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ABSTRACT

The Theory of Differential Overqualification: Does it Work?

The theory of differential overqualification, developed by Robert Frank (1978), claims that married women in smaller labor markets have a higher risk of working in jobs for which they are overqualified. This stems from the problem of dual job search for couples which is much more difficult to optimize than single job search. Here, for several reasons husbands tend to first optimize their individual job search. Their wives are "tied movers" or "tied stayers" in the sense that their job search is undertaken under the condition that the job search of their husbands is optimized. This leads especially in smaller labor markets to a higher risk of a mismatch between formal qualifications and job requirements. The only specific empirical test of this theory, until now, has been performed by McGoldrick and Robst (1996). Their results, using US data, do not support the theory. Using German panel data (GSOEP), we also test the theory of differential overqualification. Unlike previous studies we control for commuting distances and our own results provide some mixed support for the differential overqualification hypothesis.

JEL Classification: I21, J16, J24, J61

Keywords: overqualification, regional migration, marriage, gender

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1. Introduction

There exist countless studies documenting the extent and causes of gender inequality in the labor market. Very few of these studies, however, stress the importance of decision making within the family unit as an important cause of such inequalities. For example, the job search of couples is undertaken under quite different conditions relative to that of the job search of individuals. The upshot is that regional mobility may not be an important vehicle for advancement for married females, since mobility may be driven by a husband's attempt at earnings maximization. This framework was introduced into the gender wage gap discussion at the end of the seventies by several authors (Mincer 1978, Sandell 1977, Polachek and Horvath 1977, Frank 1978) and is still being utilized today (Ofek and Merrill 1997).

In this literature the work of Frank (1978) plays a special role. His theory claims that married women in smaller labor markets run a higher risk of working in jobs for which their current qualifications exceed the educational requirements of the job. They are overqualified. This is due to the problem of dual job search for couples which is much more difficult to optimize than a single job search. In this situation, husbands may follow the "male chauvinist family location decision rule" and optimize their individual job search.¹ Their wives are "tied movers" or "tied stayers" (Mincer 1978): their job search is undertaken under the condition that the job search of their husbands is optimized. This leads especially in smaller local labor markets (with fewer vacancies) to a higher risk of a mismatch between formal qualifications and job requirements. The increasing concentration of educated couples in larger cities perhaps reflects an attempt to minimize differential overqualification (Costa and Kahn, 2000).

Although Frank's own empirical test of his theory employs a traditional earnings framework, the theory itself focuses explicitly on the match quality between acquired education and the education required to perform a job. The only empirical test of

¹ It needs to be borne in mind that this is also the family location decision rule that maximises family income in most cases.

Frank's theory within an overeducation framework was undertaken by McGoldrick and Robst (1996). They tested whether married women in small local labor markets run a higher risk of being overqualified than those in larger labor markets. Their results do not support the theory of differential overqualification.²

However, neither the original formulation by Frank nor the empirical evaluation by McGoldrick and Robst acknowledge any divergence between place of residence and place of work whereby individuals can commute nor thereby escape smaller labor markets to improve match quality. This is problematic since it is well established empirically that females, and in particular, married females, have lower commutes distances where this may reflect greater household responsibilities, lower potential earnings or restricted access to private vehicles (Madden and Chiu, 1990). Lower commutes may then be seen as capturing the extent of spatial containment and may, in themselves, generate differential overqualification (Büchel and van Ham, 2002). Using German panel data (GSOEP), we control for commute distances to work and our results provide some limited support for the theory.

2. Background

The starting point of Frank's theory is an earnings maximizing individual searching for a job. The expected wage is not determined by the qualifications of the job searcher, but by the job level, i.e. the required education of the job finally accepted. Where the worker is overqualified, in the sense that their educational qualifications exceed the job requirements, there is a wage penalty relative to the "optimal" wage, which would be realized if there was a "perfect" match between qualifications and required skills.³ Therefore, the income maximizing strategy of a job-seeking individual is simple: he or she looks for a job where the extent of overqualification is minimized. For the individual, the expected amount of surplus education is a random variable. Its sampling distribution is dependent on the total number of job vacancies in

² An alternative test using a tied mover framework was conducted by Battu *et al.* (2000). They found no support for the differential overqualification hypothesis.

³ The wage penalty for being overqualified is well established in the empirical literature. However, it needs to be borne in mind that the overqualified do still get a positive albeit lower return than those who are perfectly matched (Sicherman, 1991).

all linked local labor markets (Topel 1986); this is due to the fact that migration is allowed (transaction costs are neglected). If the number of vacancies in the global labor market tends to infinity, the expected mismatch (and earnings loss) tends to zero.

