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RETURN INTENTIONS OF MIGRANTS: THEORY AND EVIDENCE

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ABSTRACT

Return Intentions of Migrants: Theory and Evidence*

This paper analyses the return intentions of migrant workers. An intertemporal model is developed where the point of return to the home country is endogenous. The analysis emphasizes three explanations of why it should be optimal to migrate only temporarily: differences in relative prices in the host and home country, the possibility of accumulating human capital abroad, which is only earnings effective back home, and complementarities between consumption and the environment where consumption takes place. Some hypotheses implied by the theory are empirically tested, using micro data on migrant workers in Germany. The results of the econometric analysis are largely consistent with the implications of the theory.

JEL classification: D9, F22
Keywords: life cycle models, international migration

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NON-TECHNICAL SUMMARY

An increasing wealth gap between the industrialized world and the countries at the bottom of the wealth scale, together with the removal of migration restrictions in East European countries, has made migration one of the major political and economic issues for the Western world.

From the perspective of the immigration country, two issues are of major interest: what are the consequences of migration for the wealth of the receiving country, and what are the optimal policies to deal with migration flows and migrants? A satisfactory answer to the second question requires some knowledge about the behaviour of the individual migrant. It should thus be one of the aims of social scientists, and especially economists, to provide some understanding of the behavioural and decision structures of migrants. This paper is one attempt to promote research in this direction. In particular, it analyses an issue which is of utmost importance for migration policies – the return behaviour of migrant workers.

In most of the theoretical and empirical literature on migration, migrants are treated as a fairly homogeneous group. So far, little attention has been paid to the fact that migrants may differ considerably with respect to the future planning horizon in the host country, not only from the indigenous population, but also among each other. But plans about the future, and features of future residence locations, have an important impact on today's behaviour and today's economic decisions. Since emigration and immigration countries often differ considerably in many economic and social characteristics, a future intended return may strongly influence migrants' behaviour in the host country. Neglecting the possibly temporary nature of migration can then have serious consequences for empirical and theoretical research and lead to incorrect conclusions. This is particularly so if analysing phenomena where plans about the future have a strong impact on current behaviour. Examples would be the analysis of the economic success of migrant workers abroad, labour supply decisions, migrants' saving behaviour and housing choice.

Much of the observed migration which takes place today is in fact intended to be temporary. This type of migration is often referred to as *return migration*, and it can be observed not only in Europe and between European and extra-European countries, but also in Asia and between Asian countries and countries of the Middle East. The target countries of return migration are generally characterized by an excess demand for labour in at least some segments of the labour market. This labour cannot be supplied by the local workforce either in the quantity requested, or at adequate prices, or both. The emigration countries usually exhibit an excess supply of labour and/or wage rates that are far below those offered in the target countries.

The classical economic argument to explain migration is the following: neglecting any fixed costs of migration, a worker has an incentive to migrate when, given his (or her) stock of human capital, his (or her) potential earnings are higher in the host than in the home country. As a consequence, and if earnings differentials were the only determinant for migration decisions, migrants would only return when the economic situation changes such that earnings at home will increase significantly relative to those in the host country. It is an observed fact, however, that return migration takes place even without such radical changes in the relative economic situation of the two countries concerned.

This paper develops an intertemporal model where the time of return to the home country is endogenous. It is shown that return migration may occur independently through three factors: a preference for consumption in the home country, which comes about by complementarities between consumption and the environment where consumption takes place; a higher price level in the host country; and the accumulation of human capital abroad which only becomes earnings effective in the home country. In real migration situations, it is likely that an intended return is affected by all three factors simultaneously. It is shown that the endogenization of return intentions leads to some comparative static results which are not obvious. For instance, the time the migrant intends to remain abroad is not simply affected by an increase in the wage differential between host and home country; rather, it matters whether an increase in the wage differential comes about by an increase in wages abroad or a decrease in wages at home.

Some empirical tests are then performed using cross-sectional data on male migrant workers in West Germany. The data contains information about the intended future duration of a migrant in Germany. Estimation results of Tobit specifications largely support the implications of the theoretical analysis. In particular, all variables which capture the environmental differential and measure the remaining time in the workforce have the expected sign and are mostly significant. Predicted earnings in the host country are used as the earnings variable. This variable is insignificant in all specifications. Nationality, residence and labour force status of the migrant's partner affect the remigration intention to some extent. The fact that children are enrolled in German schools increases the intended future duration in the host country.

This paper attempts to provide some insight into determinants of migrants' return behaviour. Knowledge about what drives migrants' return plans may help to develop more sophisticated migration policies, so that policy goals might be achieved by a system of incentives rather than by restrictions.

1. Introduction

In most of the theoretical and empirical literature on migration which evolved over the last decades, migrants are treated as a fairly homogeneous group. So far, only little attention has been paid to the fact that migrants may differ considerably with respect to the future planing horizon in the host country not only from the indigenous population, but also among each other. But plans about the future and features of future residence locations have an important impact on today's behavior and today's economic decisions. Since emigration- and immigration countries differ often considerably in many economic and social characteristics, a future intended return may considerably influence migrants' behavior in the host country. Neglecting the possibly temporary nature of migration can then have serious consequences for empirical and theoretical research and lead to wrong conclusions. This is particularly so if analyzing phenomena where plans about the future have a strong impact on current behavior. Examples would be the analysis of migrants' investment in human capital and their economic success abroad,[1] their labor supply decisions, their savings behavior[2] and their housing choice. Galor and Stark (1990, 1991) are among the first to realize that a return probability different from zero may affect migrants' behavior and performance in the host country. However, they treat in their analysis return probabilities of migrants as exogenous.

Much of the observed migration which takes place today is in fact intended to be temporary.[3] Despite its empirical importance, return migration has so far only found little interest in the economic literature. The classical economic argument to

[1]See, for instance, Chiswick (1978) and Borjas (1987). Dustmann (1993-a) finds some evidence for the hypothesis that the intended duration abroad affects the migrant's accumulation of host-country specific human capital.

[2]Merkle and Zimmermann (1992) find some evidence that return intentions of migrants affect their savings behavior.

[3]In the 50's, 60's and 70's, the labor requirements of Western Europe's industrial economies and poverty as well as unemployment in Southern European countries and in Turkey induced an immigration boom from the periphery countries into the core of Europe. This migration was considered to be temporary by the migrants, the sending countries and the receiving countries. Böhning (1984, p.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 from the 1 million Greeks migrating to West Germany between 1960 and 1984, 85% gradually returned home. Return migration is also an important issue for the United States (see Piore (1979)). 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% of legal immigrants (depending on the nationality) re-emigrated from the United States in the 70's. Warren and Peck (1980) estimate that about one third of legal immigrants to the United States re-emigrated in the 60's.

explain migration is the following: Neglecting any fixed costs of migration, a worker has an incentive to migrate when, given his stock of human capital, his potential earnings are higher in the host- than in the home country. As a consequence, and if earnings differentials were the only determinant for migration decisions, migrants would only return when the economic situation changes so that earnings at home will significantly increase relative to those in the host country. However, it is an observed fact that return migration takes place even without such radical changes in the relative economic situation of the two countries concerned. Some explanations for a return without a radical change in the economic situation in host- and home country can be found in the literature. In a recent paper, Djajic and Milbourne (1988) explain return migration by assuming that migrants have a stronger preference for consumption at home than abroad.[4] Hill (1987) shows that migration may be temporary and repetitive if the migrant has a preference for certain locations. Djajic (1989) shows that, while for permanent migrants the real wage differential matters, the migration decision of temporary migrants depends on both the real and the nominal wage differential.

In section 2 of this paper, a life cycle model will be presented where the return point to the home country is endogenous. The analysis offers three explanations why a migrant should return before retirement age. One explanation, as emphasized by Djajic and Milbourne (1988), is that migrants may have different preferences for consuming at home and abroad. These differences are due to a different subjective perception of the home- and host country environment by the migrant worker. A further reason which may induce the migrant only to migrate temporarily are different relative prices in home- and host country. Finally, migration is shown to only last temporarily should the potential earnings position of the migrant in the home country improve with the time staying abroad. Each of these factors alone is shown to induce migration to be only of a temporary nature. Comparative statics illustrate in which way the optimal return point will depend on the parameters of the model. The results of the theoretical analysis are then used to specify variables which are likely to affect the migrant's return intentions. In section 3, an empirical analysis of return intentions is performed, using micro data for Germany. The data contains information about the *intended* future duration of a migrant in Germany. Finally, section 4 summarizes the main findings.

[4]The notion that individuals' preference structure is different before and after an optimal stopping time has previously been exploited in the retirement literature (see Hu (1978)).

