No. 2100

DISCRIMINATION IN THE SWISS LABOUR MARKET: AN EMPIRICAL ANALYSIS

Stefan M Golder and Thomas Straubhaar

LABOUR ECONOMICS

Centre for Economic Policy Research

ISSN 0265-8003

DISCRIMINATION IN THE SWISS LABOUR MARKET: AN EMPIRICAL ANALYSIS

Stefan M Golder and Thomas Straubhaar

Discussion Paper No.2100
March 1999

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: http://www.cepr.org

CEPR Discussion Paper No. 2100

March 1999

ABSTRACT

Discrimination in the Swiss Labour Market: an Empirical Analysis*

Recent studies have shown that there are significant earnings differentials between immigrants and natives in Switzerland. The goal of this paper is to determine whether these differences can be attributed to diverging socio-economic endowments or to discrimination. We use the well-known econometric technique, developed by Oaxaca (1973) and Blinder (1973), to determine the extent of discrimination. As data on earnings are available only for employed, we adopt a two-stage Heckman procedure to correct for sample selection-bias. Our analysis is based on data from the 1995 wave of the Swiss Labour Force Survey (SLFS). The earnings difference decomposition between natives and immigrants reveals that the discrimination effect plays a more important role in the explanation of the earnings differentials than the endowment effect.

JEL Classification: F22, J31, J61, J71
Keywords:international migration, wage differentials, immigrant workers, discrimination

Stefan M Golder
Kiel Institute of World Economics
Duesternbrooker Weg 120
24105 Kiel
GERMANY
Tel: (49 431) 8814 470
Fax: (49 431) 8814 501
Email: stefan.golder@ifw.uni-kiel.de

Thomas Straubhaar
University of the Bundeswehr Hamburg
Holstenhofweg 85
22043 Hamburg
GERMANY
Tel: (49 40) 6541 2850
Fax: (49 40) 6541 2875
Email: thomas.straubhaar@unibw-hamburg.de

* This paper is produced as part of a CEPR research programme on *European Migration from Economic Analysis to Policy Response*, supported by a grant from the Commission of the European Communities under its Human Capital and Mobility Programme (no. ERBCHRXCT940515). An earlier version of this paper was presented at the 12th Annual Conference of the European Society for Population Economics, 4–6 June 1998, Amsterdam. Helpful comments by Thomas Bauer, Peter Kugler, Christoph Schmidt and George Sheldon are gratefully acknowledged.

Submitted 19 February 1999

NON-TECHNICAL SUMMARY

Over the past 50 years, Switzerland has experienced a substantial inflow of immigrants. Since World War II, the share of foreigners has nearly quadrupled from a mere 5% to almost 20% in 1998. These figures indicate that Switzerland, together with Australia and Luxembourg, has by far the highest share of foreigners in total population among all OECD countries. As has been shown by a number of recent studies, there are substantial earnings differentials in the economic performance between immigrants and natives. Analysing these differentials is not only interesting from an economic point of view, but also highly relevant for policy-makers. The main focus of our paper is to determine whether these differences can be attributed to diverging individual socio-economic profiles between immigrants and natives or to discrimination.

Following standard human capital theory, we assume that the performance of an individual in the labour market is largely dependent on their endowment of human capital. As we presume that workers are paid according to their marginal product, differences in socio-economic profiles should explain most of the variation in earnings across people. We cannot rule out, however, that earnings differentials between gender and/or nationality are due to discrimination, i.e. differences in rewards for the same endowment. In general, the residual, i.e. the part of the earnings differential that cannot be explained by differences in endowments, is used as a proxy for the extent of earnings discrimination.

It is not unproblematic to equalize this unexplained part of the earnings differential with discrimination, however, as there are a number of potential sources of distortion. First, productivity cannot be fully measured by endowment characteristics, which can thus lead to an under- or overestimation of the discrimination component. Second, endowment differences can at least in part be due to pre-market discrimination, e.g. parents promoting more strongly the education of sons than of daughters. Third, earnings discrimination is only one possible source of discrimination. We could also think of labour market segmentation as an alternative explanation for the existence of earnings differentials. Despite these latent problems, the decomposition of the earnings differential into an endowment and a discrimination component yields important insights for economists as well as for policy-makers.

As a starting point for this analysis, we use a Mincer type earnings function, which is estimated separately for immigrants and natives. The resulting coefficients serve as a basis for the simulation of the labour market outcome, with the extent of discrimination being calculated from the difference in the

predicted values of the explanatory variables for the two groups of natives and foreigners. Our analysis of earnings discrimination is based on the assumption that in the absence of discrimination, the estimated effects of workers endowments on earnings are identical for immigrants and natives. Discrimination is therefore revealed by differences in the estimated coefficients. As earnings data are available only for the employed, we cannot rule out the existence of a sample-selection bias, which implies that the data used do not constitute a random sample of the total population. To avoid biased estimations of the regression coefficients, we therefore augment the earnings function with a model for the earnings probability.

The main results from our analysis can be summarized as follows. Starting with the descriptive statistics, we find a significant advantage in earnings of natives compared to immigrants. While the earnings advantage is around 16% for males, it is slightly lower for females with almost 14%. At the same time, the descriptive statistics reveal significant divergences in endowments between immigrants and natives. Turning to the earnings decomposition, the analysis shows that the endowment as well as the discrimination effect turns out in favour of natives, although the latter clearly dominates the former. Furthermore, the earnings differential between native and immigrant males is mainly driven by the schooling and experience variables. As the discrimination effect is more important, this implies that the rate of return on education and experience is lower for immigrants compared to natives. A similar picture emerges with respect to females, although the discrimination effect bears a much larger importance for females for the explanation of the earnings differential. While for males around two-thirds can be explained by the discrimination effect, the share for females is almost 85%. In contrast to males, only education is relevant to explain the earnings differential for females.

