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ABSTRACT

The economic returns of taking math and science courses in high school are estimated for women who do not go on to college and for women entrepreneurs. A human capital model is used to estimate returns for respondents drawn from the National Longitudinal Survey's New Youth Cohort. Wage rates in 1990 of women who were ages 14-21 in 1979 were related to courses in math and science that were taken in high school, as recorded on a respondent's transcript and coded in standard year-long units. Little direct effect was found for the influence of high school curriculum in subsequent wage rates, either for women or for men. For women, courses in science and math did, however, significantly improve the probability that they would gain postsecondary training or go on to college. These indirect effects argue for a multi-equation model that estimates effects for women of all educational levels. Even when considering women of all educational levels, the study did not show any significant effect of science and math courses on the earnings of the self-employed. (SW)

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THE RETURNS TO EDUCATIONAL TRAINING IN MATH AND SCIENCE FOR AMERICAN WOMEN

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Executive Summary

The economic returns to math and science courses taken while in high school are estimated for women who do not go on to college and women entrepreneurs. A human capital model is used to estimate the model for respondents drawn from the National Longitudinal Survey's New Youth Cohort. Women who were 14-21 in 1979 are followed through time, and their wage rates measured in 1990. Wages earned in 1990 are related to courses in math and science that were taken in high school, recorded on a respondent's transcript, and coded in standard year long units. Little direct effect was found for the influence of high school curriculum on subsequent wage rates, either for women or for men. For women, courses in science and math did, however, significantly improve the probability that they would gain post-secondary training or go on to college. These indirect effects argue for use of a multi-equation model that estimates effects for women of all educational levels. Even when using women of all educational levels, the study did not show any significant effect of science and math on the earnings of the self-employed.

Introduction

The returns to education and training have long been a topic of interest in the field of economics, in particular subsequent to the important work of Becker (1962, 1975) and Mincer (1962, 1974). Human capital theory has provided a measurable way of relating years of education and/or work experience to the wage rates that individuals earn over their lifetimes in a free market economy. Human capital theory is intended to be generalizable to all employees whose wages are determined in free, competitive labor markets. But for American women and minorities, the theory's predictions are complicated by historical patterns of discrimination. Becker himself addressed the possibility of discrimination (1957) even as he was working out the implications of human capital theory. Employer discrimination may not be based solely on personal characteristics such as race as gender, however. The theory of human capital has quite a different interpretation if employers use educational attainment to discriminate among potential hires. Employers may not view education solely as a measure of added productivity that individuals have gained through skill acquisition. Rather, they may use educational attainment as a screening device for determining which individuals have inherent characteristics that make them more trainable in the future. If education simply screens out individuals who were not as easily trainable, then it does not matter what skills individuals acquire during the educational experience. The main skill that is important is survival in each and every educational institution. (This line of reasoning was advanced by Thurow in 1975.)

Math and science are specific skills that are acquired by students throughout their educational careers. But in high school, students, for the first time, have a clear choice as to whether to include such courses in their curriculum. For some students the choice will clearly be profitable, due to the simple fact that a certain amount of math and science is required to enter college, and graduation from college is a proven way to increase earnings. For students who do not go on to college, a curriculum that contains a higher degree of math and science may be profitable if the jobs that are available require such skills and are more highly paid than others. In a highly technological society, we might presume that a positive economic return would occur for math and science skills, even for jobs that do not require education beyond high school. If so, public policy could encourage added participation by women in high school math and science -- but only if the expected return were positive. The presumption of a positive return needs to be tested.

This study is directed, in the first instance, at women who do not go on to college. In this case, we will assume that math and science are acquired skills that will enhance the earning power of women once employed. We also assume that if employers use education for screening out certain kinds of employees, the screening will be based on a credential -- the high school degree, for example. Screening will be less likely to occur on the basis of the specific number of courses taken in math and science since it will be harder for employers to obtain such information. The thesis to be tested is that high school graduates who have a higher degree of concentration in math and science courses should earn more than those with a lower concentration. This hypothesized positive relationship will be interpreted as a human capital relationship. To calculate the economic return to math and science, we measure coursework in standard year-long units and then estimate the degree to which the addition of one year will raise subsequent earnings. Since the choice of a high school curriculum that concentrates on math and science is no more costly to an individual student than any other curriculum choice, we can express the returns solely through the benefit that occurs due to higher wages.

