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Economic Welfare, International Factor Mobility and Non-tradeable Goods

By Gerhard Rübél

Using a simple model of a small open economy producing both tradeable and non-tradeable goods, it is shown how immigration of labor affects the utility of the existing residents. The size of the change in the old residents' welfare is dependent on two factors, whose influence is explicitly discussed in the paper. One of these is the existence of remittance of part of the immigrants' earnings to their countries of origin, the other is the factor intensity relationship in the production of the two types of good.

1. The Problem

The extensive discussion of the economic effects of international factor movements has predominantly focussed on movements of international capital. (Overview in *Ruffin*, 1984) The movement of labor, however, has also been, and still is, extremely important for the world economy. The industrial countries of northern Europe have been dependent on foreign labor, especially in the 60's and 70's,¹ Workers from Mexico and the Caribbean are employed in the USA, and the oil producing countries of the middle east could not have carried out their ambitious development projects without the help of foreign labor – especially from Asia. Just recently, following the opening up of eastern Europe to the west, a new aspect of the international movement of labor has emerged. The effects of this movement, which has many of the characteristics of a population migration, have been most strongly felt in the Federal Republic of Germany.

Germany's experience of the influx of foreign workers goes back to the end of the 50's. At that time foreign labor was already beginning to be recruited for the growing domestic market, mainly from southern European countries. As a result, the number of foreign workers in Germany rose suddenly, from 100,000 in 1957 to around 2.5 million in 1973. Initially it was thought that these 'guestworkers' would stay for only a short time, the employers' associations had even planned to introduce a compulsory rotation of workers though these plans were never put into effect. In 1973 over 60 % of foreign workers stayed for less than three years and only 9 % stayed

¹ In Switzerland in 1970, for example, foreign workers made up more than 30 % of total employment. Cf. *Ruffin* 1984.

for longer than ten years. (*Blitz* 1977, *Mehrländer* 1976) Outward indications of this situation were the extremely poor living conditions in the host country and the remittance of a considerable proportion of the guestworkers' earnings to family members in the home country. Guestworkers sent over 25 % of their earnings back home in 1973. (*Blitz* 1977) From the early 1970's, however, this situation began to change. Increasingly the workers were being followed by family members and the number of foreigners who said they wanted to stay permanently was growing. What was occurring was in fact immigration. (*Mehrländer* 1976) Associated with this was a fall in the proportion of income being sent back to the countries of origin. Today many of the German-born children of the first generation of guestworkers have themselves reached working age.

The characteristics of the most recent influx of people into Germany, and the circumstances that caused it to increase dramatically, are different from those associated with the guestworker phenomenon of the 50's and 60's. The changes in the political situation in eastern Europe have resulted in the movement of whole families, mostly of German ancestry, who, from the start, intended to settle permanently in Germany. When these people are integrated into the workforce, the proportion of their earnings that they will send back to their countries of origin will be negligible.

This flow of migrants not only has different effects on Germany as recipient country, its consequences for the countries of origin are also different. The countries that the earlier guestworkers came from were mostly suffering from high unemployment, and it was mostly unskilled workers who left. The people who remained benefitted both from reduced pressure in the domestic labor market and from the remittances sent back by the foreign workers to their families. Foreign exchange earnings from remittances were higher than from export of goods to Germany.² The causes of the inflow from the East are different. These people tend to be highly skilled and have relatively little difficulty in finding jobs in Germany, especially where there is no language problem. The countries of origin suffer a permanent loss of human capital which is not even partly offset by the remittance of some of the migrants' earnings.