Among job searching couples, this maximizing problem is more complex. Under the assumption that both partners are looking for a job, the couple has to maximize its joint earnings. Following the formal deduction of both wage levels, they cannot simply aim to minimize both overqualification amounts; they have to take into account their different levels of qualifications. In addition to that, the optimization problem is complicated by the fact that both partners have to find a job in the same local labor market: the co-location problem.

Under the assumption of earnings maximization, Frank expects the husband to take the initiative following what he calls the "male chauvinist family location decision rule". This means that the husband first optimizes his individual job search: he follows the simple strategy of minimizing his overqualification. Doing that, he makes at the same time a decision about the joint local labor market when accepting a job offer. Given this decision, his wife optimizes her (now also individual) job search.

The crucial point is that the husband can perform his individual job search in the global market, i.e. in the combination of all available local labor markets, because migration is permitted. However, the job search of his wife is restricted to the local labor market chosen by her husband. Because the number of job vacancies in the local labor market is much smaller than that in the global market, the female partner has to expect a worse match between acquired and required qualifications than her husband. Therefore, her risk of her being overqualified is higher than that of her partner. This disadvantage is expected to be more acute if the husband has chosen a small local labor market.

The handicap of married females can take two forms. If the wife cannot accept an attractive job offer from another local labor market, because her husband has already optimized his job search in the current local labor market and is therefore not willing

to accept a move, she is a "tied stayer" (Mincer 1978). On the other hand if the husband decides to accept an attractive job offer in an area outside the current place of residence, his wife is forced to move with him, regardless of her job opportunities at the new place of residence, and in the worst case she has even to give up an attractive job: she is a "tied mover". In both situations, the labor market position of the wife, in terms of mismatch and earnings, is expected to be worse than that of her husband, regardless of their formal education.

The specific test of Frank's theory of differential overqualification performed by McGoldrick and Robst (1996) is based on 1985 data from the US PSID. In this wave, subjective information about the educational requirements of jobs is available. Combining this information with information on the level of acquired education of job holders, for each working person a dummy variable "overeducated? (yes/no)" can be constructed and used as a dependent variable. The same approach will be used in the replication of this test using German data in the current paper. Furthermore, McGoldrick and Robst use two additional approaches to identify overeducation. First, the Dictionary of Occupational Titles (DOT) approach that is based on the general educational requirements of specific occupations determined by job analysts (often termed the objective approach). Second, the standard deviation approach where required education is measured with ranges of tolerance (one standard deviation around the mean education level within an occupation).⁴

Their test is restricted to white married working persons between age 18 and 64. In a multinomial logistic regression, the probability of working overeducated is analyzed in a "stayer" framework.⁵ Covariates entered include: education, gender, county population (as an indicator of the size of the local labor market), experience, experience squared, training, union, kids and a term interacting female with county population.

⁴ For details on these measures and their relative merits see Oosterbeek (2000) or Büchel (2001).

⁵ This basically means that they do not focus on individual moves. In contrast, Battu *et al.* (2000) utilize a mover framework and investigate the probability of being overeducated as a function of whether married males and females had moved or not.

There is partial support for the differential overqualification hypothesis, since they find a significantly higher risk for married women of being overeducated relative to married men. However, what matters is the size of the labor market in conjunction with gender. Here there is neither a significant effect for county population on its own or when interacted with female. Since the latter expected effect is crucial for Frank's theory, their results do not lend support to the existence of differential overqualification.

However, the empirical formulation by McGoldrick and Robst makes no allowance for commuting. This is unfortunate since commuting may, especially for those that are resident in smaller labor markets, offer an avenue for improving match quality. On the other hand there is evidence that this is restricted for females. Madden and Chiu (1990) state that 'it is a universal and widespread empirical finding that women commute less than men'. The disagreement arises when one considers the causes of such spatial containment. Some have pointed to the importance of household responsibilities and children (Van den Berg and Gorter, 1996), others to differential access to more efficient private vehicles (Dasgupta *et al* 1985) and some to differences in potential earnings (Gordon *et al.*1989). Regardless of the driving force females may be spatially constrained generating differential overqualification.

It is also possible that with a growing suburbanisation of jobs, especially within the US (Glaeser and Kahn, 2001) the job matches of those resident in rural areas may actually be improved. This unintended benefit of employment sprawl may of course be reflected in shorter commuting distances. There is some support for the suburbanization effect in West Germany with the large cities experiencing a loss of jobs (Tassinopoulos, 2000).