This research is also directed at women who, whether they go to college or not, become entrepreneurs. We define entrepreneurs as women who identify themselves as "self-employed." For these women, the returns to math and science should be measured while holding constant the effects of any schooling that occurred beyond high school. To make the returns to math and science comparable for all groups, the definition for "math and science" will be courses taken while enrolled in high school (and not while enrolled in college or any other post-secondary school). The hypothesis to be tested is the same as was advanced for high school graduates, namely that those who take more high school science and math will earn more than those who take less.

Data for Calculating Returns to Math and Science

Data sets for calculating the economic returns to math and science coursework must have some rather stringent characteristics. Adult wage rates should be related to the choices that young people make in their secondary curriculum. If adults are surveyed at only one point in time, they will have to rely on their own recall about the courses they took many years prior, and their recall may be quite faulty. A longitudinal survey would be preferable, collecting a record of high school coursework at the time that a person was enrolled in school and adult wage rates in a follow-up period a number of years later.

Secondly, the data set should contain a full listing of courses taken during high school. The courses should be coded so that math and science courses are clearly distinguished from all others. Respondents should be from many geographic locations so that a variety of jobs will be related to the choice of curriculum. But the variety means that schools may differ considerably in their treatment of courses -- the names given to various courses and the credits assigned. The coding should be as standardized as possible with a consistent credit given to courses across all high schools.

Thirdly, the data set should contain a wide variety of variables that can control for all the other factors that influence wage rates as work careers unfold. It is unlikely that a large enough sample of individuals can be found whose work careers are similar and who vary only with respect to the number of courses of high school science and math that have been taken. The varied work experiences of the sample will need to be controlled statistically.

Finally, the data set should contain a complete record of work experience over time. Work experience is a critical control variable. Human capital theory argues that work experience itself can contribute significantly to subsequent wage rates, due to the informal training and skill acquisition that accrues during such work. Work experience is hard to recall over several years' time. For this reason, a longitudinal survey is desirable because work experience can be measured as it occurs. The survey should accumulate work experience as reported by respondents at regular time intervals, and it should result in a continuous record.

One data set, and perhaps only one, meets all the above requirements. It is the National Longitudinal Surveys' Youth Cohort (NLSY). The National Longitudinal Surveys of Labor Market Experience were begun in 1965 to determine why increasing numbers of older men were leaving the labor force before the normal retirement age. Because of the usefulness of the surveys for answering a number of other questions about the labor market, three additional cohorts -- young men, young women, and mature women -- were added to the original sample of men, and the time periods for interviewing each cohort were repeatedly extended. In 1979, a new cohort of young men and women was added, the "New Youth Cohort" or NLSY, The new youth cohort, first interviewed in 1979, included

12,686 youth of both sexes age 14-21 as of January 1, 1979. As of 1990, the NLSY cohort had been surveyed annually ten times in person and once by telephone. Survey design and distribution of the data are done by Ohio State's Center for Human Resource Research.

The NLSY contains information on work experience for all respondents from the time they were last enrolled in school until the first interview in 1979 (for those not enrolled in school). From interview to interview, data are gathered cumulatively on work experience. Hourly rates of pay are available for all jobs held from 1979 through the 1990 interview. The data set includes an extensive list of variables measuring education, training, and a variety of personal characteristics that would be required for statistical controls.

