The effects of local employment opportunities on youths' work and schooling

By: David C. Ribar

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Abstract:
This study uses individual-level data from the Sample Edited Detail File of the 1990 Decennial Census of the United States to estimate multinomial logit models of young men's and women's enrollment and employment behavior. The models include county-level averages of (1) the earnings opportunities currently available to individuals with similar educational backgrounds and (2) the difference in earnings opportunities associated with additional schooling as explanatory variables. Estimates indicate that young people who have not yet completed high school are relatively insensitive to changes in earnings opportunities. For young people who have completed high school, increases in current earnings opportunities modestly reduce enrollments and increase employment.
Keywords: Demand for schooling; Salary; Wage differentials

Article:
1. Introduction
At a time when their overall economic status appears to be deteriorating, young people's work and schooling decisions have become pivotal. Economists are already familiar with the broad trends in wages over the last two decades — the decrease in unskilled workers' wages and the increase in skilled workers' wages — that led to the rise in the returns to schooling for the general population. Less well known are the differences in trends across age groups. For younger workers without a college degree, average wages fell even more sharply than for similarly educated older workers over this period. For younger workers with a degree, wages rose during the 1980s but stagnated thereafter. Thus, despite facing otherwise favorable labor market conditions including a prolonged economic expansion and a small cohort size, today's youth must invest more in schooling than previous generations just to maintain its relative economic position.

There have been some positive changes in schooling behavior. While high school completion rates among 18–24 year-olds have remained fairly steady at just over 80% for the last 20 years, college enrollment rates for this age group increased from about a quarter to just over a third.[1] Unfortunately, the increase in schooling has not been enough to compensate for the change in wages, and the net economic well-being of teenagers and young adults has declined (Card & Lemieux, 1997; Levy & Murnane, 1992; Schrammel, 1998).

This study examines the sensitivity of young people's work and schooling decisions to differences in economic opportunities. Specifically, it examines whether the wages currently available to a person with a given educational attainment influence the decisions to work and go to school. It also examines whether the difference in wages associated with additional schooling affect these decisions. To measure economic opportunities, the study uses the Sample Edited Detail File (SEDF) of the 1990 Decennial Census of the United States to form county-level averages of the wages for young people with different levels of schooling. It combines these aggregate measures with other individual-level data from the SEDF to estimate multinomial logit models of

young men's and women's enrollment and employment outcomes. In addition to the wage measures, the models control for individuals' demographic characteristics, other economic variables, and state-specific fixed effects.

The rest of this article is organized as follows. Section 2 lays out an informal conceptual model and reviews previous empirical studies of the effects of employment opportunities on youths' employment and schooling behavior. Section 3 describes the econometric model, the analysis data set, and the variables used in the empirical analysis. Estimation results are reported in Section 4. The results are discussed and conclusions are offered in Section 5.

2. Existing studies of the effects of employment opportunities on work and schooling

There has been a considerable amount of research examining the determinants of young people's work and schooling behavior. For brevity (and because several thorough reviews already exist), this section reviews a narrower set of studies which explicitly consider the effects of economic opportunities on youth decision-making.[2]

Most recent empirical economic research on youths' schooling and work decisions is motivated either by Becker's (1993) model of human capital investments or by extensions of that model. Consider a simple dynamic framework in which people derive utility from consumption and leisure as youths and later as adults. People are constrained in the amount of time available at any period in their lives and can divide their time in each period between leisure, work and schooling. People are also constrained in their incomes. Assume that they begin with an initial endowment of wealth as youths, can add to their income through work as youths and adults, can save money over time, but perhaps are restricted in their ability to borrow. Also assume that schooling imposes direct, up-front monetary costs but also increases the wages people can earn in the future.

In this framework, youths deciding to attend school balance the benefits of additional schooling with the direct and opportunity costs of schooling. The boost in wages associated with more schooling (the returns to schooling) represents the benefits, while the current level of wages without any additional schooling represents the opportunity costs. If the returns to schooling increase, the model predicts that youths will obtain more schooling; if wages for workers without schooling increase, the model predicts that schooling will decrease. In the model, changes in wage opportunities also affect youths' decisions to work. Specifically, if youth wage rates increase, youths will be more likely to seek employment.

Much of the empirical research of the effects of economic opportunities on youth decision-making has focused on work decisions (see, e.g., Bound & Holzer, 1993; Freeman and Freeman; Freeman & Rodgers, 1999). These studies have found that teenage and young adult labor market outcomes are very sensitive to changes in local aggregate conditions such as unemployment rates and job availability. Some of these studies have also reported that unskilled youths and minority youths are particularly sensitive to local economic conditions.

A few studies have jointly considered enrollment decisions. Ihlanfeldt (1992) found that increased access to jobs, as measured by local unemployment rates and average travel times to work, led to substantially higher rates of work among low-skill urban youths but had few effects on school enrollment. Examining a broader sample of youths, Card and Lemieux (1997) found that regional employment rates were positively related to work for men and women and enrollment for women, but negatively related to enrollment for young men. They also found that increases in regional wage rates reduced enrollment for both sexes but did not affect employment. Neumark and Wascher (1995) focused on minimum wages and found that higher minimum wages reduced enrollments but had little effect on overall employment. All of these studies considered either general measures of employment conditions (e.g., total or gender-specific unemployment rates) or measures specific to low-skill workers as measures of opportunities; none considered the effects of differences in earnings or employment associated with different levels of education.

