11 Why go back?

Return motives of migrant workers

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Introduction

Most of the theoretical and empirical literature on migration has paid little attention to the fact that many migrants return to their home countries after having spent a number of years in the host country. This is surprising, since many migrations today are in fact temporary. For instance, labour migrations from Southern to central Europe in the 1950s–1970s were predominantly temporary. Böhning (1984: 147) estimates that "more than two thirds of the foreign workers admitted to the Federal Republic [of Germany], and more than four fifth in the case of Switzerland, have returned." Glytsos (1988) reports that of the 1 million Greeks migrating to West Germany between 1960 and 1984, 85 percent gradually returned home. Dustmann (1996) provides evidence for a substantial outmigration over that period for other European countries. Return migration is also considerable for the United States. Jasso and Rosenzweig (1982) report that between 1908 and 1957 about 15.7 million persons immigrated to the United States and about 4.8 million aliens emigrated. They found that between 20 and 50 percent of legal immigrants (depending on the nationality) re-emigrated from the United States in the 1970s. Warren and Peck (1980) estimate that about one-third of legal immigrants to the United States re-emigrated in the 1960s.

The decision of migrants to return to their home countries is not only an important issue in its own right. It also has crucial implications for immigrants' behavior. Migrants who have the intention to remain for shorter periods in the host countries could be expected to accumulate less human capital which is specific to the host country economy than migrants with more permanent intentions. This has implications for assimilation patterns of immigrant workers. A number of empirical studies[1] have found considerable differences in the economic assimilation of migrant workers of different origin. If origin is correlated with expected durations in the host country (return could be less costly for some origin countries, and more costly for others), then this may contribute to explaining divergent assimilation profiles.

There is some earlier work on the effect of return plans on migrants' behaviour. Djajić (1989) shows that in a guest-worker system, levels of wages and prices in the home country affect the migrant's consumption and labour supply in the host country. Galor and Stark (1990, 1991) show that the probability of return also affects migrants' saving behavior and performance in the host country. Evidence in Merkle and Zimmermann (1992), stating that return probabilities of migrants affect their saving behavior, is compatible with these considerations.

In these studies, the return time of the migrant is assumed exogenous. Most temporary migrations in Europe and in the US, however, are migrations where it is the migrant who decides about whether and when to return. These return migrations often take place despite persistently more favourable economic conditions in the origin countries. Simple static models, where migration takes place in response to positive wage differentials between host and home country, cannot explain return migrations. In these models, migrants should only be expected to return if the economic situation changes so that real earnings at home increase relative to those in the host country.

There are some models explaining return migrations, which take place without a reversal of the economic situation in host-country and home country. Stark (1992) uses the theory of relative deprivation to explain why migrants may return to a less rich economy or region. Mesnard (2000) identifies capital market imperfections in the home country as a reason which may lead to return migrations. Djajić and Milbourne (1988) explain return migration by assuming that migrants have a stronger preference for consumption at home than abroad. Raffelhüschen (1992) uses an individual-specific location parameter in the utility function to introduce return migration in an overlapping generations model. Hill (1987) shows that migration may be temporary and repetitive if the migrant has a preference for certain locations.

This chapter develops a general life-cycle model, where a return is motivated by locational preferences, as in Djajić and Milbourne (1988), Hill (1987), and Raffelhüschen (1992). In addition, it offers in a unified setting two further motives for a return: first, higher purchasing power in the home country of assets accumulated in the host country. This motive has first been identified in a paper by Djajić (1989). A second motive is higher returns in the home economy on human capital, acquired in the host country. The last motive has first been identified in an earlier paper of mine (Dustmann, 1995), but this chapter provides a more in-depth analysis. A combination of these three motives appears to provide a more general framework which helps to explain migration behaviour, which may seem irrational in simpler models. For instance, human capital considerations may explain migrations which take place despite negative wage differentials, and a locational preference for the host country.

If migrations are temporary, then behavioral choices, like consumption and labour supply, are taken in conjunction with the choice of the migration duration. This has important implications for the way we need to specify empirical models. I briefly discuss some of these implications at the end of the chapter.

The structure of the chapter is as follows. The next section develops the basic model, and the remaining section investigates the different motives for return. The interaction between immigrants' behavior and their optimal return plans is then discussed, along with implications for empirical work. The final section summarizes the key findings and gives some conclusions.

The model

In the following analysis, only the productive life of an individual is considered. A *return migrant* is defined as a migrant who works for a chosen period in a host country, and returns *before* retirement age. Accordingly, a *permanent* migrant is a migrant who does not intend to return before retirement. Denote the migrant's active lifetime, or remaining time in the labour force, by T, and the optimal time to remain in the host country by $\hat{t}$. Consider the maximization problem of a migrant at the start of his migration history. He maximizes a utility function over the horizon T, with respect to consumption c and the optimal return point $\hat{t}$:

$$J = \int_0^{\hat{t}} u\left(c^I(\tau), \xi^I\right) e^{-\rho\tau} d\tau + \int_{\hat{t}}^{T} u\left(c^E(\tau), \xi^E\right) e^{-\rho\tau} d\tau \qquad (1)$$

where ρ is the rate of time preference, and c^I and c^E are the optimal flows of consumption abroad and at home respectively. The variables ξ^I and ξ^E summarize factors which are locationally fixed, and complementary to consumption. Examples are social relations, and subjectively perceived life quality parameters (climate, social regulations). Although both ξ^I and ξ^E may change over time, it is assumed here that they are considered as constant by the migrant when solving his optimization problem. This assumption is not as restrictive as it seems to be; a decision of how long to remain in a certain location is very likely to be affected by the subjective perception of the location at that moment, relative to the alternative location, rather than the path of possible perceptions over the optimization period. I discuss possible extensions below.

Since the migrant can influence ξ^i, $i=I, E$, only by a change in the location, ξ^I and ξ^E are treated as parameters rather than as variables. The utility functions exhibit the following properties: $u_1>0$, $u_2>0$, $u_{11}<0$, $u_{22}<0$, $u_{12}>0$, where the subscripts 1,2 denote derivatives with respect to the first and second argument. To simplify matters, the following notation will be used: $u(k,\xi^E)=v^E(k)$, $u(k,\xi^I)=v^I(k)$. Furthermore, the utility functions have the properties that $v_I^{i}(k)_{k\to\infty}\to 0$, $v_I^{i}(k)_{k\to 0}\to\infty$, $v^i(0)=0$, $i=I,E$. Throughout the analysis, it is assumed that $\xi^I \le \xi^E$. A strictly larger home location parameter ($\xi^I<\xi^E$) is assumed to correspond to a higher utility from a constant consumption flow k in the home country both in marginal as well as in absolute terms: $v_1^E(k)>v_1^I(k)$, $v^E(k)>v^I(k)$.