3. Data and Methods

The empirical analysis of the current paper is based on 1995 data from the German Socio-Economic Panel (GSOEP), directed by the German Institute for Economic Research (DIW) in Berlin. This ongoing representative data set was started in 1984, when more than 12,000 individuals aged 16 or older were interviewed. Additional

information for those people is collected every year with a nearly constant questionnaire. The main purpose of the study is to obtain longitudinal information especially in the fields of educational and labor market behavior (for more details, see SOEP Group, 2001). In this paper, the West German sub-samples "A" (Germans) and "B" (immigrants) are analyzed. The study is restricted to working people aged 16 to 65 who hold a German vocational or a university degree. Trainees and persons in education or formal training are excluded from the analysis. The sub-sample used contains 3042 working people in West Germany.

In line with McGoldrick and Robst we identify overeducation through a subjective measure. The dataset contains information about the formal vocational education of job-holders as well as a question about the education that is usually needed to perform the job. These two variables are combined to create an overeducation dummy variable. If the formal qualification is substantially higher than the qualification requirements of the job, the value of this variable is "overeducated: yes", else the value is "overeducated: no". Of course, this raises the question of what we mean by "substantially". However, this problem is somewhat reduced in Germany due to the strongly segmented labor market where job requirements are usually related to vocational or university education. Therefore, holders of such qualifications and who answer that they perform jobs that do not require such qualifications are easily detected as overeducated. The construction of the overeducation dummy is validated by the use of additional information about the occupational position (*berufliche Stellung*).

The earlier theoretical discussion pointed to the importance of three variables: gender, marital status, and the size of the local labor market. In our analysis, family status is captured via a dummy variable "married? (yes/no)". Those persons living together with a partner are grouped into the "married" category, and married persons living separately from their partner are considered single. The population size of the municipality of place of residence is used as an indicator of the size of the local labor market. This information is available in form of 9 discrete size categories (Boustedt scale). To keep the model slim, we reduced the labour market size information to a clear small/non-small antagonism, using the threshold that is common in German

spatial research (number of inhabitants <20,000) or larger ones (>20,000 inhabitants).⁶ This threshold is common in German spatial analyses.⁷ Also, in our analysis, the local unemployment rate at a level of "Raumordnungsregion" is matched to the persons' data and is used in the regression models.

In addition, several variables covering job characteristics and the socio-economic background of the persons analysed are controlled in the models. These are age, nationality, health status, educational level, importance of occupational success, participation in on-the-job-training, experience, and tenure. In separate specifications we also included other covariates such as household income, household size, age of children, and care status of children with pre-school age. None of our key results changed.

In our first step we look at the incidence and distribution of overeducation across the three crucial variables of the theoretical framework: gender, family status, and population density of place of residence (Table 1). In our second step, the probability of being overeducated is analyzed utilizing a logit model.⁸ The logit model is convenient for a presentation of results in terms of the effects of a covariate on the odds of being overeducated. Here our main focus is on the impacts of the interaction terms generated from the three strategic variables mentioned above, i. e. gender, marital status and the size of the local labor market (Table 2). Then we introduce to our analysis commuting distance to work. After having shown its relevance in the context of differential overeducation (Tables 3 and 4), we add this variable to our standard model (Table 5). Finally, a replication of the McGoldrick and Robst specification is attempted. This requires us to focus purely on those that are married. The crucial question here is, whether the size of local labor market influences significantly the gender-specific risk of working overeducated or not (Tables 6 and 7).

⁶ The matching of this information to the GSOEP respondents required special permission of the DIW data protection officer and is gratefully acknowledged.

⁷ The 20,000 limit is the major distinction line in official German Regional Planning (see Bundesamt für Bauwesen und Raumordnung, 2001).

⁸ Probit estimations were also undertaken and the statistical significance of the covariates were comparable.

4. Empirical Results

The final column in Table 1 reveals that marital status per se is not a key factor in determining whether an individual is overeducated or not. However, a breakdown by gender does show that married women do run a higher risk of being overeducated relative to unmarried women or men regardless of whether they are married or not. An additional breakdown by population density of place of residence (as an indicator of the size of the local labor market) reveals that, consistent with the theory to be tested, in West Germany married women in smaller local labor markets bear by a wide margin the highest risk among all analyzed groups of working in a job for which they are overqualified.

These results are confirmed in a logistic model (Table 2) when controlling for a large number of job and personal characteristics as well as the local unemployment rate. Among the eight interaction terms created from our three strategic dummy variables gender, family status, and size of the local labor market, the one for married women living in rural areas has not only largest coefficient, but also the only one which is highly significant in its impact on the risk of being overeducated in work instead of being correctly matched. The odds of a married female in a smaller labor market being overeducated are 1.847 times greater than for single males in cities.

