RETURNS TO ECUCATION AND EXPERIENCE IN SELF- EMPLOYMENT: EVIDENCE FROM GERMANY

Donald R. Williams
Kent State University
Kent OH 44242
USA

June, 2002

Preliminary Results: please do not quote without author's permission.
COMMENTS WELCOME!

Paper prepared for presentation at the 5th GSOEP Users Conference, DIW-Berlin, Berlin, Germany, July 3-4, 2002. I am grateful to the Department of Economics and the Office of Research and Graduate Studies at Kent State University for financial support. Some of the work presented here was conducted while an IRISS visitor at CEPS/INSTEAD, Differdange, Luxembourg.

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.

RETURNS TO EDUCATION AND EXPERIENCE IN SELF-EMPLOYMENT: EVIDENCE FROM GERMANY

1. Introduction

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

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 will contribute 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 will contribute to our knowledge of this return, as well.

The paper is organized as follows: the following section outlines the basic human capital theory and hypotheses to be examined. The data and methodology are described in section 3. The empirical results are presented in section 4, with conclusions and topics for further research in section 5.

[1] This is probably also true in many Eastern European countries.

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.

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

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. Regarding the returns to education, for example, data for the U.S. suggests that the returns are higher in the self-employment sector. Using years of educational attainment, Evans and Leighton (1989) find a rate of return of 10 percent per year among the self-employed, compared with 7 percent per year among the wage-employed, for males in the U.S. Using dummy variables for High School completion or College attendance and/or completion, Clain (2000) and Fairly and Meyer (1996) find higher rates of return to college attendance or completion in self-employment, also for males in the U.S. Clain finds lower returns to education in self-employment for females, however (although the return is positive and statistically significant).

Regarding returns to work experience, the data also suggests that the hypotheses do not hold. 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. The primary goal of this paper is to examine these hypotheses for the German labor market.

[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.

One special 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 Shuetze (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. Another explanation, for the gender differential in returns, is that there is a stigma attached to self-employment among women, and future employers heavily discount such experience.[4] An additional goal of this paper is to determine whether the German labor market exhibits a similar result.

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.

Because little work has been published regarding the self-employed in Germany, this paper will contribute to our general knowledge of that important (and growing) segment of the labor market as well.[5]

[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.
[5] Exceptions include Ozcan and Seifert (2000), McManaus (2000), Jungbauer-Gans (1999), and Lechner (1995).

3. Methodology and Data

The analysis employs the standard Mincerian earnings function:

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

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.[6] 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. Quite importantly, the GSOEP collects information on months worked in each year, differentiated according to self vs. wage employment status.[7]

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

[6] For a description of the data, see Wagner, Burkhauser and Behringer (1993).
[7] This is an improvement over some previous work, which is based on annual measures of experience.

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.

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 (TSMTH and TWMTH) 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. No attempt to estimate fixed effect or random effect specifications of the earnings function has been made.[8]

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 (YED) 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, 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

4.1 Descriptive Statistics

Descriptive statistics for the variables used in the analysis are presented in Table 2, by self-employment status. There are several statistically significant differences between the self-employed and wage-employed samples that should be noted. The self-employed have slightly more years of education and more children in the household, and are more likely to be male and of German nationality. In addition, they tend to have greater values of the wealth measures, in that they are more likely to own there own home and have higher values of total household income. There also are differences in the occupational and industry distributions. The self-employed are more likely to be in sales occupations and agricultural/mining, construction and trade industries, while they are less likely to be employed as civil servants or clerical workers and less likely to work in the manufacturing or public utilities industries. The self-employed and wage-employed samples are similar in terms of their average ages and the proportion married with spouse present.

The characteristics of the German self-employed are generally similar to those of the self-employed in the U.S.[9] Some differences in occupation and industry of employment exist, however. The self-employed in Germany are much more likely to be employed in the sales and professional and technical occupations than are the self-employed in the U.S., for example, and less likely to be employed in service occupations. Whereas in the U.S. the highest proportions of self-employment are in the service, construction and trade industries, in Germany there is a much greater role for the manufacturing industry.

---

[8] This is a topic for further research.

[9] The comparisons made here are based on data presented in previous work by Clain (2000), and Manser and Picot (1999). Future drafts of this paper will provide direct comparisons for 1997 using data from the PSID, and also for the U.K. using the BHPS.

