Labor Market Incentives to Stay in School

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Abstract

Human capital theory suggests that job opportunities will create incentives for human capital investment. If job information does not flow freely, or if they prefer not to move, students will make investment decisions based upon local job markets. Communities with a high percentage of low-skill jobs which do not reward high school and higher education do not create incentives for students to finish high school or continue beyond high school. Data from Virginia support this hypothesis. Targeted job creation, and improved labor market information may create incentives for increased human capital investment in many rural communities.

Key Words: dropouts, education, human capital, job markets

Introduction

It has long been obvious that education is an important ingredient in national economic growth (Schultz), but more recently it has become apparent that the same conclusion does not necessarily apply to local economic growth (Killian and Parker; McGranahan and Ghelfi). In the short run at least, increased expenditures on public education simply have not yielded high economic returns to localities. Direct investments in job creation, industrial attraction, infrastructure, and other programs have had higher local returns.

In the long run, indiscriminant job creation has also failed to lead to more permanent improvements in local economies. Even some counties with rapid job growth have not experienced decreases in poverty for example (Larson and White). Even more unfortunate, however, may be the incentives that low-skill jobs have created for individuals as they make education investment decisions.

Human capital theory (Schultz; Becker) predicts that the private rates of returns to education will determine the level of investment that individuals will make in their own and their children's education. Public policies which focus only on the short-run creation of jobs may reduce the long-run growth of the economy by limiting the quality of the labor supply.

This paper argues that local labor demand creates incentives for human capital investment, particularly in education. It contends that, at the individual level, human capital investment is encouraged by the existence of opportunities for better incomes given the required skills. Because national job information does not flow freely, expectations about returns to human capital investment will frequently be based on the limited information of the local labor market. The strategies, activities and policies of the predominant industries in the local labor market provide incentives to invest in education. If jobs in the local labor market do not reward education, investment in education is discouraged.

No empirical studies have directly addressed the above hypothesis. The objective of this paper is to test the hypothesis that local labor

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markets create incentives for human capital investment. The paper discusses the few empirical studies which have indirectly addressed the issue. In addition an empirical model to directly address the issue is estimated for the state of Virginia. The policy and future research implications of the model are discussed.

Human Capital Theory

In his seminal article on human capital, Schultz suggested that individuals will be willing to give up current consumption if they can obtain a higher lifetime income (and consumption) by investing in human capital. Schultz suggested that human capital investment is a specific example of general investment behavior. Human capital theory predicts that an investment will be made when the rate of return on the investment exceeds the rate of return on alternate uses of the capital (and other resources). Schultz defined investment in human capital as any expenditure in education, health, or even internal migration that is aimed at taking advantage of better job opportunities. Becker stated that investment in human capital is any activity that improves "the physical and mental abilities of people and thereby raises real income prospects." Friedman and Kuznets implicitly recognized investment in human capital as a determinant of income and wealth.

Human capital theory predicts that individuals will choose that level of investment in human capital that will maximize the present value of lifetime earnings. In this paper, we consider the decision to invest in education only, although the model can be extended to include other types of human capital as well.

The theory postulates a two-period utility function,

$$\textbf{(1)} \qquad U = U(X_1, X_2, S), \quad 0 \leq S \leq 1,$$

where X_1 and X_2 are vectors of goods in periods one and two respectively, and S represents the proportion of period 1 devoted to schooling. The individual is assumed to maximize utility subject to the income constraint,

(2)

$$Y_1[1 - S] + Y_2/[1 + r] = P_1X_1 + P_2X_2/[1 + r] + P_SS,$$

where Y_1 is potential income in period one, $Y_2 = y_2(S)$ is income in period two (a function of amount of education in period one), P is prices, and r is the discount rate. This maximization problem can be solved by forming the Lagrange function,

(3)

$$L(X_1, X_2, S, \lambda) = U(X_1, X_2, S) + \lambda\{Y_1[1 - S] + Y_2 / [1 + r] - P_1X_1 - P_2X_2 / [1 + r] - P_SS\},$$

and finding the first-order conditions[1] for a maximum,

(4)

$$\frac{\partial L}{\partial X_1} = U_1 - \lambda P_1 = 0$$

(5)

$$\frac{\partial L}{\partial X_2} = U_2 - \frac{\lambda P_2}{[1 + r]} = 0$$

(6)

$$\frac{\partial L}{\partial S} = U_s - \lambda \left[Y_1 + P_s - \frac{\partial Y_2}{\partial S} \frac{1}{[1 + r]} \right] = 0$$