2. Theory

In what follows, only the productive period of an individual will be considered. Therefore, a *return migrant* will be defined as a migrant who works for some time in a host country and returns *before* retirement age. Accordingly, a permanent migrant is a migrant who does not intend to return before retirement. Furthermore, both concepts are used as *ex ante* - concepts: A migrant is considered to be a returner as long as he *intends* to return, independently of whether he finally returns or not.[5]

The fact that migrants return after having spent some time abroad, despite persisting wage differentials, is not explainable in a model where the only driving force for migration are differences in real wages. However, if prices for consumption goods are lower at home than abroad, it may be optimal for the migrant to stay only temporarily in the host country and to postpone consumption. Another reason to return may be that the migrant accumulates human capital while being abroad, which, though not earnings effective in the host country, considerably increases his earnings potential back home. Consider, for example, a migrant who accumulates experience, like language, the understanding of production processes and work mentality, while being abroad. This human capital, though not sufficient to allow for an improvement of his earnings situation in the host country, may be of considerable value for his home country economy. A return is then induced by an increase in the migrant's *potential* wage in the home country. Temporary migration may further be caused by complementaries between consumption and other arguments in the migrant's utility function which differ between host- and home country. It is a common observation that utility created by the consumption of goods depends not only on the quantities consumed, but also on the *environment* where such consumption takes place. More specifically, it seems to be the case that the environment where consumption comes about is complementary to the utility created by the consumption good itself. The notion *environment* as it will be used here could comprise social relations, subjectively perceived life quality parameters, like climate, social regulations etc., family and friends. When analyzing agents' consumption behavior in a relatively stable environment, any interactions between en-

[5]It is important to distinguish between permanent migrants (migrants who migrate with the firm intention to stay permanently) and return migrants who initially intend to return but eventually stay forever. The economic behavior of both groups in the host country is likely to be very different. A return migrant who in the end stays permanently may have had the intention to return during a long period of his stay abroad. As long as he plans to return, his economic actions (savings, human capital investment etc.) are conditioned on this return intention. Even if finally staying permanently, his economic behavior over his life cycle is substantially different from that would he have decided to stay permanently at the outset of his migration history.

vironment and the utility gained by the consumption of some good may be neglected. However, when analyzing agents who may, involuntarily or by choice, meet their consumption decisions over their life cycle in two completely different environments, such interactions should be considered. This would be especially the case for migrants who may wish to return to their home countries. In what follows, a model will be set up where a return point before retirement age may be induced by each of these factors.

A Formal Model

Consider a migrant worker who at some point of his migration history sets up a plan about how long to remain in the host country.[6] Denote his active lifetime, or remaining time in the labor force, with T. The migrant maximizes a utility function over this horizon T, with arguments consumption c and environment ξ:

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

where $\hat{t}$ is the optimal point of return, ρ the rate of time preference, and the flow of consumption is given by c. The variables ξ^I and ξ^E summarize all factors which determine the environment of the migrant in the Immigration (host) and in the Emigration (source or home) country, respectively. Although both ξ^I and ξ^E are likely to change over time, it will be assumed that they are considered to be constant by the migrant when solving his optimization problem. In other words, the migrant ignores that ξ^I and ξ^E may change, and that such changes are possibly endogenous to his decision.[7] 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 cycle. Re-optimization at a future point in time, however, may then be based on new values for ξ^I and ξ^E. Since the migrant can influence ξ only by a change in the location, ξ^I and ξ^E will be treated as parameters rather than as variables. Both ξ^I and ξ^E are assumed to be complementary to consumption[8] in the respective location, with u being strictly concave with respect to both arguments: $u_1 > 0$, $u_2 > 0$, $u_{11} < 0$, $u_{22} < 0$, $u_{12} > 0$, where the subscripts 1,2

[6] For deciding whether or not to migrate at all, the migrant would solve an equivalent optimization problem.

[7] The migrant may, however, consciously influence (and, therefore, control) the adoption to his environment, e.g. by investment into country specific human capital (see Dustmann (1991)).

[8] In the sense of Pareto and Edgeworth, see Hicks (1979), p. 44.

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 $v_1^i(k)_{k\to\infty} \to 0$, $v_1^i(k)_{k\to 0} \to \infty$, $i = I, E$, $v^i(0) = 0$, where the subscript $_1$ denotes first derivatives. Throughout the analysis, it will be assumed that $\xi^I \leq \xi^E$: Environment at home is valued at least as high than environment abroad. It therefore follows that utility from some constant flow of consumption k is at least as high in the home- than in the host country both in marginal and in absolute terms:

$$v^E(k) = u(k,\,\xi^E) \geq v^I(k) = u(k,\,\xi^I)\;;\; v_1^E(k) = u_1(k,\,\xi^E) \geq v_1^I(k) = u_1(k,\,\xi^I)\,. \quad (2)$$

The optimization problem of the migrant consists of maximizing (2) with respect to consumption c and the optimal return point $\hat{t}$, subject to the following intertemporal budget constraint:

$$\int_0^{\hat{t}} y^I\, e^{-r\tau}\, d\tau + \int_{\hat{t}}^{T} y^E(\hat{t})\, e^{-r\tau}\, d\tau + K_0 - \bar{K}\, e^{-rT} - \int_0^{\hat{t}} c^I(\tau)\, e^{-r\tau}\, d\tau - \int_{\hat{t}}^{T} p\, c^E(\tau)\, e^{-r\tau}\, d\tau = 0\,, \quad (3)$$

where c^I and c^E are the optimal flows of consumption abroad and at home, respectively, and r is the (time–constant) interest rate. Incomes per unit of time in the immigration- and the emigration country are given by y^I and y^E. They are both assumed to be constant over time, but y^E may positively depend on the return point $\hat{t}$, with $y_{\hat{t}}^E > 0$, $y_{\hat{t}\hat{t}}^E \leq 0$. This allows for the possibility that the time the migrant spends in the host country enhances his human capital which will, however, only become earnings effective after re-migration. The wage differential between host- and home country, $(y^I - y^E)$, is assumed positive at least for some t, $0 \leq t \leq T$. The relative price level between emigration- and immigration country is given by p, and K_0 is the stock of savings at $t = 0$. $\bar{K}$ is the desired stock of savings at the end of the planning horizon, T. Since T corresponds to the length of the productive period of the migrant, $\bar{K}$ could be thought of as the amount of savings the migrant considers as appropriate for his retirement period.

Optimization problems of the type above are usually solved in two stages. In the first stage, an optimal consumption plan will be chosen for any $\hat{t}$. Denote the marginal utility of income at t as $\pi(t)$, with $\pi(t) = \pi^0\, e^{(\rho - r)t}$. The marginal utility of money in $t = 0$ is π^0, which corresponds to the simple Lagrange multiplier. Optimality of the path of consumption requires that:

$$\pi(t) = \begin{cases} v_1^I(c) & : \ 0 \leq t < \hat{t} \\ \frac{1}{p} v_1^E(c) & : \ \hat{t} \leq t \leq T \,. \end{cases} \tag{4}$$

The functions $v_1^i, i = E, I$, are continuous and monotonic and, therefore, invertible. It follows that:

$$c(t) = \begin{cases} v_1^{I-1}(\pi) & : \ 0 \leq t < \hat{t} \\ v_1^{E-1}(\pi\, p) & : \ \hat{t} \leq t \leq T \,, \end{cases} \tag{5}$$

where the superscript $^{-1}$ denotes inverse functions. Furthermore:

$$\dot{c}(t) = \begin{cases} \frac{1}{v_{11}^I}\, \dot{\pi} & : \ 0 \leq t < \hat{t} \\ \frac{1}{v_{11}^E}\, \dot{\pi}\, p & : \ \hat{t} \leq t \leq T \end{cases} . \tag{6}$$

Since $\dot{\pi} = (\rho - r)\pi^0\, e^{(\rho - r)\, t}$, it follows from the strict concavity of the utility functions that the path of consumption decreases over time if $\rho > r$, and it increases if $\rho < r$. Because of space limitations, throughout the analysis the only case which will be considered is that where the rate of time preference is smaller than the interest rate: $\rho < r$. This case is consistent with increasing consumption profiles. It follows from (4) and (5) that at the point of return $\hat{t}$, a shift in consumption will possibly take place:

$$\begin{array}{lll} \lim(c(t)^I) & \leq & \lim(c(t)^E) \text{ as } v_1^I(k)\, p \leq v_1^E(k) \,. \\ t \to \hat{t}^- & & t \to \hat{t}^+ \end{array} \tag{7}$$

Expression (7) implies that the migrant's consumption profile will "jump" upwards at the point of return if $\xi^I < \xi^E$, for $p = 1$. This same effect may be induced by a higher price level in the host country ($p < 1$), even if the migrant is indifferent between consumption abroad and at home ($\xi^E = \xi^I$).

The second stage of the optimization problem consists of choosing that consumption plan as a function of the optimal point of return, $\hat{t}$, which maximizes (2) under the constraint (3). Since consumption can be written as a function of the marginal utility of income, $\pi(t)$, the budget constraint (3) implicitly determines π^0 as a function of $\hat{t}$:

$$\int_0^{\hat{t}} y^I\, e^{-r\tau}\, d\tau + \int_{\hat{t}}^T y^E(\hat{t})\, e^{-r\tau}\, d\tau + K - \int_0^{\hat{t}} c^I(\pi(\tau))\, e^{-r\tau}\, d\tau - \int_{\hat{t}}^T p\, c^E(\pi(\tau)\, p)\, e^{-r\tau}\, d\tau = \Gamma(\pi^0, \hat{t}) \,, \tag{8}$$

with $K = K_0 - \bar{K}\, e^{-rT}$. For $p \leq 1$ and $\xi^E \geq \xi^I$, it can be shown that $\frac{\partial \pi^0}{\partial \hat{t}} \leq 0$ (see (22), Appendix). Differentiating the utility function and the budget constraint with respect to the optimal return point $\hat{t}$, combining terms and using (4) yields:

$$[v^I - v^E] + \pi^0 e^{(\rho-r)\hat{t}} \left[[(y^I - c^I) - (y^E - p\,c^E)] + \frac{1}{r} y_{\hat{t}}^E [1 - e^{r(\hat{t}-T)}] \right] = \Delta(\pi^0, \hat{t}) \quad (9)$$

Relation (8) and (9) determine together the optimal π^0 and the optimal point of return $\hat{t}$. At the optimum, $\Delta(\pi^0, \hat{t}) = \Gamma(\pi^0, \hat{t}) = 0$. Appendix A derives the sufficient conditions.