Another group of studies has examined the role that the returns to schooling play in determining schooling levels. Many of these studies have relied on aggregate, time series data (see Freeman's 1986 review), although a

few have used individual-level, cross-section or panel data. Willis and Rosen (1979) used cross-section data on World War II veterans and found that differences in the levels and growth rates of earnings associated with college completion influenced men's decisions to attend college. Ribar (1993) looked at high school completion among a more recent cohort of young women and found little evidence that their decisions were influenced by differences in the return to schooling. Keane and Wolpin (1997) used longitudinal data to estimate a dynamic, structural discrete choice model of young men's schooling, work and occupation decisions. Their structural models (which by construction were consistent with a human capital model) fit the data well.

The present study combines several methodological features from the existing research and adds some new features. First, like the studies by Ihlanfeldt (1992), Neumark and Wascher (1995), and Keane and Wolpin (1997), the analysis jointly examines young people's work and enrollment decisions. This is a departure from most of the youth employment studies, which have elected to omit individuals who were still enrolled in school (e.g., Bound & Holzer, 1993; Freeman, 1991; Freeman & Rodgers, 1999). It is clear from the data that school enrollment is a major activity for young people and that many young people, especially college students, combine work and school. Omitting enrollees may lead to a very selective sample.

Second, following research on the demand for schooling, this study also considers the effects of both the current wage level and potential wage difference associated with additional schooling. This, again, is a point of departure from the youth employment studies. Previous studies' estimates of the impacts of youth wages may be biased by their failure to control for differences in the returns to schooling.

Third, this study uses local area averages as its measures of employment opportunities. As with the youth employment studies, it takes advantage of the geographic variation in economic conditions across the country to identify the effects of wages. This seems to be a more plausible basis for identification than the personal background characteristics that Willis and Rosen (1979) used. Unlike the other existing studies, this study uses counties, rather than regions, states or metropolitan areas, as the geographic units. Besides describing opportunities within a smaller geographic boundary, the use of counties also allows an analysis of outcomes for youths in both rural and urban areas.

3. Empirical approach

3.1. Econometric model

To examine the empirical relationship between young people's economic circumstances and their work and schooling behavior, I use a multinomial logit model. The model considers four discrete outcomes corresponding to the different possible combinations of enrollment and employment decisions: (1) the person neither works nor goes to school, (2) the person goes to school but does not work, (3) the person works but does not go to school, and (4) the person both works and goes to school. These are the same outcomes and same choice of model that Ihlanfeldt (1992) and Neumark and Wascher (1995) adopted.

In the model, let y^*_j denote the indirect utility associated with outcome j (=1, 4). The indirect utility is specified as a linear function of the person's initial wealth (A), unskilled wages (W_1), the wage increment associated with additional schooling ($f'(s)$), and other observed (X) and unobserved (ε_j) factors such that

$$(1)\quad y^*_j=\beta_{Aj}A+\beta_{1j}W_1+\beta_{Dj}f'(S)+XB_{Xj}+\varepsilon_j.$$

The βs, which are specific to each outcome j, represent the marginal effects of each of the observed variables on indirect utility. Individuals are assumed to choose the j with the highest indirect utility.

The unobserved variables are assumed to be independent of the observed variables, independent across outcomes and individuals, and follow an extreme value distribution. With these assumptions, the model can be estimated using maximum likelihood. The error assumptions greatly reduce the computational requirements of the model; however, they are restrictive. Most notably, they imply that the model has the independence of irrelevant alternatives property.

3.2. Analysis data

The data used in the empirical analysis are drawn from the US Census Bureau's 1990 Sampled Edited Detail File. The information in the SEDF comes from the 'long forms' which were administered as part of the 1990 decennial census. Thus, it represents a very large (one-in-six) individual- and household-level cross-section sample of the US population. I use the SEDF in two ways. First, I use it to construct individual-level observations of employment and enrollment outcomes and other demographic characteristics. Second, I aggregate data from the file to form county-level measures of local economic conditions; these county-level measures are then merged back into the individual-level data.

3.2.1. Individual- and household-level variables

The SEDF records whether a person was employed during the previous week and whether he or she had recently been enrolled in school.[3] I construct dummy variables from each of these survey responses and interact them to form the four-category dependent variable for the multinomial logit model.

The SEDF also contains demographic information on the person's sex, age, ethnic origin, and schooling level. I use the age information to form a set of year-specific dummy variables. From the ethnic origin data, I construct dummy indicators for people of African origin and people of other non-European origins (mostly native Americans, Asians, and Pacific Islanders); the omitted category is European origin. I also construct a separate dummy variable for Hispanic origin which may overlap with the other racial/ethnic categories. Using the schooling information, I distinguish between people with and without a high school diploma (or equivalent). At the household level, the SEDF records the total incomes of household members for the preceding calendar year. I subtract the individual's income from the household total to form a measure of the income of other household members. For the youngest people in the sample, other household members' incomes largely represent parents' incomes. For some of the older people in the sample, this measure may instead reflect spouses' or cohabiting partners' incomes. I interpret other household members' income as a proxy for family resources.[4] One shortcoming of this measure is that it does not capture access to resources outside the immediate household; therefore, for individuals who have moved out of their parents' home, the measure may be incomplete. More generally, estimates of the effect of this variable may confound family resource effects with household composition effects.