1. INTRODUCTION

Over the past 25 years, the analysis of labor market discrimination has received considerable attention in the literature. A survey on this research, which has mainly focused on the US, can be found in Cain (1986). It is noteworthy that this research has centered almost exclusively on the gender earnings gap, while studies on immigrant-native earnings differentials have by and large been neglected.[1] As a result of the large share of foreigners in total employment, studying this issue for Switzerland is interesting not only from an academic but also from political point of view.

A number of recent studies have shown that there are substantial earnings differentials between immigrants and natives in Switzerland [see Golder (1997), Golder/Straubhaar (1998) and Maechler (1993)]. The aim of this paper is to determine whether these differences can be attributed to diverging individual socio-economic profiles between immigrants and natives or to discrimination. As a starting point, we use a Mincer type earnings function, where logarithmic earnings are linearly related to a number of explanatory variables. A problem involved in this kind of analysis relates to the possibility of a sample-selection bias, which implies that the data used do not constitute a stochastic sample of the total population, as earnings data are only available for employed. To correct for the employment decision, we adopt a two-stage Heckman procedure.

Our analysis of earnings discrimination is based on the assumption that in the absence of discrimination, the estimated effects of workers endowments on earnings are identical for immigrants and natives. Discrimination is therefore revealed by differences in the estimated coefficients. To measure the extent of discrimination, we adopt the commonly used earnings difference decomposition approach developed by Oaxaca (1973) and Blinder (1973). This procedure allows a decomposition of the average difference in earnings between immigrants and natives into an endowment and a discrimination component.

The data used in this paper are taken from the Swiss Labour Force Survey (SLFS), a sample survey which is carried out annually since 1991. The SLFS provides important internationally

---

[1] There are a number of recent studies on the gender wage gap in Switzerland [see Kugler (1988), Bonjour (1996), Bonjour/Gerfin (1995) and Diekmann/Engelhardt (1995)].

comparable information on employment in Switzerland. Approximately 18'000 randomly selected persons from the official telephone register are interviewed every year. For the 1995 wave of the SLFS, on which the analysis of this paper is based on, an additional 14'000 persons were interviewed to allow for a more disaggregated analysis. The SLFS comprises a total of 500 questions, with each person asked around 100 questions on labor market related topics as well as on their socio-demographic profiles (e.g. sector, employment status, tenure, job mobility, job search, education, earnings).[2] The survey is restricted to persons of the resident population aged at least 15 years, i.e. Swiss and immigrants holding a residence or an annual permit. Finally, to avoid heterogeneity problems, we additionally restrict our analysis to first generation immigrants, i.e. immigrants who were either born abroad or at least aged 16 when they came to Switzerland.

2. THEORETICAL FRAMEWORK

In this section we present the theoretical framework used for the analysis of the immigrant-native earnings differentials. Earnings differentials between immigrants and natives can either be attributed to differences in human capital endowments or differences in the rewards to human capital. Following standard human capital theory, the performance of an individual in the labor market is largely dependent on his or her endowment of human capital [see Becker (1975)]. Based on the assumption that workers are paid according to their marginal product, differences in socio-economic profiles should explain most of the variation in earnings across people. Nevertheless, earnings differentials between gender and/or nationality can also be due to discrimination, i.e. differences in the rewards for the same endowment. In general, the residual, i.e. the part of the earnings differential that cannot be explained by endowment differences, is used as a proxy for the extent of earnings discrimination.

For a number of reasons it is not unproblematic, however, to equalize this unexplained part of the earnings differential with discrimination. *First*, productivity cannot be fully measured by endowment characteristics, which implies that an under- or overestimation of the discrimination component can occur. *Second*, endowment differences can at least in part be due to pre-market

---

2 For more details see Swiss Federal Statistical Office (1996).

discrimination, e.g. parents promoting more strongly the education of sons than of daughters. *Third*, earnings discrimination is only one possible form of discrimination. Aside from earnings discrimination labor market segmentation is another source of discrimination. Despite these problems, analyses that decompose earnings differentials into endowment and discrimination components, are important from an academic as well as from an economic policy point of view.

The analysis of earnings discrimination is usually based on the methodology developed by Blinder (1973) and Oaxaca (1973). The absolute earnings difference between two groups, a non-discriminated and a discriminated group, in our case natives and immigrants, is decomposed into a discrimination and an endowment component. As a starting point for the analysis, we use a Mincer type earnings function, which is estimated separately for natives and foreigners. The coefficients serve as a basis for the simulation of the labor market outcome, with the extent of discrimination being calculated from the difference in the predicted values of the explanatory variables for the two groups of natives and foreigners. The exogenous variables are valued at their respective mean values (or in case of dummy variables, the respective shares in the sample). These values are then weighted with the estimated coefficients of the earnings function to calculate the projected (logarithmic) earnings.

2.1 BASIC EARNINGS FUNCTION

In a first step, we present the earnings function on which the earnings differential decomposition is based on. As studies on wage and earnings distribution have shown, wage and earnings data are usually characterized by skewed distributions, with median earnings being smaller than mean earnings. In the literature, the log-normal distribution is therefore commonly used to approximate the effective earnings distribution. In our analysis, we use the natural log of monthly gross earnings as the endogenous variable *(LNINCGM)*.

Four remarks have to be made in this context. First, as the SLFS is a voluntary sample survey, answers to certain questions can therefore be rejected. As a result, the no-answer rate is rather high for earnings, with almost 20 per cent in the total sample [see Golder (1999)]. Second, for those providing information on earnings, these can take the form of hourly, monthly or annual data. To minimize the potential bias arising from recalculations, monthly data are used in our analysis, as almost 90 per cent of all answers are on a monthly basis. Third, to avoid earnings differences resulting from diverging weekly working hours, only full-time employed persons are

considered, i.e. persons with an employment level of 90 to 100 per cent. Finally, we use only information on persons aged 16 to 64, who are working in the civil sector.