The first term in (9) is the marginal cost of staying one unit of time longer in the host country, in terms of forgone utility: Staying longer abroad deprives the migrant of the possibility to consume during that unit of time in the home country. Notice that $[v^I - v^E] < 0$ whenever $\xi^E > \xi^I$ or/and $p < 1$. The second term is the marginal benefit of lengthening the time abroad. Costs and benefits are both measured in units of utility. The marginal benefit of staying longer abroad has two components: First, it enables the migrant to accumulate more resources $[(y^I - c^I) - (y^E - p\,c^E)]$ for lifetime consumption, and secondly, it increases his earnings potential back home, should $y_t^E > 0$. The optimal return point $\hat{t}$ is that point in time where the marginal cost of staying longer abroad is equal to the marginal benefit of doing so, or $\Delta = 0$.

For a typical return-migration pattern, the marginal cost of migration for $\hat{t} \to 0$ must be smaller than the marginal benefit, or $\Delta(\pi^0, \hat{t})_{\hat{t}\to 0} > 0$.

An interior return point occurs if marginal cost and benefit profiles cut at some $\hat{t} < T$. Multiplying the first term in (9) with -1 and differentiating with respect to $\hat{t}$ yields:

$$\pi \left[\dot{\pi} + e^{(\rho-r)\hat{t}} \frac{\partial \pi^0}{\partial \hat{t}} \right] [c^{E\prime}\, p - c^{I\prime}], \quad (10\text{-a})$$

where $c^{i\prime}$, $i = E, I$ are the derivatives of consumption with respect to π. Differentiating the second term with respect to $\hat{t}$:

$$[\dot{\pi} + e^{(\rho-r)\hat{t}} \frac{\partial \pi^0}{\partial \hat{t}}] \left[\pi [c^{E\prime}\, p - c^{I\prime}] + [(y^I - c^I) - (y^E - c^E\, p) + \frac{1}{r} y_{\hat{t}}^E (1 - e^{r(\hat{t}-T)})] \right] \quad (10\text{-b})$$
$$+ \pi [y_{\hat{t}\hat{t}}^E (1 - e^{r(\hat{t}-T)}) - y_{\hat{t}}^E (1 + e^{r(\hat{t}-T)})].$$

For $\xi^E > \xi^I$ and/or $p < 1$, it follows from (5) that $[c^{E\prime}\, p - c^{I\prime}] < 0$: the marginal cost schedule is increasing over time. Marginal benefits (expression in (10-b)) may increase or decrease, but the benefit schedule is always flatter than the cost schedule. Notice that it follows from (10-a) and (10-b) that $\frac{\partial \Delta}{\partial \hat{t}} < 0$.

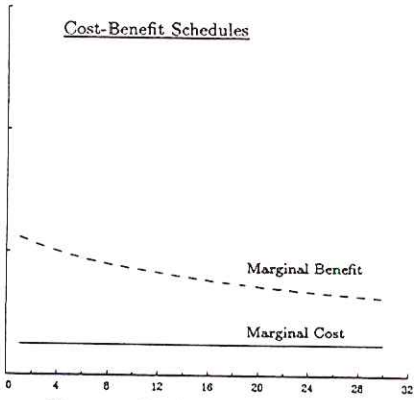

Figure 1: Marginal Cost and Benefit Schedules, Classical Case.

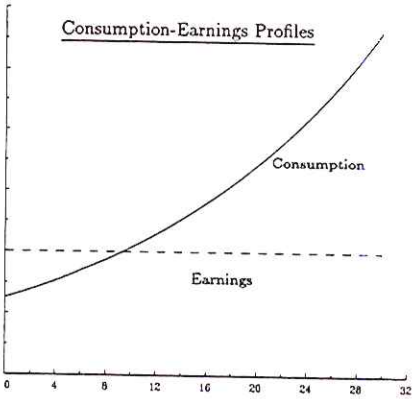

Figure 2: Earnings and Consumption Profiles, Classical Case.

It is now possible to look at some migration situations. To illustrate the implications of the model, some simulations have been performed for specific functional forms of the utility function and the accumulation of potential earnings in the home country (for details, see Appendix C). Consider first the classical case where migration occurs only as a consequence of positive wage differentials. Price levels are equal in both countries ($p = 1$), and $y_t^E(t) = 0$. The migrant is indifferent between consumption at home and abroad ($\xi^E = \xi^I$), and wages are higher abroad ($y^E < y^I$). Then the first term in (9), representing costs, is zero and the second term reduces to $\pi(y^I - y^E)$, which is positive. Consequently, $\dot{\Delta} = \dot{\pi}(y^I - y^E) < 0$[9]: Marginal benefits of staying abroad are decreasing as long as $\rho < r$. However, for a finite T, Δ will never cut the zero-line. Accordingly, the migrant will never want to return to his home country. Migration would be permanent. Figure 1 shows the cost- benefit–schedules, corresponding to the first and second term of the LHS in (9), respectively. 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 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 would never occur, or the migrant would return immediately. Consequently, if wage differentials are the only driving force of migration, as it is often assumed in the literature, only these two migration patterns are possible.

[9]Note that in this case $\frac{\partial \pi^0}{\partial t} = 0$ (see Appendix).

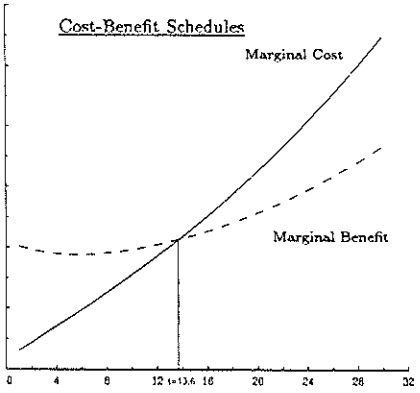

Figure 3: Marginal Cost and Benefit Schedules, Preference for Home Country.

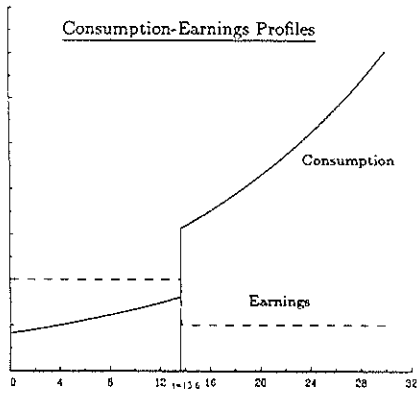

Figure 4: Earnings and Consumption Profiles, Preference for Home Country.

Let now the wage differential again be positive, with $y_t^E = 0$, but assume that the migrant has a preference for consumption in his home country: $\xi^E > \xi^I$. Costs and benefits of staying abroad (first and second term in (9)) are now negative and positive, respectively. This follows from (2) and (7). If the benefit is sufficiently high, relative to the cost of migration, $\Delta(\pi^0, \hat{t})_{\hat{t}=0} > 0$ and migration will occur. Δ is decreasing and there exists an interior return point, with $\Delta = 0$. Whether an interior solution or a corner solution occurs depends, for a given utility structure, on the preference for the home country and on the wage advantage abroad. For an interior solution, figure 3 and 4 illustrate the path of earnings and consumption and the benefit - 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 considerably and reduce the previously accumulated stock of savings.[10]

[10]The implications of an interior return point for migrants' savings behavior are analyzed in Dustmann (1993-b). For migrants' savings behavior and re-migration decisions in an uncertain environment, see Dustmann (1992).

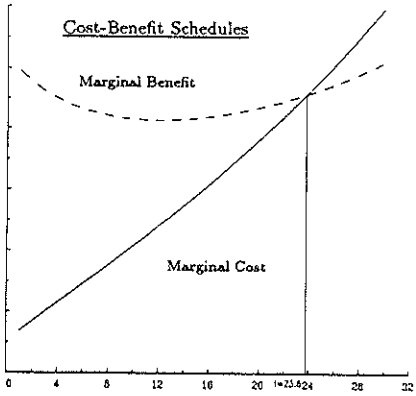

Figure 5: Marginal Cost and Benefit Schedules, Higher Price Level Abroad.

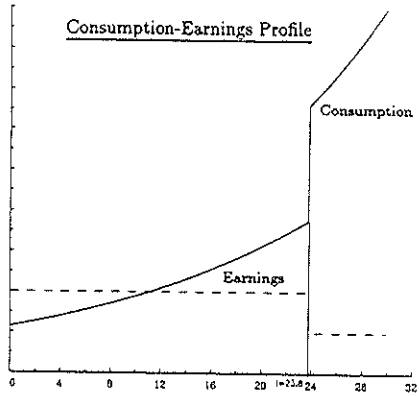

Figure 6: Earnings and Consumption Profiles, Higher Price Level Abroad.

Assume now that the migrant is indifferent between consumption at home and abroad ($\xi^I = \xi^E$), but prices are lower in the home- than in the host country ($p < 1$). Furthermore, $y^I > y^E$ and $y_t^E = 0$. It is easy to verify that the first term and the second term in (9) are again negative and positive, respectively, since prices induce consumption abroad to be always lower than consumption at home (see (5) and (7)). For $\hat{t} \to 0$, Δ may again be positive. Since Δ will decrease over time, an interior solution will occur if Δ will cut the zero-line before $\hat{t} = T$. The individual, although indifferent between locations, will first migrate, but then return to take advantage of both high wages abroad and low prices at home. This situation is illustrated in figures 5 and 6.