For the individual-level data set, I select non-institutionalized civilians who were 16 to 24 years of age and had not completed a bachelor's degree.[5] These criteria yield an initial data set with over 4.2 million observations. Subsequent data exclusions (described below) reduce the final data set to 3.9 million observations. Descriptive statistics for the individual-level variables, conditional on sex and high school completion status, are reported in Appendix A.

3.2.2. Geographic data

The empirical analysis directly incorporates a dummy variable for whether the household was in an urban area. State identifiers in the SEDF are used to form dummy variables for each of the 50 states and the District of Columbia. These dummies capture the effects of institutional features, such as minimum wage regulations, compulsory attendance laws, public assistance programs, education finance policies and other labor, schooling and human service policies, that vary across states.

State and county identifiers are also used to construct several aggregate economic variables and to link these variables with the individual-level observations. I construct three general types of economic variable: average hourly wages conditional on gender and schooling, unemployment rates conditional on gender and schooling, and average property tax payments. The first two measures are used to describe the economic opportunities for individuals with different levels of schooling. The third measure describes part of the tax base and is used as a proxy for community resources including local public school expenditures.[6]

The hourly wage measures are calculated from reports of total personal earnings, weeks worked, and usual hours worked per week in the preceding year. In the computations, individuals who did not work in the

preceding year or who had top-coded earnings or hours information are omitted. To describe the current opportunities of individuals who have not completed high school, I form gender-specific county averages of the hourly wages of 16–24 year-olds with less than a high school education. To describe the future wage benefits associated with completing high school, I take the difference of the gender-specific county averages of hourly wages for unenrolled 16–34 year-olds with and without a high school diploma or equivalent. The wage difference includes all individuals with more than a high school education, including college graduates; thus, it captures the returns directly associated with high school completion as well as the instrumental returns associated with high school acting as a stepping stone for college completion. The wage difference is calculated using older individuals and unenrolled individuals to reflect opportunities after leaving school.

Similar wage aggregates are constructed for people who have completed high school but not completed college. In this case, current opportunities are represented by wages for people of the same age group who have not completed high school but not college; future benefits are represented by the difference in wages for an extended age group of unenrolled people who have and have not completed college.

Conditional unemployment rates are calculated for the same gender, age, and schooling subgroups as the average wage measures. The unemployment rates do not appear by themselves in any of the econometric models but instead are interacted with the wage averages to form probability-weighted wage rates in some of the analyses.

The annual property-tax variables are aggregated up from household-level reports on taxes paid. Property-tax information in the SEDF is only collected for owner-occupied housing; so the aggregates omit taxes paid by landlords and taxes on commercial properties.

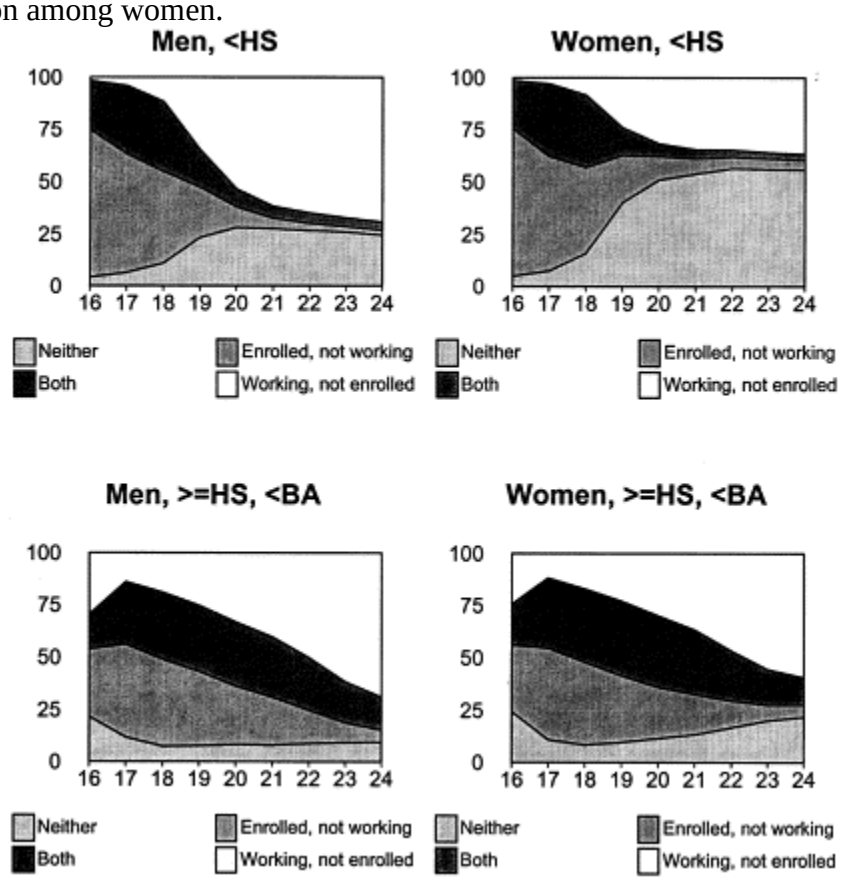
While it is straightforward to define the economic variables, obtaining precise direct county-level estimates is somewhat problematic. Most of the 3000 or so counties and county equivalents in the United States have relatively small populations — the modal county in 1990 had about 25,000 residents. Because of its size and coverage, the SEDF can be used to form direct estimates of economic variables for most, but unfortunately not all, counties in the US. Small cell sizes arise when conditional variables are calculated for some counties. To get a sense of the problem, consider the cell size that might obtain for the modal county if we select wage observations for 16–24 year-old men with less education than a high school diploma. Suppose that half the population are male, 13% are in the age range, 60% work, 40% have less schooling than a high school degree, and 1/6 are sampled; the cell size would be 65 people (=25,000×0.5×0.13×0.6×0.4/6). If the county population were 10,000 (nearly a quarter of the counties have populations smaller than this), the cell size would be 26. For reasons of precision, individual- and county-level observations are dropped if the cell sizes for any of the wage aggregates necessary for a particular individual observation were smaller than 30.[7] This leads to a large loss in the number of counties. Depending on gender and the schooling level of the subsample, the analysis drops between a quarter and a half of the counties. However, there is only a small loss (about 10%) in the number of individual observations.