The econometric literature on earnings determination is usually based on a semi-logarithmic regression equation of the form

(1) $$\ln y_i = f(x_i) + u_i \qquad i = 1,\ldots,n$$

with ln y_i being the natural log of earnings, x_i a number of exogenous, explanatory variables of earnings and u_i a stochastic error term, for which the usual assumption $u_i \approx N(0,\sigma^2)$ applies. Following Mincer (1974), we use years of schooling *(SCH)* and years of experience *(EXPE)* as the major explanatory variables. Experience is calculated as follows:

(2) $$EXPE = AGE - SCH - 6.5\,.$$

Following human capital theory, we assume the usual concave shape of earnings over the life cycle. These considerations imply that the earnings function should be expanded by a quadratic term to account for the decreasing return to labor market experience. As a result of the high degree of multicollinearity between EXPE and EXPSQ, we omit the quadratic term in our analysis.

Aside from these individual specific characteristics, a number of job and sector specific effects are relevant for the determination of earnings. To account for employment position, two dummy variables for employed holding a superior function *(EMWM)* and a board member function *(EMBM)* are included in the earnings function. Furthermore, we include a dummy-variable for branches in the tertiary sector *(SECTOR3)* that require a higher educational level, i.e. transport, storage and communication; financial intermediation, real estate, renting and business activities; and other services (health, education, research).

In addition to these microeconomic variables we include the unemployment rates at the state (cantonal) level *(UNPL)* as a macroeconomic indicator for the influence of the current economic condition on earnings. With regard to the earnings performance of immigrants, we furthermore have to consider the effect arising from the accumulation of host country specific human capital. This assimilation effect is usually measured by the number of years since migration *(YSM)*. Finally, we include a dummy-variable for immigrants from Northern Europe and other industrial countries *(NTHEU_IC)* and one for immigrants from Southern Europe

(STHEU), with immigrants from non-European countries used as the base category, to account for country-of-origin differences in the earnings performance. A summary of the variables used in the earnings function can be found in Table 1.

2.2 HECKMAN-CORRECTION

As earnings data are available only for employed, we should augment the earnings function by a model for the earnings probability, to avoid biased estimations of the regression coefficients as a result of a sample-selection bias. A selection bias can be expected, if unobserved characteristics that have an influence on the employment probability are correlated with the level of market earnings. Following Heckman (1974, 1976, 1979), the influence of the employment decision is usually accounted for with the inclusion of a selection correction variable λ, the so called Heckman-correction. As the value of λ decreases with increasing employment probability, the selection correction variable is important mainly for individuals with a relatively low employment probability. As the employment probability of males is very high in Switzerland, the Heckman-correction is adopted only for females.[3] The coefficient of λ in the earnings regressions indicates the direction of the selection bias. If the coefficient is negative, the observed earnings imply an underestimation of the potential market based earnings and vice versa.

The Heckman-correction proceeds in two steps. First, to calculate the sample-selection variable λ, a probit model is estimated for the employment probability of females. Second, this variable is used for the correction of the female earnings function. In line with labor market theory, we use the following specification for the probit model. As endogenous variable, we use the employment probability *(EMPL)*, i.e. a dichotomous variable that assumes a value of 1 if the person considered is employed and a value of 0 else.

With respect to the explanatory variables we distinguish two categories of variables. In the first category, variables that determine the market wage are considered, i.e. mainly those variables already included in the earnings function. More specifically, we use schooling *(SCH)* and experience *(EXPE)*, the state level unemployment rates *(UNPL)*, as well as the immigrant specific nationality group variables *(NTHEU_IC, STHEU)*. The second category comprises those variables that determine the reservation wage. As a first variable, we use the log of monthly household

---

3 See Golder (1998) and Golder/Straubhaar (1998).

residual earnings *(LN_HHINC)*, which can be derived from the difference of total monthly earnings and monthly gross labor earnings of the target person. Furthermore, we assume that the existence of children bears an influence on the employment probability of the parents. We therefore include three different variables classified by age groups, namely the number of children aged 6 years or less *(KID_6)*, the number of children aged 7 to 14 *(KID7_14)*, and the number of children aged 15 to 25 *(KID15_25)*. As a result of these considerations, the employment decision of females is assumed to be the result of a comparison between market and reservation wages and not due to discriminatory hiring practices of employers. This issue is important for the decomposition of the earnings differentials. Table 2 shows a summary of the variables used for the Heckman-correction.

Before turning to the theoretical considerations on the earnings difference decomposition, a few remarks on the Heckman-correction have to be made. In a survey, Puhani (1997:13) concludes that theoretical considerations as well as the results of various Monte Carlo studies "... cast doubt on the omnipotence implicitly ascribed by many applied researchers to Heckman's (1976, 1979) two-step estimator". One of the main criticisms is related to multicollinearity between the variables of the two regression equations that can lead to inefficient estimators. As emphasized by Puhani, the use of the Heckit-procedure is most needed when there is a high correlation between the error term of the selection and the main equation, and when there is a high degree of censoring in the data. Exactly in these cases, however, the Heckman-estimator is especially inefficient, and MLE-estimations allow more robust estimations. Based on these considerations, a case-by-case evaluation of the appropriateness of using a Heckman-correction should be adopted.

