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Earnings adjustment of temporary migrants

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Abstract. The strong incentives of migrants to invest into human capital and the positive selective character of migration are the main explanations for the rapid decrease of the earnings gap between migrants and natives, and, in some cases, the cross-over of migrants' earings profiles with those of native workers, as found in a variety of empirical studies on migration to the USA, Canada and Australia. The present paper shows that in the case of temporary migration the optimal investment into country specific human capital should be lower than in the case of permanent migration. Investments may not be sufficient to allow migrants' earnings to catch up with those of native workers. Furthermore, it is shown that migration is positively selective only under certain labor market conditions. Empirical findings support the hypothesis that the migrant's length of stay in the host country has an effect on his investment into human capital and, consequently, on his earnings position. The results strongly suggest the need for carefully differentiating between temporary and permanent migration when investigating migrants' earnings assimilation.

1. Introduction

In recent years the labor market adjustment of immigrants and the speed of the adjustment of their earnings to the level of respective native workers has been of growing interest in the economic literature. Following Chiswick's (1978) seminal article, a number of contributions applied some extended version of the human capital earnings function as developed by Mincer (1974) to cross-sectional as well as longitudinal data.[1] The general conclusion of these studies was that im-

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[1] See, for example, Chiswick (1978), Tandon (1978), Long (1980), Borjas (1982, 1989), Chiswick and Miller (1985), and Meng (1987).

migrants are doing surprisingly well in the American, Canadian and Australian labor market. The empirical results indicate that earnings of migrant workers, being initially lower, grow rapidly and, in some cases, overtake those of comparable native workers after no more than 10–15 years.[2] The steeper age-earnings profiles of migrant workers compared with native workers were usually explained by a stronger incentive to invest into human capital. The finding that earnings of migrants exceed those of native workers after an adaptation period was explained by a higher level of labor market ability and work motivation (Chiswick 1978). One could accordingly draw the general conclusion that migrants succeed in compensating for their initial earnings disadvantage by considerable investment into country specific human capital and, furthermore, that migrants are often a self-selected group, having a higher ability and motivation than the average native worker.

However, the kind of migration examined in the studies mentioned above was permanent rather than temporary. Moreover, the migrant was confronted with highly competitive labor markets, favoring selective migration. Therefore, the questions arise whether these results remain valid if migration is temporary and if labor is not only "pulled" by a favorable labor market situation in the host country, but also "pushed" by highly unfavorable conditions in the source country.

This paper will try to answer these questions. Section 2 will present some theoretical considerations, pointing out that the two main hypotheses used to explain the favorable situation of migrants in the labor markets of the receiving countries, high investment incentives and positive selective migration, will not necessarily be true if temporary migration is considered. An example for the kind of migration for which the above hypotheses are not likely to hold would be the temporary migration from Southern Europe and Turkey to West Germany. Section 3 will then empirically examine the assimilation of temporary migrants to the labor market conditions in West Germany. The empirical findings support the hypotheses outlined in the theoretical section. The main conclusion is then that one should carefully differentiate between permanent and temporary migration if analyzing the earnings adjustment of migrant workers.

2. Some theoretical considerations

Country-specific human capital investment and the duration of stay

The empirical literature on the speed of adjustment of immigrants to the labor market conditions of the country of immigration takes as a point of departure the human capital earnings function, as initiated by Becker and Chiswick (1966)

[2] Chiswick (1978) found that earnings of migrants in the American labor market exceed earnings of native-born men with same characteristics after 10–15 years. Analyzing earnings adjustments of migrants in the Canadian labor market, Meng (1987) calculated that the native-foreign earnings gap closes after 14 years. Borjas (1989) used a longitudinal data set on high-skilled workers for the United States. He argued that cross-sectional results overestimate the positive assimilation of migrant workers because return migration may not be randomly distributed among migrants and the quality of migrant cohorts may deteriorate over time. However, his results support the general perception that immigrant earnings do catch up to those of native workers, although the rate of convergence is relatively slow and an overtaking of earnings does not take place for all cohorts.

and further developed by Mincer (1974). According to Mincer, it should be assumed that after leaving school the worker continues to devote a certain amount of his resources to furthering skills or acquiring job related knowledge. Measured earnings or net earnings are then the difference between the worker's earnings potential, or gross earnings, and the cost of investment into human capital in that period.[3]

In the case of migrants, however, a second factor has to be considered. Since the human capital the migrant acquired in his home country is only partially transferable to the foreign labor market, the migrant, once being in the receiving country, will additionally adopt host country specific human capital.

Accordingly, measured earnings of the migrant at time t may be expressed by the following expression:

$$\ln Y_{it} = \ln E_{it} + \ln (1 - k_{it} - \mu_{it}) \tag{1}$$

Y_{it} are measured earnings and E_{it} is the migrant's gross earnings potential, both at time t. i is an index for the i^{th} individual. k_{it} and μ_{it} are the fractions of the earnings potential devoted to human capital investment, either by furthering human capital or by acquiring country specific skills, respectively. Assume that the fraction of the earnings capacity which is invested declines linearly during the working life and the duration of stay:[4]

$$k_{it} = k_{i0}\left(1 - \frac{J_i}{T_i}\right) \; ; \quad \mu_{it} = \mu_{i0}\left(1 - \frac{H_i}{\theta_i}\right) , \tag{2}$$

where k_{i0} and μ_{i0} are the ratios of post-school investment to potential earnings after leaving school and of host country specific human capital investment to potential earnings upon entering the host country, respectively. T_i is the length of working life and θ_i the amount of years the migrant worker intends to stay in the host country. The indices J_i and H_i denote years of working experience and years of residence, respectively, both measured at time t. Either investment ceases if $J_i = T_i$ or $H_i = \theta_i$.