Means, standard deviations, average standard errors, and average numbers of observations for the county-level aggregates are reported in Appendix B. The estimates from the table confirm that higher levels of schooling are associated with both higher wages and lower levels of unemployment.

4. Estimation results

Fig. 1 displays percentages of people at different ages in each of the four enrollment and employment categories. The results are presented separately by gender and high school completion status. While there are some similarities across the graphs such as generally declining age–enrollment profiles and generally increasing age–employment profiles, there are also some substantial differences. For instance, young adults who do not complete high school have much higher inactivity rates (i.e., are more likely to be both out of school and out of work) than young adults who complete high school. The graphs also show that women have higher inactivity rates than men. The inactivity rates for young adult women without a high school diploma are particularly high,

exceeding 50% from age 20 on. The gender differences in inactivity rates likely reflect childbearing and household specialization among women.



The figures also indicate that people who have not completed high school are much less likely to continue schooling beyond their teenage years than people who complete high school. Enrollment rates for men and women without a high school diploma fall to about 17% at age 20, 10–11% at age 21, and below 10% thereafter. Enrollment rates for high school graduates are 58% at age 20, and 50–51% at age 21. Because of the notable differences in work and enrollment patterns across groups, all of the subsequent empirical analyses are stratified by gender and high school completion status. In addition, the nonlinear age profiles motivate the study's use of dummy variables to control for age effects.

Table 1 lists correlations between the county-level youth employment rates, enrollment rates, and wage measures. The first column in the table reports the correlations between county-level employment and enrollment rates. Youth employment and enrollment are negatively related for all subgroups except women who have not completed high school. The negative correlations indicate that work and school are competing uses of time for high school graduates and for males. The positive correlation for young women who have not completed high school may be an artifact of their high rates of inactivity.

Outcome	Enrollment	Uninteracted wage variables		Interacted wage variables	
		Hourly wage at current age and schooling level	Difference in wages for next schooling level	Wage×(1−unemployment) at current age, schooling level	Difference in interacted wages for next schooling level
Men who have not completed high school (2352 counties)					
Employment	−0.113 ∗ ∗∗	0.055 ∗ ∗∗	0.080 ∗ ∗∗	0.377 ∗ ∗∗	−0.027
Enrollment	–	−0.146 ∗ ∗∗	−0.013	−0.120 ∗ ∗∗	0.039∗
Women who have not completed high school (1921 counties)					
Employment	0.346 ∗ ∗∗	0.058 ∗ ∗	0.104 ∗ ∗∗	0.378 ∗ ∗∗	0.026
Enrollment	–	−0.020	0.028	0.114 ∗ ∗∗	0.032
Men who have completed high school (1555 counties)					
Employment	−0.760 ∗ ∗∗	0.175 ∗ ∗∗	−0.018	0.318 ∗ ∗∗	−0.058 ∗ ∗
Enrollment	–	−0.225 ∗ ∗∗	0.054 ∗ ∗	−0.224 ∗ ∗∗	0.049∗
Women who have completed high school (1656 counties)					
Employment	−0.368 ∗ ∗∗	0.242 ∗ ∗∗	−0.080 ∗ ∗∗	0.418 ∗ ∗∗	−0.139 ∗ ∗∗
Enrollment	–	−0.086 ∗ ∗∗	−0.074 ∗ ∗∗	−0.043∗	−0.078 ∗ ∗∗

The next column in Table 1 lists correlations between the average hourly wages available to 16–24 year-old men and women at each schooling level and their average employment and enrollment rates. Consistent with the predictions of the theoretical model, current wages are positively related to employment and negatively related to enrollment for all four groups. The correlations are stronger for high school graduates than for non-graduates.