For the purposes of this research, the most important characteristic of the NLSY is its supplemental survey of schools. Once in 1980 and again in 1981 and 1983, permission was obtained from respondents to obtain transcripts from the high schools they had most recently attended. About 94% of the sample gave permission for the National Opinion Research Center to collect their transcripts. All those 17 years or older were part of the target sample in 1979. In subsequent rounds, respondents who had newly turned 17 were included in the target sample as well as those whose transcripts were incomplete in previous rounds. Response rates were 77%, 81%, and 80% in each of the three rounds respectively. A total of 8,908 transcripts were collected. About half of these are transcripts for young women.

The NLSY documentation for the High School Transcript Survey describes the data collected as follows:

> For each course four types of information were coded as follows: the grade level at which the course was taken, the course "title", the letter grade received, and the credit assigned for the course. The coding system used to identify the actual courses taken by the student was developed from the *Standard Terminology for Curriculum and Instruction in Local and State School Systems: Handbook VI*. The course identification scheme consists of a two-digit subject matter prefix (e.g., math, English) and two additional digits which specify the individual course within the general category (e.g., Algebra I, American Literature). At the time of coding, course credits were converted to Carnegie credit units. The Carnegie credit-unit system is commonly used to collect enrollment data when school systems use different methods of recording credit hours. The system assigns one (1.0) credit to a standard full-year course, or a course taken one hour a day for 180 days.

Under code 11 are listed the following mathematics courses:

Arithmetic
Mathematics
Mathematics, Special Groups
Algebra
Geometry
Trigonometry
Calculus
Special Topics

Under code 13 for the natural sciences are listed:

Science
Science, Vocational Training
Biology
Biology, Special Topics
Chemistry
Chemistry, Special Topics
Physics
Physics, Special Topics
Environmental Studies & Environmental Science
Special Topics

Each of the above categories is broken down into other more specialized course headings.

Estimating the Returns to Math and Science for Non-College Bound Youth

A linear model has been constructed relating adult wage rates to the choice of curriculum while in high school. The natural log of the wage rate is used as a dependent variable in a multiple regression that controls for a variety of other measurable human capital, personal, and labor market characteristics that could be expected to influence wage rates. In the equation that is estimated, a significant regression coefficent will show that enrollment in math or science results in a positive economic return. The size of the return will be measured in Carnegie credit units. An additional unit of math or science instruction while in high school will result in an *X* % increase in adult wage rates, all other factors constant.

The following linear model has been estimated:

$$\ln Y = a + B_1 X_1 + B_2 X_2 + B_3 X_3$$

where:

X_1 = the number of annual credits of high school math shown on R's transcript

X_2 = the number of annual credits of high school science shown on R's transcript

X_3 = a vector of human capital, personal characteristic, and labor market control variables (e.g. work experience, years of formal training, age, race, marital status, union status, region of country, rural or urban, occupation, and industry)

The natural log of the wage rate is used to capture the non-linear nature of the wage profile over time.

Since, for policy purposes, we are interested in women who do not go on to college, the sample has been restricted to women who have completed no more than 12 years of schooling. Despite the truncation of the sample, the number of years of schooling completed are still controlled for in the regression equations. For some women, dropping out of high school automatically precludes enrollment in upper level math and science courses, thus making it important to control for the number of years of school completed.

Returns are estimated in two ways to test the sensitivity of the model. All sample respondents will have attained the age of 18 by 1983 since they were 14-21 in 1979. In the initial set of estimates, adult wage rates will be defined as of 1990, seven years after the youngest respondents have graduated from high school. For the oldest respondents, adult wage rates could be measured as many as 14 years subsequent to graduation from high school. The varying times of graduation for respondents will be accounted for through the all important work experience variable. These selection criteria resulted in a sample of 1586 women who were employed in 1990, who reported a wage rate, and who had complete information for all of the independent variables included in the model.

In the second set of estimates, adult wage rates were measured in 1987, four to eleven years after graduation. Care was taken to assure that the sample was as comparable as possible between the two time periods, thereby assuring that any differences in estimates were due to the different time periods and not differences in sample composition. In 1987, the sample size was 1776.