The differing effects, briefly outlined here, that can result from international labor movements have received some attention in the literature. There has been a series of contributions which considers the problems faced by the home countries when skilled workers emigrate and human capital is therefore lost. Labor mobility has also been considered in models of international trade. Topics here are the consequences for international welfare, whether

² For Turkey, for example, the amount of foreign exchange earnings from remittances was 255% of the earnings from exporting goods to Germany. Cf. *Hierwitz/Schatz* 1977.

the effects of capital and labor mobility are symmetrical and whether factor mobility can be a substitute for trade in goods.³ The most usual assumptions made in these discussions are that the workers continue to be citizens of their home countries and that all the goods produced are tradeable. The latest developments, however, mean that, when discussing international factor movements, it is necessary to assume first, that workers are not going to return to their countries of origin and secondly that both tradeable and non-tradeable goods are produced. The latter assumption is justified by the fact that the share of services – mostly non-tradeables – in the national product of industrial countries has been increasing continuously. One of the first studies that recognized the importance of non-tradeable goods for the discussion of international labor movements was that of *Rivera-Batiz* 1982. (See also *Krauss* 1976, 1979; *Srinivasan* 1983) He showed that those who are left behind when part of the population migrates permanently become worse off in cases where non-tradeable goods exist. Other contributions have followed which have discussed this result and its applicability. Important aspects here are the modifications necessary when some of the earnings generated in the host country are sent back to the country of origin, whether the emigrants are owners of capital, and, if so, whether this capital also leaves the country when the people leave (*Thompson* 1984, *Rivera-Batiz* 1984, *Djajic* 1986, *Quibria* 1988). This discussion has, however, been limited to effects on the country of origin. The present contribution goes beyond this and looks at the possible welfare effects on the recipient country when there is an inflow of both labor and capital and when both non-tradeable and tradeable goods are produced.⁴ A further distinction is made between the case where the migrants are temporary residents and therefore remit part of their income and the case where they become permanent residents and consume the whole of their income in their new country. It is shown that the welfare effects on old residents are influenced by the remittance of part of the earnings of the migrants. These influences depend on the relative factor-intensities of the tradeable and non-tradeable goods. The model will be set out in Section 2, the case where the non-tradeable good is relatively labor-intensive is discussed in Section 3.1. and 3.2. It will be shown here how the welfare effects on the old residents differ when migrants spend the whole of their income in their new country compared to the case where they send some back to their country of origin. The same comparison will be made in Section 3.3. for the case where the tradeable good is relatively labor-intensive. The results are summarized in Section 4.

³ Cf. an overview in *Ethier* 1985 and the references listed there.

⁴ This article restricts itself solely to one particular aspect of immigration. One should therefore be cautious when interpreting the results, since unemployment, the social problems associated with integration and similar issues are not taken into account.

2. The Model

Supply: There are two bundles of goods – one consisting of tradeable goods (T) and the other of non-tradeable goods (N). Capital (K) and labor (A) are used to produce both types of goods, these factors are fully employed and internally completely mobile. The amount of the factors is exogenously given, markets are perfectly competitive.

The linear-homogeneous production-functions are:

$$T = {}_{\tau}A f({}_{\tau}k) \quad \text{and} \quad N = {}_N A g({}_N k),$$

${}_{\tau}k$: Capital-intensity in the production of tradeable goods,

${}_N k$: Capital-intensity in the production of non-tradeable goods.

If t stands for the price of the tradeable goods and n for the price of the non-tradeable goods, with the relative price p defined as n/t , then, where firms are profit maximizers, the following supply functions are obtained:

$$\begin{aligned} (1) \quad T &= T(p, K, A); & T_p &< 0; \\ & & T_K &\geq 0 \quad \text{and} \quad T_A \leq 0 \quad \text{for} \quad {}_{\tau}k \geq {}_N k; \\ (2) \quad N &= N(p, K, A); & N_p &> 0; \\ & & N_K &\leq 0 \quad \text{and} \quad N_A \geq 0 \quad \text{for} \quad {}_{\tau}k \geq {}_N k. \end{aligned}$$

The well-known relations for real wages (w) and real interest rates (r) apply:

$$\begin{aligned} (3) \quad r &= r(p); & r_p &\leq 0 \quad \text{for} \quad {}_{\tau}k \geq {}_N k; \\ (4) \quad w &= w(p); & w_p &\geq 0 \quad \text{for} \quad {}_{\tau}k \geq {}_N k. \end{aligned}$$

Demand: The demand side of the economy is determined by a utility function U , which, for simplicity, is assumed to be homothetic.

