in the two industries are equated at \( w^* \). At any wage rate greater than \( w^* \) there is specialization in the m-good, while for wages below \( w^* \) there is specialization in the c-good. An increase in the commodity price causes MM to shift outwards--which now equates unit cost with the new unit price. The new factor price frontier is given by CA'M' with A' as the point of diversification in production and \( w^{**} \) the equilibrium wage rate. In the segment A'M' there is specialization in the m-good after the increase in
the commodity price, segment A'C shows specialization in the c-good. Thus, at a higher commodity price the threshold level of wages, $w^\ast$, at which there is a switch from specialization in the m-good to the c-good is lower than the initial level at $w^\ast$.

**PRICE EFFECTS**

The effect of an increase in the commodity price on the wage rate in periods (t) and (t+1) within various zones of specialization are as follows—

1. For $w > w^\ast$ there is specialization in the m-good both before and after the increase in the commodity price. There is no reallocation effect on wages, but the real wages increase due to a revaluation effect.

2. For $w < w^{**}$ there is specialization in the c-good irrespective of the change in the commodity price. Like the earlier case there is no reallocation effect, nor is there a revaluation effect in terms of the numeriare c-good.

3. For $w^\ast > w > w^{**}$ there is a switch from diversification in production and specialization in the c-good to specialization in the m-good. In both the cases the wage rate declines on account of a reallocation effect. However, at a higher price of
the m-good, the real wage rate increases. Since reallocation and revaluation effects work in opposing directions the overall effect on the wage rate is indeterminate. It may decline, remain constant or increase depending upon the magnitudes of the two effects.

4. For \( w = w^{**} \) there is a switch from specialization in the c-good at the initial commodity price to diversification in production at the new price. Again the revaluation effect is positive but the reallocation effect works towards a decline in the wage rate.

The change in the shape of the \( \varphi \)-curve due to an increase in the commodity price is illustrated in figure 17 where the dotted line indicates the direction of the change in the wage rate. Segment (a) coincides with condition (2) above. There is no change in the wage rate due to an increase in the commodity price. Segment (b) shows a decline under the assumption that the reallocation effect outweighs the revaluation effect in the range \( w^* > w > w^{**} \) (conditions 3 & 4 above). In segment (c) the wage rate increases due to the revaluation effect (condition 1 above). The change in the \( \varphi \)-curve to the right of the
45° line would be symmetric to the changes shown in figure 17.

If, on the other hand, revaluation effect is assumed greater than the reallocation effect, changes in the $\varphi$-curve would differ. In the region of $w^* > w > w^{**}$ the wage rate would increase with the commodity price rise (figure 18).
ACCUMULATION EFFECTS

So far we have discussed the price effects on wages due to an increase in the commodity price irrespective of the time period in which it occurs. We now integrate the effect of accumulation arising in period (t) with the price effect in period (t+1) to determine the cumulative changes in the wage rate in period (t+1) to a change in the commodity price.

Consider the case of specialization in the c-good both before and after the commodity price rise in both the periods. In the region of \( w(t) < w^{**} \) the factor price frontier remains unchanged hence there is no
accumulation effect on the wages in period \((t+1)\). Since \(w(t+1)\) is also less than \(w^*\) there is no price effect in that period. Thus, for \(w(t) < w^*\) and \(w(t+1) < w^*\) there is neither a price effect nor an accumulation effect and the \(\varphi\)-curve remains unaffected.

The picture becomes complicated when specialization is other than in the \(c\)-good in period \((t)\). Price effects emerging in this period then give rise to an accumulation effect thereby exerting changes in the wages in period \((t+1)\).

Consider specialization in the \(m\)-good at both commodity prices in period \((t)\). The isoquant for the \(m\)-good moves outwards at the higher commodity price ratio signifying higher interest rate in period \((t)\) for any given wage rate. This translates into more investment in saving and less investment in training implying a higher capital-labor endowment in period \((t+1)\). This accumulation effect produces an upward pressure on the wages in period \((t+1)\) irrespective of the pattern of specialization in that period. The ultimate effect on wages in that period would of course depend upon the accumulation effect and the price effect in period \((t+1)\).

For instance, in period \((t+1)\) this means that if specialization is in the \(c\)-good, wages increase on
account of an accumulation effect. If specialization is in the m-good, accumulation effect is reinforced by the price effect in period (t+1). In the region of a switch from diversification in production to specialization in the m-good or from specialization in the c-good to diversification or specialization in the m-good (conditions 3 and 4 above) the price effect in period (t+1) is ambiguous depending upon the relative magnitudes of the reallocation and revaluation effects.

The area of ambiguity increases if specialization is not in the c-good or the m-good at both the commodity prices in period (t). In that case the price effect is indeterminate depending upon the relative magnitudes of the reallocation and revaluation effects. Accordingly, the accumulation of factors and hence their influence on the factor prices in period (t+1) is ambiguous in this zone.

The composite changes of price and accumulation effects on the wage rate in period (t) and (t+1) are illustrated below. The underlying assumption is that the revaluation effect outweighs the reallocation effect and vice versa in figures 19 and 20 respectively.
The implications of a change in the commodity price ratio are as follows—

1. Given \( \varphi(w) \), a change in the commodity price ratio causes it to shift outwards/inwards depending upon whether the consumption/investment good is capital-intensive in production everywhere except in the zone of specialization in the c-good at both the commodity price ratios.
2. Even if steady state equilibrium exists at the initial commodity price ratio, it is not assured at the new commodity price ratio. If steady state growth does indeed result at the new commodity price ratio, it will occur at a higher/lower equilibrium wage rate depending upon the outward/inward shift in the $\varphi$-curve.

3. The shift in the $\varphi$-curve can cause a change in the pattern of specialization. If, for instance, there is incomplete specialization initially, then an increase in the factor prices can cause the factor supply to change such that it coincides with the capital-labor ratio in either good, at which point perfect specialization results. In the zone where the shift in the $\varphi$-curve is indeterminate, a whole array of changes in the pattern of specialization are conceivable.