In Frank's theory, the number of job vacancies is crucial to the analysis. However, information on the number of job vacancies is not available in most large data sets. Therefore, Frank as well as McGoldrick and Robst posit a strong correlation between that "number of job vacancies", "number of jobs", and the "number of inhabitants (in the local labor market, marked by county or municipality borders)". Though, this may make some sense the only problem is that in the data sets analyzed, information about the place of work is not usually available and researchers resort to utilizing information on the place of residence of respondents instead. This may be problematic if, as is usually the case, there is a divergence between place of work and place of residence.

In the GSOEP, information about the place of work is also not available. Therefore, as in the previous studies the analysis has to use information about the place of residence as a proxy for the place of work. However, and unlike previous studies we do have information on commuting distance. As a preliminary step, the correlation between the population density of place of residence, commuting distance (measured in kilometers), and overeducation status is analyzed. Data on this is given in Tables 3 and 4 and two main points are worth making. First, commute distances are higher for married women living in smaller areas compared to those living in places with higher population densities. This suggests that many married women living in rural areas commute into urban places, i.e. into larger labor markets with better job opportunities. Second, married women who are overeducated are spatially constrained since their journeys to work are shorter, relative to those whose formal education fits exactly the required education of their jobs. This spatial constraint is especially apparent in smaller areas (Table 4).

From Table 5 it is clear that the longer the distance to work, the lower the overeducation risk. This result is not surprising - it is well known that there is a positive correlation between quality of job matches and the commute length. The effect of the rural area dummy for married females is as before though the odds ratio does increase a little to 1.857. However, the differential overqualification hypothesis rests not on the value of the coefficient for married rural females alone. To see this just examine the coefficient on the dummy for rural males. This becomes statistically significant (at 10%) when controlling for commuting distance. In other words when controlling for the possibility of escaping the disadvantages of a small local labor market through commuting, the risk of married males living in small local labor markets getting a job for which they are overqualified is significantly higher than that of single males living in larger local labor markets.

Thus a specific test of the differential overqualification hypothesis would amount to comparing the difference between rural and urban overqualification levels for males and females with the expectation that females have a larger differential. That is we subtract the difference between rural and urban overqualification coefficients for married males from the corresponding difference for married females. A Wald test is

undertaken and results are given in Table 1 of the appendix. The test, however, is not statistically significant so in a strict sense we cannot support the differential overqualification hypothesis (test statistic A1). On the other hand, the test statistics comparing rural and city married females (test statistic A3) and rural married females with city married males (test statistic A4) are statistically significant at the 10% and 1% level respectively.

The results from the other covariates in Table 5 reveal the following. Foreigners and persons with poor schooling run a higher risk of being overeducated. Graduates from specialized vocational schools e.g. school of health system, *Fachschule*, or civil servant schools run a lower risk, graduates from *Fachhochschulen* run a higher risk relative to the reference group of apprenticeship degree holders. Also the greater is a worker's experience and also tenure, the lower the risk of being overeducated. Participation in on-the-job training also reduces the chances of overeducation. Together the results for the experience, tenure and on-the-job training variables support the view that the various components of human capital are substitutes for one another (Sloane et al., 1996; Büchel and Pollmann-Schult, 2001). We also find that those persons who give a low priority to occupational success bear a substantial higher risk of being overeducated relative to persons who are more career minded. We would expect overqualification to be a function of the job offers available to an individual and thus the unemployment rate. The non-significant effect of the local unemployment rate suggests that the exclusion of this variable by McGoldrick and Robst (1996) from their estimation is rather unimportant.

In our next step we try to replicate as far as possible the McGoldrick and Robst (1996) estimation. The analysis is restricted to those who are married. Since this case selection affects two of the three strategic variables of interest, the group of eight interaction terms in the previous model are reduced to four. The results in Table 6 reveal that married women in small local labor markets do run a higher risk of being overeducated relative to married women living in places with higher population densities (see test statistic B2 in Appendix Table 1). Although the difference in the estimated parameters is only significant at the 10% level the results do lend some support to Frank's theory. However, the coefficient for rural males is also positive and

significant albeit the size of the coefficient is smaller and level of significance lower. Again the higher is the distance to work the lower the risk of being overqualified. Table 7 provides estimates that are closer to the estimation provided by McGoldrick and Robst. Unlike McGoldrick and Robst (1996) we do find that married females in rural areas are more likely to be overeducated, this effect, however, only being significant at the 10% level.

5. Conclusions

The Frank theory of differential overqualification predicts that the difference between rural and urban overqualification levels will be smaller for married males than married females. This stems from family location constraints which impact more heavily on females than males. If this hypothesis holds it would make sense for highly educated couples to concentrate in large cities in order to minimize the extent of mismatch (Costa and Kahn, 2000).