(7)

$$\frac{\partial L}{\partial \lambda} = Y_1 [1 - S] + \frac{Y_2}{[1 + r]} - P_1X_1 - \frac{P_2X_2}{[1 + r]} - P_sS = 0.$$

Rearranging equation (6) yields the expression

(8)

$$\frac{U_s}{\lambda} + \frac{\partial Y_2}{\partial S} \frac{1}{[1 + r]} = Y_1 + P_s.$$

The two terms on the left of equation (8) are the benefits of education. The first term is utility gained directly from education and the second is the increased earning ability once educated. The terms on right are the costs--foregone income and the direct costs of education, respectively.

Investment in education will, therefore, be greater for those who enjoy school, those with lower schooling costs, those with poorer earning prospects without education, and most importantly for this paper, those who expect the greatest increases in *employability* from higher education.

Those individuals who live in communities with fewer opportunities for workers with more education will calculate a lower net return to education unless they are willing to consider a permanent move from their community.

The choice criterion in equation (8) is generalized in Figure 1. Here the marginal cost of education is the sum of lost income, $Y_1(S)$, and the cost of education, (P_s). The marginal cost and benefit curves rise discontinuously at S_1, the beginning of post secondary education. The marginal benefit is assumed to be simply the change in present value of future income with more education.[2] When job opportunities are limited as along MB^o, the individual has an incentive to drop out of high school. For higher returns, as in MB^1,the individual will finish high school. Even higher returns would be needed to attend college. The discontinuities explain the frequency of the decision to finish exactly twelve years of high school.

It should also be clear that if the income earning opportunities without more education rise, the opportunity costs of education increase and more individuals will drop out of school.

Implicit in the most restrictive versions of human capital theory is the assumption that labor has perfect knowledge of job opportunities and is mobile. People have an incentive to obtain as much education as would optimize life-time earnings and to migrate to a place where they can maximize their incomes. If one can increase one's income by an amount that exceeds the cost of the move and the increased cost of living (in present value terms), then one will make the move.

Individuals may not behave in this ideal manner for several reasons. Values held by some individuals, particularly values related to family and community, may make such a move emotionally costly. In this case, the monetary gain from making a move, particularly a long distance one, must be substantial before it will be considered (Deaton, Morgan and Anschel). The risks associated with relocating--changing economic conditions in the new location--will reduce the attractiveness of a move to risk-averse individuals. In addition, rural people may lack information about job opportunities elsewhere. In these cases it is reasonable to expect that the individual responds to job opportunities in the local labor market rather than the larger labor market.