The gross earnings E_{it} of a migrant at t depend on the earnings potential he accumulated before and after migration. In logarithmic form and using a continuous notation, E_{it} can be expressed as follows:

$$\ln E_{it} = \ln E_i^0 + r_i^s S_i + r_i \int_0^{J_i} k_{i\tau} \mathrm{d}\tau + \varrho_i \int_0^{H_i} \mu_{i\tau} \mathrm{d}\tau \; , \tag{3}$$

where E_i^0 are gross earnings without any investment into human capital and S_i are years of schooling. The rates of return on investment into schooling, human

[3] The cost of investment into human capital is best understood in terms of opportunity costs. If the "full income" of a worker is equal to the time he is able and willing to devote to working activities, weighted with the wage rate that corresponds to the worker's stock of human capital, then the measured income would equal the full income minus the value of time spent for investment activities.

[4] The linearity assumption is only an approximation of the optimal path of investment. The paths of μ_{it} and k_{it} can be thought of as the solution of an optimal control problem. For an extensive treatment of human capital investment of temporary migrants in an optimal control framework, see Dustmann (1991).

capital, and investment into host country specific human capital are denoted by r_i^S, r_i and ϱ_i, respectively.

Inserting (1) and (2) into (3), solving the integrals and rearranging terms results in the following expression:

$$\ln Y_{it} = \ln E_i^0 + \ln(1-k_{it}-\mu_{it}) + r_i^s S_i + r_i k_{i0} J_i - \frac{r_i k_{i0}}{2T_i} J_i^2 + \varrho_i \mu_{i0} H_i - \frac{\varrho_i \mu_{i0}}{2\theta_i} H_i^2 \,. \tag{4}$$

Assuming the values of k_0, μ_0, r_s, r and ϱ as constant among individuals, (4) indicates that differences in migrants' earnings are explained by different schooling backgrounds S_i and different lengths of working experience J_i as well as varying durations of residence H_i in the host country. Furthermore, the theoretical derivation above suggests that the form of the investment profile of migrant workers and thus their earnings depends on the migrant's expected total duration of stay, θ. This variable is neglected in all studies that investigate the assimilation of the earnings of migrant workers. In the case of permanent migration, θ may not help to explain differences among migrants' earnings. However, if θ varies considerably among individual migrants as it is the case with temporary migration, this variable may explain a significant part of earnings differences. Equation (4) indicates that, everything else being equal, the longer the migrant expects to stay in the host country, the less concave is his earnings profile. Therefore, the slope of earnings profiles may vary among otherwise identical temporary migrants if they have different expectations about how long to stay in the host country. Furthermore, since the migration history of the average temporary migrant is shorter than that of a permanent migrant, the above considerations seem to indicate that temporary migrants' earnings profiles are flatter than those of permanent migrants.

Selective migration

The usual explanation for the empirical findings that migrants' earnings do not only adapt, but even overcome those of native workers is that migrants have, on average, higher innate labor market abilities than native workers. Arguing that the rate of return to the migration decision is higher for a high-ability person than for a low-ability person, migration is self-selective.

The underlying assumption of the selective migration hypothesis as presented by Chiswick (1978, 1986) is that migrants are fully employed in both labor markets. If, however, the labor market of the emigration country is characterized by high unemployment that affects low-ability workers to a higher extent than high-ability workers, and if in the immigration country prevails an excess demand for labor, migration may even be selective in a negative sense.

This can easily be shown by reconsidering and extending Chiswick's theoretical argument of positive selective migration. Under the simplifying assumptions that earnings do not vary with experience, work life is long and migration costs are incurred only in the initial period, the rate of return to the migration decision for a more able person is, according to Chiswick (1986), given by

$$r = \frac{(w^H - w^S)(1+k)}{(1+k)c^O + c^D} = \frac{w^H - w^S}{c^O + \frac{1}{1+k} c^D} \,, \tag{5}$$

where w^H and w^S are earnings in the host- and the source country, respectively, c^O are opportunity (time) costs and c^D direct costs of migration. (5) assumes that a more able person has earnings k% higher in both countries than a low able person. Since c^O are the time costs of migration, these costs increase with the ability level. It is obvious from (5) that, for $c^D > 0$, the rate of return is higher for the person with a higher ability level. Chiswick then concludes that the incentive to migrate is higher for high-ability workers. If abilities are similarly distributed among countries, immigrants will consequently have, on average, higher levels of ability than native workers. The selection process will be more intense the larger the direct costs of migration, c^D.