The limited empirical work in this area has not been able to support this hypothesis. Our own empirical analysis using German panel data introduces an important innovation. In particular, we make an allowance for commuting distance where commuting may offer a potential avenue through which match quality can be improved for those resident in smaller labour markets. We do indeed find that higher commute distances tend to strongly reduce the probability of being overqualified.

Our test of the differential overqualification hypothesis produces rather mixed results. The relevant coefficients do suggest some important differences in overqualification across gender. In particular, we find that in West Germany, married women do run a higher risk of being in a job which does not fully utilize their educational attainment relative to unmarried women and (married or unmarried) men. For married women this risk is especially high in small local labor markets. The odds of this group being overeducated are nearly twice (1.86) those of single urban males. However, when controlling for the distance of way to work (and therefore controlling for commuting opportunities), it turns out that both married females and males – albeit the latter to a much smaller extent - living in rural areas run a higher risk of being overeducated.

Because the formal test of differences in these two key coefficients returns a non-significant result, this finding is at odds with the theory of differential overqualification and does not lend support to the Frank theory in a strict sense. There does, however, seem to something in the direction of Frank that does require further investigation.

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Table 1. Overeducation, by population density of place of residence, gender, and family status (West Germany, 1995)

Percentages of overeducated persons among all working persons.

	Place of residence				
	High pop density		Low pop density		total
	male	female	male	female	
Single	16	17	12	13	15
Married	11	19	16	25	16
N of cases	321	296	241	171	1029
	728	424	563	298	2013
Total N					3042

"Low population density": Place of residence < 20,000 inhabitants.

Weighted frequencies / unweighted n of cases.

Only persons < 65 years.

Only persons with completed vocational education or academic degree, acquired in Germany.

Without trainees and persons in education.

Without migrants between West and East Germany after reunification.

Without immigration sample "D" of GSOEP.

Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 2. Determinants of overeducated work (Full Sample, West Germany, 1995, Logistic Regression)

Covariates	Coeff.	(Std.- Err.)	Odds Ratio	Mean
constant	-2.6597**	(0.794)	-	-
Age (years)	0.0538	(0.038)	1.055	39.22
Age**2(/100)	-0.0243	(0.045)	0.976	16.55
Foreigner	1.2058**	(0.159)	3.340	0.14
disabled 1)	-0.0157	(0.121)	0.984	0.23
Hauptschule degree 2)	0.8728**	(0.130)	2.394	0.43
(Realschule degree) 3)	.	(.)	.	.
Abitur 4)	-1.5645**	(0.531)	0.209	0.04
(apprenticeship degree)	.	(.)	.	.
Berufsfachschule degree 5)	-0.0247	(0.188)	0.976	0.08
School of health system degree	-1.0432**	(0.376)	0.352	0.03
Fachschule degree 6)	-1.1557**	(0.293)	0.315	0.08
Civil servant school degree	-1.3232*	(0.532)	0.266	0.04
other vocational degree	1.2975**	(0.208)	3.660	0.07
Fachhochschule degree 7)	0.8094**	(0.232)	2.247	0.05
University degree	-0.2449	(0.225)	0.783	0.11
occ. success is not important 8)	0.7503**	(0.149)	2.118	0.12
regional unemployment rate 9)	0.0160	(0.025)	1.016	8.74
relative experience 10)	-1.1936**	(0.233)	0.303	0.86
on-the-job training (years) 11)	-0.2087*	(0.099)	0.812	0.25
tenure (years)	-0.0471**	(0.007)	0.954	10.73
city*Woman *married 12)	0.3167	(0.216)	1.373	0.14
city*Woman *single	0.2865	(0.232)	1.332	0.09
city*Man *married	-0.1048	(0.205)	0.900	0.24
(city*Man *single)	.	(.)	.	.
rural*Woman*married 13)	0.6134**	(0.229)	1.847	0.10
rural*Woman*single	0.2293	(0.275)	1.258	0.05
rural*Man *married	0.3144	(0.212)	1.369	0.19
rural*Man *single	0.1537	(0.252)	1.166	0.08

n of cases (unweighted): 2896
-2 Log L: 2434.907**

Mean of dep. variable (weighted) 0.165

Dependent variable:
1 = overeducated work,
0 = job demand level fits the formal qualification of job holder.

Levels of significance: **: p < 0.01, *: p < 0.05, +: p < 0.10.