The migrant maximizes (1), subject to the following intertemporal budget constraint:

$$\int_0^{\hat{t}} y^I e^{-r\tau}d\tau + \int_{\hat{t}}^{T} y^E(\hat{t})\, e^{-r\tau}d\tau + K_0 - \bar{K}e^{-rT} - \int_0^{\hat{t}} c^I(\tau)\, e^{-r\tau}d\tau - \int_{\hat{t}}^{T} pc^E(\tau)\, e^{-r\tau}d\tau = 0 \qquad (2)$$

where r is the (time-constant) interest rate. To simplify matters, fixed cost of re-migration is set to zero.

The relative price level between emigration- and immigration country is given by p, where $p<1$ denotes a lower price level in the home country than in the host country. In this case, purchasing power of savings accumulated in the host country is higher in the home country. The stock of savings at $t=0$ is denoted by K_0, and $\bar{K}$ is the desired stock of savings at the end of the planning horizon, T.

Earnings per unit of time in the immigration and the emigration country are given by y^I and y^E respectively. Earnings y^I are assumed to be constant over time. However, earnings y^E may depend positively on the duration $\hat{t}$, with $y^E_{\hat{t}}\ge 0$, $y^E_{\hat{t}\hat{t}}\le 0$. Accordingly, the time spent in the host country may enhance a migrant's human capital endowment which will only become earnings effective after re-migration.

This is a rather simple way to model the accumulation of human capital. Killingsworth (1982) and Rosen (1972) refer to this formulation of human capital acquisition as the *experience model*. It captures some basic features of many real migration situations. For the economies of origin countries which are in the process of industrialization, knowledge about working patterns, institutional features, incentive structures, and the language of highly industrialized countries is likely to be very valuable. Immigrants acquire such knowledge, and they may therefore considerably enhance their productivity in the home economy.[2] This human capital, though not sufficient to raise the earnings position in the host country considerably, raises potential wages in the home country. It is this increase in the migrant's potential wage which may trigger a return, as will be shown below. Notice that for obtaining this result, it suffices to assume that experience or training abroad increases potential home country wages by more than host country wages. To simplify the analysis, host country wages are assumed constant.

Consider first consumption flows in the two countries, which are implied by maximization of (1) s.t. (2). Denoting the marginal utility of wealth at t by $\pi(t)$, with $\pi(t)=\pi^0 e^{(\rho-r)t}$, where $\pi^0=\pi(0)$, it follows that:

$$c(t) = \begin{cases} v_1^{I-1}(\pi) & : \quad 0\le t<\hat{t} \\ v_1^{E-1}(\pi p) & : \quad \hat{t}\le t\le T \end{cases} \qquad (3)$$

where the superscript $^{-1}$ denotes inverse functions. Strict concavity of the utility functions implies that the path of consumption increases if $\rho<r$. Only this case, which is consistent with increasing consumption profiles, is considered in the following analysis.

It follows from (3) that the migrant's consumption profile will "jump" upwards at the point of return if $\xi^I<\xi^E$, or if $p<1$. This model generates savings patterns which are understood as characterizing return migrations: an accumulation of savings in the host country, a peak of the savings profile upon return, and a decumulation of savings after a return (see Piore, 1979).

Writing consumption as a function of the marginal utility of income, $\pi(t)$, the budget constraint (2) implicitly determines π^0 as a function of $\hat{t}$:

$$\int_0^{\hat{t}} y^I e^{-r\tau}d\tau + \int_{\hat{t}}^{T} y^E(\hat{t})\, e^{-r\tau}d\tau + K - \int_0^{\hat{t}} c^I(\pi(\tau))e^{-r\tau}d\tau - \int_{\hat{t}}^{T} pc^E(\pi(\tau)\, p)\, e^{-r\tau}d\tau = \Gamma(\pi^0,\hat{t}), \qquad (4)$$

with $K=K_0-\bar{K}e^{-rT}$. From the first order condition with respect to $\hat{t}$ follows:

$$\underbrace{\pi^0 e^{(\rho-r)\hat{t}}\left[\left[(y^I-c^I)-(y^E-pc^E)\right]+\frac{1}{r}y^E_{\hat{t}}\left[1-e^{r(\hat{t}-T)}\right]\right]}_{\text{Benefit of staying abroad}} - \underbrace{\left[v^E-v^I\right]}_{\text{Cost of staying abroad}} = \Delta(\pi^0,\hat{t}) \qquad (5)$$

Relations (4) and (5) determine the optimal π^0 and the optimal point of return $\hat{t}$. At the optimum, $\Delta(\pi^0,\hat{t})=\Gamma(\pi^0,\hat{t})=0$.

The return decision

I now investigate in detail the various reasons for a return migration which can be explored within the framework set out above. It is useful and illustrative to distinguish between cost and benefit of an additional unit of time spent in the host country. Using (4) to determine π^0 as a function of $\hat{t}$, (5) becomes a function of $\hat{t}$ alone. The first term in (5) corresponds to the benefit ($B(\hat{t})$) of lengthening the time spent abroad (every unit of time abroad increases resources for lifetime consumption, and enhances human capital); the second term reflects the cost $C(\hat{t})$ (staying longer abroad deprives the migrant of the possibility to consume during that unit of time in the home country):

$$B(\hat{t})-C(\hat{t})=D(\hat{t}) \tag{6}$$

where $D(\hat{t})$ is the difference in benefit and cost of remaining a further unit of time abroad. At the optimal return point $\hat{t}$, the cost of staying longer abroad is equal to the benefit of doing so, or $D(\hat{t})=0$.