Chiswick's argument, however, is only true if certain labor market conditions are fulfilled. Assume an excess demand for labor in the host country and an excess supply for labor in the source country. In the case of temporary migration, host- and source country are often characterized by such labor market situations. Migration is often induced by a temporary excess demand for unskilled or semiskilled labor in the host country. The labor attracted stems from countries with significantly poorer economic conditions and, very often, an excess supply for labor in the low-skilled sector of the labor market.

Assume further that in the source country a high ability worker will more easily find a job than a low ability worker. Let k correspond to the deviation from the average ability level in the country of emigration and let $p(k)$ be the probability that a worker with level k is employed in the source country, with $p'(k) > 0$. b denotes an unemployment benefit in the source country, with $b < w^S$. Adopting Chiswick's notation, the rate of return on the migration decision to a worker with level k can be written as:[5]

$$r = \frac{w^H - [w^S p(k) + (1 - p(k))\, b]}{c^O + \dfrac{1}{1+k}\, c^D} \,. \tag{6}$$

The impact of a rise in k is now ambiguous: beside the positive effect on r, as explained above, a higher k will increase labor market opportunities of the potential migrant in his home country and, accordingly, decrease r. Therefore, for some probability distribution $p(k)$, some ability distribution and some set of values for earnings, costs and unemployment benefits the rate of return could well be highest at very low ability levels.[6] In that case, it would be more profitable for the less able worker to migrate: migration would accordingly be negatively rather than positively selective.

Although the arguments are extremely simple, the above considerations make clear that the kind of the selection process taking place strongly depends on the economic situation and the labor market conditions in both, the host- and the

[5] Since c^O are time costs of migration, they will as well depend on $p(k)$. Assuming c^O as constant does not change the intuition of the argument and simplifies matters.

[6] Let the derivation of abilities from the average ability level in the source country be normally distributed around the mean $\bar{k} = 0$. Let σ be the variance, with $\sigma = 0.5$. Accordingly, $f(k) \sim N(0, 0.5)$. Furthermore, let the probability that a person with relative ability level k is employed be equal to the cumulative distribution: $p(k) = F(k)$. If $b = 0$ and, for instance, $w^H = 10$, $w^S = 5$, $c^0 = 2$ and $c^D = 1$, the rate of return will be highest for $k = -0.2$. Migration would tend to be negatively selective.

source country. In terms of the above analysis, migration will tend to be negatively selective if unemployment benefits in the home country and the direct cost of migration are low, if there is an excess supply of labor in the home country while there is full employment in the host country, and if the probability of being unemployed is higher for those with lower levels of ability.[7]

To summarize, the above considerations suggest that earnings profiles of temporary migrants are flatter than those of permanent migrants, resulting from a shorter pay-off period for any country specific human capital investment. Furthermore, the generally assumed positive selection process is found to be strongly dependent on the economic situations in host- and source country. In the case of temporary migration economic circumstances may favor non-selective or even negative-selective migration rather than positive-selective migration.

3. Empirical analysis

Migration to West Germany – some stylized facts

Looking more closely at the history of temporary migration to West Germany, one finds that, according to the theoretical considerations above, both arguments that are used to explain the strong position of migrants in the Australian, Canadian and US-American labor market are not likely to hold for temporary migrants in West Germany.

Post-war labor immigration into West Germany started in the mid 50's and accelerated rapidly until 1973. The percentage of foreigners employed in the labor force increased from 0.6% in 1957 to 11.2% in 1973, the highest percentage of foreign workers ever employed in West Germany, and declined thereafter.[8] This heavy immigration of laborers mainly from Southern European countries and from Turkey was caused by the rapid economic development in West Germany after the second world war and the resulting growing excess demand for labor. It was supported by high unemployment rates and low per capita incomes in the countries of origin. The growing inflow of foreign workers into the German labor market was accompanied by a number of measures regulating legal, social and labor market conditions. The fear of the unions that foreign labor might be used by employers to keep wages down, the interest of employers in encouraging recruitment of foreign workers, as well as the effort of source country governments to sustain equal rights for their citizens in the host countries were largely responsible for a number of agreements that virtually accorded equal treatment of migrants in the German labor market and within the social security system. Furthermore, in the 1960's recruitment agreements were concluded between Germany and all the main source countries which considerably facilitated migration for the worker by guaranteeing him a one year contract upon arrival, accommodation and payment of travel expenses. Moreover, he could not be dismissed

[7] A further analysis of the selective migration hypothesis is presented by Borjas (1987). Using a theoretical framework set up by Roy (1951), he shows that the selection bias depends on the dispersion of earnings in the home- and in the host country and on the correlation between the disturbances affecting both labor markets. According to his analysis, a necessary condition for a positive selection is that the correlation between disturbances affecting both labor markets is sufficiently high and that income is more dispersed in the host country than in the home country.

[8] Bundesanstalt für Arbeit, Arbeitsstatistik 1974.

during the first year of residence.[9] Recruitment activities stopped in 1973, the turning point of the strong economic boom in Germany.