4.2 Simple estimates

Now let us turn to the estimated returns to human capital. Estimates of the parameters from the simple log-earnings function described above are presented in Table 3, separately by self-employment status.[10] Note that 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. The coefficient estimates for the YED 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, etal. (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. 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.

[10] 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.

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.

In summary, the OLS results suggest that the returns to human capital in self-employment in Germany exhibit the same patterns as those previously found for the U.S., except that the return to education in self-employment in Germany is not statistically significant from zero.

4.3 Instrumental Variables Estimates

Based on arguments by Card (1999) and empirical results for Germany found by others (Lauer and Steiner 2001, Trostel etal. 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, etal. 2002).[11] These IV estimates are presented in Table 4.

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.

[11] 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.

Regarding returns to work experience, the results again suggest that the return to self-employment experience is considerable 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 Table 3. Again, these results are consistent with results for workers in the U.S.

4.4 Selectivity Adjusted Estimates

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.[12] Estimates of the probit parameters are presented in Table 5. The selectivity adjusted OLS parameter estimates are presented in Table 6. 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 HHINC. Variables that are included in the OLS regressions but not in the probit are the experience variables (TSMTH and TWMTH).

Referring first to the probit results, we find that major determinants of the probability of self-employment include marital status, number of children in the household, gender, and wealth. As would be expected, the probability of self-employment varies according to occupation and industrial sector. Workers are more likely to be self-employed if in sales occupations, and less likely to be self-employed if in

[12] Unfortunately, I have not developed the capability in SAS to calculate the adjusted standard errors for an IV specification with the Heckman two-step procedure. This is a topic for further research.

clerical occupations or the manufacturing, construction, trade, or public utilities industries. These results are consistent with others for Germany (Lechner 1995) and for the U.S (e.g., Blanchflower and Meyer 1994).

The selectivity-adjusted estimate of the return to education in Table 6 is of about the same magnitude as the simple OLS estimate for the wage-employed. The return for the self-employed, however, is a good deal larger in Table 6, and more in line with the wage-employed return.

The estimated returns to self-employed and wage-employed work experience show a similar pattern as in the previous tables: 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 (in contrast to the results in Table 4). 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.

Both sets of results might be of interest to German policy-makers interested in the consequences of the self-employment experience. In particular, given the lower returns to human capital in this 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.

The analysis presented here should be viewed as preliminary, however, with many potential improvements to be made. For example, additional explanatory variables could be included in the earnings regressions. In addition, alternative measures of educational attainment could be used, to allow for non-linear effects and differential returns according to technical versus university education, for example (see Lauer and Steiner, 2001, for examples). The potential endogeneity of the work experience variables should be explored, along with the possibility of estimating the IV model corrected for sample self-selection. We could also make full use of the longitudinal nature of the data and estimate fixed or random effects models. The analysis could also be conducted with the inclusion of the East German sample. Finally, the same analysis should be conducted

using similar data from the Panel Study of Income Dynamics and the British Household Panel Survey to enhance the international comparisons.

6. Bibliography

Becker, G. 1975. *Human Capital*. New York: National Bureau of Economic Research.

Blanchflower, D.G. 2000. Self-employment in OECD Countries. *Labour Economics* 9, 471-505.

Blanchflower, D.G., and Meyer, B. 1994. A longitudinal analysis of the young self-employed in Australia and the United States. *Small Business Economics* 6, 1-20.

Card, D. 1999. The causal effect of education on earnings. In *Handbook of Labor Economics*, vol. 3b, O. Ashenfelter and D. Card, eds. North Holland, Amsterdam.

Clain, S.H. 2000. Gender Differences in Full-time Self-Employment. *Journal of Economics and Business* 52, 499-513.

Evans, D., and Leighton, L. 1989. Some empirical aspects of entrepreneurship. *American Economic Review* 79, 519-35.

Fairlie, R.W., and Meyer, B.D. 1996. Ethnic and racial self-employment differences and possible explanations. *Journal of Human Resources* 31, 757-793.

Junbauer-Gans, M. 1999. Wage gap between female-male self-employed and female-male employed persons in West Germany. *Kolner Zeitschrift fur Soziologie und Sozialpsychologie* 51 (2).