For a migration to occur it is necessary that the cost of migration for $\hat{t}\rightarrow 0$ is smaller than the benefit, or $D(\hat{t})_{\hat{t}\rightarrow 0}>0$. An interior return point occurs if cost and benefit profiles cut at some $\hat{t}<T$. An intersection of cost and benefit schedules may be caused independently by three scenarios:

(*a*) $\xi^E>\xi^I$, $y^E_{\hat{t}}=0$, $p=1$,

(*b*) $\xi^E=\xi^I$, $y^E_{\hat{t}}=0$, $p<1$,

(*c*) $\xi^E=\xi^I$, $y^E_{\hat{t}}>0$, $p=1$.

In scenario (a), differences in locational complementarities trigger a return. This explanation for return migrations has been explored by Djajić and Milbourne (1988). In scenario (b), lower prices in the home country encourage the migrant to return home. In scenario (c), an increase in the migrant's potential wage back home may cause a return. All three return motives are now investigated in detail.

To ensure that $D(\hat{t})_{\hat{t}\rightarrow 0}>0$, the wage differential between host and home country, y^I-y^E, is assumed to be positive for some initial $t, 0\leq t\leq T$. The cost $C(\hat{t})$ is positive whenever $\xi^E>\xi^I$ or/and $p<1$ (since in this case $[v^E-v^I]>0$). For scenario (c), the cost of remaining abroad equals zero.

Necessary for an interior return point is that $D(\hat{t})$ decreases in $\hat{t}$. That this is the case for each of the three return motives can be easily shown. It is instructive to derive the marginal cost and benefit schedules. For this purpose, differentiate the cost schedule with respect to $\hat{t}$. This yields an expression for the *marginal cost* $MC(\hat{t})$ of remaining a further unit of time abroad:

$$MC(\hat{t})=\pi\left[\dot{\pi}+e^{(\rho-r)\hat{t}}\frac{\partial\pi^0}{\partial\hat{t}}\right]\left[c^{E'}p-c^{I'}\right], \tag{7a}$$

where $c^{i'}$, $i=E,I$ are the derivatives of consumption with respect to $\pi(t)$, with $c^{i'},<0$. Furthermore, $\dot{\pi}$ is the change in π with respect to t, and π is evaluated at $\hat{t}$.

It can be shown that $\frac{\partial\pi_0}{\partial\hat{t}}\leq 0$ (see (11), Appendix A). For $\xi^E>\xi^I$ and/or $p<1$, it follows from (3) that $[c^{E'}p-c^{I'}]\leq 0$. Since $\dot{p}<0$, the expression in (7-a) is positive (or zero), indicating that the cost of staying in the host country increases over time (or remains constant).

The marginal benefit of remaining a further unit of time abroad, $MB(\hat{t})$, is given by:

$$\begin{aligned} MB(\hat{t}) = {} & \pi\left[\dot{\pi}+e^{(\rho-r)\hat{t}}\frac{\partial\pi^0}{\partial\hat{t}}\right]\left[c^{E'}p-c^{I'}\right]+ \\ & \left[\dot{\pi}+e^{(\rho-r)\hat{t}}\frac{\partial\pi^0}{\partial\hat{t}}\right]\left[\left(y^I-c^I\right)-\left(y^E-c^Ep\right)+\frac{1}{r}y^E_{\hat{t}}\left(1-e^{r(\hat{t}-T)}\right)\right] \\ & +\pi\left[y^E_{\hat{t}\hat{t}}\left(1-e^{r(\hat{t}-T)}\right)\frac{1}{r}-y^E_{\hat{t}}e^{r(\hat{t}-T)}\right] \end{aligned} \tag{7b}$$

Notice that the first term in (7-b) is identical to the marginal cost $M\,C(\hat{t})$, (expression 7-a). To show that $D(t)$ decreases in t, it remains to show that the second and third terms are negative for each of the three scenarios (a)–(c). If a return is motivated by (a) or (b), the third term equals zero, and the second term is negative (which follows from (5)). In case (c), the third term is clearly negative. It follows from (5) that the second terms is negative, and approaches zero as $t\rightarrow\hat{t}$. Consequently, $D(\hat{t})$ decreases in $\hat{t}$, and the benefit schedule is flatter than the cost schedule for all three scenarios $M\,B(\hat{t})-M\,C(\hat{t})<0$.

To illustrate the implications of the model, each of the three return motives is now investigated in more detail, and simulations are performed for specific functional forms of the utility function and the accumulation of potential earnings in the home country (for details, see Appendix B). As a benchmark, the case where $\xi^E=\xi^I$, $y^E_{\hat{t}}=0$, and $p=1$ is considered. This situation is referred to as the *classical case* – migration is only characterized by a positive wage differential between sending and receiving country.

The classical case

First consider the case where migration occurs as a consequence of positive wage differentials. Price levels are equal in both countries ($p=1$), and $y^E_{\hat{t}}(t)=0$. The migrant is indifferent between consumption at home and abroad ($\xi^E=\xi^I$), and wages are higher abroad ($y^E<y^I$). Consequently, the cost of spending an extra unit of time abroad, $C(\hat{t})$, is equal to zero, and the benefit is simply $\pi(y^I-y^E)$, which is positive. Although $M\,B(\hat{t})-M\,C(\hat{t})=\dot{\pi}(y^I-y^E)<0$, the benefit of staying abroad never approaches zero for a finite T. Accordingly, the migrant will never want to return to his home country. Migration, in this case, becomes permanent.

Figure 11.1 illustrates the cost and benefit schedules. Since the migrant is indifferent between consumption at home and abroad, the cost schedule is a horizontal line through 0. The benefit schedule decreases since $r>\rho$.

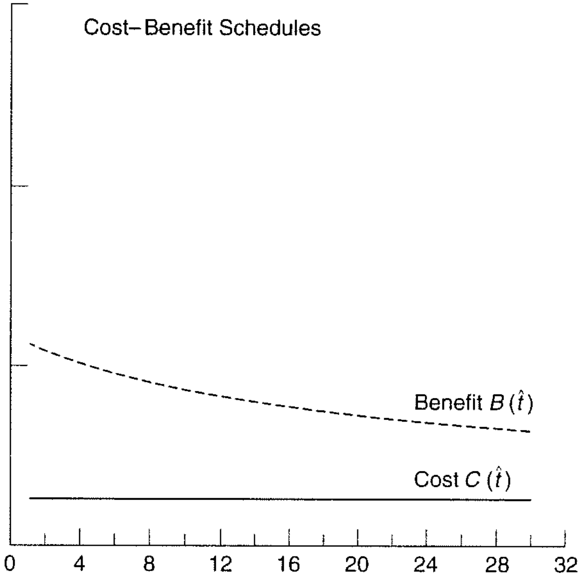

Figure 11.1 Cost and benefit schedules, classical case.

