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Voluntary Brain Waste and the Reservation Wage of Migrants. Evidence from Austria and Three CEE Countries

Klaus Nowotny*

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Abstract

Stylized facts show that migrants more often face overqualified employment than natives. Whether this “brain waste” is involuntary or voluntary is, however, unresolved; migrants may be discriminated against or they may be willing to accept a job-skill-mismatch as long as they receive a compensation for working in overqualified employment. This paper analyzes how the willingness to work in overqualified employment affects the reservation wage of skilled migrants. Both a theoretical as well as an empirical analysis show that individuals require a sizable compensation for the disutility of overqualified employment: the reservation wage of potential migrants willing to accept overqualified employment is about 11 % higher than that of potential migrants who would not accept overqualified employment.

JEL classification numbers: J15, J24, J31, F22, C24

Keywords: brain waste, overqualification, migration, reservation wage, interval regression

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1 Introduction

Empirical evidence shows that migrants more often face overqualified employment than natives. As shown by Hierländer and Huber (2010), one third of the employed foreign born with tertiary education in the EU-15 are overqualified, with levels reaching up to 57.6 %, compared to 20.9 % among natives. Among the employed foreign born with medium education levels (ISCED 3–4), about one fifth (19.8 %) is overqualified in the EU-15, compared to 7.4 % of the natives according to Hierländer and Huber (2010, see also Eichhorst et al., 2011). For the U. S., Özden and Schiff (2006, p. 237f) show that among employed migrants with tertiary education who moved to the U. S. in the 1990s only 21 to 76 % obtained skilled jobs, depending on the country of origin. Especially highly skilled migrants from Latin American countries have rather low probabilities of finding skilled employment. This “brain waste” is not only suboptimal from an individual point of view, but also inefficient both from a sending and receiving country perspective.

One question not addressed in this literature is whether migrants’ brain waste is “involuntary”, e. g. the result of labor market discrimination or due to limited transferability of qualifications (see Haley and Taengnoi, 2011, for a recent contribution), or “voluntary”: working in overqualified employment abroad can represent an optimal choice as long as migrants are compensated for the disutility of the job-skill mismatch by a higher wage.

This paper therefore analyzes the impact of the willingness to accept overqualified employment on the reservation wage of prospective medium and highly skilled migrants. The empirical analysis uses individual level data surveyed in 2010 in Austria, the Czech Republic, Slovakia and Hungary. The survey was designed to identify migration and cross-border commuting intentions in these four countries and is especially suited to the analysis in this paper because it avoids the selection problems which would be associated with estimating migrants’ reservation wages after migration.

The theoretical model shows that migrants require a “wage premium” for overqualified employment abroad, and the empirical model shows that the reservation wage abroad (relative to the wage at home) is about 11 % higher for those who are willing to accept overqualified employment.

2 Theoretical model

To show the effect of being willing to accept overqualified employment on the reservation wage of skilled workers a simple model of migration is introduced.

Assume that the lifetime utility of individual i working in her home country h in job j is given by:

$$U_i^h = w^h(r^h - a_i)g^h(s_j)m_i(s_i - s_j) \quad (1)$$

Lifetime utility depends on yearly earnings in the home country w^h multiplied by the remaining number of years the individual can work in the labor market, $r^h - a_i$, where r^h is the official age of retirement in h and a_i is the individual's age.¹ The function $g^h(\cdot) \geq 1$ gives the returns to skill in country h which are an increasing function of the skill level required by job j , s_j^h . For the sake of simplicity it is assumed that there are only two skill levels $s^{hi} > s^{lo}$ and that $g^h(s_j) = 1$ if $s_j = s^{lo}$. Workers with an individual skill level $s_i = s^{hi}$ are labeled as skilled workers, workers with $s_i = s^{lo}$ are labeled as unskilled workers.