In yet a third set of estimates, linear models were estimated to determine whether a stronger preparation in math and science improved the probablility for enrolling in college or for acquiring post-secondary training. The sample sizes for these two analyses were 4,130 and 2,403? respondents respectively.

In a final set of estimates, we examined women's entrepreneurial activity and attempted to measure the impact of math and science on self employment. The sample for analyzing entrepreneurial activity included women who went on to college as well as women who had only a high school degree or less. In this sample were 3725 women who were out of school for at least two years, who reported whether they were self employed or not in 1990 and who had full information on all the independent variables included in the models that we estimated.

For two critical variables, "outliers" were coded as missing values and some respondents were thus dropped from the sample. Respondents who reported wage rates less than $1.00 or more than $70.00 per hour were dropped. Respondents who exceeded 10 year-long course equivalent credits in the combined areas of science and math were also dropped. When respondents had missing data on work experience, they were assigned the mean value for the total sample and were not dropped.

An important issue was whether enrollment in science and math represented self-selection of the respondents into courses that they knew they could handle because of ability The problem was how to disentangle the effects of coursework in science and math from ability. In 1980, a special study was done of all NLSY respondents, the Profile of American Youth. In this study, the Armed Services Vocational Aptitude Battery (ASVAB) was administered to virtually all NLSY respondents. In 1989, the test was administered for a second time to those surveyed. The 1991 NLS Handbook describes the ASVAB as follows:

> The ASVAB consists of a battery of ten tests that measure knowledge and skill in the following areas: (1) general science; (2) arithmetic reasoning; (3) word knowledge; (4) paragraph comprehension; (5) numerical operations; (6) coding speed; (7) auto and shop information; (8) mathematics knowledge; (9) mechanical comprehension; and (10) electronics information. . . A composite score derived from four sections of the battery (the arithmetic reasoning, word knowledge, paragraph comprehension, and one half of the numerical operations section) can be used to construct an approximate and unofficial AFQT (or Armed Forces Qualifications Test) score for each youth. The AFQT is a general measure of trainability and a primary criteria of enlistment eligibility for the Armed Forces.

To try and disentangle the effects of coursework from ability in science and math, the linear model was reestimated including as an additional independent variable the respondent's 1989 AFQT score. Controlling for this, admitedly, debatable measure of ability, we then tested whether the results for math and science were changed.

A final and important test of the sensitivity of the results was to compare the results for young women and young men.

Results

Table 1, column 1 reports wage rate regressions for 1990, including as independent variables the usual human capital variables. For this sample of women who had not gone on to college, black women earned about 5 percent less than white, but Hispanics earned 6.7 percent more. Each additional year of schooling yielded 2.2 percent in earnings but an additional year of work experience produced a 3.6 percent gain. An additional year of training resulted in a 3 percent increase in earnings. Unions raised women's earnings by 12.8 percent, all else constant but married women earned no more or less than their unmarried counterparts. Women employed in professional/managerial and clerical/service occupations earned more than those employed in blue collar occupations. Women employed in the retail and trade industries and those employed in service industries earned significantly less than women employed in manufacturing. Women employed in finance and real estate did not earn significantly more or less than those in manufacturing. Women living in urban areas received higher earnings. But most importantly for this study, the number of math and science courses taken by women in high school did not have a significant impact on long run earnings. Results were no different when controlling for ability (see Table 1, column 2). Nor did they change when wage rates were measured in 1987, rather than 1990 (see Table 1, column 3). Finally, when the equations were reestimated for men, the results were similar to those for women -- the number of courses taken in science and math had no significant effect on subsequent earnings. (Results, though not shown here, are available from the authors.)