Figure 11.2 illustrates the consumption and earnings profiles. Consumption follows a typical life-cycle pattern which evolves when $r>\rho$. If, on the contrary, $y^E>y^I$, migration from the home country does not occur. Consequently, if wage differentials are the only driving force of migration, as is often assumed in the literature, only these two migration patterns are possible.

Return motive 1: locational preferences

Now consider a situation where the wage differential is again positive, with $y^E_{\hat t}=0$, but assume that the migrant has a preference for consumption in his home country: $\xi^E>\xi^I$. This corresponds to situation (a). Cost and benefit of staying abroad are now both positive. If the initial benefit is sufficiently high, relative to the cost of migration ($D(\hat t)>0$ for $\hat t\to 0$), migration occurs. However, the differential $D(\hat t)$ decreases in $\hat t$, and there exists an interior return point, where $D(\hat t)=0$. Whether an interior solution or a corner solution (permanent migration) occurs depends, for a given utility structure, on the size of the locational parameters and on the wage advantage abroad. For an interior solution, Figures 11.3 and 11.4 illustrate the path of earnings and consumption and the benefit and cost schedules respectively. Note that life-cycle consumption has a discontinuity at $t=\hat t$. The consumption profile follows a typical pattern for return migrants. While being abroad, migrants accumulate savings. After returning to the home country, they increase consumption, drawing on the previously accumulated stock of savings.

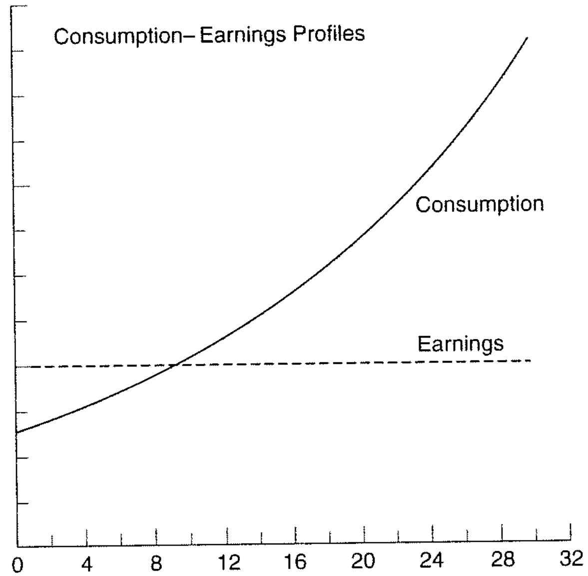

Figure 11.2 Earnings and consumption profiles, classical case.

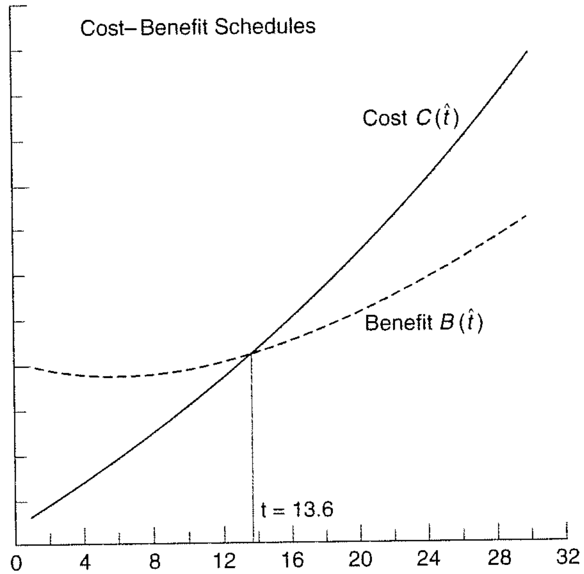

Figure 11.3 Cost and benefit schedules, preference for home country.

Return motive 2: purchasing power of savings abroad

Assume now that the migrant is indifferent between consumption at home and abroad ($\xi^I=\xi^E$), $y^I>y^E$ and $y^E_{\hat t}=0$, but the purchasing power of the host

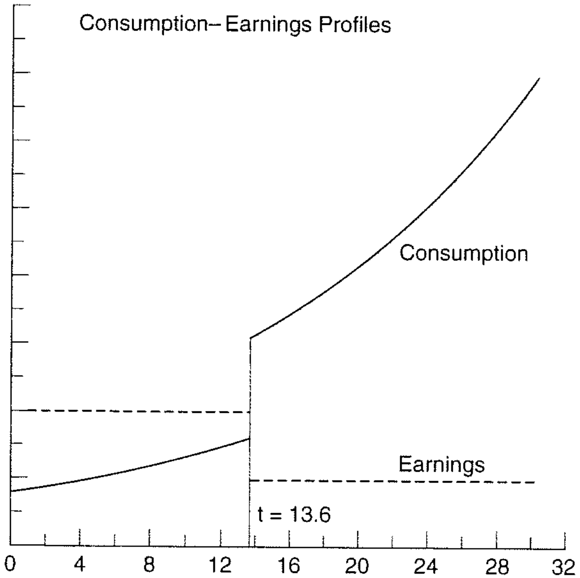

Figure 11.4 Earnings and consumption profiles, preference for home country.

country currency is higher in the home country ($p<1$). Since wages are higher in immigration countries, non-traded goods and services tend to be more expensive in host countries than in home countries. Furthermore, migrants often exhibit different consumption habits than natives, which may be due to cultural or religious differences. They may demand goods which need to be imported, and are accordingly more expensive.

A higher purchasing power of the host country currency in the migrant's home country leads to lower consumption abroad, and higher consumption at home (see (3)). Accordingly, costs $C(\hat{t})$ and benefits $B(\hat{t})$ are both positive. Migration occurs if $D(\hat{t})>0$ for $\hat{t}\rightarrow 0$. But $M\,B(\hat{t})-M\,C(\hat{t})<0$, and an interior solution occurs if the benefit schedule cuts the cost schedule before $\hat{t}=T$. The individual, although indifferent between locations, first migrates, but then returns to take advantage of both high wages abroad and low prices at home. This situation is illustrated in Figures 11.5 and 11.6.