Lastly, consider the case where wages are initially higher abroad, price levels are equal, and the migrant is indifferent between consumption at home and abroad. The migrant improves, however, his earnings position at home by the mere fact of being in the host country ($y_t^E > 0$). Time abroad increases the earnings potential at home, while it has no impact on the earnings potential abroad.[11] This is, of course, a rather simple way to model the accumulation of human capital, but it captures some basic features of migration situations which are observable. It is likely that migrant workers, working in a highly industrialized country, acquire human capital which, though not sufficient to

[11]Note that the same results can be obtained by allowing the time abroad to have also a positive impact on earnings in the host country, as long as the positive impact of staying abroad is stronger on earnings in the home country.

raise the earnings position in the host country considerably, is of high value in the home countries. For instance, if the home country is in the processes of industrialization, knowledge about working pattern, institutional features, incentive structures and the language of a highly industrialized country may make the migrant very valuable for his home economy.[12] Since the migrant is indifferent between consuming at home and abroad, the marginal cost of migrating is equal to zero (first term in (9)), but the marginal benefit is initially positive. It follows that Δ is positive for $\hat{t} \to 0$. However, since potential earnings at home are increasing over time, Δ will decrease and eventually hit the zero-line. At this point, potential earnings at home will be higher than earnings abroad. This follows from (9): For $\Delta = 0$, $y^E = y^I + (1/r)\, y_t^E\, (1 - e^{r(\hat{t}-T)})$. This case is illustrated in figures 7 and 8. Note that the cost schedule is now equal to the zero line.

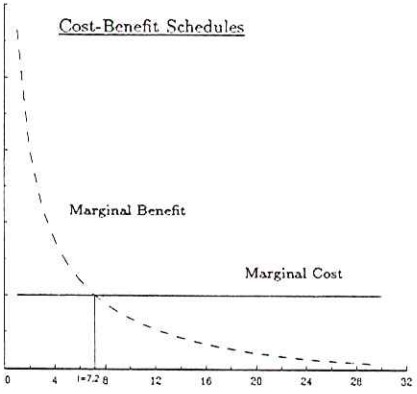

Figure 7: Marginal Cost and Benefit Schedules, Human Capital

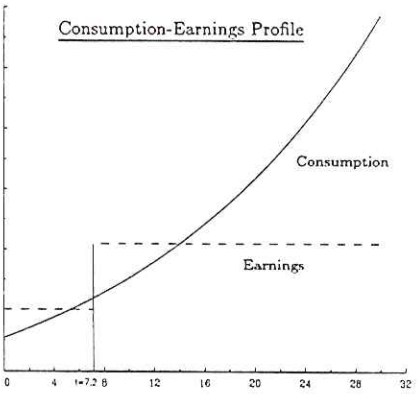

Figure 8: Earnings and Consumption Profiles, Human Capital

Any combination of the above special cases are now possible, and they are likely to take place in real migration situations.

[12] For instance, Mehrländer (1980, p.88) reports for guest worker migration to Germany that the countries of origin expected out-migration *to improve the training of the workers concerned, ultimately creating a larger reservoir of skilled labor in the countries of origin.*

Some Comparative Statics

After having outlined three causes for a return migration, it is now of interest to investigate in which direction changes in parameters affect the optimal return point, given that the optimal solution is an interior one (migration is intended to be temporary). For this purpose, comparative statics will be performed on the system described by equations (8) and (9). For $\xi^E > \xi^I$, $p \leq 1$ and $y^I > y^E$ in $t = 0$, the partial effects of an increase in $y^E, y^I, p, K, \xi^I, \xi^E$ and T on the optimal return point $\hat{t}$ are derived in the appendix. The signs of the partial effects are reported in table 1.

As one could have expected, an increase in the basic wage level in the home country, y^E, decreases the desired duration in the host country. An increase in the wage level abroad y^I, however, has an ambiguous effect: Although the direct impact of an increase in y^I on $\hat{t}$ is positive ($\hat{t}_{y^I} > 0$), the indirect impact by way of changing the marginal utility of wealth is negative ($\hat{t}_{\pi^0} \pi^0_{y^I} < 0$). Migrants would, on the one hand, like to prolong their stay abroad as a response to higher wages; on the other hand, however, the gain from a further stay abroad decreases since the increase in lifetime earnings lowers the marginal utility of wealth. As a consequence, although higher wages in the home country have an unambiguously negative effect on the length of stay abroad, higher wages abroad may have a positive or a negative effect on the optimal return point. This is an interesting and somewhat surprising result. Migrants' intended stay abroad is not simply affected by a change in the total wage differential between home- and host country, but it matters whether the wage differential rises as a response to a decrease in home country wages or an increase in host country wages.

The effect of the relative price level p on the optimal return point is likewise ambiguous in sign. This ambiguity arises because the price effect on the marginal utility of wealth itself (π^0_p) is indefinite in sign. An increase in the environment index for the host country, ξ^I, has a clear positive effect on the time the migrant wants to stay abroad. However, an increase in the environment index for the home country has an ambiguous effect on the optimal desired duration of stay. While the direct effect $\hat{t}_{\xi^E}$ is negative, the indirect effect $\hat{t}_{\pi^0} \pi^0_{\xi^E}$ is positive. An increase in the environment index raises the marginal utility of wealth and, therefore, has a positive effect on the desired duration abroad. Again, this result is surprising and indicates that, while a higher appreciation of the host country environment unambiguously increases the desired time abroad, a higher appreciation of the home country environment has no clear cut effect on the migration duration. The stock of capital at the beginning and the desired stock of savings at the end of the planing horizon have definite effects on the desired duration abroad. While a higher stock of accumulated capital at the beginning of the planing

Table1: Comparative Statics

EFFECT	$\frac{\partial i}{\partial y^E}$	$\frac{\partial i}{\partial y^I}$	$\frac{\partial i}{\partial p}$	$\frac{\partial i}{\partial \xi^I}$
DERIVATIVES	$\frac{\hat{\imath}_{y^E}+\hat{\imath}_{\pi^0}\pi^0_{y^E}}{D}$	$\frac{\hat{\imath}_{y^I}+\hat{\imath}_{\pi^0}\pi^0_{y^I}}{D}$	$\frac{\hat{\imath}_p+\hat{\imath}_{\pi^0}\pi^0_p}{D}$	$\frac{\hat{\imath}_{\xi^I}+\hat{\imath}_{\pi^0}\pi^0_{\xi^I}}{D}$
SIGN	(-)	(?)	(?)	(+)
EFFECT	$\frac{\partial i}{\partial \xi^E}$	$\frac{\partial i}{\partial K_0}$	$\frac{\partial i}{\partial \bar{K}}$	$\frac{\partial i}{\partial T}$
DERIVATIVES	$\frac{\hat{\imath}_{\xi^E}+\hat{\imath}_{\pi^0}\pi^0_{\xi^E}}{D}$	$\frac{(\hat{\imath}_{\pi^0}\pi^0_{K_0})\frac{\partial K}{\partial K_0}}{D}$	$\frac{(\hat{\imath}_{\pi^0}\pi^0_{\bar{K}})\frac{\partial K}{\partial \bar{K}}}{D}$	$\frac{\hat{\imath}_T+\hat{\imath}_{\pi^0}\pi^0_T}{D}$
SIGN	(?)	(-)	(+)	(+)

period K_0 decreases the intended duration abroad, a higher desired stock of capital at the end of the planing period $\bar{K}$ has an increasing impact on the desired duration abroad. Finally, if at the end of an active working life consumption is clearly higher than income ($pc^E > y^E$), a longer horizon T induces a higher intended duration of stay. In other words, those who are younger would like to stay longer in the host country.

Notice that in the case where $\xi^I = \xi^E$ and $p = 1$, but $y_t^E > 0$ so that an interior solution occurs only by the human capital argument, the term $\hat{\imath}_{\pi^0} = 0$. Then the effect of an increase in y^I is unambiguously positive, while the effect of an increase in ξ^E is unambiguously negative.

3. Estimating Return Intentions

An Empirical Model

The results from the theoretical analysis above provide some indications about the choice and the impact of variables on the return intentions of migrant workers. From the comparative statics of the last section, the intended duration of stay of a migrant worker may be written as a function of the following determinants:

Intended Duration = f(wage abroad (?), potential wage at home (−), relative price level (?), environment index abroad (+), environment index at home (?), stock of savings (−), desired stock of savings at retirement age (+), remaining horizon (+)).

The signs denote the expected effects on the intended duration. A full specification of the above model requires extensive information on an individual level, which is very difficult to obtain. In the empirical analysis which follows it will not be possible to specify all determinants of return intentions as implied by the theory. Therefore, the analysis should be considered as a theory-guided exploration of the data rather than a test nf the theoretical model.

The Data

Crucial for an empirical investigation is the availability of data on migrants' return intentions. Such unique information is available in the German Socio-Economic Panel (SOEP). The data used for the empirical analysis are drawn from the first wave of the panel from 1984. The panel comprises 4500 households of German nationality and 1500 households of foreign nationality. The vast majority of the latter group consists of so-called *guest-workers*, migrants with Spanish, Yugoslavian, Turkish, Greek and Italian nationality, who migrated to Germany mainly before 1973[13]. This migration was meant to be temporary by the German government and, at least initially, by the migrants themselves.