Footnotes:

1) Health status is hindering "a little bit"/"a lot" when performing daily life. 2) Lower secondary school degree. 3) Intermediate school leaving certificate; here: including "Fachabitur". 4) Upper secondary leaving certificate (giving access to higher education); here: only in combination with a non-academic degree. 5) Full-time basic vocational school certificate. 6) Specialized technical school certificate. 7) Specialised college of higher education degree. 8) "Reaching occupational success" is "less important" or "not important"; term of interaction for Germans only (not asked for foreigners). 9) Level is "Raumordnungsregion (1994 data from BfLR). 10) Calculation for observable period: Number of years working / (Number of years working + Number of years not working), including year of actual observation. 11) Activities of years 1987 - 1993. 12) "City": place of residence > 20,000 inhabitants. 13) "Rural": place of residence < 20,000 inhabitants.

Covariates in parenthesis: reference categories.
Unweighted means as documentation information.

Only persons < 65.

Only persons with completed vocational education or academic degree, acquired in Germany.

Without trainees and persons in education.

Without migrants between West and East Germany after reunification.

Without immigration sample "D" of GSOEP.

Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 3. Commuting distances, by population density of place of residence, gender, and family status (West Germany, 1995)

Means of daily commuting distances in km					
	Place of residence				Total
	High pop density		Low pop density		
	male	female	male	female	
Single	14.5	12.6	14.9	13.8	13.9
Married	16.0	8.2	19.1	11.2	14.4
N of cases	299	284	208	163	954
	659	401	485	286	1831
Total N					2785

Note: Loss of cases (compared to Table 1) is mainly caused by people with irregular daily ways to work ("question does not apply").

"Low population density": Place of residence < 20,000 inhabitants.

Weighted frequencies / unweighted n of cases.

Only persons < 65 years.

Only persons with completed vocational education or academic degree, acquired in Germany.

Without trainees and persons in education.

Without migrants between West and East Germany after reunification.

Without immigration sample "D" of GSOEP.

Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 4. Distances of way to work of married women, by population density of place of residence, and overeducation status (means in km, West Germany, 1995)

	High pop density	Low pop density
Correctly allocated	9.3	12.9
Overeducated	5.5	7.0

T-Tests: both $p < 0.01$.

"Low population density": Place of residence < 20,000 inhabitants.

Weighted means.

Only married women < 65 years.

Only persons with completed vocational education or academic degree, acquired in Germany.

Without trainees and persons in education.

Without migrants between West and East Germany after reunification.

Without immigration sample "D" of GSOEP.

Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 5. Determinants of overeducated work (Full Sample, West Germany, 1995, Logistic Regression)

Covariates	Coeff.	(Std.- Err.)	Odds Ratio	Mean
constant	-2.5949**	(0.841)	-	-
Age (years)	0.0536	(0.040)	1.055	39.09
Age**2(/100)	-0.0252	(0.049)	0.975	16.43
Foreigner	1.2069**	(0.168)	3.343	0.14
disabled 1)	0.0309	(0.128)	1.031	0.23
Hauptschule degree 2)	0.9385**	(0.138)	2.556	0.42
(Realschule degree) 3)	.	(.)	.	.
Abitur 4)	-1.3523*	(0.535)	0.259	0.04
(apprenticeship degree)	.	(.)	.	.
Berufsfachschule degree 5)	0.0976	(0.196)	1.102	0.08
School of health system degree	-1.1045**	(0.398)	0.331	0.03
Fachschule degree 6)	-1.0390**	(0.308)	0.354	0.08
Civil servant school degree	-1.1277*	(0.539)	0.324	0.04
other vocational degree	1.4053**	(0.221)	4.077	0.07
Fachhochschule degree 7)	0.9413**	(0.249)	2.563	0.05
University degree	-0.1850	(0.248)	0.831	0.11
occ. success is not important 8)	0.8137**	(0.156)	2.256	0.13
regional unemployment rate 9)	0.0188	(0.026)	1.019	8.74
relative experience 10)	-1.1122**	(0.249)	0.329	0.86
on-the-job training (years) 11)	-0.2136*	(0.107)	0.808	0.25
tenure (years)	-0.0514**	(0.008)	0.950	10.78
way to work (distance in km)	-0.0208**	(0.004)	0.979	13.15
city*Woman *married 12)	0.2327	(0.229)	1.262	0.14
city*Woman *single	0.2210	(0.245)	1.247	0.10
city*Man *married	-0.0406	(0.218)	0.960	0.24
(city*Man *single)	.	(.)	.	.
rural*Woman*married 13)	0.6187**	(0.241)	1.857	0.10
rural*Woman*single	0.3104	(0.287)	1.364	0.06
rural*Man *married	0.3889+	(0.229)	1.475	0.18
rural*Man *single	0.1712	(0.275)	1.187	0.07

n of cases (unweighted): 2655
-2 Log L: 2162.9**
Mean of dep. variable (weighted) 0.154

Dependent variable:
1 = overeducated work,
0 = job demand level fits the formal qualification of job holder.