The lifetime wage is, however, discounted by an individual job-skill mismatch parameter $m_i(s_i - s_j) \leq 1$. It is assumed that $m_i(\cdot) = 1$ if $s_i = s_j$ and that $\partial m_i(\cdot)/\partial(s_i - s_j) < 0$, so that lifetime income is only discounted if there is a job-skill mismatch. Because the focus is on skilled workers, $m_i(\cdot) = 1$ if $s_j = s^{hi}$ and $m_i(\cdot) < 1$ if $s_j = s^{lo}$. $m_i(\cdot)$ can vary over individuals and even be negative, so that for some individuals working in overqualified employment actually entails a disutility. Correspondingly, the lifetime utility when working abroad in country f and job k can be defined as:

$$U_i^f = w^f(r^f - a_i)g^f(s_k)m_i(s_i - s_k) \quad (2)$$

To keep the analysis as simple as possible, assume that for jobs in the home country s_i is always equal to s_j , so that individuals can always find a job which matches their skills in the home country. Furthermore, assume that the age of retirement is the same at home and abroad ($r^h = r^f$). Because $m_i(\cdot) = 1$ if $s_i = s_j$ and we are focusing on skilled individuals only, utility from working in the home country is then given by:

$$U_i^h = w^h(r - a_i)g^h(s^{hi}) \quad (3)$$

If the individual is offered a skilled job in country f , utility from working abroad is given by:

$$U_i^f = w^f(r - a_i)g^f(s^{hi}) \quad (4)$$

¹For the sake of simplicity it is assumed that the rate of wage growth is equal to the interest rate, so that $w^h(r^h - a_i)$ is also the discounted present value of lifetime income.

Since the individual will consider working abroad only if the utility differential $U_i^f - U_i^h$ exceeds the disutility arising from the costs of moving abroad C , the relative reservation wage for adequately skilled employment abroad is given by:

$$R(s^{hi}, s^{hi}) = \frac{w^f g^f(s^{hi})}{w^h g^h(s^{hi})} = 1 + \frac{C}{w^h g^h(s^{hi})(r - a_i)} \quad (5)$$

A skilled individual will thus be indifferent between working at home and working abroad if the wage in skill-adequate employment abroad relative to skill-adequate employment at home $R(s^{hi}, s^{hi})$ is equal to one plus the ratio of migration costs to lifetime income in skill-adequate employment at home. If the actual wage offer (relative to the wage at home) exceeds one plus the ratio of migration costs to lifetime income in skill-adequate employment at home, the individual will move abroad, if it is lower, the individual will not move abroad. The relative reservation wage increases with the age of the individual and the costs of moving abroad, and decreases with the wage in skill-adequate employment at home.

If the individual is offered an unskilled job in country f , utility is given by:

$$U_i^f = w^f (r - a_i) m_i(s^{hi} - s^{lo}) \quad (6)$$

Since (6) is negative (or zero) if $m_i(s^{hi} - s^{lo}) \leq 0$, individuals with a high disutility for overqualified employment abroad would not consider such a job offer. Thus, for those with $m_i(\cdot) \leq 0$ the relative reservation wage is always given by (5).

If $0 < m_i(\cdot) \leq 1$, however, the relative reservation wage is given by:

$$R(s^{hi}, s^{lo}) = \frac{w^f}{w^h g^h(s^{hi})} = \left(1 + \frac{C}{w^h g^h(s^{hi})(r - a_i)} \right) \frac{1}{m_i(s^{hi} - s^{lo})} \quad (7)$$

As can be seen from equations (5) and (7), $R(s^{hi}, s^{lo}) > R(s^{hi}, s^{hi})$: the relative reservation wage of overqualified employment is higher than the relative reservation wage of skill-adequate employment for given costs of mobility, a given age of the individual and a given wage in skill-adequate employment at home. Thus, for those with $0 < m_i(\cdot) \leq 1$ the relative reservation wage of adequately qualified employment abroad is given by (5) while the relative reservation wage of overqualified employment abroad is given by (7).

Skilled individuals therefore require a compensation for the disutility of the job-skill mismatch implied by overqualified employment if they are willing to accept such a job offer at all. This implies that overqualified employment is not necessarily the result of labor market discrimination in the host country;

overqualified employment can be a rational choice as long as the wage compensates the individual for the job-skill mismatch.

