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DOI
10.1016/S0094-1190(03)00008-1

Publication date
2003

Document Version
Author accepted manuscript

Published in
Journal of Urban Economics

This is the author's Post-print version (final draft post-refereeing as accepted for publication by the journal). The definitive, peer-reviewed and edited version of this article is published as: Büchel F. and van Ham M. (2003) Overeducation, regional labour markets, and spatial flexibility. Journal of Urban Economics 53, 482-493. http://dx.doi.org/10.1016/S0094-1190%2803%2900008-1

Overeducation, regional labor markets, and spatial flexibility

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Abstract. For most workers, access to suitable employment is severely restricted by the fact that they look for jobs in the regional labor market rather than the global one. In this paper we analyze how macro-level opportunities (regional market characteristics) and micro-level restrictions (the extent to which job searchers are restricted to the regional market) can help to explain the phenomenon of overeducation. We use a two-step procedure to control for selective access to employment. The results show that the size of the labor market is an important factor in avoiding overeducation.

Keywords: Overeducation, job search, spatial flexibility

JEL Codes: J62, J61, J21

1. INTRODUCTION

Workers are deemed to be overeducated if their acquired skills exceed the skills required to perform their current job (for an overview of overeducation, see e.g. Tsang and Levin [29]). The underlying reason for workers' overeducation is a shortage of appropriate jobs.

In traditional labor market research, it is assumed that workers look for jobs on the global market. However, employment opportunities are mainly determined at the regional level: due to limited spatial flexibility, most people only look for work on the local (regional) market (see Van Ham et al. [32]; [33]; Van Ham [35] for an overview of this theory). Spatial flexibility refers to the amount of time that workers are willing to spend on commuting (commuting tolerance) and their willingness to migrate for a job (migration tolerance).

A job seeker confronted with a regional market where no suitable jobs are available has three 'options' (Simpson [27]). The first is non-participation, i.e., unemployment. The second is accepting a local job below his or her level of qualification, resulting in overeducation. The third is accepting a suitable job further away, beyond the current regional market (see Van Ham et al. [33] on workplace mobility). This can be achieved either by commuting over a longer distance or by migration.

There now exists an extensive body of literature on overeducation (see Groot and Maassen van den Brink [12] for a recent overview). Surprisingly, little attention has yet been paid to the spatial aspects of overeducation, the only exception being studies that focus on the job-seeking behavior of married women (see section 2). This deficit of research is remarkable, since a lack of job opportunities in combination with limited spatial flexibility of the workforce is a well-established explanation of unemployment (for literature on the spatial mismatch hypothesis, see, for example, Preston and McLafferty [23]).

The aim of this article is to provide a framework that links the occurrence of overeducation at the individual level to the availability of employment opportunities, and to test it for the West German market. The central question is to what extent macro-level opportunities (regional market characteristics) and micro-level restrictions (commuting and migration tolerance) can help to explain the phenomenon of overeducation.

2. SPATIAL DETERMINANTS OF OVEREDUCATION

The only theoretical work that takes account of the spatial determinants of overeducation is the theory of differential overqualification developed by Frank [11]. Frank theorizes that in dual-earner households, the husband chooses a job in the global market. The wife's job seeking is then restricted to the regional market chosen by her husband. Because this regional market is much smaller than the global one, the wife can be expected to run a higher risk of overeducation than her partner. Several authors have tested Frank's theory, and the results are mixed. The findings of McGoldrick and Robst [21] and Battu et al. [2] led them to reject the theory. Büchel [5] and Büchel and Battu [7], on the other hand, showed that married women in Germany indeed run a high risk of working in jobs for which they are overeducated, especially when they live in a small regional market. Nevertheless, a formal test of differences between the estimated coefficients for males and females performed by Büchel and Battu [7] yielded a non-significant result, and thus also failed to support Frank's theory in a strict sense.

The higher risk of overeducation caused by geographic restrictions is a central aspect of Frank's theory. Frank, however, focuses exclusively on married women. In this paper we postulate that a more general theoretical framework is needed, because geographic restrictions affect the market outcomes of all workers.

