

Couch, Kenneth A.

Article — Digitized Version

High school vocational education, apprenticeship, and earnings: A comparison of Germany and the United States

Vierteljahrshefte zur Wirtschaftsforschung

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Couch, Kenneth A. (1994) : High school vocational education, apprenticeship, and earnings: A comparison of Germany and the United States, Vierteljahrshefte zur Wirtschaftsforschung, ISSN 0340-1707, Duncker & Humblot, Berlin, Vol. 63, Iss. 1/2, pp. 10-18

This Version is available at:

<https://hdl.handle.net/10419/141043>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Training and Earnings Inequality

High School Vocational Education, Apprenticeship, and Earnings: A Comparison of Germany and the United States¹

by Kenneth A. Couch

A growing dissatisfaction with the vocational education system has led American policymakers to consider alternative methods of training today's youth for tomorrow's labour market. Increasing attention has focused on the German apprenticeship model which mixes formal schooling with on-the-job training. Yet to date there has been no direct comparison of the post-schooling outcomes of American and German youth who have received these alternative forms of training. This paper uses national representative data from the United States and Germany to compare the increase in earnings associated with high school "vocational education" in these two countries.

For Germany, the phrase "vocational education" will refer to high school apprenticeship. For the United States, vocational education means education to prepare for entry into a specific vocation; it may consist of classwork, work experience, or both. The choice to compare these two different programs reflects the perception that if the United States develops an apprenticeship program, the natural starting point would be to modify the existing vocational education system.

Past literature provides weak evidence that high school vocational education in the United States increases earnings relative to other types of high school education. The methodology used in this literature is to select a sample of individuals who completed the same number of years of education while participating in different curricula and compare the subsequent earnings of the various groups. Gustman and Steinmeier (1982) find a positive effect on earnings for women of various types of vocational and commercial training relative to other curricula. For males, Tannen (1983) reports an initial 5 percent earnings increase associated with a high school vocational education relative to other types of high school education, but the effect dissipates by the eleventh year following graduation from high school. Several other studies report no relative increase in the earnings of male vocational graduates

(Freeman and Wise 1979, Grasso and Shea 1979, Gustman and Steinmeier 1982, and Rumberger and Daymount 1984). Efforts to locate research that addresses the same topic in Germany have been unsuccessful.

Data and Sample Selection

For the estimations presented in this paper, two primary data sets are utilized, the German Socio-Economic Panel (GSOEP) and the National Longitudinal Surveys of Youth (NLSY). Both data sets are longitudinal in design. The years of data available from the GSOEP are a subset of those available from the NLSY.

The German Socio-Economic Panel provides nationally representative information on all persons aged 16 or older, households, and families residing within Germany. The initial year of the GSOEP was 1984, and while the surveys continue, 1988 was chosen as the outcome year for this study in order to avoid problems of interpretation associated with reunification in 1989.

The National Longitudinal Surveys of Youth began in 1979 and provides nationally representative information of the non-institutional population of the United States aged 14 to 22 in that year. While the NLSY provides information for a specific age cohort of the United States population, the level of detail is generally more extensive than that of the GSOEP for education and training issues. Most of the variables used in the analysis were directly surveyed in the GSOEP and matching variables were constructed from the NLSY. Inability to obtain corresponding information across the two surveys limited the analysis to some extent, but most variables one would expect to see in estimations were obtained.

To align the GSOEP and NLSY in terms of cohort coverage, individuals in the 1988 panel of the GSOEP were discarded to match the age distribution of respondents to the NLSY in 1988. The remaining individuals in both surveys were aged 23 to 32 in 1988. Assuming an age of 18

¹ I would like to thank Richard Burkhauser for providing data from the German Socio-Economic Panel as well as computer resources for this project under the National Institute on Aging Program Project #1-P01-AG09743-01.

Table 1

National Educational Attainment in 1988 for Individuals Aged 21 and Older, United States and Germany

Germany		United States	
	Percentage of Population		Percentage of Population
No Formal School Certificate	0.5		
Primary School Certificates Held:	85	Elementary School	
Non-class School Degree	19	0 to 4 years	2.4
Secondary School Degree	61	5 to 7 years	4.4
Other Degree	3	8 years	5.2
No degree (Sonstige Ausbildung)	2		
High School Certificates Held:	60	High School	
High School Degree	11	1 to 3 years	11.8
Technical High School Degree	4	4 years	38.9
Vocational School	7		
Training (Lehre)	42		
College or University Certificate Held:	15	College	
Health Care School	2	1 to 3 years	17.0
Technical School	6	4 years or more	—
Civil Service Training	4		
Technical College	3		
University, Technical College	6		
College Outside Germany	—		
Population:	100		
Highest Degree Received:			
Pre-High School	29		
High School	55		
Post-High School	15		
Total Population	41,546,842		151,635,000
<i>Source:</i> German data calculated using the German Socio-Economic Panel. Percentages will not sum to 100 since an individual may hold more than one certification at a level such as high school. United States from U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Educational Attainment in the United States, March 1991 and 1990.			