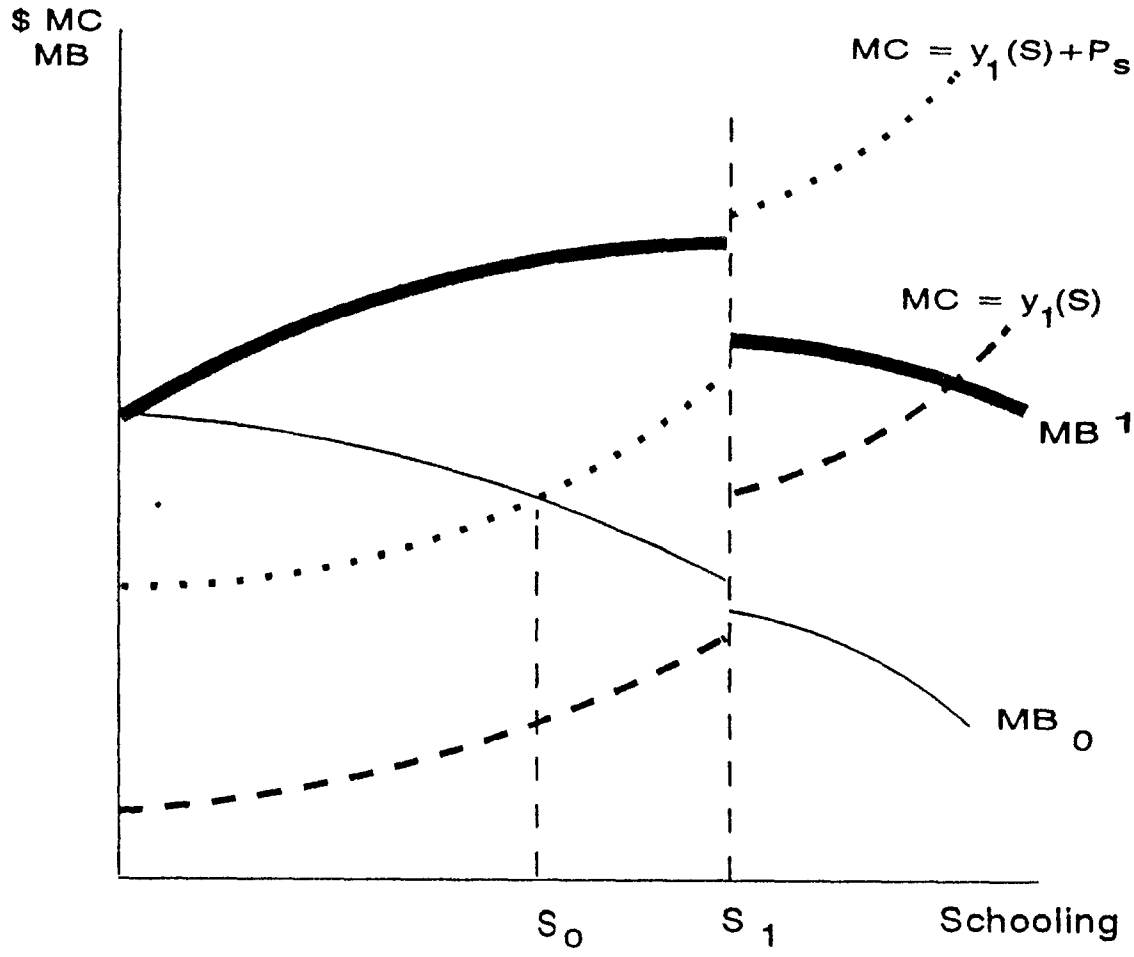
Empirical Studies

Human capital investment increases the individual's productivity resulting in higher earnings (Becker). When aggregated for a community, the increased labor productivity has a positive impact on economic growth (Miner; Schultz; Denison; Becker). As a result empirical studies have been dominated by analyses of individual and social returns to education (Becker; Psacharopoulos) and by the role of human capital in economic growth (Schultz; Denison). The impact of local education on plant location is an outgrowth of the latter (Smith, Deaton, and Kelch; McNamara, Kriesel, and Deaton).

The possibility of a feedback loop in which economic development also encourages human capital investment has largely gone unanalyzed in empirical studies. In fact, Falk suggests that a major research issue for the 80s is the affect of the structural characteristics of the local labor market on the life plans and chances of rural youth. This section reviews the existing empirical evidence concerning the impact of the local economic structure on human capital investment. Although the following studies were not specifically designed to address the issue, they do provide some support. The following section presents a model specially designed to address the issue.

Killian and Parker found that the relationship between education and economic growth is changing over time in the United States. Increasing average educational levels does not necessarily cause job growth in local economies. From 1969 to 1979, metropolitan areas with higher levels of average schooling grew faster than those

Figure 1: Marginal Costs and Marginal Benefits of Continuing in High School



with lower than average schooling levels. But in the 1980s, average educational levels had little impact on job growth in metropolitan areas. Rather, there was a positive relation between the percentage of college graduates and local employment growth and between dropout rates and local employment growth. This finding suggests the existence of dual labor markets: one involving well-educated people and the other requiring only low levels of education. Thus, variation in local industrial structure affects the demand for labor.

McGranahan and Ghelfi conclude that lack of demand for highly skilled labor in rural areas caused the wage differential between high and low skilled workers to increase more rapidly in urban than in rural areas during the 1980s. Lack of demand in rural areas resulted in a "substantial out-migration of the better educated rural working age population" (McGranahan and Ghelfi). The less educated apparently had less incentive to move, demonstrating that individuals do respond to labor market demand.

A 1977 study of high school dropouts in a three-county area of Missouri showed that students do respond to the local labor market. Fifty-four percent of the dropouts perceived that they would have no difficulty finding jobs and that better jobs would be hard to find even with a high school

diploma (University of Missouri; and Hobbs and Hobbs). This suggests that students' expectations of the returns to a high school education were not enough of an incentive to keep them in school.