We start with Simpson [27], who pictures the economy as a group of local market 'islands', between which moves are costly. The costs of information flows and mobility between islands restrict workers' attempts to secure jobs located on other islands. Within the framework offered by Simpson, job-seeking behavior is spatially systematic in two ways. First, workers will seek jobs located as closely as possible to their place of residence in order to economize on search and mobility costs. Second, workers will seek jobs that require the skills they have acquired. If no suitable jobs are available on their own 'island', and mobility costs to 'escape' are too high, workers might 'bump down' and accept a job below their level of qualification.

The availability of suitable employment opportunities is central to the above theoretical considerations. For an individual job seeker, the availability of jobs is determined by two factors (Van Ham et al. [32]). The first determining factor is the location of the residence in relation to the spatial configuration of employment opportunities. Jobs are not evenly spread over space in either quality and quantity. The second factor is the size of the market that can be searched from the residence. This size depends on the spatial flexibility of the job seeker – his or her migration and commuting tolerance.

Migration tolerance is limited because a residential move may engender considerable costs, for example, the loss of location-specific capital (Hey and McKenna [16]). Especially for dual-earner households, where one residential location has to be combined with two work locations, migration tolerance is limited (Mulder and Hooimeijer [22]; Jarvis [17]).

Commuting tolerance refers to the maximum time a worker is willing to commute for a job. For most workers in modern western societies, 45 minutes of commuting is the absolute maximum (Van Ommeren [36]). Because they have shorter commuting times, women are thought to have a lower commuting tolerance than men (Blumen [4]). According to Madden [19] gender differences in household roles are important in influencing women to accept jobs closer to home (see also Johnston-Anumonwo [18] on the household responsibility hypothesis). Especially when children are present in the household, women are restricted in their spatial mobility (Baccaïni [1]; Rouwendal [24]).

The rationale of the above theoretical framework is that individual spatial flexibility in combination with the spatial distribution of suitable job opportunities, relative to the place of residence, largely determines the risk of overeducation. We expect the risk of overeducation to be highest for those workers restricted to a small regional market. As a consequence, spatial mobility can be seen as a means of avoiding overeducation (Van Ham et al. [33]). Based on these considerations we formulate three hypotheses. First, we expect those living far away from a large concentration of employment to run the highest risk of overeducation. For these workers it is costly (in terms of commuting or migration) to get a suitable job. Second, we expect a high regional level of unemployment to increase the probability of overeducation. A high regional level of unemployment indicates fierce competition on the regional market. Under these conditions it is more difficult for workers to find a suitable job. Third, workers who are spatially more flexible – in the present analysis measured in terms of having access to a car for personal use – are expected to have a lower risk of overeducation. Spatially flexible workers have better access to employment opportunities located further away.

3. DATA AND METHODOLOGY

The data used in this paper were derived from the 1998 wave of the German Socio-Economic Panel (GSOEP). This database is administered by the German Institute for Economic Research (DIW) in Berlin (see Wagner et al. [37] for details). The analyses were restricted to respondents aged between 16 and 65 years with a German vocational qualification or university degree (i.e., those who are at risk of overeducation). We excluded students, trainees and people in the armed forces. Following this selection procedure, the data set comprised 5143 respondents, 3306 of whom were employed. Additionally, 1998 regional data for the 75 West German spatial planning regions (*Raumordnungsregionen*) were obtained from the German Federal Office for Building and Regional Planning (Bundesamt für Bauwesen und Raumordnung [9]). Using the *Raumordnungsregion* number for the GSOEP respondents' place of residence as a key variable, we were able to match individual data to regional data. We gratefully acknowledge the invaluable help of the data protection officer responsible for the GSOEP data, who granted us special permission to link these two sets of data.

Theoretical considerations have two important implications for the methodology we used. First, the cases in our model need to be clustered by region of residence (the 75 West German *Raumordnungsregionen)*. The data includes both individual level and regional characteristics, and there is more than one respondent per region in our sample. Ignoring the nested nature of the data would violate the standard assumption of independence of observations that underlies traditional regression models. Clustering the data by region in the model used solves this problem (StataCorp [28]).