for high school graduation in both countries (in Germany it would actually be 19), the results in the paper apply to individuals who have been out of high school for 5 to 14 years.

Since the purpose of the analysis is to obtain measures of the effect on earnings of vocational education in the United States and apprenticeship in Germany relative to other types of high school education, direct measures of education are needed. Since years of education are not available in the GSOEP, the less precise measure of high school degree is used as a sample selection variable. All individuals with more or less than a high school certification in each country were removed from the sample. English translations of the groupings of certifications within Ger-

many equivalent to a high school education in the United States are found in Table 1. Individuals still enrolled in school or receiving training were discarded. The resulting samples contain 854 individuals from the GSOEP and 5756 from the NLSY.

Records were deleted from both samples due to nonresponse for the outcome variable (earnings), 51 observations from the GSOEP and 259 from the NLSY. These individuals constituted 6 and 4 percent of the respective samples. Given the relatively small attrition due to nonresponse, all figures provided in the paper are weighted to correct for oversampling of minority populations in each survey.

Table 2

Variable Means, Standard Deviations and Definitions NLSY and GSOEP Subsamples, 1988 Surveys
Mean (Standard Deviation)

	GSOEP N = 803	NLSY N = 5,497
Apprentice/Vocational Graduate	.79 (.4)	.30 (.46)
Manufacturing Employment	.16 (.37)	.18 (.38)
Children in HouseholdLess than 16	.34 (.47)	.35 (.48)
Foreign/Race	.02 (.16)	.22 (.41)
Sex (Female = 1)	.48 (.50)	.50 (.50)
Other Income	1,709 (1,671)	9,835 (24,347)
ln (Other Income)	5.7 (3.3)	4.3 (4.9)
Age	27 (2.6)	27.2 (2.3)
Age Squared	735 (140)	746 (126)
Gross Earnings	2,240 (1,520)	15,183 (26,906)
ln (Gross Earnings)	6.4 (3.1)	7.9 (3.7)
Employed	.82 (.38)	.82 (.39)
Married	.58 (.49)	.56 (.23)
Experience	7.99 (2.6)	9.21 (2.31)
Experience Squared	70.5 (41.87)	90.2 (42.9)
Definitions		
Apprentice/Vocational Graduate	GSOEP received "Lehre" and United States self-assessment of high school education coded as 1.	
Manufacturing Employment	Currently employed in manufacturing industry coded as 1.	
Children in Householdless than 16	Coded as 1	
Foreign/Race	Non-German GSOEP respondents and Blacks and Hispanics in the United States coded as 1.	
Sex	Female coded as 1.	
Other Income	GSOEP — Net household income per month less net income of respondent per month. NLSY — Reported earnings of spouse over past year.	
Age	years	
Gross Earnings	GSOEP — DM per month. NLSY - Reported earnings past year.	
Employed	Currently employed coded as 1.	
Married	Coded as 1 if married.	
Experience	GSOEP = Age - 19. NLSY = Age - 18.	

Table 1 presents detailed information on the national educational attainment of Germans calculated from the GSOEP and similar information from Current Population Reports for the United States. As the table indicates, for 55 percent of Germans aged 25 or older, the highest degree held is some form of high school certification. Some have more than one certificate, but of all high school level certificates held in Germany, 69 percent came from the apprenticeship program which has received so much attention in the United States.

Within the German apprenticeship program, students may be enrolled for 1 to 4 years. Generally, an apprenticeship may be offered by a company only if that position is expected to exist following the period of training. Students spend a minimum of 1 day a week at a work site or training center jointly organized by industry, unions, and the government. Apprenticeships cover a wide variety of occupations, from assembly line work in manufacturing to running a cash register at a retail store. The longer a student remains in the apprenticeship program, the more time is spent at the work site, up to a maximum of 4 days a week. This program of combined apprenticeship and classroom training is often referred to as the dual system of education.