Note also that this return motive creates a target saving behavior. Interestingly, savings do not necessarily peak at the return point; in the case depicted in Figure 11.6, the migrant reduces his savings stock while still residing in the host country.[4] A target saving behavior of return migrants, which has often been emphasized in the literature (see, for instance, Piore, 1979), seems to be compatible with scenarios (a) and (b).

Return motive 3: human capital

Lastly, consider the case where wages are initially higher abroad, the

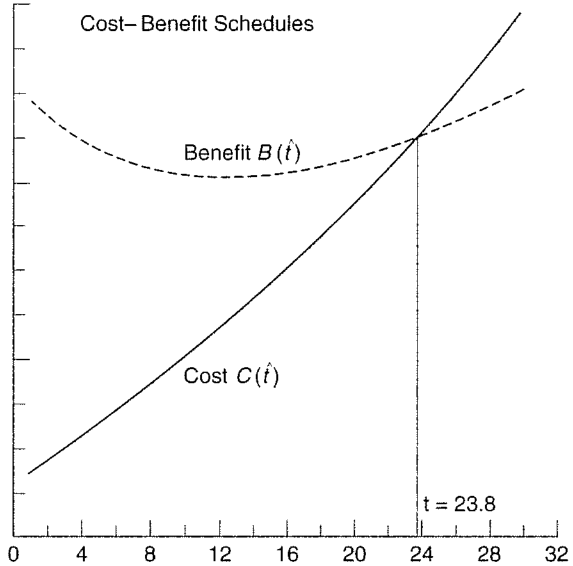

Figure 11.5 Cost and benefit schedules, higher price level abroad.

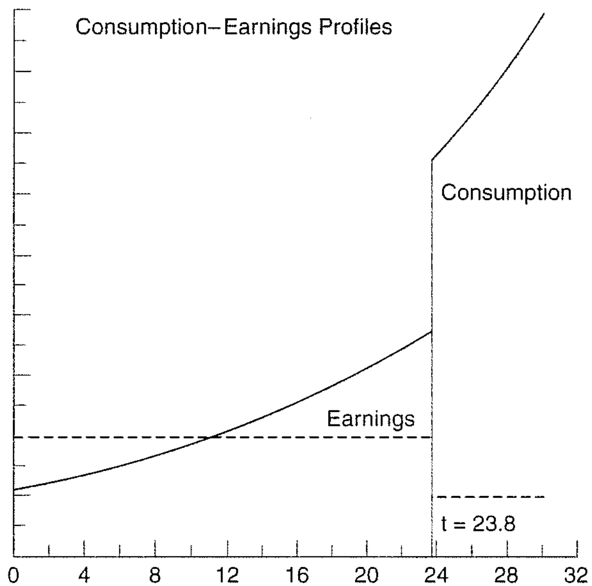

Figure 11.6 Earnings and consumption profiles, higher price level abroad.

and the migrant is indifferent between consumption at home and abroad ($\xi^I=\xi^E$). The time the migrant spends abroad, however, increases his earnings potential at home ($y^E_t>0$), while it has no impact on the earnings home and abroad, the cost of migration $C(\hat{t})$ is equal to zero, and the benefit reduces to:

$$B(\hat{t}) = y^I = y^E + \frac{1}{r} y_I^E \left[1 - e^{r(\hat{t}-T)}\right], \qquad (8)$$

which is positive for $\hat{t} \to 0$. However, since potential earnings at home are increasing over time, $B(\hat{t})$ will decrease, and eventually become zero. This is exactly the point when the migrant returns. Notice that at this point, the potential wage in the home country must be strictly higher than the wage received in the host country.

This situation is illustrated in Figures 11.7 and 11.8. The cost schedule is now equal to the zero line, but benefits decrease as the migrant improves his potential earnings position in the home country.

The model leads to a number of further interesting insights and results. One immediate implication is that migration and re-migration may occur, despite an initially *negative* wage differential. To see this, consider (8). The last term measures the benefits from human capital acquired in the host country over the remaining period in the home country. If this term is sufficiently large, benefits may well be positive, although the initial wage differential $y^I - y^E$ is negative. Migration in this case is purely an investment decision, and solely triggered by the future return to human capital.

Combinations of the different scenarios may now serve to describe specific types of migration. For instance, student migrations are frequently

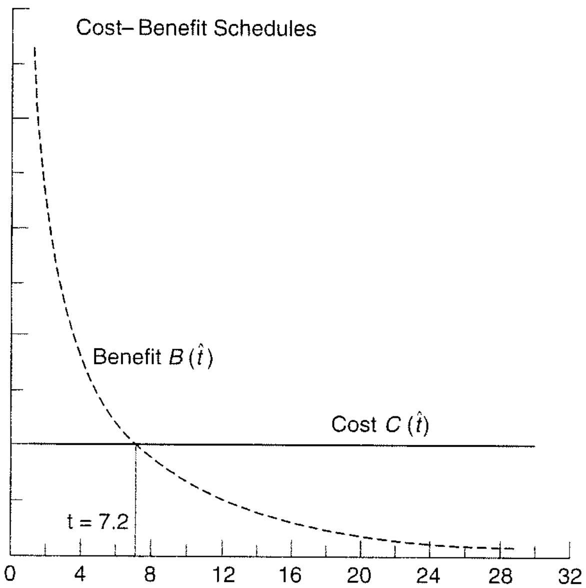

Figure 11.7 Cost and benefit schedules, human capital.

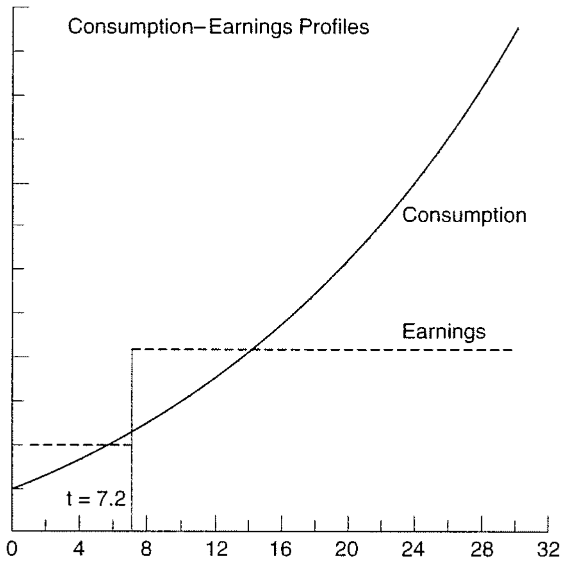

Figure 11.8 Earnings and consumption profiles, human capital.

characterized by a negative wage differential (consisting of forgone earnings in the home country, and possibly negative earnings abroad, such as fees etc.). However, migration occurs if the return to human capital acquired abroad is sufficiently large over the remaining time in the home country (last term in (8)).