In the third column, correlations are reported for the difference in average hourly wages associated with an increase in schooling. Unlike the current wage variables, the results for the wage differences do not provide strong support for the theoretical model. Counter to the predictions of the model, the wage difference is significantly positively related to employment for men and women who have not completed high school and significantly negatively related to enrollment for women who have completed high school. The only results that are consistent with theory are those for male high school graduates; although the correlations are weak, the wage differences for this group are negatively related to enrollment and positively related to employment.

The final two columns of Table 1 list results for wage variables that have been interacted with employment rates. The interactions are intended to weight each of the wage measures by the probability of actually obtaining a job if one were to look for work. For skilled workers, who have relatively low unemployment rates, the interactions do not change the wage variables very much. However, there are appreciable effects for unskilled workers. For men without a high school diploma, the interaction reduces the average current wage variable from $5.64 to $4.46 per hour and increases the average wage difference from $2.29 to $2.99. For women without a high school diploma, the interaction reduces the current wage measure from $5.08 to $3.97 and increases the difference measure from $1.83 to $2.52.

Adjusting the current wage variables for unemployment probabilities leads to weaker or, in the case of women without a high school diploma, wrong-signed correlations with enrollment rates. The adjustment leads to stronger correlations with employment; however, this is an artificial result that simply reflects a correlation between the aggregate unemployment and employment rates. The results for the adjusted wage difference variable are slightly better. The correlations for men at both schooling levels are weak but consistent with theory. Some wrong-signed results, however, still appear for women.

In general, the bivariate correlations provide some support for the theoretical model. Nearly all of the current wage correlations have correct signs while only some of the wage difference variables have correct signs. The next step in the empirical analysis is to examine whether these relationships hold up or are strengthened in multivariate specifications.

Table 2 reports the study's primary estimation results. The table lists coefficients from the multinomial logit models for the current wage, wage difference, other household income, and area property tax variables. Because the coefficients are difficult to interpret directly, Table 2 also lists estimates of the marginal effects of the economic variables on the outcome probabilities. These effects were calculated by taking the average of the marginal effects evaluated at each individual observation. In addition to the listed variables, the models were specified to include controls for age, race and ethnicity, urban residence, and state of residence. For brevity, detailed results for these other controls are not reported.[8]

	Enrolled, not working		Working, not enrolled		Enrolled and working	
	Coefficient	$\partial P/\partial x$	Coefficient	$\partial P/\partial x$	Coefficient	$\partial P/\partial x$
Men who have not completed high school						
Hourly wage at current age and schooling level	−0.0281 * * * (0.0044)	0.0009	0.0047 (0.0045)	0.0025	−0.0514 * * * (0.0048)	−0.0050
Difference in wages for next schooling level	−0.0005 (0.0031)	−0.0019	0.0176 * * * (0.0031)	0.0015	0.0108 * * * (0.0033)	0.0014
Other HH members' income (0000s)	0.1685 * * * (0.0017)	0.0096	0.0410 * * * (0.0018)	−0.0046	0.1638 * * * (0.0017)	0.0054
Property taxes (00s)	0.0088 * * * (0.0012)	−0.0020	0.0256 * * * (0.0012)	0.0017	0.0240 * * * (0.0012)	0.0022
Log likelihood			−881,620.40			
Women who have not completed high school						
Hourly wage at current age and schooling level	−0.0016 (0.0044)	−0.0003	0.0241 * * * (0.0048)	0.0021	−0.0037 (0.0049)	−0.0007
Difference in wages for next schooling level	0.0005 (0.0034)	−0.0002	0.0242 * * * (0.0037)	0.0020	−0.0018 (0.0037)	−0.0007
Other HH members' income (0000s)	0.2351 * * * (0.0018)	0.0125	0.1342 * * * (0.0020)	0.0035	0.2329 * * * (0.0019)	0.0066
Property taxes (00s)	0.0044 * * * (0.0012)	−0.0026	0.0226 * * * (0.0013)	0.0015	0.0245 * * * (0.0013)	0.0030
Log likelihood			−744,799.09			
Men who have completed high school						
Hourly wage at current age and schooling level	−0.3380 * * * (0.0056)	−0.0427	0.0423 * * * (0.0047)	0.0515	−0.1829 * * * (0.0053)	−0.0165
Difference in wages for next schooling level	−0.0641 * * * (0.0029)	−0.0062	−0.0150 * * * (0.0026)	0.0052	−0.0381 * * * (0.0028)	−0.0015
Other HH members' income (0000s)	0.0096 * * * (0.0010)	0.0009	−0.0051 * * * (0.0010)	−0.0032	0.0146 * * * (0.0010)	0.0026
Property taxes (00s)	0.0412 * * * (0.0011)	0.0021	0.0199 * * * (0.0010)	−0.0031	0.0441 * * * (0.0011)	0.0035
Log likelihood			−1,183,304.30			
Women who have completed high school						
Hourly wage at current age and schooling level	−0.2658 * * * (0.0051)	−0.0345	0.0710 * * * (0.0043)	0.0418	−0.1251 * * * (0.0048)	−0.0132
Difference in wages for next schooling level	−0.1157 * * * (0.0031)	−0.0093	−0.0262 * * * (0.0025)	0.0096	−0.0935 * * * (0.0029)	−0.0078
Other HH members' income (0000s)	0.0640 * * * (0.0011)	0.0020	0.0537 * * * (0.0011)	0.0018	0.0655 * * * (0.0011)	0.0033
Property taxes (00s)	0.0426 * * * (0.0009)	0.0016	0.0269 * * * (0.0008)	−0.0011	0.0485 * * * (0.0009)	0.0039
Log likelihood			−1,421,541.40			