Two more tests of the model's specification were also done. For the first test we summed both math and science courses. We entered them in the regression equation in place of the separate science and math variables, reasoning that to some degree science and math might be good substitutes for each other. The sum total of math and science courses could therefore be related to higher wage rates when each separately was not. But results showed that in this form the variable was insignificant. For the second test, we defined a series of dummy variables to measure the sum of math and science courses taken while in high school. This specification was based on the possibility that a minimum number of science and math courses may be necessary before their impact on wage rates can be observed. We divided the total number of math and science courses into the following groups: Students who had no science and math; students who had 1, 2, or 3 courses; students who had 4 or 5 courses and students who had 6 or more courses. We found that women who had 6 or more courses did earn significantly more in 1990, 20 percent more than other students. The result occurred only for 1990, however. When the equation was reestimated for 1987, none of the dummy variables was significant (see Table 2).

Estimating the Returns to Math and Science for Women Entrepreneurs

For women who become entrepreneurs, coursework in math and science could have several effects. First, enrollment in math and science while in high school could have a positive impact on enrollment in college. If college education were to raise wage rates, which we suspect it would, then high school science and math would have an indirect positive influence on wages for women, whether entrepreneurs or not. The second effect is similar to the first but applies more specifically to non-college bound youth. Enrollment in math and science while in high school could have a positive impact on the amount of post secondary training that a woman obtains. The training, in turn, would be expected to have a positive influence on subsequent wage rates, thus linking indirectly coursework in math and science with greater long run wage rates. Thirdly, coursework in math and science could have a direct effect on entrepreneurial activity, raising the probability that any woman would choose an entrepreneurial career, regardless of how much education or training she had acquired.

To test for the first two of these effects we regressed the probability of going on to college and the probability of acquiring post-secondary training on the following: race (white, black, and hispanic), marital status, region of residence (north/south), urban or rural residence, number of courses in math and number of courses in science. For the 4,130 women interviewed in 1990 who had complete data on these variables, we found that the number of courses taken in math significantly raised the probability of going on to college but the impact was not large. Each year of coursework in math increased the probability of entering college by 2.4 percent. The number of courses taken in science had almost the same impact, each year raising the probability of going on to college by 1.9 percent (Table 3, Col. 1). For women who did not go on to college (2403 respondents), we found somewhat similar results. The total number of courses in science raised the probability of post secondary training, additional year of coursework raising the probability of acquiring such training by 2.6 percent. (Table 3, Col. 2)

To test for the last of these effects, we used the full sample of women who went on to college and women who did not. We estimated the direct effect of coursework in science and math on entrepreneurial activity by regressing the probability of self employment status on the same set of variables as in Table 1 but omitting the dummy variables that controlled for occupation. We found that most of the human capital variables were unrelated to the probability of self-employment in 1990. Neither education nor training had an impact, and each year of work experience raised the probability of self employment by only 0.3 percent (Table 4, Col. 1). The number of courses in either math or science had no significant effect. Married women were significantly more likely to be self employed, married status raising the probability by 4 percent. Industry variables were the most important. Employment in the personal service industry was associated with a 38 percent increased likelihood of self employment when compared with employment in manufacturing. Women employed in all the service industries other than professional services were significantly more likely to be self employed. Women employed in agriculture, forestry, and fishing were 23 percent more likely to be self employed than were women employed in manufacturing.

To estimate the differential impact that courses in math and science might have on wage rates for self employed women, we estimated an earnings equation for all women in the NLS in 1990, both for those who went on to college and for those who did not. The earnings equation is similar to the one shown in Table 1 but with several important modifications. First, annual earnings rather than hourly wage is the dependent variable since a wage rate cannot be calculated for self-employed women. Second, education is measured in dummy variables, women who had some college and those who graduated from college being compared with all others. To some extent the effect of science and math taken while in high school will be measured through these two educational dummy variables. Third, self employment is controlled for in the equation and an interaction term between self employment and coursework in science and math has been created to capture any differential impact that science and math might have for women entrepreneurs. A significant coefficient would imply that women entreprenuers who had more coursework in science and math earned more than entrepreneurs who had less such coursework. Results show that, in this case as well as the previous, courses in science were unrelated to subsequent earnings but courses in math were. Even after controlling for the effect that coursework in math has on earnings through college, an extra year of math raises subsequent annual earnings by $629. Entrepreneurs did not earn significantly more than other women, and there was no differential positive effect for science and math for the women who were entrepreneurs (Table 4, Col. 2). The positive return to courses in math for the full sample of women may mean that the insignificant effects we obtained for women who do not go on to college occurred because of the restriction in range of the wage rates that were measured for the dependent variable.