Levels of significance: **: p < 0.01, *: p < 0.05, +: p < 0.10.

Footnotes:

1) Health status is hindering "a little bit"/"a lot" when performing daily life. 2) Lower secondary school degree. 3) Intermediate school leaving certificate; here: including "Fachabitur". 4) Upper secondary leaving certificate (giving access to higher education); here: only in combination with a non-academic degree. 5) Full-time basic vocational school certificate. 6) Specialized technical school certificate. 7) Specialised college of higher education degree. 8) "Reaching occupational success" is "less important" or "not important"; term of interaction for Germans only (not asked for foreigners). 9) Level is "Raumordnungsregion (1994 data from BfLR). 10) Calculation for observable period: Number of years working / (Number of years working + Number of years not working), including year of actual observation. 11) Activities of years 1987 - 1993. 12) "City": place of residence > 20,000 inhabitants. 13) "Rural": place of residence < 20,000 inhabitants.

Covariates in parenthesis: reference categories.
Unweighted means as documentation information.

Only persons < 65.
Only persons with completed vocational education or academic degree, acquired in Germany.
Without trainees and persons in education.
Without migrants between West and East Germany after reunification.
Without immigration sample "D" of GSOEP.
Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 6 Determinants of overeducated work (Married Persons, West Germany, 1995, Logistic Regression)

Covariates	Coeff.	(Std.- Err.)	Odds Ratio	Mean
constant	-0.6667	(1.220)	-	-
Age (years)	-0.0164	(0.055)	0.984	41.71
Age**2(/100)	0.0531	(0.064)	1.055	18.38
Foreigner	1.2472**	(0.225)	3.481	0.13
disabled 1)	0.0187	(0.152)	1.019	0.25
Hauptschule degree 2)	0.8721**	(0.173)	2.392	0.45
(Realschule degree) 3)	.	(.)	.	.
Abitur 4)	-1.4719+	(0.759)	0.229	0.03
(apprenticeship degree)	.	(.)	.	.
Berufsfachschule degree 5)	0.0528	(0.233)	1.054	0.09
School of health system degree	-1.1403*	(0.468)	0.320	0.03
Fachschule degree 6)	-1.2086**	(0.351)	0.299	0.09
Civil servant school degree	-1.7566*	(0.755)	0.173	0.05
other vocational degree	1.1939**	(0.274)	3.300	0.09
Fachhochschule degree 7)	0.6076+	(0.332)	1.836	0.05
University degree	-0.1080	(0.303)	0.898	0.10
occ. success is not important 8)	0.7484**	(0.188)	2.114	0.13
regional unemployment rate 9)	0.0064	(0.032)	1.007	8.76
relative experience 10)	-1.4032**	(0.315)	0.246	0.88
on-the-job training (years) 11)	-0.1714	(0.125)	0.842	0.25
tenure (years)	-0.0445**	(0.009)	0.956	12.51
way to work (distance in km)	-0.0288**	(0.006)	0.972	12.87
city*Woman *married 12)	0.1920	(0.194)	1.212	0.22
(city*Man *married)	.	(.)	.	.
rural*Woman*married 13)	0.5694**	(0.216)	1.767	0.16
rural*Man *married	0.4400*	(0.188)	1.553	0.26

n of cases (unweighted): 1770
-2 Log L: 1455.6**

Mean of dep. variable (weighted) 0.159

Dependent variable:
1 = overeducated work,
0 = job demand level fits the formal qualification of job holder.

Levels of significance: **: p < 0.01, *: p < 0.05, +: p < 0.10.

Footnotes:
1) Health status is hindering "a little bit"/"a lot" when performing daily life. 2) Lower secondary school degree. 3) Intermediate school leaving certificate; here: including "Fachabitur". 4) Upper secondary leaving certificate (giving access to higher education); here: only in combination with a non-academic degree. 5) Full-time basic vocational school certificate. 6) Specialized technical school certificate. 7) Specialised college of higher education degree. 8) "Reaching occupational success" is "less important" or "not important"; term of interaction for Germans only (not asked for foreigners). 9) Level is "Raumordnungsregion (1994 data from BfLR). 10) Calculation for observable period: Number of years working / (Number of years working + Number of years not working), including year of actual observation. 11) Activities of years 1987 - 1993. 12) "City": place of residence > 20,000 inhabitants. 13) "Rural": place of residence < 20,000 inhabitants.