For men and women who have not completed high school, the current wage and wage difference variables are estimated to have small and inconsistently-signed effects on enrollment and employment. For instance, the estimates indicate that a dollar increase in the current wage reduces the probability of men's enrollment by 0.41% but also reduces the probability of men's employment by 0.25%. At the same time, a dollar increase in the wage difference reduces men's enrollment by 0.05% and increases men's employment by 0.29%. For women, the current wage variable is correctly signed — a dollar increase reduces enrollment by 0.10% and increases work by 0.14%. However, the wage difference variable is incorrectly signed for both schooling and employment.

Among high school graduates, the current wage variable is consistently signed with much stronger effects. A dollar increase in current wages increases men's employment by 3.5% and women's employment by 2.9% and reduces men's enrollment by 5.9% and women's enrollment by 4.8%. Contrary to theory, increases in the wage difference are also estimated to increase employment and reduce enrollment.

Household resources, as measured by other household member's incomes, are estimated to have positive effects on enrollment for all groups. Household income is also estimated to have positive effects on women's employment and little net effect on men's employment. The positive effect on enrollment is consistent with individuals from wealthier households facing fewer borrowing constraints. However, the positive effects on employment run counter to theory.

Higher property taxes are estimated to have weak positive effects on enrollment for people who have not graduated from high school and strong positive effects for people who have graduated from high school. The positive effects are consistent with this variable acting as a proxy for school quality. The stronger effects for high school graduates are unexpected but may reflect students from stronger school districts being better prepared to continue on to college.

Table 3 reports coefficient and marginal effect estimates for multinomial logit models that are respecified to include the wage and wage difference variables interacted with employment rates as measures of economic opportunities. Replacing the uninteracted wage variables with the interacted variables substantially increases the likelihood values for all four subgroups and changes some of the wage results. However, because the coefficients on the other variables are not greatly affected, the table only lists results for the wage variables.

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Table 3 reports coefficient and marginal effect estimates for multinomial logit models that are respecified to include the wage and wage difference variables interacted with employment rates as measures of economic opportunities. Replacing the uninteracted wage variables with the interacted variables substantially increases the likelihood values for all four subgroups and changes some of the wage results. However, because the coefficients on the other variables are not greatly affected, the table only lists results for the wage variables. For men and women who have not completed high school, the estimated effects of the interacted current wage variable are much stronger than the estimates from Table 2. A dollar increase in the employment-weighted current wage is estimated to increase men's and women's employment by 2.7% and decrease their enrollment by 0.62% and 0.22%, respectively. The estimated effects of the wage difference variable are smaller and mostly in line with the earlier estimates. For high school graduates there are fewer changes. The directions and general magnitudes of the estimates for the wage variables are very similar to those reported in Table 2. Taken as a whole, the estimates for the interacted current wage variables provide stronger evidence for the human capital model while the interacted wage difference variables continue to provide very weak evidence.

Several other alternative specifications of the multinomial logit were estimated to check the sensitivity of the results. Specifications for men and women without high school education were re-estimated just on samples of 17–20 year-olds. From Fig. 1, this narrower age group is more on the decision margin for all four enrollment and employment outcomes than older or younger people. As expected, 17–20 year-olds were more sensitive to economic changes but not dramatically so. The estimated effects of the wage variables was still relatively small. Specifications for high school graduates were similarly re-estimated omitting 16 year-olds. As indicated in Fig. 1, the work and enrollment patterns for 16 year-olds are distinctly different from those of the rest of the sample; however, because 16 year-olds make up only a tiny portion of the sample (about 0.16%), omitting them made no difference in the estimates.

Finally, specifications were estimated with and without the state dummy variables. All three local area variables (the current wage, wage difference, and property-tax variables) were sensitive to the omission of the state dummy variables. There were few sign changes among the marginal effects for the local area variables, but there were some magnitude changes. For the less-educated subsample, the marginal effects generally became stronger when the state dummy variables were dropped; for the more-educated subsamples, the marginal effects became weaker. Specification tests indicated that the state dummies were jointly significant; so, the study focuses on results which include these variables.