3 Data and empirical strategy

To empirically test the predictions of the theoretical model data surveyed in a project aimed at analyzing cross-border migration and commuting intentions in Austria, the Czech Republic, Slovakia and Hungary are used. The surveys were conducted in September–November 2010 using personal interviews following a stratified sampling method. The strata were defined as combinations of region of residence, age, sex and educational attainment to represent the working-age population between 15 and 64 years of age in Austria, the Czech Republic, Slovakia and Hungary.² All in all, 10,223 interviews were conducted, 1,561 in Austria, 3,551 in the Czech Republic, 2,302 in Slovakia and 2,809 in Hungary.

The dependent variable is the relative reservation wage which would make the individual indifferent between moving abroad and working at home. The relative reservation wage was surveyed using the following question: “Compared to the income you could earn in your country (e.g., the income you earned in your current or last job), which income would make you willing to work abroad?”. The predetermined answer categories were “(also) lower”, “equal”, “higher by a half”, “twice as high”, “two to three times as high”, “four to five times as high” and “more than five times as high”.³

The reservation wage is missing for those who did not respond to the question either because they have not yet had an own income (for example, students) or because they are not willing to work abroad at all. From 10,223 interviews conducted in these four countries, 3,889 contain information on the reservation wage. Among these 3,889 observations, 843 have completed primary education level (educational equivalent to ISCED classifications 0-2) only. The empirical analysis focuses only on the medium and highly skilled with educational attainments equivalent to ISCED classifications 3 and above because it can be assumed that the low-skilled cannot be overqualified. The final sample thus consists of 3,046 observations.

Because the answer categories consist of a combination of point data (“equal”, “higher by a half”, “twice as high”), interval data (“two to three times as high”,

²In Austria, data were only surveyed in the capital Vienna. In all other countries, interviews were conducted in all regions.

³That the data are based on stated preferences instead of actual wages is actually an advantage for the empirical analysis because it can be expected that individuals who are willing to accept overqualified employment are overrepresented in data based on realized migration decisions simply because they have a larger pool of job offers to choose from than those who are not willing to work in overqualified employment. By using data on stated mobility preferences this selection problem can be avoided.

“four to five times as high”) and right-censored data (“more than five times as high”), interval regression will be applied in the empirical analysis (see, for example, Wooldridge, 2002, p. 508f). The answer category “also lower” was coded as interval data with lower limit zero and upper limit one to rule out a negative relative reservation wage.⁴

[Table 1 about here.]

Table 1 shows the distribution of relative reservation wages in the final sample, both in total and across countries. About one third (32.2 %) of the respondents in the final sample reported a reservation wage of two to three times their income at home. The distribution of reservation wages however varies markedly across countries, especially between Austria and the three CEECs considered, reflecting the large differences in wage levels. While in Austria 15.6 % would work abroad for the same wage they could earn in Austria, this percentage is only 0.6–2.8 % in the other countries. On the other hand, the relative reservation wage of almost 31.5 % of the Hungarian, 33.8 % of the Czech and 47.7 % of the Slovak respondents is four to five times their income at home or higher, while only 8.9 % of the Austrian respondents would require such a high reservation wage. To sum up the figures in table 1, most Austrians would work abroad for 1.5 to 2 times their income at home, while most Czech, Slovak and Hungarian respondents would work abroad for an income that is about 2-5 times their income at home.

In a subsequent question, the respondents were then asked whether they would accept a job abroad where the qualification required is below their own qualification, yielding a dummy variable which is one if the individual would accept overqualified employment abroad and zero else. This is the main right hand side variable of interest in the empirical analysis. While it does not measure the job-skill mismatch parameter $m_i(s_i - s_j)$ directly, the dummy variable allows a comparison of the relative reservation wage of those with $m_i(\cdot) \leq 0$ (i. e. of those who would never accept a job below their own skill level) given by equation (5) and the relative reservation wage of those with $0 < m_i(\cdot) \leq 1$ given by equation (7). Following the discussion in section 2 a positive sign for the parameter of the overqualification dummy can be expected.⁵

Across all countries considered, 25.9 % of the respondents are generally willing to accept overqualified employment (see table 2). The willingness to work in

⁴In any case, the results in section 4 are robust to an alternative specification where the “also lower” category is coded as being left-censored in the interval $(-\infty, 1]$. Results are available from the author upon request.