The effect of economic development on human capital investment is suggested in a study by Rosenzweig. Using data from the U.S., Colombia, India, Malaysia, and the Philippines, with models of household behavior, Rosenzweig concludes that population growth and human capital investment reflect the economic circumstances of a country. The observed mix of family size, levels of health, nutrition, and schooling are *symptoms* not *causes* of the economic development level. In another cross-national study, Nuss and Majka found that the level of economic development (as indicated by per capita Gross National Product) has a positive effect on female education.

To alleviate the economically depressed conditions in rural areas, manufacturing industries are actively recruited. It is assumed that this creates jobs, raises income levels, stabilizes income and thus reduces poverty in the region. Recent studies have found that manufacturing recruitment has not achieved these goals, and that human capital investment still lags far behind that of more prosperous regions (Larson and White). The creation of new jobs through industrialization did not improve human capital investment because the manufacturing jobs created did not require high skills.

Industries in Appalachian Kentucky have very low proportions of workers who are noticeably rewarded for having post-secondary educational qualifications. The replacement of mining jobs with manufacturing jobs resulted in approximately the same ratio of managerial, professional, and technical workers to production workers as previously (Smith, 1988). Smith (1989) hypothesized that without a change in job mix there is no increase in incentives to invest in human capital. DeYoung found that manufacturing industries in Appalachian Kentucky had no positive impact on educational performance. Farming income negatively affected tenth grade reading levels. Mining income negatively affected reading levels as well as graduation rates.

Although the studies cited above were not specifically designed to address the issue of the impact of the economic structure on human capital investment, they do hint at the existence of such a relationship. In general, they suggest that individuals do respond to labor demand conditions by investing more or less in education. In addition, they suggest that the local labor market does influence decisions to drop out of school. The creation of low-skilled jobs does not encourage increased human capital investment.

Models of Human Capital Investment in Virginia

To directly address the issue of the impact of local labor demand on human capital investment, two models of human capital investment are estimated for Virginia counties and independent cities. In Virginia, school districts coincide with county and independent city boundaries, causing less variation in public educational opportunities within a county than in most other states. In several cases, counties and cities run a joint school system. In these cases the counties and cities were combined for the analysis.

Here we study the decision to get a high school diploma or to dropout and the decision of high school graduates to continue their education. High school dropout rates are a negative aggregate indicator of investment in human capital: the lower the dropout rate, the greater the investment in human capital. Dropout rates, while also related to other social factors such as poverty or teenage pregnancy, are an indication of young people's perceptions or expectations of the returns to formal schooling (University of Missouri; Hobbs). Dropout rates are measured as the annual percent of students who do not continue their high school education (Virginia Department of Education). The second measure of human capital investment is the percentage of high school graduates continuing their education (Virginia Department of Education). Post secondary education includes trade schools, community college and four-year college. This is a positive indicator of how the returns to post-secondary are perceived by students.

Socio-economic status is a good predictor of student achievement when aggregated at the school level or higher (Hobbs). Two measures of

socio-economic status--income level and income distribution--are included in the model. Real per capita income is expected to be positively related to investment in human capital because there will be less need for students to drop out of school to contribute to family income. In addition, higher income families are more likely to be aware of the returns to education. Also, better educational opportunities are more likely to be made available in the counties with higher incomes. Each of these increases the return to or reduces the cost of education.

Income distribution, measured by the family poverty rate, is expected to negatively affect human capital investment. Hobbs points out that income distribution is particularly germane for rural areas where the poverty rate is above that of urban areas. Students from poorer families may need to drop out of school to contribute to the family income. These same students may have entered school at a disadvantage and struggled throughout their time in school. Students from poorer families are less likely to continue beyond high school because of the additional costs involved.

If direct information on future job opportunities and rewards is not readily available, students will use the limited information provided indirectly by the local labor market. This information includes unemployment rates, and the occupational structure of the local market. As unemployment rates increase, the short-run likelihood of finding a job decreases. While high unemployment rates may also decrease the expected short-run returns to education, employers can become more selective in their hiring, choosing the applicant with more education (Howe). Thus, education increases the longer-term probability of getting a job, while the high unemployment rate reduces the opportunity cost of remaining in school. Overall, higher current unemployment rates are expected to increase human capital investment. High local unemployment rates may also lead some individuals to consider the larger labor market and continue their education in order to compete in that market.