The above considerations show that dynamic modelling is crucial to understand migrations which may seem non-rational in simple static models. Furthermore, a single return motive may not suffice to explain some of the observed migratory behavior. The above framework allows us to study a large range of empirical migration situations.

Comparative statics

To investigate how parameter changes affect the migrant's optimal duration abroad, comparative statics can be performed on the system described by equations (4) and (5). The partial effects of an increase in the parameters y^E, y^I, p, K and T on the optimal return time $\hat{t}$ are derived in the Appendix,[5] and they are reported in Table 11.1.

If return migration is caused by locational preferences or purchasing power considerations ($\xi^E > \xi^I$ or/and $p < 1$), a change in any of these parameters has a direct as well as an indirect effect on the optimal duration $\hat{t}$, corresponding to an income and a substitution effect. The indirect effect results from changes in the marginal utility of wealth π^0, which in turn affects $\hat{t}$. However, if return migration is caused by scenario (c) only, the indirect effect vanishes, and only the direct effect is at work. The reason is that in this case the optimal paths of consumption and income are separable. These two situations are distinguished in the discussion which follows. In Table 11.1, the first row refers to the situation where a return is induced by motives (a) or/and (b); the second row refers to the situation where a return is induced by situation (c) only.

The effects of an increase in the home country wage y^E is unambiguously negative. Both the direct and the indirect effect point in the same direction. However, the effect of an increase in the host country wage on the optimal duration is not clear-cut for (a), (b). The reason is that now the direct effect and the indirect effect point in different directions. Intuitively, the migrant would like to prolong the stay abroad as a direct response to higher wages; but the gain from a further stay abroad decreases, and this has a counteracting effect on the optimal duration. Dustmann (1999b) provides some empirical evidence, which is compatible with the observation that the migration duration may decrease if the wage differential increases.

Notice that, if the return is solely induced by the human capital argument (situation (c)), an increase in host country wages has an unambiguously positive effect on the length of migration. The reason is that in this situation, the optimal paths of consumption and income are separable. Accordingly, changes in the marginal utility of wealth π^0 do not affect the optimal return time, and the indirect effect is equal to zero.

Consider next the effect of a decrease in purchasing power (increase in p) on the optimal return time. Again, the total effect is ambiguous. The direct effect is clearly positive: a decrease in purchasing power increases the optimal duration in the host country. However, the indirect effect is not clear-cut, since the effect of an increase in p on the marginal utility of wealth itself (π^0_p) is ambiguous. These are the conventional counteracting effects on the marginal utility of wealth: an increase in p decreases the flow of consumption c^E, but, at the same time, increases expenditures. Depending on the magnitude of these two effects, π^0 increases or decreases. Consequently, the total effect of an increase in p on the total duration is ambiguous, implying that an increase in purchasing power may decrease or increase the optimal migration duration.

Again, if human capital considerations are the only reason for a return migration (scenario (c)), then the indirect effect vanishes, and the effect of an increase in purchasing power on the optimal return time is unambiguously positive.

Table 11.1 Comparative statics

Increase in	y^E	y^I	p	K_0	$\bar{K}$	T
Motives (a), (b)	<0	$\gtrless 0$	$\gtrless 0$	<0	>0	$\gtrless 0$
Motive (c)	<0	>0	>0	<0	>0	>0

A further interesting variable is the length of the migrant's remaining active lifetime, T. Empirically, heterogeneity among immigrants with respect to T is reflected by heterogeneity in the age at entry to the host country. The direct effect of an increase in T (term $\hat{t}_T$) appears to be positive. The indirect effect is positive if expenditures at the end of an active working life are higher than earnings ($p\,c^E - y^E > 0$, see Appendix). This clearly occurs if only locational preferences trigger a return migration. Accordingly, in this case migrants who are younger at entry to the host country remain abroad longer. Likewise, under return scenario (c), the indirect effect vanishes ($t_{\pi^0} = 0$), and migrants who are younger at entry stay abroad longer. If purchasing power considerations are the return motive, however, the effect is ambiguous in general.

Other parameters which influence the optimal time abroad are the initial wealth and the desired wealth at the end of the planning horizon. Effects of both parameters are clear-cut. While a higher stock of accumulated capital at the beginning of the planning period (K_0) decreases the optimal duration abroad, a higher desired stock of capital at the end of the planning period ($\bar{K}$) has the opposite effect.

Extensions and implications for empirical work

The above model does not allow for the choice of leisure. Also, the mechanism of human capital accumulation is simple. Extensions, which allow for labour supply choices, and choices about human capital investments, are straightforward. Economists are typically interested in understanding and modelling these behavioral decisions of individuals. The model set out above provides a powerful framework to study behavior of migrant workers within a life-cycle model. Other than native workers, migrants who plan to return take these return plans into account when making choices in the host country. This has important implications for empirical work. Neglecting the simultaneity between, for instance, consumption and labour supply choices on the one side, and return plans on the other, may lead to misspecified empirical models.

To illustrate this point, consider savings and consumption behavior of migrants. Within the framework set out above, conditions (3), (4) and (5) determine simultaneously consumption $c(t)$, the marginal utility of wealth, $\pi(t)$, and the optimal return point, $\hat{t}$. To obtain an estimable specification, linearize these three equations, and solve out for $\pi(t)$. This leaves us with a system of two simultaneous equations, determining consumption and the optimal return time. Dropping, for simplicity, time indices, and adding error terms, results in the following statistical model:

$$c = \alpha_1 + \alpha_2 \hat{t} + \alpha_3 x + u,$$
$$\hat{t} = \beta_1 + \beta_2 c + \beta_3 z + v, \qquad (9)$$

where α_i and β_i, $i=1,2,3$ are parameter (vectors), and u and v are error terms. The (vectors) x and z contain variables which determine consumption and the return time, respectively. Suppose that one element of x is the wage in the host country, and that the respective parameter in α_3 is the parameter of interest.