2.3 EARNINGS DIFFERENCE DECOMPOSITION

After the discussion of the earnings function and the Heckman-correction, we now turn to the discussion of the earnings difference decomposition approach, as outlined by Oaxaca (1973) and Blinder (1973). In a first step, the earnings functions for immigrants and natives are estimated separately. The two equations can be written as follows:

(3) $\ln Y_{ni} = X_{ni}\beta_{ni} + \lambda_{nf}\gamma_{nf} + \varepsilon_{ni}$ and

(4) $\ln Y_{fi} = X_{fi}\beta_{fi} + \lambda_{ff}\gamma_{ff} + Z_{fi}\alpha_{fi} + \varepsilon_{fi}$

with ni = native male (nm) and female (nf)

fi = foreign male (fm) and female (ff)

with β_{ni} and β_{fi} representing the respective coefficient vectors that are identical for immigrants and natives. α_{fi} corresponds to the coefficient vector for the immigrant specific variables and γ_{nf} and γ_{ff} respectively stand for the coefficients of the selection correction variables. As we use OLS to estimate these coefficients, the estimated regression line passes through the mean values. Eq. (3) and (4) can therefore be rewritten as follows:

(5) $\ln \overline{Y}_{ni} = \overline{X}_{ni}\hat{\beta}_{ni} + \overline{\lambda}_{nf}\hat{\gamma}_{nf}$ and

(6) $\ln \overline{Y}_{fi} = \overline{X}_{fi}\hat{\beta}_{fi} + \overline{\lambda}_{ff}\hat{\gamma}_{ff} + \overline{Z}_{fi}\hat{\alpha}_{fi}$,

with $\hat{\beta}_{ni}$, $\hat{\beta}_{fi}$, $\hat{\alpha}_{ff}$, $\hat{\gamma}_{nf}$ and $\hat{\gamma}_{ff}$ representing the vectors of the estimated OLS-coefficients. The difference in the mean values of the logarithmic earnings between the two groups can then be written as follows

(7) $\ln \overline{Y}_{ni} - \ln \overline{Y}_{fi} = \left(\overline{X}_{ni}\hat{\beta}_{ni} - \overline{X}_{fi}\hat{\beta}_{fi}\right) + \left(\overline{\lambda}_{nf}\hat{\gamma}_{nf} - \overline{\lambda}_{ff}\hat{\gamma}_{ff}\right) - \overline{Z}_{fi}\hat{\alpha}_{fi}$.

If we define the difference in the coefficient vectors for non-immigrant specific variables as follows

(8) $\Delta\hat{\beta} = \hat{\beta}_n - \hat{\beta}_f$ so that $\hat{\beta}_f = \hat{\beta}_n - \Delta\hat{\beta}$,

then by substituting in eq. (7) and some rearrangements, we get

(9) $$\begin{aligned}\ln \overline{Y}_{ni} - \ln \overline{Y}_{fi} = {} & \left(\hat{\beta}_{0ni} - \hat{\beta}_{0fi}\right) + \sum\left\{\overline{X}_{fi}\left(\hat{\beta}_{ni} - \hat{\beta}_{fi}\right)\right\} - \overline{Z}_{fi}\hat{\alpha}_{fi} \\ & + \sum\left\{\hat{\beta}_{ni}\left(\overline{X}_{ni} - \overline{X}_{fi}\right)\right\} + \left(\overline{\lambda}_{nf}\hat{\gamma}_{nf} - \overline{\lambda}_{ff}\hat{\gamma}_{ff}\right)\end{aligned}.$$

Based on eq. (9), the earnings differential between immigrants and natives can be decomposed as follows.[4] The first decomposition component, the so called group effect, is given by the difference of the constant terms, the share of the earnings differential that is due to diverging coefficients, and the immigrant specific variables. Based on the seminal contribution by Becker (1971), we assume that prejudices by a majority group, in our case natives, vis-á-vis immigrants, lead to a loss in utility for the former, which have to be compensated by wage reductions for the latter. In the terminology of Blinder, this group effect is equal to the hypothetical earnings increase that immigrants could achieve, if they would exhibit the same earnings structure as natives, ceteris paribus. The group effect can thus be interpreted as the discrimination effect that indicates the share of the earnings differential that is due to discrimination.

The endowment effect is composed of the last two terms in eq. (9). The first part reflects the hypothetical additional earnings immigrants could achieve, if they had identical endowments as natives. The second part comprises the sample-selection bias correction variable for female employed. This component is included in the endowment effect as we assume that the participation decision of employable females is voluntary and unrestricted. If we would, instead, assume that females willing to work would be restricted in their participation decision by discriminating employers, we would have to include this component in the discrimination effect.

As can be seen from eq. (9), endowment differences are weighted with the estimated coefficients of the non-discriminated group, while the difference in the estimated coefficients is weighted with the average characteristics of the discriminated group. If we would alternatively substitute for $\hat{\beta}_n$, and not for $\hat{\beta}_f$ in eq. (7), we would get the following alternative formulation of the earnings difference decomposition after some rearrangements

$$\text{(10)} \qquad \begin{aligned} \ln \overline{Y}_{ni} - \ln \overline{Y}_{fi} = & \left(\hat{\beta}_{0ni} - \hat{\beta}_{0fi}\right) + \sum \left\{\overline{X}_{ni}\left(\hat{\beta}_{ni} - \hat{\beta}_{fi}\right)\right\} - \overline{Z}_{fi}\hat{\alpha}_{fi} \\ & + \sum \left\{\hat{\beta}_{fi}\left(\overline{X}_{ni} - \overline{X}_{fi}\right)\right\} + \left(\overline{\lambda}_{nf}\hat{\gamma}_{nf} - \overline{\lambda}_{ff}\hat{\gamma}_{ff}\right) \end{aligned} .$$

---

4 As the decomposition of the earnings differential is based on logarithmic and not absolute earnings, by taking antilogs, we get geometric mean values. The earnings differential is thus decomposed for the geometric mean values. The endowment and the discrimination effect can then approximately be interpreted as the percentage increase or decrease in the geometric group mean values. In case of larger logarithmic differences, however, this leads only to a rough approximation.