The panel contains information about all persons living in a respective household, as well as on the household as such. The data used for this analysis stem from the sub sample of migrant workers. The analysis is based on a question in the personal questionnaire which is related to the migrant's intention about how long to remain in Germany. Migrants were asked whether they would like to stay in Germany forever, or whether they want to return to their home countries in either the next 12 months or in some years. Those who replied that they intend to return in some years time were further requested to specify the number of years they want to remain in Germany.

The empirical analysis is restricted to male migrants of Italian, Spanish, Yugoslavian, Turkish and Greek nationality, who are heads of households and who were full-time employed, part-time employed or unemployed at the time of the interview.[14] Furthermore, all those who were older than 64 and those who did not provide information about future return intentions were excluded from the sample. The final sample used for empirical analysis consists of 988 individuals, of whose 668 want to return to their home country before retirement age.

[13]For some details on guest-worker migration to Germany, see Mehrlaender (1980).

[14]Female partners of migrants are excluded since return intentions of spouses are likely to be correlated. This would violate the independence assumption concerning the dependent variable.

Estimation Method

In accordance with the theoretical model above, denote with $\hat{t}$ the observed intended duration of stay, as reported in the questionnaire, and with T the remaining horizon of the migrant in the work force. Both $\hat{t}$ and T vary among individuals. Denote the desired duration of stay with τ, and assume that τ depends on a vector of observed individual characteristics x, with weights β. Using the index i for individuals, it follows:

$$\tau_i = x_i'\beta + u_i\,; \quad i = 1, ...N\,, \tag{11}$$

where u_i is a collection of all unobserved variables. The migrant returns before retirement age only if his desired duration of stay is smaller than the remaining horizon in the work force. In other words, $\tau_i > T_i$ corresponds to a corner solution of the migrant's optimization problem in section 2.

It follows:

$$\hat{t}_i = \begin{cases} \tau_i & \text{iff} \quad \tau_i < T_i \\ T_i & \text{iff} \quad \tau_i \geq T_i \end{cases} \tag{12}$$

Under the assumption that the u_i are drawn *iid* from $N(0, \sigma^2)$, the standard censored Tobit model evolves, with the threshold T_i varying among individuals. All what is known about those observations which hit the threshold T_i is:

$$Pr(\hat{t}_i = T_i) = Pr(\tau_i > T_i) = Pr(u_i > T_i - x_i'\beta) = 1 - \Phi_i\left(\frac{T_i - x_i'\beta}{\sigma}\right), \tag{13}$$

and for those observations $\hat{t}_i < T_i$:

$$Pr(\hat{t}_i < T_i)\, f(\hat{t}_i | \hat{t}_i < T_i) = \Phi_i\left(\frac{T_i - x_i'\beta}{\sigma}\right) \frac{\phi_i\left(\frac{\hat{t}_i - x_i'\beta}{\sigma}\right)\frac{1}{\sigma}}{\Phi_i\left(\frac{T_i - x_i'\beta}{\sigma}\right)}, \tag{14}$$

where f is the distribution function of the normal distribution and $\Phi(.)$ and $\phi(.)$ denote the density function and the distribution function of the standard normal. The likelihood function follows straightforwardly:

$$L = \prod_0 [1 - \Phi_i(.)] \prod_1 \Phi_i(.) \prod_1 \Phi_i(.)^{-1}\, \phi(.)_i\, \sigma^{-1}, \tag{15}$$

where $\prod_0$ denotes the product over those observations for which $\hat{t}_i = T_i$ and $\prod_1$ the product over those observations for which $\hat{t}_i < T_i$. The first two terms on the RHS of

(15) correspond to the likelihood of a probit model and the third term corresponds to the likelihood of a truncated tobit model. Amemiya (1973) shows that the maximum likelihood estimators for β, σ are strongly consistent and asymptotically normal. Olsen (1978) proved that the logarithm of the transformed likelihood, where $\alpha = \frac{\beta}{\sigma}$, is globally concave. Note that the estimated β - coefficients of (15) are the marginal effects of a change in x_j on the *desired* duration τ, not on the *observed* duration $\hat{t}$. The marginal effect of a change in the variable x_j on the *observed* duration $\hat{t}$ is given by:

$$\frac{\partial E(\hat{t})}{\partial x_j} = \Phi(\frac{T - x'\beta}{\sigma})\,\beta_j\,. \tag{16}$$

Marginal effects on both the desired and the observed future duration will be reported in the results. Asymptotic variances for *observed* marginal effects as reported in the table are obtained by first order expansion of (16).

Variables and Specification

For the tobit estimation, the horizon of the migrant will be defined as the remaining years in the labor force, calculated as $[65 - age]$. This corresponds to the definition of a permanent migrant in the theoretical analysis above as being a migrant who wishes to stay in the host country for all of his *productive* life. Accordingly, with this definition individuals will appear as censored if they indicate the intention to remain longer than $[65 - age]$.[15] Table 2 reports some frequencies for those who want to return before retirement age. The upper part of the table presents the intended future duration at the time of the interview, the lower part the desired time to be spend in the host country before retirement (or the age of 65). More than 40% of the subsample of returners intends to return in the next 4 years. At the point of desired return, 75% are younger than 57 and about half of those who intend to return are younger than 49 years old.

The theoretical model above identifies determinants which are likely to influence the intended duration of stay of the migrant worker in the host country and, therefore, should enter the vector x_1. Unfortunately, data limitations make it impossible to fully specify an econometric model to estimate the effect of all these factors on the return intention. The variables used for the empirical analysis will be described below.

Wages: The monthly gross earnings the migrant receives in the host country is reported in the questionnaire for those who participate in the labor market. Using

[15] Only 10 of those in the sample who intended to return wanted to return after the age of 65. They appear as censored in the Tobit model.

Table2: Intended Durations, Remaining Time At Home.

YEARS	FREQUENCY	PERCENT	CUMULATED	PERCENT (CUM.)
		Intended Duration		
(0, 4]	279	0.417	279	0.417
(4, 8]	190	0.284	469	0.702
(8, 12]	130	0.194	599	0.896
(12, 16]	37	0.055	636	0.952
(16, 20]	26	0.038	662	0.991
(20, 30]	6	0.009	668	1.000
>30	0	0.000	668	1.000
		Remaining Time in Labor Force after Intended Return		
(0, 4]	71	0.106	71	0.106
(4, 8]	99	0.148	170	0.254
(8, 12]	66	0.098	236	0.353
(12, 16]	101	0.151	337	0.504
(16, 20]	88	0.131	425	0.636
(20, 30]	175	0.262	600	0.898
>30	68	0.101	668	1.000

SOURCE: Socio-Economic Panel, wave 1, 1984.

information on average weekly hours worked, gross hourly wages are computed. To use this variable as an explanatory variable, however, is problematic for two reasons: First, such information is not available for the unemployed, and secondly, measured earnings are endogenous if human capital accumulation depends on the intended duration in the host country (see Dustmann (1991,1993-a)). Therefore, the wage variable used for estimation purposes are predicted wages (WAGEFIT). Predictions were constructed by a two-stage estimation procedure as suggested by Heckman (1979) to take care of a possible selection bias, induced by a possible correlation of the selection rule into unemployment and the earnings equation.[16] The potential wage facing the individual migrant in the home country is not measurable, due to a lack of appropriate and detailed wage data for the countries of origin. Therefore, the only wage variable used in the empirical analysis are fitted wages in the host country. Additionally, dummy variables for nationalities are introduced in some regressions to capture basic differences in labor

[16]The selection equation is estimated using a probit specification, where regressors are years of labor market experience, years since migration (both as linear and quadratic terms), marital status, language proficiency, years of schooling, years of job specific education and dummies for the different nationalities. The Heckman correction term in the earnings regression is insignificant. Regressors in the wage equation are standard human capital variables, years of residence and nationality dummies.

market situations between the different countries of origin and the host country.[17]

Environment: An important determinant for the subjective appreciation of an environment is *exposure* to that environment. Most important for exposure is the time of residence in a certain location. Years of residence are measured by the variable YSM. This variable may be both an indicator for the degree of alienation of the migrant from his home country environment and habituation and integration to the host country environment. Knowledge of the foreign language is a further indicator for integration into the foreign society. Good or very good knowledge of the home country language, on the other side, is an indicator for strong links to the home country. To capture language proficiency, variables HLANG1 and GLANG1 are specified which are equal to 1 if the migrant speaks the home country language or the host country language well or very well, respectively.

Crucial for the perception of an environment are social reference persons. Most important is here the partner of the migrant. To have a partner at home is likely to raise the attachment to the home country, while having a partner of German nationality is likely to support integration into and appreciation of the environment of the host country. The variable PARTNOT is a dummy variable which takes the value one when the migrant's partner is not living in Germany, while the variable PARTGERM is one if the partner has the German nationality.

Children may likewise influence the migrant's attitude towards the host country environment. Children above the age of 6 usually attend German schools, and they therefore force parents to cope with their German environment. Children may further transport certain characteristics of the host country into the family, like language and behavioral rules. Moreover, to have children who started school in Germany may oblige the parents to lengthen their stay abroad until the children have finished their scholastic education. Children above the age of 6 may therefore have a prolonging effect on the intended duration in the host country. In the empirical analysis, four variables on children are used. The variable $c1$ is equal to one if one child in the respective family is above the age of 6 and, consequently, enrolled in school; $c2$ is equal to one if more than one child is above the age of 6 and $b3$ equals one if children are present who are younger than 6. Lastly, the variable CHOME is one if the migrant has children who live in the home country. While the first two variables are expected to positively influence the intended duration abroad, the third variable may have a negative impact, since

[17]Note, however, that nationality dummies represent a variety of other factors, like the value of human capital acquired abroad in the home country, the political situation in the home country and the extend to which home- and host country environment differ (or the *distance* between the two societies).