$$U = U({}_N C, {}_{\tau} C).$$

If E represents the minimum nominal expenditure necessary to achieve a certain level of utility, then it follows, in functional form, that:

$$(5) \quad E = E(t, n, U), \quad \text{with:}$$

$$E_t = {}_T C(t, n, U),$$

$$E_n = {}_N C(t, n, U),$$

$$E_U: \text{expenditure equivalent of a change in utility.}$$

To simplify the analysis, the country is assumed to have no external debt in the initial situation. Remittances (R) of part of foreign workers' earnings to their home countries consist of tradeable goods. In each period, aggregate consumption expenditure must equal the value of the aggregate output of goods minus possible remittances.

$$(6) \quad E(t, n, U) = t(T - R) + nN.$$

The domestic market for a non-tradeable good always clears.

$$(7) \quad N = {}_N C.$$

The equilibrium condition for the traded goods sector follows from (6) and (7):

$$(8) \quad T = {}_T C - R.$$

Because one of the two equilibrium conditions (7) and (8) is redundant, equations (1) to (7) determine the seven endogenous variables T , N , r , w , E , U , and n . The price of the tradeable good, t , is determined in the world market and, in what follows, will be set at one.

3. Immigration of labor

3.1. The case of no remittances when the production of the non-tradeable good is relatively labor-intensive

To analyze the welfare effects of immigration of labor on old residents of a country, the following scenario is assumed: the immigrants have the same homothetic utility function as the existing residents. The production of non-tradeable goods is relatively labor-intensive and the immigrants remit none of their earnings to their countries of origin. The immigration of labor is accompanied by an import of capital. If σ stands for the percentage growth of capital relative to the percentage intake of labor, it holds that:

$$(9) \quad \sigma \equiv \frac{dK}{K} / \frac{dA}{A}, \quad \text{or} \quad dK \equiv \sigma k dA.$$

In what follows, it is assumed that overall capital-intensity (k) falls as a result of the labor immigration and, in this case, $\sigma < 1$.

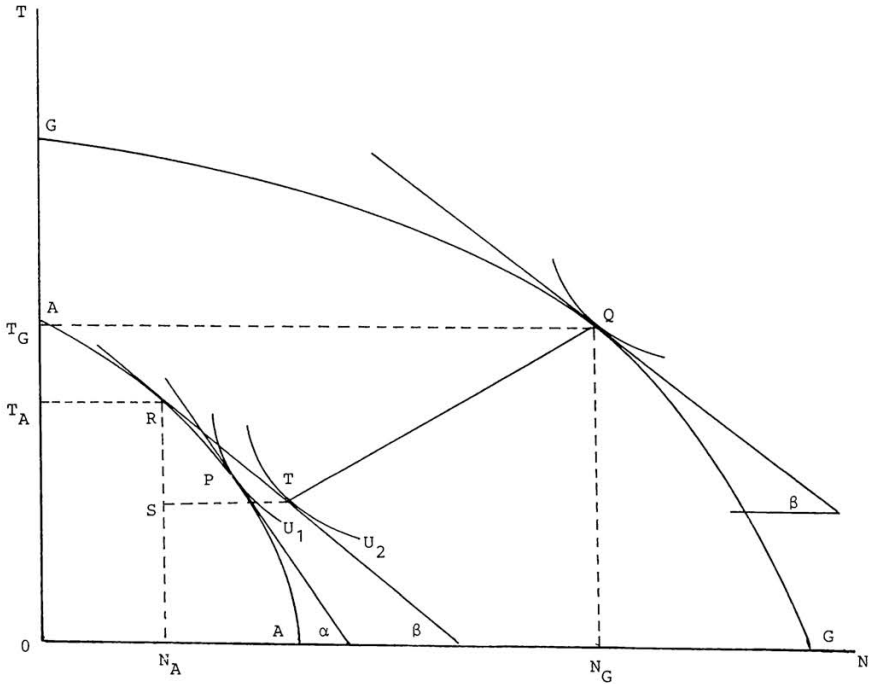


Fig. 1

In figure 1, AA is the country's transformation curve before immigration takes place. Only the goods of the tradeable sector can be traded internationally. When the country is neither a creditor nor debtor, the point of tangency P of the aggregate transformation curve and a community indifference curve shows both production and consumption relationships between the two sectors. The price of the tradeable goods is determined in the world market, the price of the non-tradeable goods is determined by domestic supply and demand. The equilibrium relative price between the tradeable and non-tradeable goods before immigration is therefore $tg \alpha$. If, as a result of the inflow of labor and capital, overall capital-intensity falls, and if the non-tradeable good is relatively labor-intensive, then there is an outward shift of the aggregate transformation curve to GG . The new production and consumption point is Q , the point of tangency between the new transformation curve and a community indifference curve. As a result of the

shift of the transformation curve, the relative price of the non-tradeable goods falls from tangent α to tangent β .