To test the hypothesis that the proportions of high and low paying occupations affect human capital investment, this study includes several measures of local labor market structure. The current labor market structure is a proxy for the structure that students expect when they enter the labor market. Students may expect the structure to change, but even this expectation will be based on the current and past market (Fruedenberg).

As hypothesized by Smith (1989), individuals will perceive greater returns to education in areas where there are high percentages of people with jobs who are rewarded for their education. If the majority of jobs available are low-paying and do not reward higher education, investment is expected to be lower. The percentage of *occupations* that are managerial is expected to positively influence investment as students will be able to see the returns to education. The percentage of local occupations that are services is expected to negatively affect human capital investment. The occupations included within each category are given in the appendix.

McGranahan and Ghelfi point out that there are differential returns to education between rural and urban areas. A more rural location is expected to negatively affect human capital investment because of lower returns to education relative to more urban areas. To reflect the differential returns to education in rural and urban areas, a series of bivariate variables based on a non-metropolitan-metropolitan continuum are introduced. The codes categorize counties according to their population and proximity to metropolitan areas (Butler). The codes range from 0 to 9, with 9 as the most rural.[3] Because of the small numbers of counties, categories 0 and 1 (more than one million in population) were grouped as were categories 4 and 5. Categories 4 and 5 are non-metropolitan counties with urban populations of 20,000 or more. Category 4 is adjacent to a metropolitan county and category 5 is not. Only one metropolitan county was classified as "0." This county was grouped with the next category of metropolitan counties. The omitted category is the most urban with populations of one million or more. A similar classification of counties was used in the report *After the Factories* (Rosenfeld, Bergmar, and Rubin).

The dependent variables for the two models are dropout rates and the percentage of high school

graduates continuing their education by county/school system (Virginia Department of Education). Independent variables include the percentage of county employment in occupations classified as managerial and services (Center for Public Service, 1989), real per capita income (U.S. Department of Commerce, 1986), the unemployment rate (U.S. Department of Commerce, 1987), the family poverty rate (Center for Public Service, 1987), and a measure of rurality (Butler). All rates are expressed in percentages and real per capita income is given in $1000's of dollars. All data are for 1980, unless otherwise specified. The means and standard deviations of these variables are presented in table 1.

The regression results and parameter estimates for the two models are given in table 2. The equations, while explaining a small portion of the variation in the dependent variables, support the central thesis of this study--that the local labor market influences educational investments.

An increase in the percentage of employment in managerial occupations reduces the local dropout rate and substantially increases the percentage of high school students who continue their education as expected. The percentage of employment in service occupations, on the other hand, is associated with an increase in the dropout rate. Among those who finish high school, opportunities in the service occupations have little effect. These observations, including the apparent lack of importance of service jobs to those who decide on post secondary education, are consistent with the human capital investment perspective.

Unemployment rates have little influence on the decision to stay in high or to continue beyond high school. If higher unemployment rates encourage some students to invest in education when the opportunity costs are low (as predicted by human capital theory), they must also discourage others by reducing their expectations about returns to education. Perhaps students simply consider the short-run unemployment rate to be irrelevant to their long-term plans.

Higher real per capita income increases the percentage of students who continue beyond high school. Per capita income also appears to increase the drop-out rate. This anamoly may be explained by the tradition of private schooling in Virginia. In high income areas, more students attend private schools leaving public schools with a higher percentage of at-risk youth who are more likely to dropout. Ideally a measure of private schooling should be included in the model, but we know of no secondary source for that information.

The family poverty rate increases the dropout rate. The poverty rate also increases the percentage of students continuing beyond high school. While unexpected, Johnson, Kraybill and Deaton report similar findings and suggest two explanations. When income is concentrated, those who have the means are more likely to continue their education. Poorer students who finish high school may make special efforts to continue beyond high school as a way of improving their economic security. Poorer and better-off students may be choosing different types of post-secondary education, but our data do not provide more detailed information

Contrary to expectations, counties in the three most rural categories had lower dropout rates than less rural and metropolitan counties. It may be that these counties had few job opportunities so that the opportunity cost of the student remaining in school is low. In fact these counties have high out-migration and students may continue in school in response to a non-local labor market.

