Returns to Education and Experience in Self-Employment: Evidence from Germany

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Abstract

This paper compares the returns to human capital in the self-employed and wage-employed sectors of the economy. Using data from the former West German sample of the German Socioeconomic Panel survey for the 1984 – 1997 time period, we estimate returns to education and work experience from standard log-earnings equations for self-employed and wage-employed workers. Two key results are found. First, additional schooling has a smaller effect on earnings for the self-employed than for the wage-employed. Indeed, educational attainment has an insignificant effect on self-employment earnings. Second, prior self-employment experience receives a lower return in wage-employment than does prior wage-employment experience. These results are consistent across specifications controlling for education endogeneity and self-selection bias.

Acknowledgements

1. Introduction

The proportion of the workforce that is self-employed has increased dramatically in many western economies in the past several decades. In Europe, the increases have continued through the decade of the 1990s in some countries (including Germany).[1] Many governments and public policy makers view self-employment as an activity to be encouraged, in order to combat poverty and unemployment.

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[1] The rate has also increased in Canada (in stark contrast to the U.S.). See Manser and Picot (1999) and Blanchflower (2000).

It is important, therefore, that we understand the determinants of self-employment earnings and success. This paper focuses on one such determinant, the individual's level of human capital investment or attainment. The labor market rewards to human capital among individuals who are working in the wage and salary sector (hereafter "wage sector") are very well known. Much less known are the rewards to human capital investment in the self-employment sector. This paper contributes to our knowledge of these returns.

It also is important that we understand something of the consequences of self-employment for those who return to the wage sector. In particular, to what extent is the labor market experience accumulated while in self-employment subsequently rewarded in the wage sector? This paper contributes to our knowledge of this return, as well.

2. Theoretical foundations

The basic human capital model (Becker 1975, Mincer 1974) posits that investments in skill through formal educational attainment or through on-the-job training and experience increase the productivity of workers, which is subsequently rewarded in the labor market through higher earnings. Human capital acquisition has also been viewed as a signal of higher productivity, rather than a contributor to it, which is again rewarded in the labor market by higher earnings (Spence 1973). In both cases, profit-maximizing firms pay a higher wage for workers with higher levels of educational attainment and work experience.[2]

The role of human capital acquisition, particularly educational attainment, is less clear-cut for the self-employed. On the one hand, in the wage-employed sector, some of the return to additional skill (and productivity) may be captured by the firm.[3] The self-employed accountant or attorney, therefore, might earn a higher return to education in the self-employed sector. But on the other hand, the potential role of educational attainment as a signal, for example, is significantly lessened for the self-employed, except perhaps in the case of self-employed professionals, for whom educational attainment may signal higher productivity to potential customers. In addition, even the role of education in increasing productivity is lessened for the self-employed, as much of one's productivity in self-employment depends on entrepreneurial or other abilities (e.g., salesmanship) not emphasized in formal education programs. Consequently, on balance the return to education might be higher or lower in self-employment as compared to wage-employment.

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[2] Non-pecuniary rewards to human capital are ignored throughout this paper.

[3] This also raises the point that some part of the income reported by the self-employed represents returns to capital or entrepreneurship, rather than a return to labor.

The role of human capital acquisition through on-the-job experience, however, is likely to be the same for the self-employed as it is for the wage-employed (except to the extent that earnings in wage employment are directly tied by contract to tenure through seniority provisions). We would expect, therefore, that the estimated return to on-the-job experience should be the same in both employment sectors.

Support for these hypotheses in previous work has been mixed. Data for the U.S. suggests that the returns to education are higher in the self-employment sector for males, for example (Evans / Leighton 1989, Clain 2000, Fairly / Meyer 1996). Clain finds lower returns to education in self-employment for females, however. Regarding work experience, Evans and Leighton (1989), for example, find that the return to previous wage-employment work experience is higher in the wage sector than in the self-employment sector for males. They find the returns to self-employment work experience to be about the same in both sectors.

A topic studied in previous work for the U.S. is the return to self-employment experience for workers who have returned to wage-sector employment. Williams (2000, 2001) and Bruce and Schuetze (2000) have found that the wage-sector return to self-employment experience is significantly less than the wage-sector return to wage-sector experience (at least for women and among youth). Williams attributes this difference to differential returns to sector-specific human capital. That is, the increased productivity from additional experience in self-employment does not necessarily transfer to the wage-employment sector.[4] An explanation for the gender differential in returns is that there is a stigma attached to self-employment among women (but not among men), and future employers heavily discount such experience.