This fall in p follows from equations (1) to (7). For a simultaneous increase in A and K , with $dK = \sigma k dA$, it follows that (where dA^* stands for the overall change in factors):

$$(10) \quad \frac{dn}{dA^*} = \frac{1}{D} \{ g \pi (\tau k - \sigma k) - \\ - {}_N C_E [n g \pi (\tau k - \sigma k) - f \pi ({}_N k - \sigma k)],$$

with:

$$\pi \equiv \frac{1}{\tau k - {}_N k}$$

$${}_N C_E \equiv \frac{{}_N C_U}{E_U} : \begin{array}{l} \text{change in consumption expenditure on} \\ \text{the non-tradeable goods as a result of} \\ \text{a change in total expenditure.} \end{array}$$

$$D \equiv -N_p + {}_N C_p < 0.$$

The relative price of the non-tradeable goods will fall, with t assumed constant, if there is an excess supply of these goods in the domestic market.

Change in supply: When there is a change in the supply of non-tradeable goods with relative prices constant, it follows that:

$$(11) \quad \left. \frac{dN}{dA^*} \right|_{dp=0} = g \pi (\tau k - \sigma k) > 0 \quad \text{for } \pi > 0 \text{ and } \sigma < 1.$$

This is the first expression in the curved brackets in equation (12). From the assumption made here that the production of the non-tradeable good is relatively labor-intensive, it follows that $\pi > 0$. In this case, however, the capital-intensity of the tradeable goods is greater than the overall capital-intensity ($\tau k > k$). If it is further assumed that overall capital-intensity falls as a result of the factor increase ($\sigma < 1$) there is an unambiguous increase in the output of the non-tradeable goods, because $\tau k - \sigma k > 0$.

Change in Demand: The increase in the production of the non-tradeable goods, and the consequent increase in income, also lead, proportionately to $n {}_N C_E$, to an increase in demand for these goods. Because $n {}_N C_E$ is less than one,⁵ the increase in demand is smaller than the increase in supply and the market for the non-tradeable goods still has an excess supply. This is shown

⁵ It holds that $n {}_N C_E + t {}_T C_E = 1$ and thus, as long as the tradeable goods are not absolutely inferior, that $n {}_N C_E < 1$.

by the second expression in the curved brackets. The change in income, which results from the production effect in the trade sector, also affects demand. With p constant, the following change in output of the tradeable goods results from the factor increase:

$$(12) \quad \left. \frac{dT}{dA^*} \right|_{dp=0} = -f\pi(Nk - \sigma k).$$

An increase in the supply of labor, with K constant ($\sigma = 0$) and $\pi > 0$, results in an unambiguous fall in output of the tradeable goods (Rybczynski case). Proportionately to ${}_NC_E$, such a fall in income leads to a reduction in demand for the non-tradeable goods and the relative price unambiguously falls. Where $0 < \sigma < 1$, the change in output is indeterminate as ${}_Nk < k$. In the borderline case $\sigma = {}_Nk/k$, output of the tradeable goods is unchanged. In what follows it will be assumed that the increase in the stock of capital is so small that the demand effect in the market for the non-tradeable goods, which results if there is an increase in output of the tradeable goods, does not dominate the relative price change.

Thus, as a result of the inflow of factors, excess supply appears in the market for the non-tradeable goods and the relative price of this type of good falls ($dn/dA^* < 0$). The size of the price effect is also influenced by D , that is, by both the price sensitivity of production of the non-tradeable goods ($N_p > 0$) as well as of the demand for these goods (${}_NC_p < 0$).