Table3: Sample Characteristics, 1984. Whole sample and subsamples of those who wish to return and who wish to stay.

Variable	Code	*Whole Sample*		*Wish to Return*		*Wish to Stay*	
		Mean	SD	Mean	SD	Mean	SD
Pred. Gross Wage (DM)	Wagefit	16.19	*1.49*	16.11	*1.48*	16.35	*1.51*
Years since Migration	Ysm	15.28	*4.93*	14.83	*4.80*	16.22	*5.05*
Age	Age	41.77	*9.52*	41.68	*9.48*	41.98	*9.61*
Good or Very Good German	Glang1	0.39		0.34		0.50	
Good or Very Good M. Tongue	Hlang1	0.93		0.94		0.91	
Married	Married	0.92		0.93		0.90	
Partner not in Germany	Partnot	0.07		0.09		0.03	
Partner German	Pgerm	0.05		0.02		0.12	
Partner working	Partact	0.37		0.38		0.36	
Unemployed	Unemp	0.06		0.07		0.06	
Turkish	Tr	0.30		0.34		0.24	
Greek	Gr	0.14		0.15		0.11	
Italian	Ita	0.21		0.20		0.25	
Spanish	Sp	0.13		0.11		0.17	
Jugoslavian	Jug	0.20		0.19		0.23	
One Child older 6	C1	0.22		0.22		0.23	
More than one Child older 6	C2	0.24		0.23		0.27	
Children younger than 6	C3	0.27		0.28		0.24	
Children in Home Country	Chome	0.14		0.17		0.09	
Sample Size		988		668		320	

SOURCE: Socio-Economic Panel, wave 1, 1984.

parents may plan to return *before* their children enroll in school. Having children in the home country should have a negative effect on the intended duration of stay abroad. Note that children in the host country have possibly two effects on return intentions: They may induce parents to *expose* themselves to the host country environment and, therefore, have an effect on the subjective perception of that environment. They may also act, however, as a constraint on the decision of the parents by indirectly forcing them to remain until their scholastic education has finished.

Horizon: The variable Horizon, calculated as $[65 - age]$, is an indicator for the remaining horizon of the individual in the work force. It corresponds to the variable T in the theoretical model.

Others: One could argue that the fact of being unemployed has a positive impact on the return intention of the migrant. One could also argue that the favorable benefit system in Germany makes it unattractive for a migrant to return as a response of

being unemployed in the host country. To investigate this issue, the variable UNEMP is introduced which assumes the value 1 if the individual is unemployed at the time of the interview. The participation of both partners in the labor market may be an indicator for the effort of the family in accumulating savings in the shortest possible time and to return thereafter. The variable PARTACT, which is equal to one if the partner is active in the labor market, should then have a positive effect on return intentions.

Summary statistics on all variables for the whole sample and for the subsets of permanent and temporary migrants (as defined above) are given in table 3.

Results

Table 4 reports results of the tobit estimations. The columns MEO contain the marginal effects on the *observed*, censored intended duration of stay ($E(\hat{t}_i)$, see (16)), while the estimated coefficients reflect the effects on the expected, *potential* duration of stay ($E(\tau_i)$). Remember that censoring takes place if the intended duration of stay exceeds $[65 - age]$, or if an individual reports to intend to stay forever. The discussion of estimated coefficients refers to the marginal effects on observed durations.

The theoretical analysis indicated that the effect of wages in the host country on the optimal duration abroad is ambiguous. In the estimations, the variable which reflects the wage position in the host country (WAGEFIT) is insignificant throughout all specifications. This is not surprising since earnings in the host country are likely to interact quite strongly with potential earnings at home, for which no observations are available. The lack of information on this important variable is surely a major weakness of the empirical analysis.

The specification in column 1 of table 4 presents results when including only personal characteristics as regressors. The coefficient on the variable YSM is positive, as expected, and strongly significant. Each year of residence raises the intended duration by 0.41 years. The variable which reflects the remaining time in the labor force (HORIZON) is likewise positive and strongly significant and the effect is of similar size. Each future additional year in the labor force increases the intended duration in Germany by 0.37 years. Note that the positive effect of the horizon variable is in accordance with the theoretical analysis for the case where the migrant will desave at the end of his working cycle. The language variables are both significant and have expected signs. While a good or very good knowledge of the German language increases the migrant's intended duration in the host country by about three years (compared with those who speak German only on an intermediate level), high language proficiency in the host

Table4: Tobit Analysis, Intended Durations

VARIABLE	(1)	MEO	(2)	MEO	(3)	MEO
CONSTANT	-4.234	-3.668	-1.935	-1.689	9.610	8.408
	(0.752)	(0.752)	(0.332)	(0.332)	(1.235)	(1.234)
WAGEFIT	0.208	0.180	0.353	0.308	-0.270	-0.243
	(0.597)	(0.597)	(1.016)	(1.016)	(0.584)	(0.584)
YSM	0.483	0.418	0.372	0.324	0.470	0.414
	(4.054)	(4.052)	(3.140)	(3.139)	(3.465)	(3.464)
HORIZON	0.432	0.374	0.402	0.351	0.416	0.359
	(7.655)	(7.638)	(6.374)	(6.365)	(6.365)	(6.356)
GLANG1	3.505	3.036	2.505	2.187	2.234	1.955
	(3.704)	(3.703)	(2.673)	(2.673)	(2.374)	(2.374)
HLANG1	-3.609	-3.126	-3.531	-3.082	-3.251	-2.845
	(2.006)	(2.006)	(1.995)	(1.994)	(1.831)	(1.830)
UNEMP	-1.022	-0.885	-1.233	-1.076	-1.791	-1.567
	(0.570)	(0.570)	(0.702)	(0.702)	(1.008)	(1.008)
MARRIED			-1.587	-1.386	-1.908	-1.669
			(0.845)	(0.845)	(1.014)	(1.014)
PARTNOT			-2.895	-2.527	-2.900	-2.537
			(1.519)	(1.519)	(1.535)	(1.535)
PARTGERM			10.471	9.140	10.488	9.175
			(4.997)	(4.991)	(5.016)	(5.010)
PARTACT			-1.816	-1.585	-1.897	-1.660
			(1.928)	(1.928)	(2.010)	(2.009)
C1			1.169	1.020	1.502	1.314
			(1.027)	(1.027)	(1.320)	(1.320)
C2			1.932	1.687	2.322	2.032
			(1.729)	(1.729)	(2.057)	(2.057)
C3			-1.898	-1.656	-1.643	-1.431
			(1.672)	(1.699)	(1.454)	(1.447)
CHOME			-2.440	-2.130	-2.696	-2.359
			(1.844)	(1.844)	(2.035)	(2.035)
TUR					-4.107	-3.593
					(2.695)	(2.695)
GR					-4.657	-4.074
					(2.955)	(2.954)
ITA					-4.519	-3.954
					(2.477)	(2.476)
SP					-1.330	-1.164
					(0.704)	(0.704)
SIGMA	13.069		12.746		12.630	
	(33.587)		(33.665)		(33.676)	
Log − Likelihood	-2958.5		-2934.3		-2926.9	
No. of Obs.	988		988		988	
Censored	320		320		320	

SOURCE: Socio-Economic Panel, wave 1, 1984.
Note: Absolute t-ratios in parenthesis.

country language has exactly the opposite effect on return intentions. The estimations reveal that being unemployed is not a significant determinant for the migrant to reduce the future intended duration in the host country. The coefficient on the respective variable is negative, but insignificant throughout all specifications.

Column 2 reports results when introducing variables which reflect the family context. Notice the strong impact of the variable PARTGERM: Those with a spouse of German nationality intend to stay 9 years longer in Germany than the reference group of married migrants who have a partner of non German nationality residing in Germany. Having a partner who does not live in Germany (PARTNOT) has the expected negative impact on the desired time abroad; however, the effect of this variable is not significantly different from zero. Migrants who have a spouse which is active in the German labor market, as indicated by the variable PARTACT, intend to stay 1.58 years less in Germany than those married with partners which are not active. One explanation for this finding, as indicated above, is that both partners being active in the labor market may reflect the effort to accumulate savings faster to return sooner.

The signs on the variables for children correspond to the expectations. Having one child which is above the age of 6 and, therefore, enrolled in a school in Germany has an increasing, but not significant effect on the desired duration in the host country. However, having more than 1 child enrolled in school increases intended durations significantly (at the 10% level) by 1.7 years, while having children who do not yet receive a scholastic education in Germany reduces intended durations by 1.65 years. This seems to favor the hypothesis that children do to a lesser extend act as integrating factors, but rather act as constraints in obliging parents to remain until after their education. Finally, having children in the home country reduces significantly intended durations by 2.1 years.

Column 3 includes dummy variables for the different nationalities, with Yugoslavian migrants as the reference group. These dummy variables may capture a variety of different factors which influence the return intentions, like economic conditions, nationality-conditioned attachment to the home country and political conditions. It is senseless to interpret these variables in one way or another. Compared to Yugoslavian and Spanish migrants, Greek migrants would like to return 4.07 years earlier, Turkish migrants 3.6 years earlier and Italian migrants 3.9 years earlier. Notice that the nationality dummies interact with the wage variable: The coefficient changes sign, but remains insignificant.