Accordingly, the situation of temporary migrants coming to Germany was characterized by low costs of migration and high rates of return resulting from the considerable economic differences between most source countries and the host country. Emigration may have been especially appealing to those who would have had difficulties to find a job in the home country. In addition, the duration of stay was expected to be temporary both by the governments concerned and by the guest worker himself. This may result in a lower incentive to invest into country specific human capital as is the case with permanent migration. Consequently, one would expect to find migration to West Germany to be less positively selective and the effort of the migrant to invest into country specific human capital to be low.

In what follows, earnings profiles of temporary migrants in West Germany will be estimated. The main concern will be to test whether profiles differ from those found for permanent migrants in the labor markets of Australia, Canada and the United States. To test the hypothesis that the duration of stay has a positive impact on country specific human capital investment, additional tests are carried out, using interview data on the expected length of stay of the migrant worker.

Data and sample characteristics

The empirical analysis below uses as a data base the first wave of the German socioeconomic panel, collected in 1984. The panel is organized on a household base. Besides asking about household specific characteristics, all people above 16 years were personally interviewed. The first wave consists of 6000 households which can be subdivided into two sub samples, according to the nationality of the head of the household. The sub sample with a German household head comprises 4500 households, whilst that with a household head of Turkish, Spanish, Jugoslavian, Greek or Italian nationality comprises 1500 households.

The data used for this study is restricted to men of foreign and German nationality, above the age of 16 in 1984, who were full time employed at the time of the interview. Self-employed persons, persons who are enrolled in educational programs or who do an apprenticeship, and state employees are excluded from the analysis. The latter group had to be removed from the sample since people with non German nationality are usually not allowed to become state employees. After removing all individuals with missing values in relevant variables, the final sample is reduced to 1838 persons with German nationality and 1064 persons with foreign nationality. Due to missing values in variables about the intended future duration of stay of the migrant in the host country, the sample reduces to 939 observations when calculations are based on this information.

Table 1 compares some economic and socio-economic characteristics of German nationals and immigrants with foreign nationality. The average gross-earnings, reported as earnings in the month preceding the interview, are 20% higher for German nationals compared with foreign workers. This substantial absolute income difference might be partially explained by the different schooling- and training backgrounds of the two groups. From the sample information two dif-

[9] Mehrländer (1980), pp. 81, 82.

Table 1. Sample characteristics of native and foreign males (1984)

	Natives		Foreigners	
	Mean	SD	Mean	SD
Earnings (DM)	3339	*1312*	2669	*659*
Log of earnings	8.05	*0.34*	7.86	*0.25*
Age	39.97	*11.23*	39.54	*10.67*
Years of schooling[a]	1.88	*2.91*	1.06	*1.77*
Years of training[a]	3.00	*1.67*	1.25	*1.85*
Years of working experience	20.60	*11.45*	20.64	*10.43*
Married [%]	75.57	*	85.33	*
Years since migration	*	*	14.73	*5.13*
Language satisfactory [%]	*	*	39.55	*
Language good or very good [%]	*	*	43.33	*
Sample size	1838		1064	

Source: Socio-Economic Panel, wave 1, 1984
[a] After the age of 14

ferent variables on the educational background can be extracted. Both refer to the level of education received after the age of 14.[10] The variable Schooling (SCH) measures the years spent in school, evening school or at university, while the variable Training (TRAIN) measures the years of job-specific education and apprenticeship. The average amount of years of both forms of educational input is higher for natives than for foreign nationals. Both groups have approximately the same average age (AGE) and working experience (EXP), with working experience measured as the amount of years a person was full time employed. A higher percentage of foreign nationals in the sample is married. A relatively high percentage of migrant workers claimed to have at least a satisfactory knowledge of the German language, even though none of the countries of origin uses German as a main language. The average amount of years since migration (YSM) is fairly high, indicating that most of the migrants immigrated before 1973, the year when recruitment activities stopped.

Subdivided into 7 time intervals, Table 2 reports statistics on the percentage of migrants that fall into the respective sub category on the years they have already spend in Germany, YSM, the length of time they intend to further remain in Germany, ISTAY, and the total length of stay, TOTSTAY. The numbers for the construction of the variable ISTAY are based on interviews which asked foreign nationals how long they further expect to stay in Germany. Possible answers were *forever* or a specific number of years. TOTSTAY is then calculated by simply adding the amount of years the migrant intends to remain in the host country and the number of years since migration.

The first row of Table 2 indicates that 85% of the migrant population in the sample has been in Germany for more than 10 years. The numbers in the second row reveal that nearly one third of the migrant population intends to stay more than 30 years or forever.

[10] The empirical analysis below therefore assumes an equal schooling background for all persons before the age of 15. A further differentiation of education and schooling was not possible since the data had to be constructed using a biographical scheme that lists life activities after the age of 14.