Rural counties, in general, have a lower percentage of students who continue their education. One set of urban counties also has a low percentage of students continuing their education. Nine of the eleven counties in this category border the city of Richmond, a very rapidly growing area that has experienced labor shortages, increasing the opportunity costs of remaining in school.

The significantly lower dropout rates and significantly lower continuation rates in rural areas suggest that the vertical section of the marginal cost (MC) curve in figure 1 captures a larger proportion of rural than urban students. This would suggest that the perceived cost of going to college in rural areas is greater than in urban areas and/or that the perceived increment in earnings from college over high school is lower in rural areas.

Table 1. Means and Standard Deviations of Dependent and Independent Variables

	Mean	Standard Deviation
Dependent Variables		
Annual average dropout rate	5.78[a]	1.91
Percentage of high school graduates continuing education	50.47	12.95
Independent Variables		
Percentage of managerial occupations	18.50	6.75
Percentage of service occupations	12.96	3.18
Percentage of unemployment	5.66	1.86
Family Poverty Rate	10.75	4.10
Real per capital income ($1000's)	94.82	27.29
Number of observations = 129		

[a]This is the annual average rate for grades 8 through 12. The cumulative annual rate is approximately five times this rate.

Table 2. Demand for Labor Regressed on Human Capital Investment

Independent Variables, 1980	Dropout Rate, 1980[a]	Percentage Continuing Education, 1980[a]
Constant	2.723	23.215
	(1.234)	(7.724)
% managerial occupations	-.080[xx]	.809[xxx]
	(.041)	(.257)
% service occupations	.127[xxx]	.068
	(.050)	(.314)
% unemployment	-.025	.581
	(.103)	(.642)
Family poverty rate	.216[xxx]	.546[xx]
	(.047)	(.297)
Real per capita income ($1000s)	.128[x]	.773[x]
	(.091)	(.566)
Medium metropolitan	.161	-6.558[xx]
	(.587)	(3.672)
Small metropolitan	.176	-4.594
	(.632)	(3.954)
Rural with small urban	-.421	3.815
	(.642)	(4.019)
Rural, adjacent	-.061	-7.611[xx]
	(.581)	(3.634)
Rural, not adjacent	-.994[xx]	-7.597[xx]
	(.590)	(3.696)
Completely rural, adjacent	-1.276[xx]	-6.725[xx]
	(.628)	(3.932)
Completely rural, not adjacent	-1.454[xx]	-8.968[xx]
	(.659)	(4.123)
$\bar{R}^2$	.26	.37
F probability	.0001	.0001

[a]Numbers in parenthesis are standard errors. The coefficients indicate the percentage change in the dependent variable associated with a unit change in each of the independent variables. For example, a 1 percent increase in employment of managers will reduce the dropout rate by .08 percent.
[xxx]Statistically significant at .01
[xx]Statistically significant at .05
[x]Statistically significant at .10

Overall, the equations support the hypothesis that the local labor market creates incentives for human capital investment. The specific hypothesis that the mix of jobs in the local labor market affect human capital investment is also supported.

In addition, a closer look at the two equations suggests that students may make two separate decisions. The first decision, whether to finish high school or dropout, is influenced by one set of variables. For those who finish high school, the second decision to continue their education is influenced by a different, but overlapping set of variables. For example, both decisions are influenced by the percentage of managerial occupations but service occupations are not a relevant factor in the decision to pursue post-secondary education. Location factors affect both decisions, but in opposite directions.

Policy Implications and Directions for Future Research

Although Schultz's original discussion of human capital suggested that the demand for labor creates incentives for human capital investment, this direction of causation has largely been ignored in research and in practice at the local level. Instead, the emphasis has been on the impact of the levels of local education on economic development and job growth. In practice, this has translated into job recruitment based on the existing educational and skill levels in the community. While meeting the short-run need for jobs, such actions reinforce the existing labor market structure and do not increase the incentives for human capital investment.

As difficult as it is to break this cycle, communities must pursue a variety of long-range strategies that enhance employment opportunities for skilled production workers, managers, and professionals (Smith, 1989; Reid). This should improve the incentives to increase human capital investment and eventually make the growth in quality jobs more likely.