Second, the relationship between the availability of employment opportunities and overeducation is not straightforward. Those in employment are a selective group, and it can be assumed that the selection process is related to our dependent variable (overeducation). If no suitable employment is available, unemployment can be chosen as a strategy to avoid overeducation. Because those most likely to be overeducated are those least likely to enter employment (Van Ham et al. [34]), analyzing overeducation while restricting the sample to the employed could lead to biased results. In the present study we account for sample selection bias by employing a variant of Heckman's [15] two-step selection model. In the first step, the probability of being employed is analyzed. In the second step, the probability of those in employment being overeducated is analyzed. Because the dependent variables in both the selection and the overeducation model are binary, a bivariate probit model with sample selection is proposed, following Van de Ven and Van Praag [30].[1] Such a maximum-likelihood probit model with sample selection provides consistent, asymptotically efficient estimates for all parameters in the model (StataCorp [28]).

When specifying a two-step model one has to ensure the model is properly identified (Manski [20]). Strictly speaking, our model is basically identified by functional form because the bivariate probit model is non-linear. However, we decided to adopt an additional strategy in order to avoid multicollinearity problems and to ensure identification of the model.

The key element of this strategy is to select at least one instrument variable that affects only the employment decision, but not the overeducation risk. The difficulty here is that we can expect very similar factors to influence both the employment decision and the overeducation risk, since both selection processes, i.e., the access to any job as well as the access to a good one, are influenced by differences in people's productivity. Since a formal econometric test that could indicate the correct specification of the model is not available, any argument as to why specific variables are expected to influence the employment equation, but not the overeducation one, has to be of a substantive, theoretical nature. In our situation, we chose the strategy of using identical sets of regressors in both equations (because of the arguments given above), with the exception of the age variables, which we only use in the employment equation. Our anticipation that this variable influences only the employment probability, but not the overeducation risk, is based on three arguments. First, there are good theoretical arguments to suggest that age does not significantly influence the risk of working in a job for which one is overeducated, since--compared to people of intermediate age--both younger and older workers run an above-average risk of overeducation. The career mobility theory by Sicherman and Galor [26] states that graduates often start their occupational career with a job for which they are overqualified (Sicherman [25]), whereas older employees face the problem of continuing obsolescence of the skills that they acquired in initial vocational training (Blechinger and Pfeiffer [3]). The latter phenomenon presents a severe risk, especially in the German labor market, where initial vocational training plays a much more important role in the accumulation of human capital than ongoing vocational training received during the later employment career. Second, we ran a model that includes the age variables as regressors in a single probit overeducation equation. This test produced very similar results to the overeducation equation with sample selection shown in the lower part of Table 2 and yielded no significant age effect (not shown). Though this may not be taken as a proof, it at least suggests that omitting the age variables in the overeducation equation of our main model does not substantially affect our results. Third, the non-significant age effect produced by this test is in line with existing literature; see, e.g., Büchel and Battu [7], where not a single one of the various model specifications produced a significant coefficient for either age or age squared. The same pattern can be observed in the paper by Dolton and Silles [10], who use a model specification with a single metric age covariate only.

---- please insert Table 1 about here ----

Table 1 presents the variable summary statistics and definitions of the variables for the whole sample (the employment selection model) and the employed only sample (the overeducation model).

The overeducation variable deserves special attention. This variable was constructed following a procedure developed by Büchel and Weißhuhn (see Büchel [6]). Whether or not a worker is overeducated was determined by means of the so-called 'subjective' approach based on self-assessment, i.e., by asking workers about the level of education usually required to perform their current job. If the actual level of qualification was higher than the job requirements, the worker was defined as being overeducated; if not, he or she was classified as being correctly allocated. This binary outcome variable was validated by information about the occupational position of the respondents. Following this validation procedure, less than 1% of cases were rejected due to an obviously implausible combination of the three variables actual level of qualification, job requirements, and occupational position. A further 6% were rejected because they could not be conclusively classified as either overeducated or correctly allocated (the so-called "gray" or "mixed" category; for details of the categorization scheme, see Büchel [6]). After weighting, 14.1 percent of the employed men and 18.2 percent of the employed women in our data set were identified as being overeducated (average 15.8 percent).