Table 2. Intended length of stay and total length of stay (foreign males, 1984)

Interval [in years]	≤ 1	$1<x\leq 5$	$5<x\leq 10$	$10<x\leq 15$	$15<x\leq 20$	$20<x\leq 30$	>30
YSM [in %]	0.32	5.32	9.05	49.41	20.77	15.13	0.00
ISTAY [in %]	6.28	32.16	21.83	4.58	3.19	0.64	31.31[a]
TOTSTAY [in %]	0.00	0.32	3.51	10.44	19.92	27.37	38.45

Source: Socio-Economic Panel, wave 1, 1984. Sample size: 939 observations
[a] 99% of this number intend to stay forever

However, more than 55% of the migrants intend to return to their home countries within the next ten years. The numbers reveal, furthermore, that of the migrant population living in Germany less than one third intends to change the temporary status into a permanent status, even though the intended total length of stay (TOTSTAY) of more than 95% of migrant workers is longer than 10 years. One could expect that from those who do want to return to their home countries a high percentage will retire in Germany and return after retirement. This is, however, not the case. From those who do not intend to stay forever in Germany (69% of the migrant sub sample), only 2.3% want to return after the age of 64.[11] This implies that the vast majority of migrants intends to either try to find employment in their home country, live on savings or become self-employed after return.

A comparative analysis of earnings of German and foreign nationals

Different empirical specifications of Eq. (4) will be used for estimation, using data on natives, on foreign nationals and a pooled data set. In this section it will be investigated whether, as found for other countries, the earnings of migrant workers in Germany do catch up with those of German nationals. In the next section, and using only data on migrant workers, the hypothesis that a shorter total duration of stay implies flatter earnings profiles as a consequence of a lower human capital investment will be tested.

Table 3 reports OLS estimation results using data on German natives [column (1)] and a pooled data set of both foreign nationals and natives [column (2)–(6)].[12] The coefficients presented in column (1) emerge from a regression of the natural logarithm of monthly earnings on the exogenous variables labor market experience (EXP), labor market experience squared (EXPSQ), years of schooling (SCH) and job-specific education and apprenticeship (TRAIN), and marital status (MARRIED). Results in columns (2)–(6) are produced by pooling the two sub samples of natives and migrants. Regression equations in columns (2) and (3) are extended by a dummy variable (FOR) that is 1 for foreign nationals, and by the variables years since migration and years since migration squared,

[11] 8.8% will be older than 60 at the point of expected return.

[12] A χ^2 test as suggested by Breusch and Pagan (1979) revealed that all estimates suffer from heteroscedasticity. The appropriate estimators for the variances of the parameter estimates are obtained by using a method as suggested by White (1980). White's estimate of the covariance matrix is consistent and allows to draw inferences from OLS results without necessarily specifying the form of heteroscedasticity.

Table 3. Regression analysis of earnings of foreign and German nationals. (Dependent variable: natural logarithm of monthly gross earnings)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
CONSTANT	**7.383**	**7.478**	**7.480**	**7.443**	**7.384**	**7.384**
	(273.424)	(318.858)	(316.508)	(283.838)	(273.725)	(273.738)
EXP	**0.037**	**0.033**	**0.032**	**0.037**	**0.037**	**0.037**
	(14.132)	(16.312)	(15.987)	(14.327)	(14.511)	(14.497)
EXPSQ	**−0.0007**	**−0.0006**	**−0.0006**	**−0.0007**	**−0.0007**	**−0.0007**
	(−12.259)	(−14.875)	(−14.540)	(−12.617)	(−12.499)	(−12.488)
SCH	**0.056**	**0.047**	**0.047**	**0.047**	**0.055**	**0.056**
	(20.506)	(19.446)	(19.475)	(19.646)	(20.570)	(20.567)
TRAIN	**0.034**	**0.025**	**0.025**	**0.023**	**0.034**	**0.034**
	(8.809)	(7.298)	(7.292)	(7.144)	(8.852)	(8.850)
MARRIED	**0.133**	**0.124**	**0.124**	**0.123**	**0.119**	**0.120**
	(8.341)	(9.161)	(9.144)	(9.125)	(9.014)	(9.087)
FOR		**−0.166**	**−0.190**	**−0.134**	**0.030**	**−0.017**
		(−5.326)	(−2.831)	(−1.899)	(0.426)	(−0.233)
FOR*YSM		**0.0019**	**0.006**	**0.015**	**0.014**	**0.013**
		(1.070)	(0.651)	(1.723)	(1.576)	(1.440)
FOR*YSMSQ			**−0.0001**	**−0.0003**	**−0.0002**	**−0.0002**
			(−0.466)	(−1.287)	(−0.914)	(−0.926)
FOR*EXP				**−0.014**	**−0.018**	**−0.017**
				(−3.506)	(−4.524)	(−4.333)
FOR*EXPSQ				**0.0003**	**0.0002**	**0.0002**
				(3.042)	(3.327)	(3.376)
FOR*TRAIN					**−0.024**	**−0.025**
					(−4.001)	(−4.236)
FOR*SCH					**−0.043**	**−0.045**
					(−6.372)	(−6.622)
FOR*L2						**0.045**
						(2.138)
FOR*L3						**0.072**
						(3.255)
$\bar{R}^2$	0.36	0.33	0.33	0.34	0.34	0.36
No. of Obs.	1838	2902	2902	2902	2902	2902

Source: Socio-Economic Panel, wave 1, 1984. Note: *t*-ratios in parenthesis. Reported *t*-statistics are based on standard errors which are corrected for heteroscedasticity.
Regression results presented in column 1 are generated using data for German nationals only. Results in columns (2)−(6) are based on a pooled data set of natives and foreign nationals.