The hypothesized effect of the program is that it provides some of the economic benefits of job tenure. Job tenure is associated with the acquisition of specific training which in theory is more highly rewarded in terms of wages. Also, job tenure and specific human capital are theoretically associated with higher employment probabilities since firms have incentives to employ and retain workers with skills that are important to their business. Both of these effects should increase observed earnings of apprentices following certification.

In the United States, a somewhat larger proportion of the population 76 percent have completed high school or college. Also, relative to the German system, the United States offers fewer formal options in curriculum selection at the high school level.

In the samples used for this study, individuals who had participated in apprenticeship in Germany or vocational education in the United States needed to be identified directly. For Germany, an individual's successful completion of an apprenticeship can be determined if they have received a specific certification (lehre). The variable Apprentice is thus set equal to 1 if an individual received that certification. Table 2 indicates that 79 percent of the sample selected from the GSOEP (after weighting) were certified as apprentices in 1988.

For the United States, two approaches exist for determining whether an individual received vocational training during high school. The first uses transcript survey information from the NLSY to construct a variable for the proportion of an individual's classwork which was vocational in nature. The second approach utilizes a self-assessment by individuals of whether or not their high school education was primarily vocational, commercial, general, or college

preparatory in nature. Because detail at the individual course level is not available in the GSOEP, the decision was made to use the self report by individuals. Also, prior research indicates that construction of measures of education based on transcript information does not lead to different results when estimating the effects of various curricula on later earnings (Rumberger and Daymount 1984). Table 2 indicates that using the self-assessed measure, 30 percent of the cohort under consideration assessed their own high school education as being primarily vocational or commercial in nature. For the remainder of the paper, these individuals are referred to as vocational graduates.

Earnings Equation Estimates

Table 2 contains the definitions, means, and standard deviations of the variables used in the estimations. Tables 3 contains means and standard deviations for each sample conditional on gender and type of education. The estimates are of logarithmic earnings equations including standard regressors along with a dummy for either vocational education in the United States or apprenticeship in Germany. For both countries, the set of explanatory variables includes sex, race, marital status, whether there are children in the household less than age 16, other available household income, labour market experience, and a dummy indicating employment in manufacturing. In alternative specifications, a quadratic term for experience is also included, consistent with the possibility of depreciation of human capital. The only variable that differs across the two countries is that nationality is included in the German equation while race is included for the United States.

A summary of the estimated effects of vocational training and apprenticeship on later earnings obtained from least squares calculations is provided in Table 4. A complete set of parameter estimates is contained in Appendix A. Estimates are provided for both the entire sample in the United States and Germany as well as conditional on gender. In both countries, none of the parameter estimates for either the entire sample or for females is statistically significant at the 10 percent level. However, for German males, all four estimates presented are positive and statistically significant at the 10 percent level. Two of the four estimates for males in the United States are also statistically significant at the 10 percent level. The estimated relative increase in earnings of certified male apprentices in Germany based on these estimates is more than double that of male vocational graduates in the United States.

Conclusion

The estimates presented in this paper indicate that 5 to 14 years following completion of high school in Germany, the earnings of the average certified apprentice who received no further training could not statistically be distinguished from those of participants in other curricula.

Table 3

Variable Means and Standard Deviations by Sex and Degree Type
Mean (Standard Deviation)