Some overeducation researchers argue that cognitive dissonance problems among the interviewed workers make this 'subjective' approach prone to measurement errors. They propose that the competing 'objective' approach is used instead, with every occupation being assigned a particular job-level requirement which can then be compared with the actual educational level of the respondent. On the basis of this information, it is again possible to determine whether or not each individual worker has surplus education for his or her job. However, this approach has several major disadvantages, mainly caused by wide ranges of intra-occupational job requirements. Consequently, the subjective approach has been predominant in more recent empirical studies. It is assumed that the worker in question is in the best position to judge which qualifications are actually necessary for the job he or she performs: "This [subjective approach] has the advantage of obtaining information from the source closest to the actual job situation, taking account of all specific circumstances." (Hartog & Oosterbeek [14]:186; for a detailed description of competing forms of measurement, see Büchel [6]). Furthermore, methodological analyses indicate that results are relatively robust with respect to the form of measurement chosen (Hartog [13]).

4. RESULTS

Table 2 presents the results of the full bivariate probit model with sample selection. First of all, the highly significant coefficient ρ (0.665) shows that there is a strong positive correlation between the error terms of the employment and overeducation equations, indicating that workers with a low probability of employment run a high risk of overeducation when they find a job. In other words, for some people, working in a job for which they are overeducated is a strategy chosen to avoid unemployment, and vice versa (for the substitutional character of unemployment and overeducation see Büchel [6]; Van Ham [34]).

The results of the selection equation are presented in the top half of Table 2. The dependent variable indicates whether respondents were employed (1) or not (0). For a more thorough discussion of the theoretical background of this part of the model, see Van Ham [31] and Van Ham et al. [34]. Here, the results of the analysis – all of them in line with existing literature – are only discussed briefly. The results show that for women, having children aged up to 16 years decreases the probability of being in employment. Having a partner increases the probability of employment for both men and women. The higher the additional household income (the net household income minus the net earnings of the respondent), the lower the probability of being employed; this effect is stronger for women than for men. The probability of being employed is non-linearly related to age: with increasing age, the probability of being employed first increases and then falls. Employment probability increases with the number of years in education. Foreigners and disabled people have a lower chance of being employed. Those who have a car at their personal disposal have a higher employment probability than others. Of the two regional variables included in the employment equation, only the regional unemployment rate has a significant impact: the probability of being employed decreases with an increasing regional rate of unemployment.

---- *please insert Table 2 about here* ----

The results of the overeducation equation are given in the bottom half of Table 2. The dependent variable indicates whether the respondents were overeducated (1) or not (0). As expected, women with children up to 16 years run a higher risk of overeducation than women without children or men. In a standard probit model of overeducation, without taking the selection mechanism into account, the effect of children on the incidence of overeducation among women is much stronger (not shown). This is probably because the employment selection mechanism for women is partly determined by the presence of children (see results of the selection equation in the top half of Table 2). The results further show that the probability of overeducation decreases with increasing years of education. These results are in line with empirical evidence reported in the overeducation literature (for Germany, see e.g.: Büchel [6]). In all industrialized countries, qualification-specific unemployment rates are negatively correlated with the educational level. Since overeducation is a typologically analogous mismatch situation in the same way as unemployment, a corresponding pattern can be expected. The probability of overeducation also decreases with longer firm tenure. This is in line with the human capital based assumption that "overeducation may be a compensation for a lack of (…) relevant productive skills necessary for the job" (Groot and Maassen van den Brink [12]:157; see Büchel and Pollmann-Schult [8] for more specific evidence of this relationship). Also in line with previous findings, disabled workers run a higher risk of overeducation. An unexpected result is that foreigners do not face a higher overeducation risk than Germans. In a standard probit model of overeducation, without taking the selection mechanism into account, the effect of citizenship is strong and highly significant (not shown). Again, this is probably because being a foreigner plays a significant role in the selection mechanism into employment (see results of the selection equation in the top half of Table 2).

Spatial flexibility reduces the risk of overeducation. Those with a car for personal use are less likely to be overeducated than those without. Of course, this effect should be interpreted with some caution, because the direction of the causal effect is unclear: those with a high-level job might earn higher incomes, and thus be in a better position to afford a car.

The longer the traveling time to a large agglomeration, the higher the probability of overeducation. This means that access to a large concentration of employment opportunities reduces the probability of overeducation.

Contrary to our expectations, however, the regional unemployment level does not impact on overeducation. In the light of this result, it is interesting to take a second look at the employment equation. The results show that with an increasing rate of unemployment, the probability of employment decreases. Access to a large agglomeration has no significant effect on employment. These results are important in helping us to understand the mechanisms behind overeducation. In order to avoid unemployment, it is relevant to have access to a regional market with a low level of unemployment: it is not the size of the market that matters, but the level of competition. On the other hand, in order to avoid overeducation, the size of the market is crucial: job seeking on a large market increases the probability of finding a suitable job, regardless of the structure of supply and demand.