(YSM) and (YSMSQ), respectively. These variables are zero for natives. The equations presented in column (4)−(6) additionally allow for varying parameters of the experience variables and the schooling variables between natives and foreign nationals. Furthermore, dummy variables on language abilities are introduced, where L2 stands for satisfactory and L3 for good or very good knowledge of the German language.

The results using the native sub sample [column (1)] are quite similar to those found for other countries. All coefficients have the expected sign and are significantly different from zero. Evaluated at 5 years of experience, an additional year of being in the labor force increases earnings of natives by 3.0%. After 15 years of working experience the positive impact of an additional year of experience has

been reduced to 1.6%. The impact of schooling and job-specific education on earnings of natives is quite different. While an extra year of job-specific education raises income by 3.4%, the impact of an additional year of after-elementary schooling is considerably larger (5.6%). Married men have earnings 13.3% higher than non-married men.

Columns (2) and (3) report results emerging from using a pooled data set, introducing a dummy for foreign nationality (FOR) as well as variables that capture the years since migration. In column (2), the years of residence variable is introduced in a linear form (YSM) and in column (3) in linear and quadratic form (YSM and YSMSQ), respectively. Although the coefficients have the expected sign, they are not significantly different from zero. These results seem to indicate that the duration of stay in the host country does not have a narrowing impact on the earnings gap between German nationals and migrant workers. Allowing for varying parameters on the experience variable between the two groups slightly increases size and significance of the YSM-coefficient [see results in column (4)]. Since a further year in the host country affects migrants' earnings via the years since migration variables as well as via the experience variables, the results in column (4) indicate that the effect of a further year of residence, although improving the relative earnings difference of immigrants, is compensated by the considerably lower effect of the experience variable on immigrants earnings (FOR*EXP), as compared with the effect on natives earnings.

To gain further insight into the relative adjustment of migrants' earnings, estimation results from the two sub samples on native and foreign workers (column (1) in Tables 3 and 4, respectively) are used to calculate the percent earnings increase for an additional year of experience in the German labor market. According to Table 1, migrants enter the German labor market after an average labor market experience in their home country of 6 years. Upon entering the host country, each additional year in the German labor market increases their earnings by $\delta \ln Y^M/\delta t = 0.025 - 0.001\, t$ (calculations based on the numbers in column (1), Table 4). Measured likewise after 6 years of labor market experience, an additional year raises earnings of native workers by $\delta \ln Y^N/\delta t = 0.029 - 0.0014\, t$ (calculations are based on the numbers in column (1), Table 3). Both expressions are not substantially different. Evaluated at 5 years after entry into the German labor market (which corresponds to 11 years being in the labor force), an additional year increases migrant's earnings by 2.00%, while it increases earnings of a comparable native worker by 2.20%. After 10 years in Germany, or 16 years in the labor force, the respective numbers are 1.5% for migrants and 1.5% for natives.

Accordingly, there is no earnings crossover and no narrowing impact of the duration of residence on the income gap between migrants and German nationals as found in other empirical studies on migrants earnings. Temporary migrants do not improve their relative earnings position in the German labor market.

Column (5) in Table 3 reports results of an estimation that allows for varying coefficients of the educational variables between foreign and German nationals. A year of schooling or training affects earnings of migrants and native workers to a different extend. The effect of an additional year of schooling of foreign citizens on monthly earnings is significantly lower than for German nationals. The difference is considerable: while each year of schooling increases earnings of natives by 5.5%, it increases earnings of migrants by only 1.2%. The effect of a year of job-specific education and apprenticeship on earning of migrants is likewise significantly lower than on earnings of native workers. An explanation

for these results may be that migrants' schooling and job-specific education took mainly place in the home countries and is of small value in the German labor market. Finally, the results in column (6) indicate that a good or very good knowledge of the German language (L3) reduces the earnings differential considerably (7.2%).[13] Those with a satisfactory language ability (L2) have earnings which are 4.5% higher than those with a poor knowledge of the German language. These differences in earnings due to language ability indicate that language ability is thought to be correlated with productivity by German employers. It may also indicate that workers with knowledge of the German language are more capable of acquiring and using specific labor market information and, consequently, obtain better-paid jobs.[14]

The above results indicate that migrant workers in the German labor market do not improve their earnings position, relative to comparable native workers. These results are in contrast to the findings for other countries. The earnings gap between migrants and natives does not close over the whole migration history of the foreign worker. These findings may be explained by the hypothesis stated above: in terms of the human capital framework, temporary migrants in the German labor market may not invest into host country specific human capital sufficiently enough to catch up with native earnings.

Immigrant earnings and the expected duration of stay

The theoretical considerations above suggested that the total length of stay of a migrant in the host country should have a positive impact on his investment into host country specific human capital and, as a consequence, on his earnings position. In this section, this hypothesis will be empirically tested. The simple deterministic model of human capital investment, on which these conclusions are based, assumes that the migrant has upon arrival in the host country a firm idea for how long to stay. Furthermore, he will stick to his initially planned length of duration over his entire migration history. All decisions concerning investments into human capital are then based on this fixed planned period of stay in the host country. It is, however, unlikely that migrants enter the host country with firm intentions about their duration of stay, and it is even more unlikely that duration intentions upon arrival will not change during the migrant's period abroad. Unforeseeable changes in preferences, evaluations and economic conditions may induce the migrant to revise his former intentions more or less frequently during his migration history. This possible discrepancy between the implications of a deterministic model and the features of the process which generated the data on which empirical tests are based should be kept in mind when evaluating the results.