As an example, communities may wish to develop long-range strategies to recruit, develop, and retain firms with higher ratios of managerial and professional occupations than that currently found in the community. Although jobs may initially be filled by immigrants, the labor market will improve, and as local students invest more in education they will qualify for these better jobs. Initiatives by communities to upgrade their local labor market should not be restricted to the recruitment of firms external to the area. Focus also should be directed to the manufacturing sectors that have been a traditional component of the rural employment picture. The rural textile sector, for example, is undergoing major changes that require skill upgrading for both production workers and managers (Dumas and Henneberger). These complementary activities could provide an important signal that higher labor force skills are needed, a message that could lead to an increased level of interest in local human capital investments.

Economically under-developed communities may be reluctant to invest in education. If most of the educated members of the community leave because they are unable to find suitable jobs, the community loses a portion of the return on its investment. If employment in skilled jobs is available, on the other hand, and the majority of educated residents remain or return, then the community is able to realize a full return on its investment. One strategy to increase the local return on educational investment was implemented in a small community in Virginia. It created a foundation that provides students with the support to attend college and guarantees them a job in the community upon graduation.

Firms that employ a high proportion of educated workers often are interested in improving local education opportunities (Smith and DeYoung). Encouragement from these firms to strengthen education may increase the community's efforts to break out of its steady state of low-wage jobs. For example, some textile firms, in conjunction with community colleges, are sponsoring skill upgrading programs for both their production workers and managers. Similar programs could be designed for future workers as a part of a high school vocational curricula or as part of a post-secondary vocational training program.

The model indicates that students do assimilate information from the local labor market. An additional strategy could be directed at improving the amount of information current students have about local and non-local job

opportunities for educated workers. Such information may encourage more students to complete their high school education. A study of dropouts in Missouri suggests that people respond favorably to changes in information about the local labor market and returns to education (University of Missouri). Job information, combined with educational opportunities for those already in the labor market, may lead to increased investments in human capital.

In conclusion, there is evidence that individuals respond to the labor market, especially the local labor market, when making human capital investment decisions. Low wage jobs in the local labor market do not encourage investment in human capital. Carefully crafted information on job opportunities, job training and targeted job creation strategies have the potential to increase incentives for human capital investment.

At the same time, there is much more to be learned about the impact of the local labor market on human capital investment. While previous research focused on the impact of education on economic growth and this research focused on the impact of economic structure on education incentives, these relationships should also be studied as a simultaneous processes. In addition there may be lags in response to labor market variables which should be investigated. This study used Virginia data. These relationships should be estimated for other states to test whether these results are generalizable.

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Endnotes

1. The second order conditions are satisfied if U is regular strict quasi-concave.

2. The value of the marginal utility of education could be added without loss of generability. It is omitted here for simplicity.

3. The size categories of the continuum are given in the appendix.

Appendix Table 1. Occupations

	Managerial and Professional Specialties
11	Officials and Administrators, Public Administration
12-13	Officials and Administrators, Other
14	Management Related Occupations
16	Engineers
17	Computer Scientists
18	Natural Scientists
19	Social Scientists and Urban Planners
20	Social, Recreation, and Religious Workers
22	Teachers; College, University and Other Post-Secondary Institution
23	Teachers, Except Post-Secondary Institution
24	Vocational and Educational Counselors
25	Librarians, Archivists, and Curators
26	Physicians and Dentists
27	Veterinarians
28	Other Health Diagnosing and Treating Practitioners
29	Registered Nurses
30	Pharmacists, Dietitians, Therapists, and Physician's Assistants
32	Writers, Artists, Performers, and Related Workers
33	Editors, Reporters, Public Relations Specialists, and Announcers
34	Athletes and Related Workers
	Service Occupations
50	Private Household Occupations
51	Protective Service Occupations
52	Service Occupations, Except Private Household and Protective
91	Military Occupations

Source: U.S. Department of Commerce. "Standard Occupational Classification Manual." United States Government Printing Office, 1980.

Appendix Table 2. Rural-urban continuum code

Code	**Metropolitan Counties:**
0	Central counties of metro areas of 1 million population or more
1	Fringe counties of metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
	Nonmetropolitan Counties:
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,000, not adjacent to a metro area
8	Completely rural or fewer than 2,500 urban population, adjacent to metro area
9	Completely rural or fewer than 2,500 urban population, not adjacent to a metro area

Source: Butler, Margaret A. "Rural-Urban Continuum Codes for Metro and Non-Metro Counties, Staff Report No. 9028 ERS/USDA. April, 1990.