Cross-national differences in these returns might arise from institutional differences, in both the educational systems and in work arrangements. The importance of the apprenticeship in Germany, for example, might affect the returns to both education and work-experience when compared with the United States. An additional goal of this paper is to determine whether the German labor market yields results similar to those found in the U.S.

3. Methodology and Data

The analysis employs the standard Mincerian earnings function:

$$Ln(Yi) = aS_i + b\mathbf{X}_i + c\mathbf{Z}_i + e_i \ ,$$

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[4] An alternative explanation is provided by Uhly (2001), who argues that the lower return to self-employment experience simply reflects the less-stable employment histories of the self-employed.

where for each individual i, Y is monthly earnings in self- or wage-employment in 1997, S is years of schooling, X is a vector of experience measures (months of experience, experience squared), Z is a vector of personal, job, or firm-related characteristics, and e is an individual level error term. The parameters are first estimated using simple ordinary least squares, then with corrections for endogeneity and self-selection, as described in section 4 below. The parameters are estimated separately by self-employment status in 1997.

The data for the analysis are from the German Socio-Economic Panel (GSOEP) for the years 1984 to 1998.[5] The GSOEP is a longitudinal household survey, conducted since 1984, of approximately 6000 households in the first year. The survey collects individual-level personal, job, family background, and household characteristics annually for each individual in the sample. The GSOEP also collects information on months worked in each year, differentiated according to self vs. wage employment status. This is an improvement over the data of some previous work, which is based on annual measures of experience.

Only the West German and West German foreigner samples are used in this analysis. The sample is further restricted to those who were present in the sample in every year, 1984–1998 (balanced sample design), who were aged 25–60 in 1997, and who were employed in 1997. The statistical analysis was also limited to those who did not have missing values for any of the variables. The final sample was made up of 1907 individuals, of whom 176 were self-employed in 1997.[6]

The longitudinal nature of the data is employed only in the sense that some variables were created using values from multiple years. In particular, the experience variables (Self Experience and Wage Experience) are defined as the cumulative months of self-employment experience or wage-employment experience for the 1984–1996 time period. The monthly income variables for 1997 are taken from the 1998 wave.

The variables utilized in the analysis are described in Table 1. For the dependent variable, we use the natural log of 1997 monthly earnings in self-employment, wage-employment, or self and wage employment in total. The schooling variable (Education) is defined simply as the years of educational attainment as of 1997. The experience variables are as described above. Other variables employed in the analysis include personal characteristics (gender, marital status, age, German nationality), job characteristics (industry, occupation, whether civil servant), household characteristics (number of children,

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[5] For a description of the data, see Wagner, Burkhauser and Behringer (1993).

[6] One problem ignored in this work is the potential selectivity bias arising from a greater likelihood for non-response among self-employed individuals. If the self-employed non-respondents also have higher earnings, then our estimates would understate the return to self-employment among the population as a whole.

Table 1

Variable Definitions

Variable Name	Definition	SOEP Source File
Dependent variables		
Self Income	Log of self-employment income, 1997	OP
Wage Income	Log of wage-employment income, 1997	OP
Total Income	Log of total income, 1997	
Education and Experience		
Education	Years of education, 1997	NPEQUIV
Self Experience	Total months of self-employment experience, 1984 – 1996	A-MPKAL
Wage Experience	Total months of wage-employment experience, 1984 – 1996	A-MPKAL
Demographic and Personal Characteristics		
Age	Age of respondent, 1997	NPEQUIV
German	=1 if German nationality =0 otherwise	OP
Married	=1 if married with spouse present, 1997 =0 otherwise	NPEQUIV
Children	Number of children in the household, 1997	NPEQUIV
Male	=1 if male =0 if female	NPEQUIV
Family Background		
Father inter. ed.	= 1 if father has "intermediate" level of education	CP
Father upper ed.	=1 if father has "upper secondary" level of education	CP
Father miss. ed.	=1 if father's education is missing or not known	CP
Mother inter. ed.	=1 if mother has "intermediate" level of education	CP
Mother upper ed.	=1 if mother has "upper secondary" level of education	CP
Mother miss. ed.	=1 if mother's education is mission or not known	CP
Wealth Measures		
Owner	=1 if owns residence =0 otherwise (tenant)	NH
Hhold income	Household net income	NH
Occupation and Industry		
Professional	=1 if professional or technical occupation, 1997	NPGEN
Manager	=1 if administrative or managerial occupation, 1997	NPGEN
Clerical	=1 if clerical occupation, 1997	NPGEN
Sales	=1 if sales occupation, 1997	NPGEN
Service	=1 if service occupation, 1997	NPGEN
Civil servant	=1 if a civil servant	NP
Ag., mining	=1 if agricultural or mining industry	NP
FIRE	=1 if finance, insurance or real estate industry	NP
Manufacturing	=1 if manufacturingindustry	NP
Construction	=1 if construction industry	NP
Trade	=1 if retail or wholesale trade industry	NP
Public	=1 if public utility or transportation industry	NP