To show the difference between the situation of the old residents before and after immigration, we can imagine the economy being divided into two sectors, one with the old residents and one with the immigrants (*Rivera-Batiz* 1982, *Bhagwati/Brecher* 1980). Trade takes place between these two sectors. It follows from the fact that immigration is associated with a fall in overall capital-intensity that the sector consisting of old residents is capital abundant and therefore specializes in the production of the relatively capital-intensive good. This is shown in figure 1 where the new price line with slope $\text{tg } \beta$ is tangent to the country's pre-immigration transformation curve of the old residents (the country's original transformation curve) at production point R . After trade (with the immigrants), the relatively capital abundant sector specializes in the production of the relatively capital-intensive good (production moves from P to R) and thus the relative price of the 'imported' goods falls from $\text{tg } \alpha$ to $\text{tg } \beta$. Total output of the tradeable (non-tradeable) goods is $0T_G$ ($0N_G$), and the old residents' share of this is $0T_A$ ($0N_A$).⁶ However, the old residents no longer must themselves produce

⁶ It is also assumed in figure 1 that the output of the tradeable good increases, i.e., $\sigma > {}_Nk/k$. Here and in what follows it is assumed, that the transformation curve for the old residents in the existence of foreign factors – which is clearly a hypothetical construct – will not change with a change of the relative price.

everything they consume. Instead, they can now sell RS of the relatively capital-intensive tradeable goods to the immigrants at relative price $tg \beta$, receiving in return ST of the relatively labor-intensive non-tradeable goods. By this means they reach the consumption point T at the higher level of utility U_2 . Points T and Q are on the same ray from the origin because it was assumed that the old residents and the immigrants have identical homothetic utility functions.

The improvement in the welfare of the old residents after trade can also be illustrated with a model of a small country which is assumed to produce two kinds of tradeable goods. The country is relatively capital abundant and therefore specializes in the production of the relatively capital-intensive good T . In this model, equations (7) and (8) of the set of equations (1) to (8) above are discarded, because equilibrium in the domestic markets is no longer necessary. If, in this situation, the relative price of the imported good N changes (change of n with t constant), the following welfare effect appears, expressed as a change in the level of expenditure:

$$(13) \quad \frac{E_U dU}{dn} = (N - {}_N C) < 0.$$

If this result is transferred over to the context of the previous model, it can be seen that a fall in the relative price of the non-tradeable goods results, *ceteris paribus*, in an increase in welfare for the old residents. When non-tradeable goods exist, the inflow of new residents means that the old residents' production and consumption no longer have to be identical. They are now able to participate in the well-known welfare gains from trade in goods.

3.2. The case of remittances when the production of the non-tradeable good is relatively labor-intensive

A modification of the results set out in Section 3.1. occurs when the immigrants remit part of their earnings back to their country of origin. Figure 2 shows this situation. A transfer of a part of the earnings to another country takes the form of a transfer of tradeable goods. As in figure 1, the country's original transformation curve shifts from AA to GG . However, aggregate demand can no longer be obtained by simply adding the identical utility functions of the old and new residents. Compared to figure 1, there is now a relatively greater demand for the tradeable goods. The relative price of the non-tradeable goods will also fall more than in figure 1. This additional change in the relative price of the non-tradeable goods as a result of remittances is, from equations (1) to (8), given by:

$$(14) \quad \frac{dp}{dR} = \frac{dn}{dR} = \frac{{}_N C_E}{-N_p + {}_N C_p} < 0.$$

tradeable goods, and WQ' of the tradeable goods. In accordance with their utility function, they consume $T'W$ of the non-tradeable goods and MV of the tradeable goods themselves (point V).⁷ All the non-tradeable goods the country produces are thus consumed there and the immigrants have an amount VQ' of the tradeable goods available to send back to their countries of origin.

It is clear from figure 2 that not only are the old residents in a better situation as a result of the labor immigration, but that their improvement in welfare is larger, the larger the proportion of their income the immigrants send back to their countries of origin. The reason for this is the larger rise in the relative price of the tradeable goods, which means that the old residents specialize more in the production of those goods in which they have comparative cost advantages relative to the immigrants.