Lauer, C. and Steiner, V. 2001. Chapter 6: Germany, in *Education and Earnings in Europe*, C. Harmon, I. Walker, N. Westergaard-Nielsen, eds. Cheltenham, UK: E. Elgar..

Lechner, M. 1995. Some specification tests for probit models estimated on panel data. *Journal of Business and Economic Statistics* 14 (4), 475-488.

Manser, M.E., and Picot, G. 1999. The role of self-employment in U.S. and Canadian job growth. *Monthly Labor Review* 122, 10-25.

McManus, P.A. 2000. Market, state, and the quality of new self-employment jobs among men in the US and Western Germany. *Social Forces* 78 (3), 865-905.

Mincer, J. 1974. *Schooling, Experience, and Earnings*. Columbia University Press, New York.

Oscan, V., and Seifert, W. 2000. Self-employment of immigrants in Germany: Exclusion or path to integration? *Soziale Welt-Zeitschrift fur Sozialwissenschaftliche Forschungg und Praxis* 51 (3).

Spence, M. 1973. Job Market Signaling. *Quarterly Journal of Economics* 87, 355-374.

Trostel, P, Walker I., and Woolley, P. 2002. Estimates of the economic return to schooling for 28 countries. *Labour Economics* 9, 1-16.

Uhly, A. 2001. Consequences of Transient Self-employment for Wages. Working paper, University of Trier.

Wagner, G.G., Burkhauser, R.V., and Behringer, F. 1993. The English language public use file of the German Socio-Economic Panel. *Journal of Human Resources* 28 (2), 429-433.

Williams, D. 2000. Consequences of self-employment for men and women in the United States. Labour Economics 7, 665-687.

Williams, D. 2001. Youth Self-Employment: Its Nature and Consequences. Working paper, Kent State University.

TABLE 1
VARIABLE DEFINITIONS

Variable Name	Definition	SOEP Source File
Dependent variables		
LSINC	Log of self-employment income, 1997	OP
LWINC	Log of wage-employment income, 1997	OP
LTINC	Log of total income, 1997	
Education and Experience		
YED97	Years of education	NPEQUIV
TSMTH	Total months of self-employment experience, 1984-1996	A-MPKAL
TWMTH	Total months of wage-employment experience, 1984-1996	A-MPKAL
Demographic and Personal Characteristics		
AGE97	Age of respondent	NPEQUIV
GERMAN	=1 if German nationality =0 otherwise	OP
MARR97	=1 if married with spouse present, =0 otherwise	NPEQUIV
NUMCHL97	Number of children in the household	NPEQUIV
MALE	=1 if male =0 if female	NPEQUIV
Family Background		
FEDINT	= 1 if father has “intermediate” level of education	CP
FEDUP	=1 if father has “upper secondary” level of eduation	CP
FEDMIS	=1 if father’s education is missing or not known	CP
MEDINT	=1 if mother has “intermediate” level of eduaction	CP
MEDUP	=1 if mother has “upper secondary” level of education	CP
MEDMIS	=1 if mother’s education is mission or not known	CP
Wealth Measures		
OWNER	=1 if owns residence =0 otherwise (tenant)	NH
HHINC	Gross household income in 1997	NH
Occupation and Industry		
PROTEC97	=1 if professional or technical occupation	NPGEN
ADMAN97	=1 if administrative or managerial occupation	NPGEN
CLER97	=1 if clerical occupation	NPGEN
SALES97	=1 if sales occupation	NPGEN
SERV97	=1 if service occupation	NPGEN
CIV97	=1 if a civil servant	NP
AGMIN97	=1 if agricultural or mining industry	NP
FIRE97	=1 if finance, insurance or real estate industry	NP
MANUF97	=1 if manufacturing industry	NP
CONST97	=1 if construction industry	NP
TRADE97	=1 if retail or wholesale trade industry	NP
PUBLIC97	=1 if public utility or transportation industry	NP

TABLE 2
DESCRIPTIVE STATISTICS
(by self-employment status)