⁵Although we do not know whether those who would accept overqualified employment abroad reported their relative reservation wage of overqualified employment abroad $R(s^{hi}, s^{lo})$ or their relative reservation wage of skill-adequate employment abroad $R(s^{hi}, s^{hi})$, it can still be expected that individuals with $0 < m_i(\cdot) \leq 1$ reported a higher reservation wage on average.

overqualified employment varies considerably across countries: while in Austria only 11.6 % are willing to accept a job-skill mismatch, this percentage is 21.5 % in the Czech Republic, 27.3 % in Slovakia and even 43.5 % in Hungary.

[Table 2 about here.]

As stated in the theoretical model in section 2 the age of the individual as well as income in skill-adequate employment at home also enter the regression. While information on the former is available in the dataset (and age as well as age squared enter the regression to capture nonlinearities in the effect of age on relative reservation wages), the latter can be proxied by the individual's current income. While in the Czech Republic and Slovakia the respondents were asked for their exact monthly net income, the Hungarian survey used income categories starting with "up to 40,000 Hungarian forint" and then moving up in steps of 20,000 forint to the final category "more than 400,000 forint". In the Austrian survey the respondents were first asked to report their exact monthly net income; only if they refused (or were not able) to provide an exact answer, the respondents were presented with income categories.⁶ Both in the Austrian and Hungarian data, the category midpoints of the income variable are used in the subsequent analysis. The Czech and Hungarian responses were then converted to Euro values using the average exchange rates over the sampling period September–November 2010 (24.605 CZK/EUR and 277.207 HUF/EUR according to Eurostat). As the relative reservation wage decreases with the wage in skill-adequate employment at home, a negative sign can be expected for the parameter of the income variable.

In the Czech Republic and Slovakia the income variable is missing for 38.0 % and 26.9 %, probably due to the fact that the respondents were asked for their exact monthly net income, while it is missing for only 21.8 % in Austria and 18.2 % in Hungary where income categories were available. Because of the large number of missing values, the income variable will be set to zero for those who reported no income. In addition, a dummy variable will enter the regression that assumes the value one if income is not reported and zero else. As shown in table 2 the average monthly net income reported by the respondents is about € 1,630 in Austria, € 725 in the Czech Republic, € 705 in Slovakia and about € 400 in Hungary. These figures correspond reasonably well for example to figures from the European Union Survey on Income and Living Conditions (EU-SILC), where the mean equivalized net income for the population between 18 and 64 years of age in 2010 was around € 2,020 in Austria, € 705 in the Czech Republic, € 600 in Slovakia and around € 400 in Hungary.

⁶The categories were: "up to € 400", "€ 401–650", "€ 651–900", "€ 901–1,100", "€ 1,101–1,250", "€ 1,251–1,450", "€ 1,451–1,650", "€ 1,651–1,850", "€ 1,851–2,200", "€ 2,201–2,900", "€ 2,901–3,600", "€ 3,601–4,000", "€ 4,001–4,500", "€ 4,501–5,000" and "more than € 5,000."

Because the costs of moving abroad are not directly observable, dummy variables for marital status and the presence of children in the household are included. Since previous research suggests that persons living in larger households will face higher costs of moving abroad (such as job search costs or schooling for other household members) than single households (see Mincer, 1978), these variables can be expected to increase the reservation wage. Dummy variables are also included for female respondents and respondents with a completed tertiary education. Country dummies are used to capture country fixed effects in wage levels or costs of mobility, with Austria as the base category. Finally, a dummy variable captures whether the respondents actually considered working abroad at the time of the interview because it can be expected that those who are interested in moving abroad have better information about the actual wage levels abroad, and therefore lower relative reservation wages. Among those who reported a reservation wage, 52.2 % actually considered working abroad at the time of the interview (see table 2).

4 Estimation results

Table 3 shows the results of the interval regressions. The estimated parameters can be interpreted as linear effects on the relative reservation wage (Wooldridge, 2002). Controlling only for overqualification and age (column I) yields a coefficient of the overqualification dummy of 0.255. This implies that individuals who would accept overqualified employment require a sizable wage premium of about 25.5 % of the income they could earn at home compared to individuals who would not accept overqualified employment. The coefficient is, however, probably biased due to omitted variables, especially income. As expected, age enters the regression with a positive sign, but the effect becomes smaller as age increases, as shown by the negative value of age squared.