4. Conclusions

This paper analyzes return intentions of migrants. The expected future horizon of a migrant in the host country is likely to considerably influence his economic behavior and is therefore an important factor to consider if analyzing the economic situation of migrants in the immigration country. In section 2, a life cycle model is developed, where the planning horizon is defined to be equal to the remaining period of the individual in the work force. Individuals decide about their consumption streams and about the optimal return point to their home countries. The theoretical analysis illustrates that in the classical case of a positive and persistent wage differential between emigration and immigration country the only feasible solution is a corner solution which corresponds to permanent migration. It is then shown that a return migration may be independently induced by 3 factors, given an initially positive wage differential: A preference for consumption in the home country, a higher price level in the host country, and the accumulation of human capital abroad which becomes only earnings effective in the home country. In real migration situations, it is likely that an intended return is affected by all three factors simultaneously. In the case of an interior solution, comparative statics reveal that the length of the time the migrant intends to stay abroad depends positively on the length of the planning horizon, the desired stock of savings at the end of the planing horizon and the environment index for the host country and negatively on the potential earnings level in the home country and the stock of savings accumulated at the point of decision making. The effect of a change in the relative price level is ambiguous in sign. A surprising result is that an increase of the wage rate in the host country does not, as one could expect, increase the desired time abroad; instead, the effect is ambiguous. The reason is that an improvement in the wage situation does not only have a direct positive effect on the intended duration abroad, but also an indirect negative effect by reducing the marginal utility of wealth. This result is important: The length of desired migration is not necessarily increasing if the wage differential between host- and home country increases; it matters whether this increase comes about by an increase in host country wages or a decrease in home country wages. A further surprising result is that an increase of the environment index of the home country has an inconclusive effect on the intended duration abroad. A higher positive evaluation of the home country environment does not necessarily reduce the intended duration abroad. Again, this ambiguity results from the indirect wealth effect.

In section 3, estimations are performed using cross sectional data on male migrants to Germany. The data contains unique information on the migrant's intended dura-

tion in the host country. Estimation results of Tobit specifications largely support the implications of the theoretical analysis. In particular, all variables which capture the perception of the environment have the expected sign and are mostly significant. As wage variable in the host country, predicted wages are used. This variable is insignificant in all specifications, which is likely to be a result of an under specification, since lack of appropriate data did not allow to control for potential wages at home. The nationality and the labor force status of the migrant's partner have a significant effect on remigration intentions. The fact that children are enrolled in German schools reduces return probabilities and increases the intended future duration in the host country.

A thorough understanding of the behavior of migrant workers is important to construct better and more efficient migration policies which achieve policy goals by a sophisticated system of incentives rather than by restrictions. This study is an attempt to provide some insight into the return behavior of migrant workers. Further empirical and theoretical research in this direction is desirable.

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Appendix A: Sufficiency

Necessary condition for $\hat{t}, \pi^0$ being a solution for (8) and (9) which maximizes lifetime utility is that $\Gamma(\pi^0, \hat{t}) = 0$ and $\Delta(\pi^0, \hat{t}) = 0$. Recall equation (9):

$$[v^I - v^E] + \pi^0 e^{(\rho - r)\hat{t}} \left[[(y^I - c^I) - (y^E - p\, c^E)] + \frac{1}{r} y_t^E [1 - e^{r(\hat{t} - T)}] \right] = \Delta(\pi^0, \hat{t}) = 0 . \quad (17)$$

Sufficient for $\hat{t}$ being a maximum is that the expression in (17) is decreasing in $\hat{t}$. Using (8) to write π^0 as a function of $\hat{t}$ and differentiating (17) with respect to $\hat{t}$ (utilizing (4) and (5)) yields:

$$\frac{\partial \Delta}{\partial \hat{t}} = [\dot{\pi} + e^{(\rho - r)\hat{t}} \frac{\partial \pi^0}{\partial \hat{t}}] [(y^I - c^I) - (y^E - p\, c^E) + \frac{1}{r} y_{\hat{t}}^E (1 - e^{r(\hat{t} - T)})] + \pi [y_{\hat{t}\hat{t}}^E (1 - e^{r(\hat{t} - T)}) - y_{\hat{t}}^E (1 + e^{r(\hat{t} - T)})]. \quad (18)$$

Since $\frac{\partial \pi^0}{\partial \hat{t}} \leq 0$ (follows from (22)) and $\dot{\pi} = (\rho - r)\pi < 0$, the first term in brackets is negative. The last term in (18) is always negative since $y^E$is a concave function in $\hat{t}$. Remains to show the sign of the second expression in brackets. Consider three cases, which correspond to the three possible situations where a return before retirement age may occur: (a) $\xi^E > \xi^I, y_t^E = 0, p = 1$; (b) $\xi^E = \xi^I, y_t^E = 0, p < 1$; (c) $\xi^E = \xi^I, y_t^E > 0, p = 1$. In case (a), it follows from (7) that $[v^I - v^E] < 0 \, \forall t$. From the necessary condition for an optimum (17), it follows that the first expression in brackets in (18) must be positive. Consequently, $\frac{\partial \Delta}{\partial \hat{t}} < 0$. Case (b) follows the same line of argumentation. In case (c), $[v^I - v^E] = [c^I - c^E] = 0$. For wages being initially higher abroad, the first term in brackets in (18) will be positive. This corresponds to a positive benefit of migration and is a necessary condition to induce the migrant to migrate at all. While being abroad, potential earnings back home are increasing and the term in brackets decreases. At the point of return, it follows from (17) that this term is equal to zero. The second term is negative, so that also in case (c) $\frac{\partial \Delta}{\partial \hat{t}} < 0$. It follows that for all three situations where a return before retirement may occur the sufficient conditions are fulfilled.

Appendix B: Comparative Statics

Comparative statics on the system described by equations (8) and (9) 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 $(\hat{t}, \pi^0)$.

Sufficient to apply the implicit function theorem is that $\Gamma(\pi^0, \hat{t}) = 0$ and $\Delta(\pi^0, \hat{t}) = 0$ and that $\mathrm{Det}(H) \neq 0$, with H:

$$H = \begin{bmatrix} \frac{\partial \Gamma}{\partial \pi^0} & \frac{\partial \Gamma}{\partial \hat{t}} \\ \frac{\partial \Delta}{\partial \pi^0} & \frac{\partial \Delta}{\partial \hat{t}} \end{bmatrix} \quad (19)$$

where

$$\frac{\partial \Gamma}{\partial \pi^0} = -\left[\int_0^{\hat{t}} \frac{\partial c^E}{\partial \pi} e^{(\rho-2r)\tau}\, dt + \int_{\hat{t}}^{T} p \frac{\partial c^I}{\partial \pi} e^{(\rho-2r)\tau}\, dt\right] > 0 \qquad \text{since} \qquad \frac{\partial c}{\partial \pi} = \frac{1}{v_{11}} < 0\,, \tag{20}$$

$$\frac{\partial \Gamma}{\partial \hat{t}} = \frac{\partial \Delta}{\partial \pi^0} = [(y^I - c^I) - (y^E - c^E p) + \frac{1}{r} y_{\hat{t}}^E (1 - e^{r(\hat{t}-T)})]\, e^{-r\hat{t}} \geq 0\,, \tag{21}$$

Since $\frac{\partial \Delta}{\partial \hat{t}} < 0$ (see Appendix A), it follows that $\mathrm{Det}(H) < 0$. Note that this is exactly the saddelpoint condition. Therefore, a unique differentiable solution exists at the point $\Gamma(\pi^0, \hat{t}) = 0$ and $\Delta(\pi^0, \hat{t}) = 0$. Comparative statics are now easily derived by totally differentiating the system described by (8) and (9).

First consider equation (8). Totally differentiating and re-arranging terms yields:

$$\begin{aligned} d\pi^0 &= \frac{b_1}{b} d\hat{t} + \frac{b_2}{b} dy^E + \frac{b_3}{b} dy^I + \frac{b_4}{b} dp + \frac{b_5}{b} dK + \frac{b_6}{b} d\xi^I + \frac{b_7}{b} d\xi^E + \frac{b_8}{b} dT \\ &= \pi_{\hat{t}}^0 d\hat{t} + \pi_{y^E}^0 dy^E + \pi_{y^I}^0 dy^I + \pi_p^0 dp + \pi_K^0 dK + \pi_{\xi^I}^0 d\xi^I + \pi_{\xi^E}^0 d\xi^E + \pi_T^0 dT\,, \end{aligned} \tag{22}$$

where

$$\begin{aligned} b &= -\left[\int_0^{\hat{t}} \frac{\partial c^E}{\partial \pi} e^{(\rho-2r)\tau}\, dt + \int_{\hat{t}}^{T} p \frac{\partial c^I}{\partial \pi} e^{(\rho-2r)\tau}\, dt\right] > 0 \\ &\quad \text{since} \quad \frac{\partial c}{\partial \pi} = \frac{1}{v_{11}} < 0\,, \\ b_1 &= [(y^E - c^E p) - (y^I - c^I)] - \frac{1}{r} y_{\hat{t}}^E (1 - e^{r(\hat{t}-T)})]\, e^{-r\hat{t}} \leq 0 \\ b_2 &= -\left[1 - e^{-r(T-\hat{t})}\right] \frac{1}{r} e^{-r\hat{t}} < 0\,, \\ b_3 &= -\left[1 - e^{-r\hat{t}}\right] \frac{1}{r} < 0\,, \\ b_4 &= \int_{\hat{t}}^{T} [c^E + \pi\, p \frac{\partial c^E}{\partial p}] e^{-r\tau} d\tau \underset{>}{\overset{\leq}{}} 0 \qquad \text{as} \qquad c^E \underset{>}{\overset{\leq}{}} \pi\, p \frac{\partial c^E}{\partial p}\,, \\ b_5 &= -1 < 0\,, \\ b_6 &= \int_0^{\hat{t}} \frac{\partial c^I}{\partial \xi^I} e^{-r\tau} d\tau > 0 \qquad \text{since} \qquad \frac{\partial c^I}{\partial \xi^I} = \frac{-\frac{\partial v_1}{\partial \xi^I}}{v_{11}^I} > 0\,, \\ b_7 &= \int_{\hat{t}}^{T} p \frac{\partial c^E}{\partial \xi^E} e^{-r\tau} d\tau > 0 \qquad \text{since} \qquad \frac{\partial c^E}{\partial \xi^E} = \frac{-\frac{\partial v_1^E}{\partial \xi^E}}{v_{11}^E} > 0\,, \\ b_8 &= [pc^E - y^E] e^{-rT} > 0 \qquad \text{for} \qquad pc^E > y^E \qquad \text{at} \qquad t = T\,. \end{aligned}$$