	Wage-Employed		Self-Employed	
Variable	**Mean**	**Std Dev**	**Mean**	**Std Dev**
LSINC	7.3434093	1.3327452	8.2986986	1.1164092
LWINC	8.2336951	0.6453724	7.5089950	0.8790715
LTINC	8.2283031	0.6598113	8.2662560	0.9368495
YED97	11.5470826	2.7202848	11.9829545	2.5900346
TSMTH	2.6626228	12.5334459	72.2840909	53.4136310
TWMTH	129.7983824	39.1109333	57.4090909	47.5604004
AGE97	44.2536106	8.6245940	43.9545455	8.1344545
GERMAN	0.8030040	0.3978442	0.8977273	0.3038711
MARR97	0.7718082	0.4197882	0.7556818	0.4309081
NUMCHL97	0.7914500	0.9941195	0.9886364	1.0582392
MALE	0.5829001	0.4932222	0.6704545	0.4713892
OWNER	0.5176199	0.4998338	0.6704545	0.4713892
HHINC	5036.10	2131.14	5611.48	2772.49
PROTEC97	0.1912189	0.3933747	0.2272727	0.4202658
ADMAN97	0.0381282	0.1915612	0.0681818	0.2527768
CLER97	0.2368573	0.4252769	0.0340909	0.1819804
SALES97	0.0733680	0.2608149	0.2329545	0.4239196
SERV97	0.1086077	0.3112363	0.0909091	0.2883000
CIV97	0.2819180	0.4500636	0.0113636	0.1062953
AGMIN97	0.0248411	0.1556858	0.1136364	0.3182746
FIRE97	0.0404391	0.1970436	0.0454545	0.2088932
MANUF97	0.3431542	0.4748997	0.1136364	0.3182746
CONST97	0.0629694	0.2429781	0.1022727	0.3038711
TRADE97	0.1010976	0.3015451	0.1761364	0.3820230
PUBLIC97	0.1513576	0.3585007	0.0568182	0.2321553
SERVI97	0.2351242	0.4241990	0.3295455	0.4713892
FEDINT	0.0647025	0.2460712	0.0738636	0.2622951
FEDUP	0.0554593	0.2289406	0.1250000	0.3316625
FEDMIS	0.3824379	0.4861231	0.2784091	0.4494947
MEDINT	0.0641248	0.2450459	0.1136364	0.3182746
MEDUP	0.0179087	0.1326581	0.0454545	0.2088932
MEDMIS	0.3928365	0.4885221	0.2897727	0.4549511
N	1731		176	

TABLE 3

OLS LOG-EARNINGS EQUATIONS
(by self-employment status)

	Wage-Employed		Self-Employed	
Variable	**Parameter Estimate**	**Standard Error**	**Parameter Estimate**	**Standard Error**
INTERCEPT	6.53123	0.07652	6.81962	0.64920
YED	0.05665	0.00520	0.02456	0.04142
TSMTH	0.00318	0.00079	0.00634	0.00259
TWMTH	0.00557	0.00030	0.00462	0.00298
MARR97	-0.11852	0.02606	-0.17046	0.20610
NUMCHL97	-0.01496	0.01106	0.11970	0.08395
MALE	0.47345	0.02550	0.69238	0.21869
GERMAN	-0.07280	0.02866	-0.10168	0.28920
PROTEC97	0.26884	0.03937	0.21392	0.34263
ADMAN97	0.48882	0.05893	0.22152	0.37219
CLER97	0.10639	0.03418	-0.05320	0.55761
SALES97	-0.03756	0.04916	-0.00047	0.38072
SERV97	-0.12656	0.04112	-0.27526	0.37634
CIV97	0.04865	0.03268		
AGMIN97	0.03937	0.06801	-0.76886	0.38951
FIRE97	0.29126	0.05781	0.25847	0.50887
MANUF97	0.21086	0.03402	-0.12817	0.33102
CONST97	0.06835	0.05028	0.23432	0.38593
TRADE97	-0.05962	0.04471	0.07016	0.35009
PUBLIC97	0.12625	0.03755	0.21676	0.43070
R-SQUARED	.5778		.2754	
F-STATISTIC		125.88		3.14

TABLE 4

GMM LOG-EARNINGS EQUATIONS
(by self-employment status)