It is obvious that estimation of the consumption equation, omitting the optimal return time, does not identify this parameter, because of a conventional simultaneous equations bias. The parameter identified in this case is a compound parameter, measuring the direct effect of changes in wages, conditional on the optimal return time, and the indirect effect, by way of changing the return time. For this particular example, it can be shown that, while the direct effect is positive, the indirect effect is ambiguous in general (see Dustmann, 1995, for details). Accordingly, when estimating consumption functions for return migrants without taking this simultaneity into account, the parameter estimate on wages in the host country is not the structural parameter which the analyst may want to identify.

Similar considerations apply in related models, where labour supply or human capital investments of immigrants are analysed. Dustmann (1997a) develops a simplified version of the above model, where individuals choose labour supply in addition. The model is estimated for females, where partner characteristics identify the model. Dustmann (1999a) develops a model where investments in human capital production are a further choice variable. The empirical application investigates investments in language capital of migrant workers.

Summary and conclusions

This chapter analyzes migration and re-migration decisions of migrant workers. A life-cycle model is developed where individuals decide simultaneously about their optimal consumption, and the optimal return time to their home countries. In previous studies, locational preferences (Djajić and Milbourne, 1988) and purchasing power differentials between countries (see Djajić, 1989) have been emphasized to explain temporary migrations. A further motive for a return migration, human capital enhancement while abroad, has first been identified by Dustmann (1995). This chapter combines all three motives within a unified framework, and provides further analysis of all three motives.

The model provides a general framework for studying the behavior of immigrants who choose their return time optimally. The analysis has also important implications for empirical work, as demonstrated above. Neglecting the fact that the migrant's return decision is taken simultaneously with other behavioral decisions in the host country may lead to misspecified empirical models.

The model is not without shortcomings, however. Although it explains a number of stylized facts, and provides some structure on the specification

of empirical models, it is simplistic in many respects. It replicates a world where all decisions are taken at the time of immigration. Only in a completely deterministic world with fully informed agents, however, do intention and realization coincide. In a non-deterministic setting, and where agents are not fully informed at the time of immigration, migrants may re-optimize when obtaining additional information on host and home country. Furthermore, preference parameters, which have been assumed as constant in this model, may well change over time. As a consequence, migrations initially planned as permanent may become temporary, and vice versa. To model this process requires a dynamic model, where information about host and home country is updated in each period, and where return plans are adjusted accordingly. This is an interesting avenue for further research, and attempted in a paper by Adda and Dustmann (2000).

Notes

1 See, for instance, Borjas (1984), Chiswick and Miller (1993).
2 Gains in human capital were in fact emphasized during labor migration movements in Europe. Mehrländer (1980: 88), for instance, reports for the case of Germany that the countries of origin expected outmigration *to improve the training of the workers concerned, ultimately creating a larger reservoir of skilled labour in the countries of origin.*
3 This is always true for utility functions where the elasticity of the marginal utility of consumption is not decreasing in consumption.
4 See Dustmann (1995) for a detailed analysis of migrants' savings behavior under these three scenarios.
5 Changes in the wage $y^E(\hat{t})$ have to be understood as changes in the base wage at $\hat{t}=0$.

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Appendix A: comparative statics

Comparative statics on equations (4) and (5) may be performed by using the implicit function theorem. To apply the implicit function theorem, one has to ensure that a unique local differentiable solution exists at $(\hat{t},\pi^0)$ Necessary for $(\hat{t},\pi^0)$ being an optimal solution to (4) and (5) is that $\Gamma(\pi^0,\hat{t})$ and $\Delta(\pi^0,\hat{t})=0$. Sufficient is that the Jakobian H of the system described by (4) and (5) fulfills $\partial\Gamma/\partial\pi^0>0$, $\partial\Delta/\partial\hat{t}<0$ and $Det(H)=0$, with H:

$$H=\begin{bmatrix}\dfrac{\partial\Gamma}{\partial\pi^0} & \dfrac{\partial\Gamma}{\partial\hat{t}}\\[2ex] \dfrac{\partial\Delta}{\partial\pi^0} & \dfrac{\partial\Delta}{\partial\hat{t}}\end{bmatrix} \tag{10}$$

Deriving the elements of H (see below), it can be shown that this condition is fulfilled. Totally differentiating equation (4), and re-arranging terms yields:

$$\begin{aligned} d\pi^0 &= \frac{b_1}{b}d\hat{t}+\frac{b_2}{b}dy^E+\frac{b_3}{b}dy^I+\frac{b_4}{b}dp+\frac{b_5}{b}dK+\frac{b_6}{b}dT\\ &=\pi^0_{\hat{t}}d\hat{t}+\pi^0_{yE}dy^E+\pi^0_{yI}dy^I+\pi^0_p dp+\pi^0_K dK+\pi^0_T dT \end{aligned} \tag{11}$$

where

$$b=-\left[\int_0^{\hat{t}} c^{I'}\,e^{(\rho-2r)\tau}dt+\int_{\hat{t}}^{T} pc^{E'}\,e^{(\rho-2r)\tau}dt\right]>0,$$

where $c^{i'}$, $i=E,I$, are the derivatives with respect to π.

$$\begin{aligned} b_1 &= \left[\left(y^E-c^Ep\right)-\left(y^I-c^I\right)-\frac{1}{r}y^E_{\hat{t}}\left(1-e^{r(\hat{t}-T)}\right)\right]e^{-r\hat{t}}\le 0,\\ b_2 &= -\left[1-e^{-r(T-\hat{t})}\right]\frac{1}{r}e^{-r\hat{t}}<0,\\ b_3 &= -\left[1-e^{-r\hat{t}}\right]\frac{1}{r}<0,\\ b_4 &= \int_{\hat{t}}^{T}\left[c^E+\pi p\frac{\partial c^E}{\partial(p\pi)}\right]e^{-r\tau}d\tau \lesseqgtr 0 \quad \text{as} \quad c^E \lesseqgtr \pi p\frac{\partial c^E}{\partial(p\pi)},\\ b_5 &= -1<0,\\ b_6 &= \left[pc^E-y^E\right]e^{-rT}>0 \quad \text{for} \quad pc^E>y^E \quad \text{at} \quad t=T. \end{aligned}$$

The effect of an increase in the price level on the budget constraint is ambiguous in sign. It depends on whether the direct effect of a price change on the cost of consumption is smaller than the indirect effect of a change in the consumption flow as a consequence of a change in the price. An increase in T has a positive effect on lifetime expenditure (tightening the migrant's budget constraint, and increasing the marginal utility of wealth) if expenditures are higher than earnings at $t=T$.