GSOEP - 1988						
	Total		Females		Males	
	Apprentice	Not Apprentice	Apprentice	Not Apprentice	Apprentice	Not Apprentice
Employed	.83 (.37)	.78 (.41)	.69 (.46)	.69 (.46)	.95 (.22)	.9 (.3)
Apprentice	1.0 (0.0)	0.0 (0.0)	1.0 (0.0)	0.0 (0.0)	1.0 (0.0)	0.0 (0.0)
Manufacturing	.17 (.38)	.12 (.32)	.13 (.33)	.05 (.21)	.2 (.4)	.21 (.41)
Children	.35 (.48)	.28 (.45)	.45 (.5)	.36 (.48)	.17 (.45)	.18 (.39)
Foreign	.03 (.16)	.02 (.14)	.01 (.11)	.02 (.14)	.04 (.2)	.02 (.12)
Sex	.46 (.5)	.56 (.5)	1.0 (0.0)	1.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Other Income	1,721 (1,660)	1,662 (1,714)	1,984 (1,290)	1,943 (1,551)	1,501 (1,890)	1,301 (1,852)
In (Other Income)	5.76 (3.3)	5.4 (3.5)	6.5 (2.8)	5.6 (3.6)	5.1 (3.5)	5.03 (3.3)
Age	26.7 (2.5)	28.2 (2.4)	27.0 (2.6)	27.8 (2.5)	26.4 (2.5)	29.0 (2.2)
Age Squared	718 (137)	800 (131)	735 (140)	781 (136)	704 (134)	822 (122)
Earnings	2,177 (1,388)	2,475 (1,928)	1,471 (1,209)	1,756 (1,503)	2,767 (1,246)	3,403 (2,026)
In (Earnings)	6.43 (3.03)	5.4 (3.5)	5.2 (3.6)	5.3 (3.6)	7.5 (1.9)	7.25 (2.5)
Experience	7.7 (2.5)	9.2 (2.4)	8.0 (2.6)	8.8 (2.5)	7.4 (2.5)	9.6 (2.2)
Experience Squared	65.4 (40.8)	89.7 (40.4)	70.0 (42.0)	84.0 (41.0)	61.0 (39.0)	96.7 (39.0)
Unemployed	.17 (.37)	.22 (.41)	.31 (.46)	.31 (.46)	.05 (.22)	.1 (.3)
Married	.58 (.49)	.58 (.5)	.4 (.49)	.49 (.5)	.72 (.45)	.7 (.46)
N =	643	160	310	91	333	69
NLSY - 1988						
	Total		Females		Males	
	Vocational Graduate	Not Vocational Graduate	Vocational Graduate	Not Vocational Graduate	Vocational Graduate	Not Vocational Graduate
Employed	.82 (.38)	.82 (.39)	.7 (.46)	.72 (.45)	.93 (.25)	.91 (.29)
Vocational Graduate	1.0 (0.0)	0.0 (0.0)	1.0 (0.0)	0.0 (0.0)	1.0 (0.0)	0.0 (0.0)
Manufacturing	.19 (.39)	.17 (.38)	.14 (.34)	.13 (.34)	.24 (.43)	.22 (.41)
Children	.33 (.47)	.36 (.48)	.39 (.49)	.43 (.49)	.27 (.44)	.3 (.46)
Race	.22 (.41)	.22 (.42)	.21 (.41)	.22 (.41)	.22 (.42)	.22 (.42)
Sex	.49 (.5)	.5 (.5)	1.0 (0.0)	1.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Other Income	9,364 (22,086)	10,037 (25,254)	14,250 (29,831)	15,113 (31,505)	4,634 (7,318)	5,042 (15,450)
In (Other Income)	4.4 (4.8)	4.3 (4.8)	5.2 (5.0)	5.2 (2.0)	3.5 (4.5)	3.4 (4.5)
Age	26.7 (2.3)	27.4 (2.3)	26.9 (2.3)	27.3 (2.3)	26.6 (2.2)	27.5 (2.3)
Age Squared	720 (122)	757 (126)	727 (125)	753 (126)	713 (118)	761 (126)
Earnings	14,283 (14,575)	15,569 (30,704)	9,679 (9,014)	10,838 (30,524)	18,740 (17,299)	20,224 (30,173)
In (Earnings)	7.94 (3.6)	7.8 (3.7)	7.0 (3.94)	7.0 (4.0)	8.85 (2.9)	8.7 (3.1)
Experience	8.7 (2.3)	9.4 (2.3)	8.9 (2.3)	9.3 (2.3)	8.6 (2.2)	9.5 (2.3)
Experience Squared	81 (41)	94 (43)	84 (42)	93 (43)	78.8 (39.4)	95 (43)
Unemployed	.18 (.38)	.18 (.39)	.3 (.46)	.28 (.45)	.07 (.25)	.09 (.29)
Married	.56 (.5)	.55 (.5)	.61 (.49)	.58 (.49)	.52 (.5)	.52 (.5)
N =	1,663	3,834	838	2,004	825	1,830

Table 4

Summary of Least Squares Estimates of the Effect of Apprenticeship or Vocational Training on Earnings
Parameter (t-statistic)

Specification	GSOEP			NLSY		
	Total	Female	Male	Total	Female	Male
(a)	-.12 (.48)	-.44 (1.0)	.58 (2.10)	.09 (.9)	-.01 (.09)	.24 (1.86)
(b)	-.14 (.60)	-.45 (1.1)	.56 (2.06)	.09 (.9)	-.02 (.1)	.24 (1.9)
(c)	.35 (1.56)	.20 (.6)	.63 (2.30)	.08 (.7)	-.02 (.1)	.21 (1.61)
(d)	.34 (1.50)	.20 (.6)	.62 (2.30)	.08 (.8)	-.02 (.1)	.21 (1.61)

Notes: Complete sets of parameter estimates are contained in Appendix A. All estimates are of log earnings equations including the following regressors: — (a) vocational Graduate (or Apprentice), Race (or Foreign), and Experience. — (b) (a) plus Experience Squared. — (c) (a) plus Married, Children less than Age 16, natural logarithm of other income, and manufacturing employment. — (d) (c) plus Experience Squared.