An empirical test of the hypothesis that the total duration of stay has a positive impact on the migrant worker's earnings position requires information about the migrant's intended total duration of stay in the host country. The avail-

[13] Note that coefficients on the language variables measure differential effects, both compared with a poor knowledge of the German language.

[14] For an extensive analysis of determinants for writing and speaking fluency of migrant workers in Germany, as well as the impact of language on earnings, see Dustmann (1993).

able data allow to construct a variable for the total duration of stay which is based on the migrant's intended future duration and his years of residence, both in 1984. This number may, of course, differ from what the migrant would have said upon arrival. An empirical test of the hypothesis that the intended total duration of stay abroad has a positive effect on the migrant's earnings position is therefore based on the assumption that the data reflect to some extent initial intentions and incentives of human capital investment. Furthermore, since intentions, or the revision of former intentions, may be influenced by the migrant's earnings position in the host country, a variable which is based on information about intended future durations of stay may not be exogenous when used as a regressor in an earnings equation. This requires estimation techniques which consider the possibly endogenous character of this variable.

An empirical specification (TOT) of the variable θ is constructed along the following lines: when the migrant worker intends to return before reaching retirement age (which is assumed to be equal to 64), TOT is calculated as the sum of the intended future duration of stay and the years since migration. It is therefore equal to TOTSTAY above. When the migrant intends to either return after retirement age or to stay forever, and based on the assumption that after an active working life no earnings-effective country specific human capital investment will take place any more, TOT is constructed by adding to the years since migration the difference between 64 and the age of the migrant.

Table 4 reports results of different specifications of earnings equations for the foreign subsample. The results in column (1) indicate that the duration of residence in Germany (YSM) has a positive effect on earnings. Each year in Germany increases migrant's earnings by 0.73%. Note that this only indicates that years of residence improve the absolute earnings position of migrant workers. This does not imply that migrants improve their earnings positions relative to comparable native workers. Adding a quadratic term of the years since migration variable (YSMSQ), however, renders both coefficients insignificant [column (2)].

According to Eq. (4), the intended total duration of stay should have an impact on the degree of concavity of the earnings profile. This requires the estimation of a regression with varying coefficients on the variable YSMSQ. Column (3) presents the respective results, where YSMSQ is simply replaced by the variable YSMSQ/TOT. Coefficients on both YSM and YSMSQ/TOT are now significantly different from zero. The numbers indicate that the migrant's earnings profile is less concave, the longer his total intended duration of stay. This is exactly what the theory implies. The effect of the total duration of stay on earnings profiles is, however, quite weak. When considering only the effect of the YSM-variables, after 5 years of residence an additional year in the country will increase migrants earnings by 0.57% if the expected total duration of stay is only ten years. This number increases to 0.84% if the migrant intends to stay for 20 years and to 0.92% if he intends to stay for 30 years.

As indicated above, the intention of the migrant about how long to remain in the host country is not necessarily stable over the migration history and may well be influenced by his earnings position. The variable TOT would then be endogenous.[15] Therefore, the same specification was estimated, using an instrumental variable approach. An instrument for TOT was constructed by first estimating a

[15] For a theoretical model of return decisions and duration intentions of temporary migrant and extensive empirical tests, see Dustmann (1992).

Table 4. Regression analysis of earnings of foreign nationals. (Dependent variable: natural logarithm of monthly gross earnings)

Variable	(1)	(2)	(3)	(4)	(5)
CONSTANT	**7.441**	**7.422**	**7.429**	**7.463**	**7.410**
	(221.199)	(99.497)	(174.323)	(169.785)	(156.892)
EXP	**0.024**	**0.024**	**0.024**	**0.024**	**0.022**
	(7.411)	(6.562)	(6.883)	(7.196)	(6.457)
EXPSQ	**−0.0005**	**−0.0005**	**−0.0005**	**−0.0005**	**−0.0004**
	(−7.842)	(−7.060)	(−7.212)	(−7.657)	(−6.238)
SCH	**0.014**	**0.015**	**0.015**	**0.014**	**0.015**
	(3.230)	(2.191)	(2.203)	(2.194)	(2.235)
TRAIN	**0.015**	**0.015**	**0.015**	**0.015**	**0.013**
	(3.259)	(3.428)	(3.418)	(3.639)	(3.322)
MARRIED	**0.067**	**0.067**	**0.074**	**0.074**	**0.082**
	(2.658)	(2.547)	(2.702)	(2.748)	(2.812)
YSM	**0.0073**	**0.011**	**0.011**		**0.017**
	(3.742)	(1.071)	(3.755)		(3.017)
YSMSQ		**−0.0001**			
		(−0.396)			
YSMSQ/TOT			**−0.0053**		**−0.013**
			(−1.903)		(−1.914)
YSM1				**0.0019**	
				(0.605)	
YSM2				**0.0054**	
				(2.203)	
YSM3				**0.0058**	
				(2.528)	
$\bar{R}^2$	0.15	0.15	0.15	0.15	0.14
No. of Obs.	939	939	939	939	939
Estimation	OLS	OLS	OLS	OLS	IV