[Table 3 about here.]

When income is controlled for in the regression, the wage premium which compensates those willing to accept overqualified employment for the job-skill mismatch drops by about ten percentage points to 14.6 % both when estimating the model only for those who reported an income (column II) as well as when missing income values are being controlled for (column III). The estimated coefficients hardly change between specification II and III, showing that the results are robust to the exclusion of those observations without a reported income. As expected, a higher income is associated with a lower relative reservation wage.

However, the wage variable becomes insignificant and considerably smaller after controlling for country fixed effects (column IV). The country dummies

show that after controlling for other individual characteristics, the relative reservation wage is about 105 to 146 % higher in the three CEECs considered than in Austria. The regression in column IV also shows that the relative reservation wage of those who actually considered working abroad at the time of the interview is 57.3 % smaller than the relative reservation wage of those who did not consider working abroad.

Controlling for country fixed effects brings down the coefficient of the overqualification dummy to 0.107. The parameter changes only marginally when additional controls for individual characteristics (sex, marital status, children and tertiary education, see column V) or interaction terms between the “income missing” dummy and the country dummies are included (column VI), which are all insignificant.

Thus, after controlling for the model variables and country fixed effects a wage premium of about 11 % emerges; the relative reservation wage is about 11 % higher for those who are willing to accept overqualified employment compared to those who would not accept overqualified employment abroad.⁷

5 Conclusions

The theoretical and empirical models in this paper show that overqualified employment is not necessarily the outcome of labor market discrimination of migrants in the host country, but can also represent the migrant’s rational choice as long as she is compensated for the disutility of the job-skill mismatch by a higher wage. The estimates in this paper show that the compensation required for accepting overqualified employment abroad is about 11 % of the income the individual could earn at home. Furthermore, the relative reservation wage increases with age, but at a decreasing rate. The income at home decreases the relative reservation wage, but the income variable is only significant at the 10 % level. The estimated parameters of the country fixed effects show that even after controlling for individual characteristics the relative reservation wage in the CEECs considered (the Czech Republic, Slovakia and Hungary) is considerably higher than in Austria. According to the regression results, potential migrants from the CEE countries require a relative reservation wage that is about 100–150 % higher than those of prospective Austrian migrants.

The results of the theoretical model and the empirical analysis therefore imply that migrants should—*ceteris paribus*—be disproportionately drawn from the

⁷To check for the robustness to changes in the empirical method, the model in column VI was also estimated by an OLS regression on the interval midpoints. The change in the empirical method yields a slightly smaller, but nevertheless statistically significant parameter of the overqualification dummy of 0.097. All other parameters change only marginally. The results of the OLS regression are available from the author upon request.

group of those who do not accept overqualified employment because they have lower reservation wages. This appears at odds with the observation that the proportion of overqualified migrants is higher than the proportion of overqualified natives. This can, however, be explained by the fact that individuals who are willing to accept overqualified employment have a larger pool of job offers to choose from, since they would accept both jobs where the required skills matches their own skills as well as jobs where the required skills are below their own skills if the additional income meets their (higher) reservation wage. Individuals who are not willing to work in overqualified employment, on the other hand, have a smaller selection of jobs to choose from.

A second explanation is that the tolerance for overqualified employment increases after moving abroad because of labor market discrimination: because migration is costly and can be seen as an investment into future wage gains abroad, employers can exploit migrants' position and offer only low-skill-low-wage jobs or low-skill wages for medium- or high-skill jobs to those who have already migrated. Migrants may then have no other choice than to accept overqualified employment if they want to recoup (at least part of) their investment (or do not want to risk being sent back to their home country if they entered the host country illegally). Whether this is the case is, however, left to future analysis.