Covariates in parenthesis: reference categories.
Unweighted means as documentation information.

Only married persons < 65.
Only persons with completed vocational education or academic degree, acquired in Germany.
Without trainees and persons in education.
Without migrants between West and East Germany after reunification.
Without immigration sample "D" of GSOEP.
Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Table 7. Determinants of overeducated work (Married Persons, Model Variant of Table 6, West Germany, 1995, Logistic Regression)

Covariates	Coeff.	(Std.- Err.)	Odds Ratio	Mean
constant	-0.2232	(1.202)	-	-
Age (years)	-0.0211	(0.055)	0.979	41.71
Age**2(/100)	0.0575	(0.064)	1.059	18.38
Foreigner	1.1790**	(0.222)	3.251	0.13
disabled 1)	0.0228	(0.152)	1.023	0.25
Hauptschule degree 2)	0.8782**	(0.173)	2.406	0.45
(Realschule degree) 3)	.	(. .)	.	.
Abitur 4)	-1.4766+	(0.760)	0.228	0.03
(apprenticeship degree)	.	(. .)	.	.
Berufsfachschule degree 5)	0.0523	(0.233)	1.054	0.09
School of health system degree	-1.1213*	(0.468)	0.326	0.03
Fachschule degree 6)	-1.1919**	(0.351)	0.304	0.09
Civil servant school degree	-1.7689*	(0.754)	0.171	0.05
other vocational degree	1.2074**	(0.274)	3.345	0.09
Fachhochschule degree 7)	0.6140+	(0.331)	1.848	0.05
University degree	-0.1106	(0.303)	0.895	0.10
occ. success is not important 8)	0.7552**	(0.188)	2.128	0.13
regional unemployment rate 9)	-0.0124	(0.031)	0.988	8.76
relative experience 10)	-1.4105**	(0.314)	0.244	0.88
on-the-job training (years) 11)	-0.1729	(0.125)	0.841	0.25
tenure (years)	-0.0434**	(0.009)	0.958	12.51
way to work (distance in km)	-0.0269**	(0.006)	0.973	12.87
Woman	0.0280	(0.179)	1.028	0.37
rural*Woman 12)	0.3383+	(0.206)	1.403	0.16

n of cases (unweighted): 1770
-2 Log L: 1461.0**
Mean of dep. variable (weighted) 0.159

Dependent variable:
1 = overeducated work,
0 = job demand level fits the formal qualification of job holder.

Levels of significance: **: p < 0.01, *: p < 0.05, +: p < 0.10.

Footnotes:

1) Health status is hindering "a little bit"/"a lot" when performing daily life. 2) Lower secondary school degree. 3) Intermediate school leaving certificate; here: including "Fachabitur". 4) Upper secondary leaving certificate (giving access to higher education); here: only in combination with a non-academic degree. 5) Full-time basic vocational school certificate. 6) Specialized technical school certificate. 7) Specialised college of higher education degree. 8) "Reaching occupational success" is "less important" or "not important"; term of interaction for Germans only (not asked for foreigners). 9) Level is "Raumordnungsregion (1994 data from BfLR). 10) Calculation for observable period: Number of years working / (Number of years working + Number of years not working), including year of actual observation. 11) Activities of years 1987 - 1993. 12) "Rural": place of residence < 20,000 inhabitants.

Covariates in parenthesis: reference categories.
Unweighted means as documentation information.

Only married persons < 65.
Only persons with completed vocational education or academic degree, acquired in Germany.
Without trainees and persons in education.
Without migrants between West and East Germany after reunification.
Without immigration sample "D" of GSOEP.
Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

Appendix

Table 1. Linear Hypotheses Testing Results, Gained from Tables 5 and 6 (Wald Tests)

Sample No.	Test on estimated parameters	Test Results: Chi2, Sig. level
Full Sample (Table 5)		
A1.	(rural,Man,married) - (city,Man,married)= (rural,Woman,married) - (city,Woman,married)	0.0264 n.s.
A2.	(rural,Man,married) = (rural,Woman,married)	1.1723 n.s.
A3.	(rural,Woman,married) = (city,Woman,married)	3.5592 +
A4.	(rural,Woman,married) = (city,Man,married)	10.0929 **
Married Persons (Table 6)		
B1.	(rural,Man,married) = (rural,Woman,married)	0.3506 n.s.
B2.	(rural,Woman,married) = (city,Woman,married)	3.3087 +

Levels of significance: **: $p < 0.01$, *: $p < 0.05$, +: $p < 0.10$, n.s.: $p \geq 0.10$.

Source: Own calculations from German Socio-Economic Panel GSOEP, West Germany, 1995.

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