Source: Socio-Economic Panel, wave 1, 1984. Note: *t*-ratios in parenthesis. Reported *t*-statistics are based on standard errors which are corrected for heteroscedasticity.

tobit specification, where the dependent variable equals the intended future duration of stay if, for some migrant, this number is smaller than the remaining time in the workforce, calculated as (64-age). The dependent variable is set equal to (64-age) if the intended future duration is above this limit, or if the migrant intends to stay forever. The predicted values from the tobit estimation were then added to the years since migration variable (YSM).[16] Results of the instrumental variable estimation are presented in column (5). The estimated coefficients indicate likewise that the total duration of stay has a steepening impact on earnings profiles. This effect is slightly stronger as in the OLS regression. Again evaluated at 5 years of residence, an additional year in the host country improves the migrant's earnings position by the 0.4% for a total residence of only 10 years, and by 1.05% and 1.26% for a total residence of 20 and 30 years, respectively.

[16] The regressors used in the tobit model are YSM, MARRIED, L3, and a variable for age. Furthermore, dummy variables for nationalities and additional variables were included which indicate whether the migrant's partner lives in the home country, whether the migrant transfers money back home, whether the migrant has children in Germany, and whether he has children who live in the home country.

As an additional test of the effect of the total duration of stay on migrants' earnings position, the specification in column (1) was re-estimated, allowing the coefficients on the variable YSM to vary corresponding to the total duration in the host country. The results are reported in column (4). The variable YSM1 measures years since migration for migrants with a total intended duration of stay below 20 years, YSM2 for those who stay at least 20 years, but less than 30 years, and YSM3 for those who stay at least 30 years. The years since migration variable is insignificant for migrants who do not want to stay longer than 20 years (YSM1). As indicated by the coefficient on the variable YSM2, each additional year of residence improves earnings of migrants who stay at least 20 years, but less than 30 years, by 0.54%. This effect is slightly larger for those who stay at least 30 years, as indicated by the coefficient on the variable YSM3.[17]

The above results support the hypothesis, suggested by the theoretical considerations, that the investment in country specific human capital of migrant workers depends positively on the expected length of stay in the host country. For a nonlinear specification, earnings profiles are less concave the longer the total intended duration of stay in the host country. These effects, however, are quite small in size. When allowing the coefficients on the variable YSM to vary according to whether the intended total duration of stay is less then 20 years, between 20 and 30 years, or above 30 years, only the coefficients on the YSM-variables for those who stay at least 20 years are significantly different from zero.

4 Summary and conclusion

Empirical studies on earnings assimilation of permanent migrants to Australia, Canada and the United States have shown that the initial earnings gap between migrants and native workers steadily decreases over the time the migrant spends in the host country. The main explanation for the steeper earnings profiles of migrants was that migrant workers have stronger incentives to invest into their human capital than natives. The findings that migrant earnings overtake those of natives after an adaptation period was explained with the selective character of migration.

In Section 2 it was shown that, in a human capital framework, the size of investment of a migrant into human capital specific to the labor market requirements of the host country positively depends on his expected total length of stay abroad. Consequently, temporary migrants should do worse in the foreign labor market than permanent migrants. Furthermore, reconsidering Chiswick's argument for positive selective migration, it was found that migration will be positively selective only if certain labor market conditions are fulfilled in both host- and source countries. In the case of temporary migration, labor market conditions in both countries are often likely to be unfavorable to positive selection. This may reinforce the weak position of these migrants in the host country labor market.

To gain some further insight into earnings adjustments of temporary migrants, earnings of native workers and migrant workers were analyzed. The

[17] The hull hypotheses of the coefficients for YSM2 or YSM3 being equal to the coefficient for YSM1 are both rejected at the 5% level. The respective F-statistics are $F(1, 930) = 4.92$ and $F(1, 930) = 5.96$. The null hypothesis of equal coefficients for YSM2 and YSM3 could not be rejected ($F(1, 930) = 0.15$).

data used stems from the German socio-economic panel. Temporary migration to West Germany seems to exhibit features that are contrary to a favorable relative earnings position in the labor market of the host country: the migration is thought to be temporary, and economic conditions in both host country and source countries during the migration period seem not to be supportive for a positive selection. The empirical results indicate that, unlike the findings for permanent migration to other countries, foreign workers in the German labor market receive lower wages than their native counterparts throughout their working history, other things being equal. There is no earnings-crossover between these two groups. The income gap between migrant workers and natives in the German labor market is not closing over the migrant's migration history. Using data on the expected length of stay in the host country, empirical findings support the hypothesis that the total length of stay positively influences country specific human capital investment and, therefore, earnings of migrants.

The results suggest that it is important to distinguish between permanent and temporary migration when considering the assimilation of migrants in the foreign labor market.

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