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Interval	All countries	AT	CZ	SK	HU
[0, 1]	0.5 (15)	1.5 (13)	0.0 (0)	0.0 (0)	0.2 (2)
[1, 1]	5.8 (178)	15.6 (133)	2.1 (18)	0.6 (3)	2.8 (24)
[1.5, 1.5]	10.2 (310)	23.6 (201)	5.3 (46)	4.2 (20)	5.0 (43)
[2, 2]	22.8 (695)	32.2 (274)	20.3 (176)	16.5 (78)	19.4 (167)
[2, 3]	32.3 (984)	18.0 (153)	38.5 (333)	30.9 (146)	41.0 (352)
[4, 5]	19.5 (594)	6.9 (59)	22.0 (190)	28.2 (133)	24.7 (212)
[5, ∞)	8.9 (270)	2.0 (17)	11.8 (102)	19.5 (92)	6.9 (59)
Observations	100.0 (3,046)	100.0 (850)	100.0 (865)	100.0 (472)	100.0 (859)

Table 1: Distribution of reported relative reservation wages in % for full sample and by country. Number of observations in parentheses.

Variable	All countries		AT	CZ	SK	HU
	Mean	S. D.	Mean	Mean	Mean	Mean
Overqualification (0/1)	0.259	0.438	0.116	0.215	0.273	0.435
Age (in years)	35.960	11.721	38.462	35.022	34.278	35.353
Monthly net income (in €)*	888.749	802.946	1631.356	725.940	706.736	399.740
Income missing (0/1)	0.262	0.440	0.218	0.380	0.269	0.182
Female (0/1)	0.430	0.495	0.482	0.380	0.415	0.435
Single (0/1)	0.470	0.499	0.408	0.499	0.574	0.446
Kids (0/1)	0.295	0.456	0.315	0.363	0.083	0.324
Tertiary education (0/1)	0.228	0.420	0.313	0.184	0.218	0.196
Considering work abroad (0/1)	0.522	0.500	0.421	0.502	0.411	0.703

Table 2: Summary statistics for independent variables. Number of observations = 3,046, except *number of observations = 2,249. S. D. = standard deviation.

Model	I	II	III	IV	V	VI
Overqualification (0/1)	0.255*** (0.057)	0.146** (0.063)	0.146*** (0.057)	0.107** (0.053)	0.109** (0.055)	0.109** (0.055)
Age (in years)	0.048*** (0.014)	0.051*** (0.016)	0.055*** (0.014)	0.050*** (0.013)	0.042*** (0.013)	0.041*** (0.013)
Age ²	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Monthly net income (in € 1,000)		-0.393*** (0.036)	-0.384*** (0.036)	-0.062 (0.039)	-0.062* (0.035)	-0.068* (0.037)
Income missing (0/1)			-0.195*** (0.064)	-0.011 (0.062)	-0.007 (0.064)	-0.073 (0.100)
Female (0/1)					-0.015 (0.046)	-0.014 (0.046)
Single (0/1)					-0.071 (0.049)	-0.068 (0.049)
Kids (0/1)					0.038 (0.053)	0.041 (0.053)
Tertiary education (0/1)					-0.047 (0.053)	-0.045 (0.053)
Considering work abroad (0/1)				-0.573*** (0.046)	-0.566*** (0.046)	-0.567*** (0.046)
Country: AT (base category)						
CZ (0/1)				1.079*** (0.065)	1.071*** (0.061)	1.011*** (0.073)
SK (0/1)				1.461*** (0.076)	1.470*** (0.080)	1.481*** (0.093)
HU (0/1)				1.047*** (0.072)	1.038*** (0.065)	1.026*** (0.075)
Income missing × CZ (0/1)						0.173 (0.129)
Income missing × SK (0/1)						-0.044 (0.178)
Income missing × HU(0/1)						0.026 (0.148)
Constant	1.925*** (0.258)	2.081*** (0.294)	2.039*** (0.256)	1.395*** (0.242)	1.584*** (0.252)	1.630*** (0.254)
Log-likelihood/ R^2	-5121.519	-3683.047	-5063.075	-4788.305	-4786.29	-4784.886
Observations	3,046	2,249	3,046	3,046	3,046	3,046

Table 3: Results of interval regression models. Dependent variable: relative reservation wage. Standard errors in parentheses. * significant at 10 % level, ** significant at 5 % level, *** significant at 1 % level.