household income, whether the individual owns his or her residence or is a tenant), and family background characteristics (father's education, mother's education). The latter variables are used as instrumental variables for the IV estimates of returns to education.

4. Results

Descriptive statistics for the variables used in the analysis are presented in Table 2, by self-employment status.[7] Estimates of the parameters from the simple log-earnings function described above are presented in Table 3, separately by self-employment status, in columns (1) through (4).[8] The results presented here assume linear effects of work experience. Estimates of the earnings function with non-linear effects yield similar qualitative results. The linear specification is presented here in order to simplify comparison across the samples. Referring first to the returns to education, the coefficient estimates for the Education variable are 5.7 percent for the wage-employed, and about 2.5 percent among the self-employed (yielding rates of return of about 5.9 and 2.5 percent, respectively). Only the wage-employed return is significantly different from zero, however. The magnitude of the wage-sector estimated return to education is slightly above the estimates for Germany in Trostel et al. (2002), and below the estimates presented by Lauer and Steiner (2001). The low, and insignificant, estimate for the return to education in self-employment is similar in magnitude to the return for women found by Clain (2000).

The estimated returns to additional work experience (measured in months) also differ according to sector of employment. The results suggest significantly higher returns to self-employment experience in the self-employment sector than in the wage-employment sector.[9] Likewise, significantly higher returns to wage-employment experience are found in the wage-employment sector than in the self-employment sector. These results are similar to those presented in Evans and Leighton (1989) and Williams (2000) for the U.S.

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[7] Discussion of the differences between the wage and self-employed, as well as comparisons with self-employed in the U.S., are presented in a longer version of this paper (Williams 2002), available from the author.

[8] Note that the civil servant variable is excluded from the self-employment earnings equation. The excluded category for the occupation variables is agricultural, production and other, and for the industry variables is the service industry. All results in this paper are generated using SAS, Version 8. No corrections are made for self-selection into the workforce.

[9] For this and other statements regarding statistical significance, the difference in returns is significant at the 90 percent level of confidence or greater, using standard t-tests to compare the coefficients.

Descriptive Statistics (by self-employment status)

Variable	Wage-Employed		Self-Employed	
	Mean	Std Dev	Mean	Std Dev
Self Income	7.343	1.332	8.298	1.116
Wage Income	8.233	0.645	7.508	0.879
Total Income	8.228	0.659	8.266	0.936
Education	11.547	2.720	11.982	2.590
Self Experience	2.662	12.533	72.284	53.413
Wage Experience	129.798	39.110	57.409	47.560
Age	44.253	8.624	43.954	8.134
German	0.803	0.397	0.897	0.3031
Married	0.771	0.419	0.755	0.430
Children	0.791	0.994	0.988	1.058
Male	0.582	0.493	0.670	0.471
Owner	0.517	0.499	0.670	0.471
Hhold income	5036	2131	5611	2772
Professional	0.191	0.393	0.227	0.420
Manager	0.038	0.191	0.068	0.252
Clerical	0.236	0.425	0.034	0.181
Sales	0.073	0.260	0.232	0.423
Service	0.108	0.311	0.090	0.288
Civil servant	0.281	0.450	0.011	0.106
Ag., mining	0.024	0.155	0.113	0.318
FIRE	0.040	0.197	0.045	0.208
Manufacturing	0.343	0.474	0.113	0.318
Construction	0.062	0.242	0.102	0.303
Trade	0.101	0.301	0.176	0.382
Public	0.151	0.358	0.056	0.232
Service	0.235	0.424	0.329	0.471
Father inter. ed.	0.064	0.246	0.073	0.262
Father upper ed.	0.055	0.228	0.125	0.331
Father miss. ed.	0.382	0.486	0.278	0.449
Mother inter. ed.	0.064	0.245	0.113	0.318
Mother upper ed.	0.017	0.132	0.045	0.208
Mother miss. ed.	0.392	0.488	0.289	0.454
N	1731		176	