Similarly, high school level apprenticeship for German females is not associated with increases in earnings relative to participants in other high school curricula. For German males, however, apprenticeship certification is associated with significant increases in earnings relative to individuals who took alternative coursework during high school.

The pattern of estimated earnings effects for vocational graduates in the United States is similar to that for certified apprentices in Germany. The average graduate and females experience no relative increases in earnings but males do.

While the relative increases in earnings for German males is larger than that for American males, this result, in isolation, does not unambiguously provide the sort of evidence that might justify a national system of apprenticeship in the United States. The principal problem is that from a social perspective, education through apprenticeship is more expensive than education in a classroom whether the funding is provided by the government or employers. While it is true that not all gains to society from education are expected to be in the form of increased earnings, adoption of apprenticeship in the United States is

targeted specifically at boosting earnings for young workers. The implication of the results in this paper is that, on average, certified apprentices in Germany receive about the same earnings early in their working lives as former participants in other high school curricula. Given that apprenticeship is more expensive to provide and offers no relative increases on average in earnings, proposals to adopt apprenticeship on a wide scale in the United States in order to increase earnings which would hypothetically exceed the cost of the program should be viewed with healthy skepticism.

This concern about the current movement to adopt apprenticeship in the United States, however, should not be taken as a statement that there is nothing to be learned from the German system. Clearly, the apprentice and certification process in Germany has a marked effect on the earnings of males. Coming to an understanding of the factors which contribute to those increases and examining whether they could or should be adopted in America perhaps could contribute to future discussions of educational reform. This area of future research should be of interest not only to American reformers but also to those in Germany interested in improving the performance of their educational system.

Ordinary Least Squares Estimates, 1988
Parameter (t-statistic)

Regression	(a)	(b)	(c)	(d)
GSOEP — Total Sample, N = 803				
Constant	8.5 (19.0)	5.9 (5.5)	8.1 (16.0)	7.2 (6.9)
Apprenticeship	-.12 (.48)	-.14 (.6)	.35 (1.56)	.34 (1.5)
Sex	-2.2 (10.9)	-2.2 (10.9)	-1.5 (7.7)	-1.5 (7.7)
Foreign	-.53 (.65)	-.53 (.8)	.41 (.7)	.41 (.71)
Experience	-.12 (2.8)	.6 (2.1)	.03 (.8)	.26 (1.04)
Experience Squared	—	-.04 (2.5)	—	-.01 (.93)
Married	—	—	-.09 (.4)	-.06 (.26)
Children	—	—	-2.8 (12.0)	-2.7 (11.7)
ln (Other Income)	—	—	-.15 (5.0)	-.14 (5.0)
Manufacturing	—	—	1.6 (6.5)	1.6 (6.4)
R ²	.14	.15	.36	.36
GSOEP — Females, N = 401				
Constant	8.7 (12.0)	5.23 (2.6)	6.6 (9.5)	5.8 (3.4)
Apprenticeship	-.44 (1.0)	-.45 (1.11)	.20 (.60)	.20 (.60)
Foreign	-.30 (.20)	-.39 (.26)	1.41 (1.30)	1.40 (1.30)
Experience	-.38 (5.60)	.56 (1.07)	-.006 (.11)	.20 (.50)
Experience Squared	—	-.06 (1.80)	—	-.01 (.50)
Married	—	—	.82 (2.4)	.90 (2.4)
Children	—	—	-4.3 (13.4)	-4.3 (13.2)
ln (Other Income)	—	—	-.04 (.90)	-.04 (.70)
Manufacturing	—	—	2.21 (5.2)	2.2 (5.2)
R ²	.07	.08	.50	.50
GSOEP — Males, N = 402				
Constant	5.8 (13.0)	5.1 (5.1)	7.1 (12.0)	6.9 (6.4)
Apprenticeship	.58 (2.1)	.56 (2.06)	.63 (2.3)	.62 (2.3)
Foreign	-.51 (.95)	-.50 (.90)	-.35 (.66)	-.34 (.66)
Experience	.15 (3.8)	.35 (1.4)	.12 (2.9)	.18 (.72)
Experience Squared	—	-0.1 (.80)	—	-.004 (.24)
Married	—	—	-.70 (2.5)	-.67 (2.5)
Children	—	—	-.90 (3.3)	-.88 (3.25)
ln (Other Income)	—	—	-.10 (3.6)	-.10 (3.6)
Manufacturing	—	—	.70 (2.9)	.70 (2.9)
R ²	.04	.04	.11	.11