In this case, the average endowment differences are weighted with the estimated coefficients of the discriminated group and the difference in the coefficients is weighted with the average characteristics of the non-discriminated group. The choice between eq. (9) and eq. (10) for the analysis of the extent of earnings discrimination represents a classical index number problem that involves a decision on which weights to employ.[5] In practice, both equations are usually employed, as it is assumed that they bracket the estimated effects of discrimination on wages.

Before turning to the empirical results, two remarks have to be made. First, we cannot exclude the possibility of an over- or underestimation of the extent of discrimination. An overestimation occurs if productivity related characteristics are not fully accounted for and the group with lower earnings exhibits a more unfavorable endowment of non-observable characteristics. If this group, in contrast, exhibits a more favorable endowment of non-observable characteristics, then we get an underestimation of the extent of discrimination.

Second, the model presented here for the analysis of discrimination can be augmented in several ways. First, eq. (9) and (10) could be generalized by the inclusion of weighting factors. By means of a matrix W, we could determine how the differences between the coefficients of the discrimination effect and the mean values of the endowment effects could be weighted.[6] Second, we could use the complete earnings distribution as a basis for the analysis of earnings discrimination, instead of only using the mean earnings differentials.[7]

---

5 See Berndt (1996).

6 See Blinder (1973), Oaxaca (1973), Reimers (1983) and Velling (1995). Several authors have criticized the exclusion of a weighting matrix [see Cotton (1988) and Neumark (1988)].

7 See Jenkins (1994). Jenkins (1994: 82) argues in this context that the extent of discrimination as measured by the Oaxaca/Blinder decomposition "... may be consistent with very different distributions of discrimination experience".

3. EMPIRICAL RESULTS

In the context of the empirical analysis of earnings differentials, two principal questions have to be answered. First, how much do immigrants earn compared to natives and are there differences between nationality groups? Second, are these differences due to diverging individual characteristics of immigrants or due to the fact that these individuals are immigrants?

3.1 EARNINGS FUNCTION

The analysis in the section is based on the Mincer type earnings function as depicted in eq. (1). Before we turn to the estimation results, we show some descriptive statistics for the variables used in the earnings functions. In Table 3, the descriptives for the Heckman-correction are shown. As can be seen, immigrant females exhibit a significantly higher employment probability than native females, which is due to the higher share of full-time employed of the former. Additionally, the duration of education is longer for native females on average and the duration of experience accordingly shorter.[8] Finally, household residual earnings turn out to be around 25 per cent higher for native than for immigrant females.

Turning to the descriptive statistics of the earnings function in Table 4, it can be seen that natives on average achieve higher labor earnings compared to immigrants, although there are significant differences between males and females. Natives on average are also better educated than immigrants. The opposite holds with respect to work experience. We can also observe substantial divergences in terms of the employment status for natives and immigrants. As a result of the heterogeneity within the sector variable, it will be difficult, however, to derive unambiguous conclusions on the effects of this variable.

As we use a Heckman-correction for the female earnings equation, the estimation results are shown separately by gender. In Table 5, the estimation results of the earnings function for native and immigrant males are shown. As can be seen, the coefficients of the education and experience variables as well as the employment status are significantly positive. In contrast, the

---

8 Golder (1999).

sector variable is insignificant for immigrants, which can be due to a counterbalancing effect arising from the heterogeneity within this variable.

Additionally, it turns out that the current economic condition does neither have a significant influence on the earnings level of natives nor immigrants. The insignificant assimilation effect of the duration of stay variable for immigrants is likely to be due to their rather long average duration of stay. Finally, turning to the nationality group specific variables, it can be seen that immigrants from Northern Europe and Southern Europe exhibit a significant earnings advantage of 21 and 9 per cent respectively compared to immigrants from non-European countries, ceteris paribus.

3.2 HECKMAN-CORRECTION

The analysis of the estimation results of the earnings function for native and immigrant females proceeds in two steps. In a first step, the results of the probit regression are discussed for the employment probability. In a second step, including the selection correction variable, the discussion of the results on the earnings function follows. As can be seen from Table 6, there is a widespread qualitative correspondence of the estimation results between native and immigrant females, although there are differences in the quantitative dimension of the signficant variables.

As can be seen from Table 6, the education level of native as well as immigrant females does not bear any significant effect on the employment probability. This result can be explained by the fact that the positive association between the education level and the employment probability is weakened through a substitution effect arising from the positive association between education and earnings. Furthermore, it should be borne in mind that only full-time employed are considered. Finally, the insignificant effect for immigrant females can be explained by the incomplete transferability of human capital. As the employment probability decreases with increasing age, there is accordingly a negative effect arising from experience.

Overall there is no clear association between the determinants of the market wage and the employment probability. In contrast, the determinants of the reservation wage bear a significantly negative effect on the employment probability. As can be seen from Table 6, female immigrants from Northern Europe exhibit a significantly lower employment probability than female immigrants from Southern and non-European countries. This result is due to the relatively high

share of Northern Europeans that are employed only part-time, a fact that is especially true compared to the base category of non-Europeans.