Table 3

Log-Earnings Equation Estimates

Variable	OLS Specification				GMM Instrumental Variables				Selectivity Adjusted Specification			
	Wage-Employed		Self-Employed		Wage-Employed		Self-Employed		Wage-Employed		Self-Employed	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	6.531	0.077	6.820	0.649	5.966	0.270	6.050	0.932	6.414	0.087	8.191	0.632
Education	0.057	0.005	0.025	0.041	0.113	0.026	0.108	0.080	0.054	0.006	0.044	0.030
Self Experience	0.0032	0.0008	0.0063	0.0026	0.0032	0.0013	0.0070	0.0022	0.0038	0.0286	0.0036	0.152
Wage Experience	0.0056	0.0003	0.0046	0.0030	0.0059	0.0004	0.0056	0.0026	0.0057	0.0121	0.0025	0.063
Married	-0.119	0.026	-0.170	0.206	-0.090	0.029	-0.095	0.185	-0.112	0.028	-0.103	0.157
Children	-0.015	0.011	0.120	0.084	-0.013	0.011	0.094	0.075	-0.029	0.032	0.122	0.210
Male	0.473	0.026	0.692	0.219	0.403	0.039	0.671	0.209	0.462	0.043	0.738	0.257
German	-0.073	0.029	-0.102	0.289	-0.135	0.040	-0.267	0.391	-0.096	0.064	-0.591	0.263
Professional	0.269	0.039	0.214	0.343	0.061	0.098	-0.238	0.385	0.271	0.040	0.124	0.410
Manager	0.489	0.059	0.222	0.372	0.303	0.100	0.127	0.205	0.423	0.057	0.131	0.292
Clerical	0.106	0.034	-0.053	0.558	0.038	0.048	-0.258	0.383	0.166	0.045	0.132	0.286
Sales	-0.038	0.049	-0.000	0.381	-0.078	0.067	-0.166	0.291	-0.106	0.050	-0.213	0.288
Service	-0.127	0.041	-0.275	0.376	-0.100	0.048	-0.223	0.607	-0.094	0.074	0.181	0.364
Civil servant	0.049	0.033	–	–	0.021	0.038	–	–	0.170	0.064	–	–
Ag., mining	0.039	0.068	-0.769	0.390	0.078	0.070	-0.828	0.331	0.026	0.049	-0.986	0.337

| Variable | OLS Specification | | | | GMM Instrumental Variables | | | | Selectivity Adjusted Specification | | | |
| | Wage-Employed | | Self-Employed | | Wage-Employed | | Self-Employed | | Wage-Employed | | Self-Employed | |
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
FIRE	0.291	0.058	0.258	0.509	0.309	0.061	0.533	0.488	0.321	0.056	0.180	0.288
Manufacturing	0.211	0.034	-0.128	0.331	0.232	0.038	-0.249	0.276	0.339	0.052	0.412	0.253
Construction	0.068	0.051	0.234	0.386	0.107	0.057	0.095	0.242	0.127	0.041	0.193	0.323
Trade	-0.060	0.045	0.070	0.350	-0.023	0.055	0.096	0.258	0.036	0.001	0.029	0.002
Public	0.126	0.038	0.217	0.431	0.147	0.033	0.098	0.290	0.145	0.000	0.077	0.002
Lambda	–	–	–	–	–	–	–	–	-0.457	0.109	-0.636	0.228
R-Squared	0.57		0.27		0.54		0.23		0.57		0.46	
Rho	–		–		–		–		-0.968		-0.724	

Note: Lambda is the inverse Mills ratio. Rho is the residual correlation coefficient. The sample size is 1731 for the wage-employed and 176 for the self-employed. The instrumental variables for education are mother's and father's education.