Ordinary Least Squares Estimates, 1988
Parameter (t-statistic)

Regression	(a)	(b)	(c)	(d)
NLSY — Total Sample, N = 5,497				
Constant	8.9 (42.0)	9.06 (11.0)	8.4 (39.0)	8.6 (11.0)
Vocational Graduate	.09 (.9)	.09 (.9)	.08 (.7)	.08 (.8)
Sex	-1.8 (-18.0)	-1.9 (18.0)	-1.5 (15.0)	-1.5 (15.0)
Race	-.6 (5.0)	-.6 (5.0)	-.45 (4.0)	-.45 (4.0)
Experience	-.02 (.88)	-.03 (.19)	.05 (2.0)	.002 (.01)
Experience Squared	—	.008 (.09)	—	.003 (.27)
Married	—	—	-.17 (1.3)	-.17 (1.3)
Children	—	—	-1.2 (11.0)	-1.2 (11.0)
ln (Other Income)	—	—	.01 (.9)	.01 (.8)
Manufacturing	—	—	1.6 (13.0)	1.6 (13.0)
R ²	.06	.06	.11	.11
NLSY — Females, N = 2,842				
Constant	7.98 (25.0)	8.6 (6.7)	7.8 (25.0)	8.0 (6.6)
Vocational Graduate	-.01 (.09)	-.02 (.1)	-.02 (.1)	-.02 (.1)
Race	-.18 (1.0)	-.19 (1.0)	-.15 (.8)	-.15 (.8)
Experience	-.11 (3.3)	-.26 (.9)	.02 (.5)	-.03 (.12)
Experience Squared	—	.008 (.5)	—	.003 (.18)
Married	—	—	-.7 (3.3)	-.74 (3.4)
Children	—	—	-1.9 (12.0)	-1.9 (12.2)
ln (Other Income)	—	—	.005 (.25)	.006 (.25)
Manufacturing	—	—	2.1 (10.0)	2.1 (10.0)
R ²	.004	.004	.11	.11
NLSY — Males, N = 2,655				
Constant	8.2 (32.0)	7.9 (8.0)	7.8 (30.0)	7.8 (8.0)
Vocational Graduate	.24 (1.86)	.24 (1.9)	.21 (1.61)	.21 (1.61)
Race	.98 (7.0)	.99 (7.0)	-.82 (5.8)	-.82 (-6.0)
Experience	.07 (2.7)	.15 (.7)	.08 (2.8)	.07 (.4)
Experience Squared	—	-.004 (.4)	—	.0001 (.01)
Married	—	—	.02 (.11)	.02 (.1)
Children	—	—	-.32 (2.2)	-.32 (2.0)
ln (Other Income)	—	—	.07 (4.3)	.07 (4.0)
Manufacturing	—	—	1.05 (7.5)	1.05 (7.5)
R ²	.02	.02	.06	.06
(a) Vocational Graduate (or Apprentice), Race (or Foreign), and Experience. — (b) (a) plus Experience Squared. — (c) (a) plus Married, Children less than Age 16, natural logarithm of other income, and manufacturing employment. — (d) (c) plus Experience Squared.				

References

- Freeman, Richard B. and David Wise*, 1979, *Youth Unemployment*. Cambridge, MA: National Bureau of Economic Research.
- Grasso, John T and John R. Shea*, 1979, *Vocational Training and Education: Impact on Youth*. Berkeley, CA: The Carnegie Foundation for the Advancement of Teaching.
- Gustman, Alan L. and Thomas L. Steinmeier*, 1982, The Relation Between Vocational Training in High School and Economic Outcomes, *Industrial and Labour Relations Review* 36: 73-87.
- Rumberger, Russell W. and Thomas N. Daymount*, 1984, The Economic Value of Academic and Vocational Training Acquired in High School. In Michael E. Borus (ed.), *Youth and the Labour Market: Analyses of the National Longitudinal Survey*. Kalamazoo, MI: Upjohn Institute, 157-187.
- Tannen, Michael B.*, 1983, Vocational Education and Earnings for White Males: New Evidence from Longitudinal Data, *Journal of Human Resources*: 49-66.