After these considerations on the Heckman-correction, the estimation results for the female earnings function, including the selection correction variable *(LAMBDA)* are shown in Table 7. The comparison with the results from the male earnings function reveals that there is a close qualitative correspondence in the estimated coefficients. The major divergence is given by the significantly positive correlation between the unemployment and the earnings level, which can be interpreted as an 'added-worker' effect. An interesting variable in Table 7 is the selection correction variable. As can be seen, there is not only a significant negative effect on the earnings level for native, but also for immigrant females. Based on the above considerations, we can therefore conclude that the error term of the market and the reservation wage equations are positively correlated. This implies that, based on the assumption of identical observable characteristics, females with higher potential earnings exhibit a higher reservation wage and are accordingly rather underrepresented in the labor market. Therefore, the observable earnings of employed female underestimate the earnings of employable females.[9]

3.3 EARNINGS DIFFERENCE DECOMPOSITION

The empirical results on the earnings difference decomposition are shown in Table 8 and 9. In both tables the results of eq. (9) and eq. (10) are displayed. Three main results can be derived from the earnings difference decomposition for immigrant and native males in Table 8. First, the endowment as well as the discrimination effect clearly turn out in favor of natives, although the latter largely dominates the former.

Second, the earnings differential between native and immigrant males is mainly driven by the schooling and experience variables. As can be seen in Table 8, the discrimination effect plays a much larger role than the endowment effect, which implies that the rate of return on education and experience is lower for immigrants compared to natives. This result can, however, also be explained by the incomplete transferability of human capital and experience acquired in the home country.

---

9 Kugler (1988) and Diekmann/Engelhardt (1994) arrive at similar conclusions for Switzerland.

Third, turning to the effects of the immigrant specific variables, it can be seen that they contribute to the reduction of the discrimination effect, as all three effects have a negative sign. It has to be mentioned, however, that the signs of the two dummy variables for the nationality groups hinge on the selection of the reference group.[10] If we would have used Northern European immigrants as the base category instead of non-Europeans, the signs for the two dummy variables would have been positive.

The results of the earnings difference decomposition for native and immigrant females are shown in Table 9. The comparison with the results in Table 8 reveal that the earnings differential for males is around 17 per cent larger than for females. As can be seen from Table 9, the discrimination effect bears a significantly larger importance for females, however, for the explanation of the earnings differential. While around one third of the earnings differential can be explained by the endowment effect for males, the share for females is merely about 17 per cent. In contrast to males, only the education variable is relevant to explain the earnings differential for females, although in both cases the discrimination effect also clearly dominates. Turning to the immigrant specific variables, it can be seen that they are by and large similar for males and females, as they contribute to a reduction of the discrimination effect in both cases. Overall, the comparison of the results between males and females reveals that the decomposition yields less clear results for females than for males. Finally, turning to the sample-selection correction variable, there is a small positive endowment effect in favor of immigrant females.

---

10 See Oaxaca/Ransom (1997) and Nielsen (1998).

4. CONCLUSIONS

The aim of this paper was to analyze whether earnings differentials between immigrants and natives on the Swiss labor market are due to differences in endowments or to discrimination. Following the approach developed by Blinder (1973) and Oaxaca (1973), we decompose the earnings differential between immigrant and natives into an endowment and a discrimination component. The procedure is as follows. In a first step, we estimate earnings regressions separately for the two groups by gender. To correct for sample-selection bias, arising from the endogeneity of the employment decision, we use a two-stage Heckman procedure. In a second step, the mean values of the endowment differences are weighted with the estimated coefficients from the earnings function of the non-discriminated group and the differences in the estimated coefficients are weighted with the average characteristics of the discriminated group.

The decomposition of the earnings differentials reveals that the discrimination effect plays a more important role than the endowment effect for males as well as females in the case of Switzerland. While for males, schooling and experience explain most of the earnings differential, for females this is true only with respect to the former. Furthermore, the analysis reveals that the nationality group specific variables reduce the discrimination effect for males as well as females. Finally, the sample-selection correction variable used to correct the female earnings functions leads to a small positive endowment effect in favor of immigrant females.

APPENDIX

Table 1: Earnings function (without Heckman-correction)

Variables	***Definition***	***Variables***	***Definition***
LNINCGM	Log of monthly gross earnings	***SECTOR3***	Employment in higher-skilled tertiary sector segments
SCH	Years of schooling	***YSM***	Years since migration
EXPE	Years of work experience	***UNPL***	State level unemployment rates
EMWM	Employment status with superior function	***NTHEU_IC***	Dummy variable for Northern European immigrants
EMBM	Employment status with board member function	***STHEU***	Dummy variable for Southern European immigrants

Source: own description

Table 2: Heckman-correction

Variables	***Definition***	***Variables***	***Definition***
EMPL	Binary employment variable	***STHEU***	Dummy variable for Southern European immigrants
SCH	Years of schooling	***LN_HHINC***	Log of monthly household residual earnings
EXPE	Years of work experience	***KID_6***	Number of children aged 6 years or less
UNPL	State level unemployment rates	***KID7_14***	Number of children aged 7 to 14
NTHEU_IC	Dummy variable for Northern European immigrants	***KID15_25***	Number of children aged 15 to 25

Source: own description

Table 3: Descriptive Statistics: Heckman-correction

Variables	*Native females*	*Immigrant females*	*Variables*	*Native females*	*Immigrant females*
Sample size	6652	802	*Sample size*	6652	802
EMPL	0.38 (0.48)	0.47 (0.50)	*STHEU*		0.46
SCH	10.17 (2.09)	9.85 (2.85)	*LN_HHINC*	6.30 (3.74)	6.03 (3.71)
EXPE	23.40 (12.65)	23.64 (11.48)	*KID_6*	0.32 (0.68)	0.29 (0.58)
UNPL	4.12 (1.85)	4.84 (1.97)	*KID7_14*	0.33 (0.72)	0.37 (0.69)
NTHEU_IC		0.33	*KID15_25*	0.38 (0.48)	0.26 (0.62)