5. DISCUSSION

In this paper we offer a framework that links the occurrence of overeducation at the individual level to the availability of employment opportunities. Our approach extends the existing literature by introducing a broader framework than that used in the married-women approach; we postulate that geographic restrictions affect the market outcomes of *all* workers. Further, our research design for the analysis of overeducation is innovative in two ways. First, we combine individual and regional characteristics in the same models. Second, we draw a distinction between having no job and working in a job for which one is overeducated by using a variant of the Heckman two-step procedure to control for selective access to employment. As a spin-off result of this methodological approach, we find that workers with characteristics associated with a generally low employment probability run a higher risk of overeducation than others.

Testing our framework for the West German labor market confirms the hypothesis that both spatial distribution of job opportunities and individual spatial flexibility play a major role in explaining the phenomenon of overeducation. The smaller the local labor market (in our study measured in terms of the traveling time to the nearest agglomeration), the higher the risk of overeducation. Furthermore, spatial flexibility helps workers to overcome a poor local market: access to a car for personal use helps to avoid overeducation.

By using rather rough proxies of job availability, we demonstrate the importance of including the spatial context in the explanation of overeducation. Our results might prompt research on the role of spatial flexibility as a means of reducing overeducation.

ACKNOWLEDGEMENTS. This paper was written while Maarten van Ham was a member of the Urban Research Center Utrecht (URU), Faculty of Geographical Sciences, Utrecht University. His research was supported by the Netherlands Organization for Scientific Research (NWO grant 42513002), and by the Max Planck Institute for Human Development, Berlin, Germany, which subsidized a two-month research period as a guest scientist. The paper benefited substantially from a methodological discussion with Winfried Pohlmeier. Other helpful comments came from Ulrich Rendtel, Jan Ondrich, Götz Rohwer, Ulrich Pötter, Viktor Steiner, Markus Pannenberg, and from the Editor and two anonymous referees.

NOTES.

1. The two-step selection model is often estimated by obtaining the inverse Mill's Ratio from a first stage probit, and entering it into the second stage equation. As noted by Van de Ven and Van Praag [30], if the dependent variable in the second stage equation is binary, the error term is not normally distributed; a two-stage approach to this problem would therefore yield only approximate results.

REFERENCES

1. B. Baccaïni, Commuting and residential strategies in the Ile-de-France: Individual behaviour and spatial constraints, *Environment and Planning A*, 29, 1801-1829 (1997).
2. H. Battu, P.T. Seaman and P.J. Sloane, The impact of regional migration on the earnings, employment and overeducation of married women in the UK, in "Gender and the Market" (S. Gustafsson and D. Meulders, Eds.), Macmillan Press, London (2000).