3.3. Immigration of labor when the production of the non-tradeable good is relatively capital-intensive

Until quite recently, services exemplified a type of good that was not only non-tradeable but also relatively labor-intensive. Empirical research, however, has shown that in recent years the capital endowment of jobs in the services areas has been increasing more than proportionally. In Germany, for example, a job in the manufacturing area was endowed with more capital in 1987 than one in services. But the average annual growth of capital in the services sector (excluding government) between 1980 and 1987 was above the national average (*IWD-Wochendienst* 50/1988). If the services sector is interpreted as the non-tradeable goods sector, then the above development implies that the difference in capital-intensity in the production of tradeable and non-tradeable goods is narrowing. To show what these implications are, it is assumed here that production in the traded sector is relatively labor-intensive and the production of non-traded goods is relatively capital-intensive.

If both labor and capital increase and, as a result the overall capital intensity falls, in figure 3 the original transformation curve shifts from AA to $G'G'$, this time in a clockwise direction. In what follows, it will be assumed that either the output of non-tradeable goods falls – and thus n rises – or that any increase in output is so small that the positive demand effect of the rise in T dominates the change in the relative price. Under these conditions, the relative price of the non-tradeable type of goods rises as a result of the inflow of factors.

⁷ This follows from the assumption about the utility functions, V is on a ray from the origin through T' .

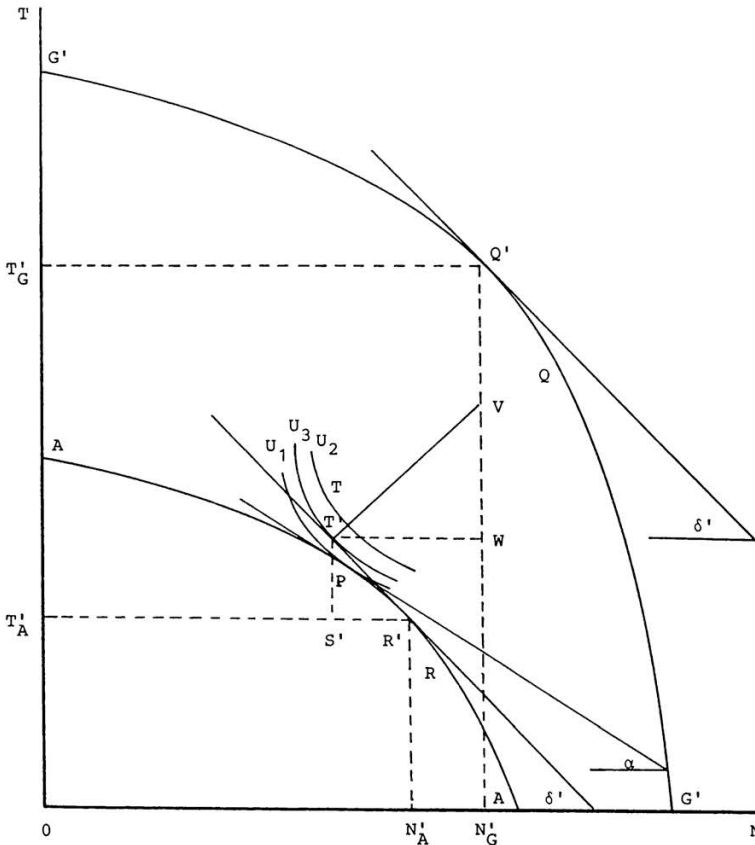


Fig. 4

form of tradeable goods. Just as in figure 3, the transformation curve in figure 4 shifts outwards to $G'G'$. Now that there are to be remittances of the tradeable goods, the quantity of these goods demanded is larger than in the case of no remittances so that the relative price of the non-tradeable goods will not rise so much. Equation (19) shows that, because there are remittances, the relative price of the non-tradeable goods always falls regardless of the relative factor-intensity in production. The new relative price $tg \delta'$ is thus smaller than $tg \delta$ and the new aggregate production point Q' is to the left of point Q . Thus the production point of the old residents R' is to the left of R . They produce quantities N_A' and T_A' , the total output is $N_{G'}$ and $T_{G'}$. In contrast to the case where the non-tradeable goods are relatively labor-intensive, the leftward shift of the old residents' production point means a reduction in their specialization and not an increase. Both the new produc-