	Enrolled, not working		Working, not enrolled		Enrolled and working	
	Coefficient	$\partial P/\partial x$	Coefficient	$\partial P/\partial x$	Coefficient	$\partial P/\partial x$
Men who have not completed high school						
	−0.0103 * (0.0055)	−0.0174	0.1774 *** (0.0055)	0.0156	0.0882 *** (0.0058)	0.0112
Wage×(1−unemployment) at current age and schooling level						
Difference in interacted wages for next schooling level	−0.0109 *** (0.0034)	−0.0019	−0.0050 (0.0034)	−0.0002	0.0007 (0.0036)	0.0015
Log likelihood			−880,748.04			
Women who have not completed high school						
	−0.0186 *** (0.0056)	−0.0180	0.1412 *** (0.0058)	0.0109	0.0991 *** (0.0059)	0.0158
Wage×(1−unemployment) at current age and schooling level						
Difference in interacted wages for next schooling level	−0.0019 (0.0039)	0.0012	−0.0043 (0.0042)	−0.0002	−0.0127 *** (0.0042)	−0.0017
Log likelihood			−744,092.75			
Men who have completed high school						
	−0.3002 *** (0.0061)	−0.0501	0.1485 *** (0.0053)	0.0622	−0.0929 *** (0.0059)	−0.0132
Wage×(1−unemployment) at current age and schooling level						
Difference in interacted wages for next schooling level	−0.0873 *** (0.0029)	−0.0076	−0.0275 *** (0.0025)	0.0062	−0.0579 *** (0.0028)	−0.0024
Log likelihood			−1,182,351.90			
Women who have completed high school						
	−0.2097 *** (0.0055)	−0.0392	0.1771 *** (0.0047)	0.0513	−0.0169 *** (0.0052)	−0.0063
Wage×(1−unemployment) at current age and schooling level						
Difference in interacted wages for next schooling level	−0.1257 *** (0.0031)	−0.0092	−0.0375 *** (0.0025)	0.0090	−0.1080 *** (0.0028)	−0.0088
Log likelihood			−1,421,018.40			

5. Discussion

Several general findings emerge from the estimation results. First, there is mixed evidence regarding the empirical validity of the human capital model. While the estimated effects of the current wage variable are consistent with the predictions of the model in most of the specifications and subsamples, the estimated effects of the wage difference variable are much weaker and often have the wrong signs. Part of the weakness in the wage difference results may reflect the fact that the difference variable has more sampling variance than the current wage variable. Another possibility is that there is not enough independent variation between the current unskilled wage and wage difference measures to properly identify effects from both variables. A lack of independent variation might arise if skilled and unskilled wages are affected by common local demand shocks or if, as Goldfarb and Yezer (1987) and Topel (1986) have argued, increased mobility among high-skill workers leads to less genuine wage variability for this group.[9] The high degree of mobility among educated workers also implies that a simple county average may not accurately reflect their wage opportunities.

A second general finding is that young high school graduates respond much more to changes in economic opportunities than non-graduates. In some specifications, graduates are 10 to 20 times more responsive than non-graduates. The differences in enrollment behavior are not that surprising. Compulsory attendance laws restrict teenagers' ability to drop out of school.[10] Rates of high school completion are high, and the national rate has not changed a great deal in recent years.

The results regarding employment responsiveness are more surprising. Previous studies (e.g., Bound & Holzer, 1993; Hoynes, 1999) have found that unskilled employment is more sensitive to local demand changes than skilled employment. The present study's use of individual-level data, skill-specific wage measures, and controls for family and community resources may account for some of the difference in findings.

A third finding is that the estimated sensitivity of non-graduates to changes in wage opportunities increases in specifications which account for employment availability by interacting wages with employment rates. Graduates remain more sensitive to wage changes than non-graduates in these specifications, but the difference between the two groups is reduced. The results are consistent with less-skilled youth being more constrained in their job opportunities than more-skilled youth.

A fourth result is that other household members' income is an important determinant of enrollment, especially for young people who have not completed high school. Enrollment rates are estimated to rise 1.5% with each $10,000 in household income for men who have not completed high school and 1.9% for women. The corresponding effects for high school graduates are 0.35% for men and 0.53% for women. Because the models do not account for factors such as family structure, household composition or parents' education, I cannot put a precise interpretation on these estimates. In particular, the finding that non-graduates are more sensitive to the income measure than graduates strongly suggests that more is at work here than just financial resources. The estimates do indicate, however, that family characteristics matter.

A fifth, and unexpected, result is that community resources in the form of property taxes on owner-occupied housing increase college but not secondary enrollments. Like the household income measure, there are other things in the community besides school spending such as the availability of transportation and other public services that the tax variable may be capturing.

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Appendix A

	Have not completed high school		Completed high school	
	Men	Women	Men	Women
Enrolled, not working	0,44 (0,50)	0,44 (0,50)	0,21 (0,41)	0,20 (0,40)
Working, not enrolled	0,21 (0,41)	0,12 (0,32)	0,45 (0,50)	0,39 (0,49)
Enrolled and working	0,23 (0,42)	0,23 (0,42)	0,25 (0,43)	0,26 (0,44)
African origin	0,13 (0,33)	0,14 (0,35)	0,09 (0,29)	0,11 (0,32)
Other non-white origin	0,12 (0,32)	0,12 (0,32)	0,08 (0,27)	0,07 (0,26)
Hispanic origin	0,15 (0,36)	0,14 (0,35)	0,08 (0,27)	0,08 (0,27)
Urban residence	0,64 (0,48)	0,67 (0,47)	0,75 (0,44)	0,76 (0,43)
Age	18,21 (2,33)	18,13 (2,35)	20,99 (1,92)	20,91 (1,94)
Other household members' income	38,690.23 (46,006.88)	38,074.70 (46,512.65)	33,322.39 (45,363.95)	30,779.12 (42,079.30)
Number of observations	924,146	782,214	1,038,085	1,176,210