	Wage-Employed		Self-Employed	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
INTERCEPT	5.96563	0.2694	6.050374	0.9315
YED	0.112567	0.0258	0.107692	0.0804
TSMTH	0.003239	0.0013	0.006972	0.00217
TWMTH	0.005905	0.0004	0.005603	0.00258
MARR97	-0.0896	0.0289	-0.09545	0.1848
NUMCHL97	-0.01317	0.0114	0.093576	0.0747
MALE	0.40276	0.0391	0.670892	0.2087
GERMAN	-0.13454	0.0396	-0.26675	0.3910
PROTEC97	0.061394	0.0984	-0.23771	0.3851
ADMAN97	0.302939	0.1002	0.126552	0.2050
CLER97	0.038263	0.0475	-0.25778	0.3828
SALES97	-0.07759	0.0667	-0.1659	0.2905
SERV97	-0.09961	0.0479	-0.22256	0.6073
CIV97	0.020847	0.0380		
AGMIN97	0.077911	0.0700	-0.82846	0.3311
FIRE97	0.308591	0.0608	0.533323	0.4875
MANUF97	0.232125	0.0384	-0.24872	0.2757
CONST97	0.106775	0.0572	0.094825	0.2422
TRADE97	-0.02326	0.0552	0.096214	0.2584
PUBLIC97	0.146949	0.0372	0.098288	0.2903
R-SQUARED	.5489		.2321	

TABLE 5

PROBIT ESTIMATES
PROBABILITY OF SELF-EMPLOYMENT

Variable	Estimate	Standard Error	Chi-Square	Pr > ChiSq
INTERCEPT	-1.66649	0.43521	14.6627	0.0001
YED97	0.0077260	0.02499	0.0956	0.7572
AGE97	0.0059833	0.0065761	0.8278	0.3629
MARR97	-0.36653	0.13451	7.4257	0.0064
NUMCHL97	0.10830	0.05471	3.9189	0.0477
MALE	0.24454	0.12213	4.0089	0.0453
GERMAN	0.20573	0.15358	1.7943	0.1804
OWNER	0.42578	0.11034	14.8906	0.0001
HHINC	0.00006857	0.00002282	9.0301	0.0027
PROTEC97	-0.01913	0.17596	0.0118	0.9134
ADMAN97	0.16224	0.21693	0.5593	0.4545
CLER97	-1.11672	0.22775	24.0418	0.0001
SALES97	0.52312	0.18501	7.9946	0.0047
SERV97	-0.09495	0.20082	0.2235	0.6364
CIV97	-2.08787	0.28173	54.9214	0.0001
AGMIN97	0.22177	0.22216	0.9966	0.3181
FIRE97	-0.27550	0.29325	0.8826	0.3475
MANUF97	-1.29998	0.15585	69.5741	0.0001
CONST97	-0.49915	0.19533	6.5304	0.0106
TRADE97	-0.59103	0.17956	10.8339	0.0010
PUBLIC97	-0.14347	0.23356	0.3773	0.5390

Log Likelihood -422.7246792

TABLE 6

LOG-EARNINGS EQUATION ESTIMATES
(Selectivity adjusted)

	Wage-Employed		Self-Employed	
Variable	**Parameter Estimate**	**Asymptotic St. Error**	**Parameter Estimate**	**Asymptotic St. Error**
INTERCEPT	6.41352	0.0867	8.19121	0.6319
YED	0.05385	0.0057	0.04367	0.0297
TSMTH	0.00383	0.0286	0.00361	0.1524
TWMTH	0.00568	0.0121	0.00246	0.0635
MARR97	-0.11157	0.0281	-0.10258	0.1568
NUMCHL97	-0.02884	0.0322	0.12176	0.2098
MALE	0.46222	0.0427	0.73800	0.2571
GERMAN	-0.09557	0.0638	-0.59111	0.2631
PROTEC97	0.27099	0.0400	0.12424	0.4098
ADMAN97	0.42290	0.0565	0.13120	0.2917
CLER97	0.16568	0.0450	0.13176	0.2859
SALES97	-0.10564	0.0497	-0.21272	0.2878
SERV97	-0.09394	0.0744	0.18057	0.3636
CIV97	0.17033	0.0639		
AGMIN97	0.02568	0.0485	-0.98655	0.3366
FIRE97	0.32050	0.0556	0.17969	0.2875
MANUF97	0.33897	0.0524	0.41240	0.2526
CONST97	0.12724	0.0413	0.19347	0.3229
TRADE97	0.03613	0.0008	0.02877	0.0018
PUBLIC97	0.14502	0.0003	0.07711	0.0020
LAMBDA	-0.45733	0.1091	-0.63632	0.2279
R-SQUARED	.5711		.4616	
RHO	-0.9687		-0.7241	