tion point and the new relative price move back to their level before immigration. Therefore, in figure 4, the old residents no longer reach the utility level U_2 . They now exchange the quantity $S'R'$ of the non-tradeable goods for the quantity $S'T'$ of the tradeable goods, at the relative price $\text{tg } \delta'$, which is lower than in the case of no remittances, in order to reach their new consumption point T' . However, T' represents the utility level U_3 which is lower than U_2 . The remittance of part of the earnings of the immigrants thus leads to a welfare loss for the old residents (though their level of utility in figure 4 is still higher than before the immigration), while in section 3.2. remittances implied an improvement in welfare for the old residents.

4. Conclusion

Using a simple model of a small open country producing both tradeable and non-tradeable goods, it was shown that immigration of labor results in an increase in the utility of the existing residents. The gain in welfare comes from the newly created opportunity to exchange in the domestic market the good which cannot be traded internationally. This gain is independent of whether the good is relatively labor-intensive or relatively capital-intensive. The size of the improvement in the old residents' welfare is, however, dependent on two factors, whose influence has been explicitly discussed in this paper. One of these is the existence or otherwise of remittance of part of the immigrants' earnings to their countries of origin, the other is the factor intensity relationship in the production of the two types of good. If the non-tradeable good is relatively labor-intensive in production, the welfare gain of the old residents will be larger, the larger the proportion of their earnings remitted by the immigrants. If, instead, the non-tradeable good is relatively capital-intensive, the welfare gain of the old residents will be smaller, the larger the proportion of the immigrants' earnings remitted.

Two observations can be made when these results are applied to the German experience. First, the proportion of earnings remitted by the immigrant workers in Germany in the sixties was very large. This was so because the majority of these people intended to work only temporarily in the host country. At that time also, the production of non-tradeable goods was clear relatively labor-intensive. Today the situation is different. The present group of people coming into Germany intend to stay permanently and their remittances to their countries of origin are negligible. Secondly, the capital endowment of a job in the non-tradeable sector has risen more than proportionately. This development can be set out, in a very simplified form, as follows:

- a) relatively labor-intensive production of non-tradeable goods combined with large remittances,

- b) relatively capital-intensive production of non-tradeable goods combined with very small remittances.

With both these constellations, there are advantages for the old residents which appear in the model presented here. In the sixties, when remittances were large, the old residents benefitted because the non-tradeable goods were relatively labor-intensive. Today, when the capital-intensity of production of these goods is stronger, the old residents are able to benefit because remittances are a very much smaller proportion of the immigrants' earnings.

The present paper considers the case where the immigration of labor is accompanied by an inflow of capital. In the paper itself it is assumed that aggregate capital-intensity falls, but the opposite situation is also covered. The parameter σ would then be larger than one and the above results would be appropriately modified.

Summary

This paper examines the welfare situation of existing residents of a country when factor immigration occurs. There is always an increase in welfare when there are non-tradeable goods and a fall in overall capital intensity. If the non-tradeable good is relatively labor-intensive, the increase in the existing residents' welfare is larger, the larger the proportion of their income the immigrant workers send back to their country of origin. However, if the non-tradeable good is relatively capital intensive, the improvement in welfare is smaller, the larger the remittances.

Zusammenfassung

Unter Berücksichtigung handel- und nicht-handelbarer Güter wird gezeigt, daß die Zuwanderung von Arbeitskräften für die Altbürger des Landes eine Nutzenverbesserung impliziert. Wird das nicht-handelbare Gut relativ arbeitsintensiv produziert, so ist der Nutzenzuwachs für die Altbürger um so größer, je größer der Teil des Einkommens der Zuwanderer ist, den diese in ihr Heimatland zurücküberweisen. Wenn das nicht-handelbare Gut dagegen relativ kapitalintensiv produziert wird, gilt der umgekehrte Zusammenhang zwischen der Größe des Nutzenzuwachses und dem Ausmaß der Rücküberweisungen.

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