The restriction of range problem is but one of several biases that may be present due to the strategy of focussing on women who did not go on to college. Earlier we experimented with dependent variables other than wage rates (post-secondary training and enrollment in college) once we found that the direct effect of coursework in science and math on wages was not significant. The results from the full sample earnings equation imply that a three equation model may be more appropriate than the simpler model on which this study is based. In such a model, post secondary training, enrollment in college and long run wage rates would all be included (i.e. endogenous). Due to time constraints, the estimation of such a model must await future study.

Summary and Conclusions

The weak results for the direct effects of high school math and science on women's subsequent wage rates tend to support an explanation of screening rather than human capital for understanding the behavior of employers. Schooling and work experience are both rewarded with higher salaries but variation in the skill that accompanies schooling is not -- at least in so far as math and science are concerned. This result does not apply only to women. We found that variation in the math and science taken by young men was likewise not associated with variation in their subsequent wage rates. Math and science do have indirect effects since women with larger numbers of math and science courses are more likely to acquire post-secondary training and to enroll in college.

Young women will not directly improve their economic futures by judicious choices of high school curriculum (i.e. math and science). If educators want to encourage women to enroll in math and science or to teach the subjects in a way that minimizes gender bias, their purpose should be to prepare women for college or for post-secondary training and not directly for the workplace. Young women will also not be more likely to own their own businesses simply because they have extra training in math and science. Additional courses in either area did not enhance the probability of self employment nor did women who were self employed and who took more science and math achieve higher earnings when self employed. The most important variable for explaining entrepreneurial activity was the choice of industry in which to work, with women employed in agriculture and in personal service industries much more likely to be self employed. Women who do not go on to college will have to rely on non-traditional occupational choices, post-secondary training, and governmental anti-discrimation policies to increase their long run economic gains.

TABLE 1

Relationship between Number of Courses in Science and Math and Hourly Rate of Pay in 1990 and 1987, Controlling for Standard Human Capital Variables[1] (t-Values in Parenthesis)[2]

Dependent Variable: Natural Log of Hourly Rate	1990	1990 (including AFQT)	1987
Independent Variables:			
Intercept	5.80	5.86	5.63
Years of math	0.006 (0.62)	0.000 (0.04)	0.016 (1.56)
Years of science	0.007 (0.64)	0.001 (0.07)	-0.011 (-1.01)
Ability (1989 AFQT score)		0.003** (5.36)	
Years of schooling	0.022** (2.56)	0.014 (1.53)	0.033** (3.61)
Years of work experience since left school	0.036** (12.1)	0.033** (10.9)	0.042** (11.0)
Years of training	0.031** (2.84)	0.027** (2.45)	0.052** (4.13)
Hispanic	0.067** (2.41)	0.098** (3.40)	0.030 (0.98)
Black	-0.050** (-2.07)	0.008 (0.30)	-0.059** (-2.30)
White (base)			
Wages covered by collective bargaining	0.128** (4.63)	0.124** (4.49)	0.093** (3.63)

TABLE 2

Relationship between Number of Courses in Science and Math and Hourly Rate of Pay in 1990 and 1987, Controlling for Schooling and Ability and Other Human Capital Variables[1] (t-Values in Parenthesis)[2]

Year for Hourly Rate	1990	1990 (including AFQT)	1987
Independent Variables			
Intercept	5.78	5.85	5.62
Years of schooling	0.025** (2.95)	0.016* (1.80)	0.037** (2.90)
Ability (AFQT score, 1989)		0.003** (5.12)	
Six or more courses in science and math	0.203** (3.23)	0.163** (2.62)	-0.006 (-0.04)
Four or five courses in science and math	0.006 (0.190)	-0.016 (-0.54)	-0.014 (-0.47)
One, two, or three courses in science and math	-0.018 (-0.72)	-0.025 (-0.99)	-0.035 (-1.22)
No science and math (base)			
F value of the equation	24.06	23.80	21.91
Adjusted R squared	0.25	0.26	0.22
Number of observations	1648	1586	1776

1 Partial Results of a Least Squares Regression where Natural Log of Hourly Rate of Pay is a Function of Curricular Choice (Total Math and Science as Measured by Categories of Coursework), Schooling, Work Experience and Other Human Ca ital Variables asShown in Table 1.