The effect of an increase in the price level on the marginal utility of wealth is ambiguous in sign. It depends on whether the direct effect of a price change on consumption is smaller than the indirect effect by a change in the consumption flow as a consequence of a change in the marginal utility of wealth. An increase in T, the horizon of the migrant, will have a positive effect on the marginal utility of wealth only if in $t = T$ he consumes more than he earns.

Totally differentiating (9) with respect to $\hat{\imath}$, π^0, p, y^E, y^I, ξ^I, ξ^E, K and T results in the following expression:

$$\begin{aligned} d\hat{\imath} &= \frac{a_1}{a}\,d\pi^0 + \frac{a_2}{a}\,dy^E + \frac{a_3}{a}\,dy^I + \frac{a_4}{a}\,dp + \frac{a_5}{a}\,dK + \frac{a_6}{a}\,d\xi^I + \frac{a_7}{a}\,d\xi^E + \frac{a_8}{a}\,dT \\ &= \hat{\imath}_{\pi^0}\,d\pi^0 + \hat{\imath}_{y^E}\,dy^E + \hat{\imath}_{y^I}\,dy^I + \hat{\imath}_p\,dp + \hat{\imath}_K\,dK + \hat{\imath}_{\xi^I}\,d\xi^I + \hat{\imath}_{\xi^E}\,d\xi^E + \hat{\imath}_T\,dT\,, \end{aligned} \tag{23}$$

where

$$\begin{aligned} a &= \dot{\pi}\,[(y^I - c^I) - (y^E - c^E\,p) + \frac{1}{r}\,y_i^E\,(1 - e^{r(\hat{\imath}-T)})] + \pi[y_{\hat{\imath}\hat{\imath}}^E(1 - e^{r(\hat{\imath}-T)}) - y_{\hat{\imath}}^E\,(1 + e^{r(\hat{\imath}-T)})] < 0\,, \\ a_1 &= e^{(\rho-r)\hat{\imath}}\,[(y^E - c^E\,p) - (y^I - c^I) - \frac{1}{r}\,y_{\hat{\imath}}^E\,(1 - e^{r(\hat{\imath}-T)})] \leq 0\,, \\ a_2 &= \pi > 0\,, \\ a_3 &= -\pi < 0\,, \\ a_4 &= -\pi\,c^E < 0\,, \\ a_5 &= 0\,, \\ a_6 &= -\frac{\partial v^I}{\partial \xi^I} < 0\,, \\ a_7 &= \frac{\partial v^E}{\partial \xi^E} > 0\,, \\ a_8 &= -\pi\,[y_{\hat{\imath}}^E e^{r(\hat{\imath}-T)}] < 0. \end{aligned}$$

Notice that a_1 and b_1 are both equal to zero in the extreme case (c). As a consequence, $\hat{\imath}_{\pi^0} = 0$. Rewrite (22) and (23):

$$\begin{bmatrix} 1 & -\hat{\imath}_{\pi_0} \\ -\pi_{\hat{\imath}}^0 & 1 \end{bmatrix} \begin{bmatrix} d\hat{\imath} \\ d\pi^0 \end{bmatrix} = \begin{bmatrix} \hat{\imath}_{y^E}\,dy^E & \hat{\imath}_{y^I}\,dy^I & \hat{\imath}_p\,dp & \hat{\imath}_K\,dK & \hat{\imath}_{\xi^I}\,d\xi^I & \hat{\imath}_{\xi^E}\,d\xi^E & \hat{\imath}_T\,dT \\ \pi_{y^E}^0\,dy^E & \pi_{y^I}^0\,dy^I & \pi_p^0\,dp & \pi_K^0\,dK & \pi_{\xi^I}^0\,d\xi^I & \pi_{\xi^E}^0\,d\xi^E & \pi_T^0\,dT \end{bmatrix}$$

Using Cramer's rule, it follows for the partial effects:

$$\frac{\partial \hat{\imath}}{\partial y^E} = \frac{\hat{\imath}_{y^E} + \hat{\imath}_{\pi^0}\,\pi_{y^E}^0}{D} < 0\,,$$

$$
\begin{aligned}
\frac{\partial \hat{t}}{\partial y^I} &= \frac{\hat{t}_{y^I} + \hat{t}_{\pi^0}\,\pi^0_{y^I}}{D} \lessgtr 0\,, \\
\frac{\partial \hat{t}}{\partial p} &= \frac{\hat{t}_p + \hat{t}_{\pi^0}\pi^0_p}{D} \lessgtr 0\,, \\
\frac{\partial \hat{t}}{\partial K} &= \frac{\hat{t}_{\pi^0}\,\pi^0_K}{D} < 0\,; \qquad \frac{\partial K}{\partial K_0} > 0\,; \qquad \frac{\partial K}{\partial K} < 0\,, \\
\frac{\partial \hat{t}}{\partial \xi^I} &= \frac{\hat{t}_{\xi^I} + \hat{t}_{\pi^0}\,\pi^0_{\xi^I}}{D} > 0\,, \\
\frac{\partial \hat{t}}{\partial \xi^E} &= \frac{\hat{t}_{\xi^E} + \hat{t}_{\pi^0}\,\pi^0_{\xi^E}}{D} \lessgtr 0\,, \\
\frac{\partial \hat{t}}{\partial T} &= \frac{\hat{t}_T + \hat{t}_{\pi^0}\,\pi^0_T}{D} > 0 \text{ for } p\,c^E > y^E \text{ at } t = T\,,
\end{aligned}
$$

where $D = 1 - \hat{t}_{\pi^0}\pi^0_{\hat{t}} = 1 - \frac{a_1 b_1}{a\,b} > 0$ follows directly from (19).

Appendix C: Simulations

For simulation purposes, let the utility functions be simple flow functions:

$$
\begin{aligned}
v^I(c) &= \tfrac{1}{(1-\alpha)}\,\xi^I\,c^{(1-\alpha)} \\
v^E(c) &= \tfrac{1}{(1-\alpha)}\,\xi^E\,c^{(1-\alpha)}
\end{aligned}
\tag{25}
$$

Furthermore, let $y^E(\hat{t}) = \bar{y}^E + \gamma\, ln(1+\hat{t})$. If $\gamma > 0$, staying longer abroad increases the migrant's earnings potential in the home country. It then follows from (8) and (9) 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:

$$
\pi^{\frac{1}{\alpha}}\left[y^I - y^E(\hat{t}) + \gamma\,\frac{1}{r\,(1+\hat{t})}\left[1 - e^{r(\hat{t}-T}\right]\right] + \frac{\alpha}{(1-\alpha)}\left[\xi^{I\,\frac{1}{\alpha}} - p\left(\frac{\xi^E}{p}\right)^{\frac{1}{\alpha}}\right] = 0\,, \tag{26-a}
$$

$$
\begin{aligned}
\dot{K}\,e^{-rT} - K_0 = \frac{1}{r}\,&\left[y^I\left[1 - e^{-r\hat{t}}\right] + y^E\left[e^{-r\hat{t}} - e^{-rT}\right]\right] \\
-\frac{1}{b}\,&\left[\left[\frac{\xi^I}{\pi^0}\right]^{\frac{1}{\alpha}}\left[1 - e^{-b\hat{t}}\right] + \left[p\,\frac{\xi^E}{\pi^0\,p}\right]^{\frac{1}{\alpha}}\left[e^{-b\hat{t}} - e^{-bT}\right]\right],
\end{aligned}
\tag{26-b}
$$

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

The basic parameter configuration for the simulations is: $\alpha = 0.4$, $\rho = 0.08$, $r = 0.1$, $T = 30$, $\xi^E = 1.3$, $\xi^I = 1$, $y^I = 4$, $\bar{y}^E = 2$, $K_0 = 0$, $\gamma = 0$, $p = 1$, $\bar{K} = 0$.
For these parameters, consumption - earnings profiles and the profile of savings are given in figures 3 and 4. The optimal point of return, $\hat{t}$, equals 13.67, and $\pi^0 = 0.82$. In figures 1 and 2, $\xi^I = \xi^E = 1$. In figures 5 and 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 7 and 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.