Source: SLFS (1995), own calculations
Notes: Standard errors in parentheses

Table 4: Descriptive Statistics: Earnings function

Variables	*Native males*	*Native females*	*Immigrant males*	*Immigrant females*
Sample size	4733	2500	757	378
LNINCGM	8.66 (0.37)	8.33 (0.35)	8.51 (0.37)	8.20 (0.38)
SCH	10.94 (2.61)	10.46 (2.25)	10.34 (3.09)	10.07 (2.90)
EXPE	21.40 (11.15)	18.95 (11.52)	24.57 (10.65)	21.71 (9.82)
EMWM	0.31	0.20	0.23	0.14
EMBM	0.14	0.06	0.09	0.05
SECTOR3	0.44	0.59	0.26	0.49
UNPL	3.98 (1.79)	4.17 (1.84)	4.66 (1.92)	4.77 (2.03)
YSM			17.51 (10.70)	14.59 (9.65)
NTHEU_IC			0.30	0.34
STHEU			0.48	0.44

Source: SLFS (1995), own calculations
Notes: Standard errors in parentheses

Table 5: OLS-regression results for the male earnings function (without Heckman-correction)

Variables	***Natives***	***Immigrants***
Sample size	4733	757
CONSTANT	7.696***	7.743***
	(310.63)	(105.17)
SCH	0.057***	0.044***
	(29.73)	(7.48)
EXPE	0.011***	0.005**
	(24.04)	(2.43)
EMWM	0.144***	0.129***
	(15.81)	(5.10)
EMBM	0.310***	0.363***
	(21.08)	(7.19)
SECTOR3	0.010***	0.034
	(11.33)	(1.15)
UNPL	–0.003	–0.005
	(1.47)	(0.92)
YSM		0.002
		(1.06)
NTHEU_IC		0.209***
		(5.96)
STHEU		0.091***
		(3.15)
Adj.–R^2	0.402	0.421

Source: SLFS (1995), own calculations

Notes: absolute t-values in parentheses are corrected for heteroskedasticity [see White (1980)]

** 10 per cent level of significance, ** 5 per cent level of significance, *** 1 per cent level of significance*

Table 6: Probit-regression on female employment probabilities

Variables	***Natives***		***Immigrants***	
	Slope b (abs. t values)	*Marginal effects*	*Slope b (abs. t values)*	*Marginal effects*
Sample size	6652		802	
CONSTANT	1.852*** (15.19)	0.6548	2.117*** (6.66)	0.8420
SCH	0.001 (0.12)	0.0004	–0.021 (1.07)	–0.0085
EXPE	–0.044*** (26.78)	–0.0155	–0.033*** (6.72)	–0.0132
UNPL	0.009 (0.82)	0.0030	–0.035 (1.42)	0.0140
LN_HHINC	–0.122*** (23.92)	–0.0432	–0.110*** (7.98)	–0.0439
KID_6	–1.135*** (23.56)	–0.4011	–0.508*** (5.40)	–0.2020
KID7_14	–0.573*** (17.28)	–0.2028	–0.256*** (3.41)	–0.1019
KID15_25	–0.260*** (6.67)	–0.0920	–0.211** (2.53)	–0.0838
NTHEU_IC			–0.268* (1.89)	–0.1065
STHEU			0.043 (0.33)	0.0171
Log–L	–2825.405		–473.409	
Pseudo–R^2	0.637		0.484	

Source: SLFS (1995), own calculations

*Notes: * 10 per cent level of significance, ** 5 per cent level of significance, *** 1 per cent level of significance*

Table 7: OLS-regression results for the female earnings function (with Heckman-correction)

Variables	***Natives***	***Immigrants***
Sample size	2500	378
CONSTANT	7.547***	7.463***
	(217.99)	(81.87)
SCH	0.056***	0.044***
	(19.04)	(7.16)
EXPE	0.007***	0.006**
	(11.59)	(2.24)
EMWM	0.094***	0.207***
	(6.29)	(4.76)
EMBM	0.179***	0.131**
	(7.18)	(1.85)
SECTOR3	0.165***	0.182***
	(13.04)	(5.97)
UNPL	0.003	0.014*
	(0.81)	(1.84)
YSM		0.001
		(0.43)
NTHEU_IC		0.130***
		(2.99)
STHEU		–0.043
		(1.05)
LAMBDA	–0.118***	–0.101**
	(7.96)	(2.11)
Adj.–R^2	0.270	0.437

Source: SLFS (1995), own calculations

Notes: absolute t-values in parentheses are corrected for heteroskedasticity [see White (1980)]

** 10 per cent level of significance, ** 5 per cent level of significance, *** 1 per cent level of significance*

Table 8: Earnings difference decomposition for native and immigrant males

Variables	***Endowment effect***		***Discrimination effect***		***Earnings difference***
	(9)	***(10)***	***(9)***	***(10)***	
CONSTANT			–0.047	–0.047	*–0.047*
SCH	0.034	0.026	0.134	0.142	*0.168*
EXPE	–0.034	–0.016	0.137	0.120	*0.104*
EMWM	0.012	0.011	0.003	0.005	*0.016*
EMBM	0.018	0.021	–0.005	–0.008	*0.013*
SECTOR3	0.018	0.006	0.017	0.029	*0.035*
UNPL	0.002	0.003	0.007	0.006	*0.010*
NTHEU_IC			–0.062	–0.062	*–0.062*
STHEU			–0.044	–0.044	*–0.044*
YSM			–0.037	–0.037	*–0.037*
Total effect	***0.051***	***0.052***	***0.104***	***0.104***	***0.155***

Source: SLFS (1995), own calculations

Table 9: Earnings difference decomposition for native and immigrant females

Variables	***Endowment effect***		***Discrimination effect***		***Earnings difference***
	(9)	***(10)***	***(9)***	***(10)***	
CONSTANT			0.084	0.084	*0.084*
SCH	0.022	0.017	0.114	0.118	*0.136*
EXPE	–0.021	–0.017	0.030	0.026	*0.009*
EMWM	0.006	0.013	–0.016	–0.023	*–0.010*
EMBM	0.003	0.002	0.002	0.003	*0.005*
SECTOR3	0.016	0.018	–0.008	–0.010	*0.008*
UNPL	–0.002	–0.008	–0.053	–0.047	*–0.055*
NTHEU_IC			–0.044	–0.044	*–0.044*
STHEU			–0.018	–0.018	*–0.018*
YSM			–0.016	–0.016	*–0.016*
LAMBDA	–0.002	–0.002			*–0.002*
Total effect	***0.022***	***0.023***	***0.110***	***0.109***	***0.132***

Source: SLFS (1995), own calculations

BIBLIOGRAPHY

Becker, Gary S. (1971): The Economics of Discrimination, 2nd ed., University of Chicago Press: Chicago & London.