2 Significant at 1 percent = ** Significant at 5 percent = *

TABLE 3

Relationship between Number of Courses in Science and Math and Probability of Enrollment in College or Other Post-Secondary Training, Controlling for Ability, Race, and Residence[1] (t-Values in Parenthesis)[2]

Dependent Variables	Prob of Enroll in College by 1990	Prob. of Post-Sec Training by 1990
Independent Variables		
Intercept	0.041	0.389
Years of Math	0.024** (3.74)	0.002 (0.119)
Years of Science	0.019** (2.80)	0.052** (2.62)
Ability (AFQT score, 1989)	0.008** (24.73)	0.007** (7.29)
Hispanic	0.123** (5.67)	0.035 (0.68)
Black	0.195** (10.15)	0.183** (3.74)
White (base)		
Residential control variables		
North	-0.068** (-4.70)	0.010 (0.27)
Urban	0.122** (7.05)	0.016 (0.38)

TABLE 4

Relationship between Number of Courses in Science and Math and Probability of Self Employment or Self Employment Earnings, Controlling for Selected Other Variables[1] (t-Values in Parenthesis)[2]

Dependent Variables	Prob. of Self Empl. 1990	Yrly Earn 1990
Independent Variables		
Intercept	-0.034	2442
Years of math	-0.005 (-1.31)	629** (3.59)
Years of science	-0.003 (-0.76)	-111 (-0.60)
Self employed, 1990		17 (0.00)
Interaction: self employment with years of math & science		-581 (-0.24)
Ability (AFQT score, 1989)	0.0003 (1.56)	58** (5.93)
Years of schooling	0.003 (1.16)	
Some college		487 (0.90)
College graduate		6951** (11.3)
High school or less (base)		---
Years of work experience since left school	0.003** (2.37)	824** (13.7)

Years of training	-0.003 (-0.81)	225 (1.08)
Hispanic	-0.009 (-0.80)	1005* (1.76)
Black	-0.020** (-1.98)	274 (0.53)
White (base)	---	---
Wages covered by collective bargaining		2171** (4.19)
Married	0.040** (5.29)	-2151** (-5.64)
Occupational control variables		
Prof., mg'l, technical		5072** (6.78)
Clerical & service		1258* (1.81)
Other blue collar (base)		---
Industry control variables		
Ag., forestry, fishing	0.230** (6.38)	-3666** (-3.31)
Mining & construction	0.061** (2.09)	82 (0.06)
Utilities	-0.018 (-0.91)	1484 (1.51)
Trade	0.015 (1.19)	-5471** (-7.72)
Fin., insur., real estate	-0.031** (-1.97)	-831 (-0.96)

Bus. repair service	0.097**	-2118**
	(5.55)	(-2.23)
Personal service	0.382**	-5756**
	(22.74)	(-5.51)
Entertain. & rec. service	0.128**	-4577**
	(3.62)	(-2.44)
Professional service	-0.002	-2989**
	(-0.18)	(-4.41)
Pub. administration	-0.029	-1180
	(-1.48)	(-1.15)
Manufacturing (base)	---	---
Residential control variables		
North		-327
		(-0.83)
Urban		2510**
		(5.30)
F Value of the equation	44.62	44.23
Adjusted R squared	0.18	0.27
Number of observations	3739	3145

[1] Ordinary least squares regressions

[2] Significant at 1 percent = ** Significant at 5 percent = *

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