In addition, the results for Germany indicate that there is a significantly higher return to wage-employment experience than self-employment experience in the wage sector. This also is consistent with the results presented by Williams (2000, 2001) and by Bruce and Schuetze (2000) for the U.S.

Based on arguments by Card (1999) and empirical results for Germany found by others (Lauer and Steiner 2001, Trostel et al. 2002), there is reason to believe that the OLS estimates of the return to education presented above are biased downward. To correct for this bias, we estimate the returns to education with an instrumental variables approach (using a Generalized Method of Moments estimator). The instruments used (father's and mother's education) have been commonly employed in other work (Lauer and Steiner 2001, Trostel et al. 2002).[10] These IV estimates are presented in columns (5) through (8).

Consistent with previous work regarding instrumental variable estimates, the IV estimated returns to education are considerably larger than the OLS estimates (from 11 to 12 percent per year). The return in the self-employment sector is not significantly less than the return in the wage sector, although the self-employment return is again not significantly different from zero.

Regarding returns to work experience, the results again suggest that the return to self-employment experience is considerably less than the return to wage-employment experience in the wage sector. In addition, the wage sector return is less than the self-employed sector return, as in the previous estimates. Again, these results are consistent with results for workers in the U.S.

In addition to the problem of endogenous educational attainment, there is the likely possibility of self-selection into the self- and wage-employment sectors. To adjust for the potential bias arising from self-selection, we use Heckman's two-step procedure. First, we estimate a probit specification of the probability of self-employment in 1997. From these estimates we construct the inverse Mills ratio (lambda), and then use lambda as a regressor in an OLS wage regression.[11] The selectivity adjusted OLS parameter estimates and their asymptotic standard errors are presented in columns (9) through (12). Variables that are included in the probit model, but not included in the OLS regressions, are the individual's age and the two wealth proxies, Owner and Hhold income. Variables that are included in the OLS regressions but not in the probit are the experience variables (Self Experience and Wage Experience).

The selectivity-adjusted estimate of the return to education is of about the same magnitude as the simple OLS estimate for the wage-employed. The re-

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[10] Other commonly used instruments include spouse's educational attainment, and father's occupation. See the special issue of Labour Economics (Volume 6, 1999) devoted to this issue for examples for several countries in Europe.

[11] The parameter estimates from the first-stage Probit model are presented in Williams (2002).

turn for the self-employed, however, is a good deal larger with this model, and more in line with the wage-employed return.

The estimated returns to self-employed and wage-employed work experience show a pattern similar to that in the previous columns: the return to self-employment experience is lower in the wage sector than is the return to wage-employment experience. In these estimates, however, the returns to self-employment experience are similar across sectors, while the returns to wage-employment experience differ. The answer to the question of whether the returns are the same across sectors appears to be sensitive to the specification used. The finding that the return to self-employment experience is lower in wage-employment, however, is consistent both across specifications and across countries. Unfortunately the estimated standard errors indicate that some of the returns are no longer significantly different from zero. Previous research has suggested that estimates from the two-step procedure are highly sensitive to the specification used, however, so care must be taken when interpreting these results.

5. Conclusions

This paper presents estimates of the returns to education and work experience for samples of self-employed and wage-employed workers in the GSOEP. The results indicate that the return to education in Germany is higher in the wage-employed sector, and that self-employment work experience is less rewarded in the wage sector than is wage-employment work experience. These results appear to hold after adjusting for the potential endogeneity of educational attainment and self-selection into the self-employment sector.

One caveat regarding the results lies in a potential problem with our measure of the returns in self-employment. Some of the return in self-employment could be in the form of accumulated business assets, which are not measured here. We might therefore understate the returns to education and experience in that sector. This would not affect our estimate of the differential return to type of experience, however, especially that found in the wage-employment sector.

This result might be of interest to German policy-makers interested in the consequences of the self-employment experience. In particular, given the lower return to self-employment experience when a worker returns to the wage sector, policy-makers need to be especially careful in terms of encouraging workers to pursue self-employment as opposed to wage sector employment. Further research should examine potential sources of the differential returns that have been found. One hypothesis of particular interest is that the return to self-employment experience is occupation-specific, and that occupational changes are the source of the observed difference in returns between wage and self-employment experience.

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