Becker, Garry S. (1975): Human Capital, New York: Columbia University Press.

Berndt, Ernst R. (1996): The practice of econometrics: classic and contemporary, Reading (Mass.): Addison-Wesley.

Blinder, Alan S. (1973): "Wage Discrimination: Reduced Form and Structural Estimates", *Journal of Human Resources*, 8 (4), 436-455.

Bonjour, Dorothe (1996): Lohndiskriminierung in der Schweiz - eine ökonometrische Untersuchung, Dissertation, Universität Bern.

Bonjour, Dorothe/Gerfin, Michael (1995): "Einkommensungleichheit zwischen Frauen und Männern. Eine ökonometrische Analyse der Schweizer Arbeitskräfteerhebung", *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, 131 (4), 701-710.

Cain, Glen C. (1986): "The Economic Analysis of Labor Market Discrimination: A Survey", in: Ashenfelter, Orley/Layard, Richard (eds.): Handbook of Labor Economics I, North-Holland: Amsterdam, 693-785.

Cotton, Jeremiah (1988): "On the Decomposition of Wage Differentials", *Review of Economics and Statistics*, 70 (2), 236-243.

Diekmann, Andreas/Engelhardt, Henriette (1994): "Einkommensungleichheit zwischen Frauen und Männern. Eine ökonometrische Analyse der Schweizer Arbeitskräfteerhebung", *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, 131 (1), 57-83.

Golder, Stefan M. (1997): "Die Arbeitsmarktperformance von Einwanderern in der Schweiz: Eine theoretische und empirische Analyse im Rahmen eines internationalen Vergleichs", *WWZ-Forschungsbericht*, 6/97 (September), WWZ: Universität Basel.

Golder, Stefan M. (1998): "On the employment performance of immigrant workers: an empirical analysis for Switzerland", *Discussion Paper No. 74*, Institute for Economic Research Halle, Halle.

Golder, Stefan M. (1999): Migration und Arbeitsmarkt: Eine empirische Analyse der Performance von Ausländern, Peter Lang Verlag: Frankfurt a.M.

Golder, Stefan M./Straubhaar, Thomas (1998): "Migration to Switzerland: Some New Evidence", *CEPR Discussion Paper*, 1791, London.

Heckman, James J. (1979): "Sample Selection Bias as a Specification Error", *Econometrica*, 47 (1), 153-162.

Heckman, James J. (1976): "The Common Structure of Statistical Models of Truncation, Sample Selection Bias and Limited Dependent Variables and a Simple Estimator for Such Models", *Annals of Economic and Social Measurement*, 5 (4), 475-492.

Heckman, James J. (1974): "Shadow Prices, Market Wage and Labor Supply", *Econometrica*, 42 (4), 679-694.

Jenkins, Stephen P. (1994): "Earnings discrimination measurement: A distributional approach", *Journal of Econometrics*, 61 (1), 81-102.

Kugler, Peter (1988): "Lohndiskriminierung in der Schweiz: Evidenz von Mikrodaten", *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, 124 (1), 23-47.

Maechler, Andréa M. (1993): "Assimilation and Earnings Dynamics in Switzerland: A Comparison Between Foreign Permanent Residents' And Native Workers' Earnings Profiles", Institut Universitaire des Hautes Etudes Internationales, Université de Genève, mimeo.

Mincer, Jacob (1974): Schooling, experience and earnings, NBER, New York.

Neumark, David (1988): "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination", *Journal of Human Resources*, 23 (3), 279-295.

Nielsen, Helena S. (1998): "Two Notes on Discrimination and Decomposition", *Working Paper 98-01*, Centre for Labour Market and Social Research, University of Aarhus and the Aarhus School of Business.

Oaxaca, Ronald L. (1973): "Male-Female Wage Differentials in Urban Labor Markets", *International Economic Review*, 14 (3), 693-709.

Oaxaca, Ronald L./Ransom, Michael R. (1997): "Identification in Detailed Wage Decomposition", *Working Paper 97-12*, Centre for Labour Market and Social Research, University of Aarhus and the Aarhus School of Business.

Puhani, Patrick A. (1997): "Foul or Fair? The Heckman Correction for Sample Selection and Its Critique: A Short Survey", *ZEW-Discussion Paper*, 97-07, Mannheim.

Reimers, Cordelia (1983): "Labor Market Discrimination Against Hispanic and Black Men", *Review of Economics and Statistics*, 65 (4), 570-579.

Swiss Federal Statistical Office (1996): Die Schweizerische Arbeitskräfteerhebung – Konzepte, Methodische Grundlagen, Praktische Ausführung", Bern.

Velling, Johannes (1995): "Wage Discrimination and Occupational Segregation of Foreign Male Workers in Germany", *ZEW-Discussion Paper*, 95-04, Mannheim.

White, H. (1980): "A Heteroscedasticity Consistent Variance Covariance Matrix Estimator and Direct Test of Heteroscedasticity", *Econometrica*, 48 (4), 817-818.