3. D. Blechinger and F. Pfeiffer, Technological Change and Skill Obsolescence: the Case of German Apprenticeship Training, in “Education and Training in a Knowledge-based Economy” (H. Heijke and J. Muysken, Eds.), MacMillan Press Ltd., Houndmills and London, UK (2000).
4. O. Blumen, Gender differences in the journey to work, *Urban Geography*, 15, 223-245 (1994).
5. F. Büchel, Tied movers, tied stayers - The higher risk of overeducation among married women in West Germany, in “Gender and the Market” (S. Gustafsson and D. Meulders, Eds.), Macmillan Press, London (2000).
6. F. Büchel, Overqualification: reasons, measurement issues and typological affinity to unemployment, in “Training in Europe. Second report on vocational training research in Europe 2000. Background report, Vol. 2” (P. Descy and M. Tessaring, Eds.), Office for Official Publications of the European Communities, Luxembourg (2001).
7. F. Büchel and H. Battu, “The Theory of Differential Overqualification – Does it Work?”, *Scottish Journal of Political Economy* (forthcoming).
8. F. Büchel and M. Pollmann-Schult, “Overeducation and skill endowments -The role of school achievement and vocational training quality,” IZA Discussion Paper No. 337, Bonn (2001).
9. Bundesamt für Bauwesen und Raumordnung (BBR; German Federal Office for Building and Regional Planning), “Aktuelle Daten zur Entwicklung der Städte, Kreise und Gemeinden. Ausgabe 1999 (Current Data on the Development of Cities, Districts and Municipalities. 1999 Edition),” BBR, Bonn (1999).
10. P. Dolton and M. Silles, Over-education in the graduate labour market: Some evidence from alumni data. London School of Economics, *Centre for the Economics of Education Discussion Papers* No. 09 (2001)
11. R.H. Frank, Why women earn less: the theory and estimation of differential overqualification, *The American Economic Review*, 68, 360-373 (1978).
12. W. Groot and H. Maassen van den Brink, Overeducation in the labor market: a meta-analysis, *Economics of Education Review*, 19, 149-158 (2000).
13. J. Hartog, On Returns to Education: Wandering along the Hills of ORU Land, in “Education and Training in a Knowledge-based Economy” (H. Heijke and J. Muysken, Eds.), MacMillan Press Ltd., Houndmills and London, UK (2000).
14. J. Hartog and H. Oosterbeek, Education, Allocation and Earnings in the Netherlands: Overschooling?, *Economics of Education Review*, 7 , 185-194 (1988).
15. J. Heckman, Sample selection bias as a specification error, *Econometrica*, 47, 153-161 (1979).
16. J.D. Hey and C.J. McKenna, To move or not to move, *Economica*, 46, 175-185 (1979).
17. H. Jarvis, Identifying the relative mobility prospects of a variety of household employment structures, 1981 - 1991, *Environment and Planning A*, 31, 1031-1046 (1999).
18. I. Johnston-Anumonwo, The influence of household type on gender differences in work trip distance, *Professional Geographer*, 44, 161-169 (1992).
19. J.F. Madden, Why women work closer to home, *Urban Studies*, 18, 181-194 (1981).
20. C.F. Manski, “Identification problems in the Social Sciences”, Harvard University Press, Cambridge, MA (1995).
21. K. McGoldrick and J. Robst, Gender differences in overeducation: a test of the theory of differential overqualification, *American Economic Review*, 86, 280-285 (1996).
22. C.H. Mulder and P. Hooimeijer, Residential relocations in the life course, in “Population Issues. An interdisciplinary focus” (L.J.G. Wissen and P.A. Dykstra, Eds.), Kluwer, New York (1999).
23. V. Preston and S. McLafferty, Spatial mismatch research in the 1990s: progress and potential, *Papers in Regional Science*, 78, 387-402 (1999).

24. J. Rouwendal, Spatial job search and commuting distances, *Regional Science and Urban Economics*, 29, 491-517 (1999).
25. N. Sicherman, “Overeducation” in the Labor Market, *Journal of Labor Economics*, 9, 101-122 (1991).
26. N. Sicherman and O. Galor, A Theory of Career Mobility, *Journal of Political Economy,* 98, 169-192 (1990).
27. W. Simpson, “Urban structure and the market: worker mobility, commuting and underemployment in cities,” Clarendon Press, Oxford (1992).
28. StataCorp, “Stata Statistical Software: Release 7.0,” Stata Corporation, College Station, TX (2001).
29. M.C. Tsang and H.M. Levin, The economics of overeducation, *Economics of Education Review*, 4, 93-104 (1985).
30. W.P.M.M. Van de Ven and B.M.S. Van Praag, The demand for deductibles in private health insurance: a probit model with sample selection, *Journal of Econometrics*, 17, 229-252 (1981).
31. M. Van Ham, Workplace mobility and occupational achievement, *International Journal of Population Geography*, 7, 295-306 (2001).
32. M. Van Ham, P. Hooimeijer and C.H. Mulder, Urban form and job access: disparate realities in the Randstad, *Journal of Economic and Social Geography*, 92, 231-246 (2001).
33. M. Van Ham, C.H. Mulder and P. Hooimeijer, Spatial flexibility in job mobility: macrolevel opportunities and microlevel restrictions, *Environment and Planning A*, 33, 921-940 (2001).
34. M. Van Ham, C.H. Mulder and P. Hooimeijer, Local underemployment and the discouraged worker effect, *Urban Studies*, 38, 1733-1751 (2001).
35. M. Van Ham, “Job access, workplace mobility, and occupational achievement,” Eburon, Delft (2002).
36. J. Van Ommeren, “Commuting and relocation of jobs and residences: a search perspective,” Free University, Amsterdam (1996).
37. G.G. Wagner, R.V. Burkhauser and F. Behringer, The English Language Public Use File of the German Socio-Economic Panel Study, *Journal of Human Resources*, 28, 429-433 (1993).