Totally differentiating (5) with respect to $\hat{t}$, π^0, p, y^E, y^I, K and T results in the following expression:

$$d\hat{t} = \frac{a_1}{a} d\pi^0 + \frac{a_2}{a} dy^E + \frac{a_3}{a} dy^I + \frac{a_4}{a} dp + \frac{a_5}{a} dK + \frac{a_6}{a} dT$$
$$= \hat{t}_{\pi 0} d\pi^0 + \hat{t}_{yE} dy^E + \hat{t}_{yI} dy^I + \hat{t}_p dp + \hat{t}_K dK + \hat{t}_T dT \qquad (12)$$

where

$$a = \dot{\pi}\left[\left(y^I - c^I\right) - \left(y^E - c^E p\right) + \frac{1}{r} y_{\hat{t}}^E\left(1 - e^{r(\hat{t}-T)}\right)\right]$$
$$+ \left[\pi \frac{1}{r} y_{\hat{t}\hat{t}}^E\left(1 - e^{r(\hat{t}-T)}\right) - y_{\hat{t}}^E\left(1 - e^{r(\hat{t}-T)}\right)\right] < 0,$$
$$a_1 = e^{(\rho - r)\hat{t}}\left[\left(y^E - c^E p\right) - \left(y^I - c^I\right) - \frac{1}{r} y_{\hat{t}}^E\left(1 - e^{r(\hat{t}-T)}\right)\right] \leq 0$$
$$a_2 = \pi > 0,$$
$$a_3 = -\pi < 0,$$
$$a_4 = -\pi c^E < 0,$$
$$a_5 = 0,$$
$$a_6 = -\pi\left[y_{\hat{t}}^E e^{r(\hat{t}-T)}\right] < 0.$$

Notice that a_I and b_I are both equal to zero for scenario (c). As a consequence, $\hat{t}\,\pi^0 = 0$ in this case. Rewrite (11) and (12):

$$\begin{bmatrix} 1 & -\hat{t}_{\pi 0} \\ -\pi_{\hat{t}}^0 & 1 \end{bmatrix} \begin{bmatrix} d\hat{t} \\ d\pi^0 \end{bmatrix} = \begin{bmatrix} \hat{t}_{yE} dy^E & \hat{t}_{yI} dy^I & \hat{t}_p dp & \hat{t}_K dK & \hat{t}_{\xi I} d\xi^I & \hat{t}_{\xi E} d\xi^E & \hat{t}_T dT \\ \pi_{yE}^0 dy^E & \pi_{yI}^0 dy^I & \pi_p^0 dp & \pi_K^0 dK & \pi_{\xi I}^0 d\xi^I & \pi_{\xi E}^0 d\xi^E & \pi_T^0 dT \end{bmatrix}$$

Using Cramer's rule produces the partial effects in Table 11.1, where $D = 1 - \hat{t}_{\pi 0}\pi_{\hat{t}}^0 = 1 - \frac{a_I b_I}{a b} > 0$.

Appendix B: simulations

For the simulations, the utility functions are specified as follows:

$$v^I(c) = \frac{1}{(1-\alpha)} \xi^I c^{(1-\alpha)},$$
$$v^E(c) = \frac{1}{(1-\alpha)} \xi^E c^{(1-\alpha)}. \qquad (13)$$

Furthermore, earnings in the host country are $y^E(\hat{t}) = \bar{y}^E + \gamma ln(1+\hat{t})$. If $\gamma > 0$, staying longer abroad increases the migrant's earnings potential in the home country. It then follows from (4) and (5) that the optimal time of return, $\hat{t}$ and the marginal utility of wealth in $t=0$, π^0, together with the realized stock of savings in $t=T$ is determined by the following system of equations:

$$\pi^{\frac{1}{\alpha}}\left[y^I - y^E(\hat{t}) + \gamma \frac{1}{r(1+\hat{t})}\left[1 - e^{r(\hat{t}-T)}\right]\right] + \frac{\alpha}{(1-\alpha)}\left[\xi^{I\frac{1}{\alpha}} - p\left(\frac{\xi^E}{p}\right)^{\frac{1}{\alpha}}\right] = 0, \qquad (14a)$$

$$\bar{K}e^{-rT} - K_0 = \frac{1}{r}\left[y^I\left[1 - e^{-r\hat{t}}\right] + y^E\left[e^{-r\hat{t}} - e^{-rT}\right]\right]$$
$$-\frac{1}{b}\left[\left[\frac{\xi^I}{\pi^o}\right]^{\frac{1}{\alpha}}\left[1 - e^{-b\hat{t}}\right] + \left[p\frac{\xi^E}{\pi^0 p}\right]^{\frac{1}{\alpha}}\left[e^{-b\hat{t}} - e^{-bT}\right]\right], \qquad (14b)$$

where $b = \frac{1}{\alpha}(\rho - r) + r$.

The basic parameter configuration for the simulations is: $\alpha=0.4$, $\rho=0.08$, $r=0.1$, $T=30$, $\xi^E=1.3$, $\xi^I=1$, $\gamma^I=4$, $\bar{y}^E=2$, $K_0=0$, $\gamma=0$, $p=1$, $\bar{K}=0$.

For these parameters, consumption–earnings profiles and the profile of savings are given in Figures 11.3 and 11.4. The optimal point of return, $\hat{t}$, equals 13.67, and $\pi^0=0.82$. In Figures 11.1 and 11.2, $\xi^I=\xi^E=1$. In Figures 11.5 and 11.6, the price level p is chosen to be equal to 0.8. The optimal return point and the marginal utility of wealth in $t=0$ are $\hat{t}=23.8$ and $\pi^0=0.71$. Finally, Figures 11.7 and 11.8 show profiles where $\xi^I=\xi^E=1$, but $\gamma=2$. Optimal return point and marginal utility of wealth are now given by $\hat{t}=7.2$ and $\pi^0=0.63$, respectively.