Appendix B

	Mean	Standard deviation	Average standard error	Average number of observations
Men who have not completed high school (2352 counties)				
Hourly wage, ages 16–24 with less than a high school diploma	5.645	1.396	0.685	245
Hourly wage, unenrolled ages 16–34 with less than a high school diploma	7.944	1.865	0.823	258
Hourly wage, unenrolled ages 16–34 with high school diploma or more	10.236	1.726	0.546	1096
Wage difference	2.292	1.872	–	–
Unemployment, ages 16–24 with less than a high school diploma	0.210	0.092	0.042	217
Unemployment, unenrolled ages 16–34 with less than a high school diploma	0.175	0.084	0.035	267
Unemployment, unenrolled ages 16–34 with high school diploma or more	0.068	0.037	0.012	1101
Property taxes paid	600.232	482.820	10.453	3843
Women who have not completed high school (1921 counties)				
Hourly wage, ages 16–24 with less than a high school diploma	5.084	1.321	0.665	213
Hourly wage, unenrolled ages 16–34 with less than a high school diploma	6.012	1.569	0.769	184
Hourly wage, unenrolled ages 16–34 with high school diploma or more	7.847	1.417	0.391	1264
Wage difference	1.835	1.659	–	–
Unemployment, ages 16–24 with less than a high school diploma	0.221	0.094	0.046	180
Unemployment, unenrolled ages 16–34 with less than a high school diploma	0.206	0.083	0.045	171
Unemployment, unenrolled ages 16–34 with high school diploma or more	0.073	0.033	0.012	1197
Property taxes paid	653.302	509.048	9.929	4511
Men who have completed high school (1555 counties)				
Hourly wage, ages 16–24 with high school diploma but no college degree	6.993	1.242	0.459	601
Hourly wage, unenrolled ages 16–34 with high school diploma but no college degree	9.891	1.426	0.432	1203
Hourly wage, unenrolled ages 16–34 with a college degree or more	13.815	2.604	1.188	350
Wage difference	3.925	2.273	–	–
Unemployment, ages 16–24 with high school diploma but no college degree	0.101	0.046	0.019	521
Unemployment, unenrolled ages 16–34 with high school diploma but no college degree	0.069	0.032	0.010	1209
Unemployment, unenrolled ages 16–34 with a college degree or more	0.023	0.020	0.013	351
Property taxes paid	749.295	522.026	10.172	5309
Women who have completed high school (1656 counties)				
Hourly wage, ages 16–24 with high school diploma but no college degree	5.832	0.986	0.382	605
Hourly wage, unenrolled ages 16–34 with hgigh school diploma but no college degree	7.284	1.236	0.358	1099
Hourly wage, unenrolled ages 16–34 with a college degree or more	11.241	1.919	0.929	338
Wage difference	3.957	1.666	–	–
Unemployment, ages 16–24 with high school diploma but no college degree	0.099	0.049	0.020	511
Unemployment, unenrolled ages 16–34 with high school diploma but no college degree	0.076	0.034	0.012	1037
Unemployment, unenrolled ages 16–34 with a college degree or more	0.027	0.023	0.014	324
Property taxes paid	724.863	518.320	10.152	5067

Notes

[1] Educational statistics were obtained from the US Census Bureau's web site ⟨www.census.gov/population/socdemo/school/report97/taba-5.txt⟩, August 1999.

[2] Interested readers are referred to Mare's (1995) recent overview of trends in schooling and Haveman and Wolfe's (1995) review of research studies on youth outcomes.

[3] The Census questionnaires, which households were to complete and return by April 1, 1990, asked 'At any time since February 1, 1990, has this person attended regular school or college?'

[4] The SEDF does identify families and subfamilies within households; so a narrower income measure could be constructed. Because a substantial number of the subfamily 'heads' in the age group I examine are the teenage and young adult children of the household heads, the broader household measure seems to be called for.

[5] I also omit observations with allocated education data.

[6] Property tax revenues are an important component of local school expenditures. The US Bureau of the Census (1995) reported that in the 1991–92 academic year, property tax revenues accounted for two-thirds of local elementary and secondary school expenditures. However, there is a substantial amount of variation across jurisdictions in the way that schools are funded. Because of these differences, property taxes may be only a weak proxy for school expenditures.

[7] For example, the wage aggregates that are used for a young man with less schooling than a high school diploma are:

•the average hourly wage for men aged 16–24 with less than a high school degree;
•the average hourly wage for unenrolled men aged 16–34 with less than a high school degree; and
•the average hourly wage for unenrolled men aged 16–34 with high school degree or more.

If the cell size for any of these variables is less than 30, the observation is dropped.

[8] The coefficients for the other controls are jointly significant and have the anticipated signs. Detailed results are available from the author.

[9] Goldfarb and Yezer (1987) have argued that high-skill workers are so mobile that geographic wage differences for this group might reflect only compensating differentials for cost-of-living and local amenities.

[10] In 1997, 11 states plus the District of Columbia required youth to attend school through age 18; nine states required attendance through age 17, and the remaining states required attendance through age 16 (National Center for Education Statistics, 1998).