TABLE 1 Variable summary statistics and definitions

	Mean	Std. Dev.
Employment selection equation (N = 5143)		
Dependent: Employed (1 = employed)	0.643	0.479
Female (1 = female)	0.455	0.498
Child(ren) up to 16 years (1 = child(ren) present)	0.407	0.491
Partner (1 = partner present)	0.782	0.413
Additional household income (*1000 DM)[d]	1.494	2.798
Age (in years)	40.990	11.557
Age square	1813.670	995.835
Education (in years)	12.200	2.301
Foreigner (1 = foreigner)	0.191	0.393
Disabled[a] (1 = disabled)	0.114	0.318
Car for personal use	0.724	0.447
Traveling time to agglomeration[b]	1.214	0.348
Unemployment rate[c]	10.029	2.815
Overeducation equation (N = 3306)		
Dependent: Overeducation (1 = overeducated)	0.188	0.391
Female (1 = female)	0.408	0.492
Child(ren) up to 16 years (1 = child(ren) present)	0.418	0.493
Partner (1 = partner present)	0.772	0.419
Additional household income (*1000 DM)[d]	0.740	2.627
Education (in years)	12.366	2.449
Tenure (in years)	10.154	9.436
Foreigner (1 = foreigner)	0.122	0.328
Disabled[a] (1 = disabled)	0.073	0.259
Car for personal use (1 = car present)	0.797	0.403
Traveling time to agglomeration[b]	1.217	0.352
Unemployment rate[c]	9.915	2.749

[a] Workers are defined as disabled if they state that their health situation “strongly” impedes their performance of daily activities.
[b] Average travel time in hours to the nearest three agglomerations by car.
[c] Percentage unemployed in total potential labor force (15-65 years old).
[d] Additional household income is defined as the net monthly household income minus the net monthly earnings of the respondent

Source: Own calculations based on GSOEP data, matched with regional data from the German Federal Office for Building and Regional Planning (both for 1998).

TABLE 2 Determinants of employment and overeducation (bivariate probit model with sample selection)

	Coefficient	Robust Std. Error[1]
Employment selection equation (N = 5143)		
Female	0.121	0.094
Child(ren) up to 16 years	0.037	0.065
Female * child(ren) up to 16 years	-0.315***	0.068
Partner	0.169**	0.080
Female * partner	0.038	0.107
Additional household income (in 1000 DM)	-0.141***	0.015
Female * additional household income (in 1000 DM)	-0.041***	0.015
Age (in years)	0.064***	0.015
Age squared	-0.001***	0.000
Education (in years)	0.030***	0.011
Foreigner	-0.875***	0.050
Disabled	-0.440***	0.047
Car for personal use	0.406***	0.037
Traveling time to agglomeration	-0.078	0.146
Unemployment rate	-0.029**	0.015
Constant	-0.246	0.484
Overeducation equation (N = 3306)		
Female	-0.054	0.092
Child(ren) up to 16 years	-0.090	0.062
Female * child(ren) up to 16 years	0.156*	0.083
Partner	0.097	0.082
Female * partner	0.002	0.102
Additional household income (in 1000 DM)	-0.018	0.017
Female * additional household income (in 1000 DM)	0.032	0.024
Education (in years)	-0.063***	0.013
Tenure (in years)	-0.029***	0.003
Foreigner	0.153	0.099
Disabled	0.142*	0.081
Car for personal use	-0.131**	0.063
Traveling time to agglomeration	0.181**	0.090
Unemployment rate	-0.002	-0.013
Constant	-0.269	0.281
Log Likelihood = -4058.99		
Correlation Coefficient (ρ)[2]	0.665***	0.136

*=p<0.10; **=p<0.05; ***=p<0.01

1) Standard errors adjusted for clustering on *Raumordnungsregionen* (spatial planning regions).
2) Wald test for independent equations: chi-square = 10.86, df = 1, p = 0.001.

Source: Own calculations based on GSOEP data, matched with regional data from the German Federal Office for Building and Regional Planning (both for 1998, West Germany).