

# EDUCATION, EARNINGS, AND COLLEGE ENROLLMENT IN THE UNITED STATES

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## FOREWORD

Technological developments and associated changes in the structure of economic activity have substantial consequences for the relative demands for the various factors of production. Changes in the composition of labor demand have particularly significant consequences, especially in market economies, in which relative earnings and conditions of employment may change substantially even over relatively brief periods. The first of the two papers in this report, which build upon the author's earlier modeling of the markets for different educational-attainment classes of labor\*, documents the anticipated decline in the relative earnings of the highly educated in the United States in the period since the late 1960s\*\*. The second then summarizes the probable implications of these and related developments for the educational attainments of future cohorts of labor force entrants.

It is anticipated that future studies will provide comparative analyses for other economies, illuminating the influence of institutional, demographic, and other factors on the process of labor force adaptation to changing patterns of labor demand.

ANATOLI SMYSHLYAEV

Project Leader

*Comparative Analysis of Economic  
Structure and Growth*

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\*Stephen P. Dresch "Demography, Technology and Higher Education: Toward a Formal Model of Educational Adaptation", *Journal of Political Economy* (June 1975), and "Ability, Fertility and Educational Adaptation", in Julian Simon (Ed.), *Research in Population Economics* (Greenwich, Connecticut: JAI Press, 1978).

\*\*These developments are examined at a much more refined level and in greater detail in Stephen P. Dresch, *Occupational Earnings, 1967-1981: Returns to Occupational Choice, Schooling and Physician Specialization* (Greenwich, Connecticut: JAI Press, 1981).



# Education and Lifetime Earnings: The Census Bureau's Misguided Misrepresentations

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In the contemporary United States, education, conceived as an activity which is pursued in institutions of formal schooling, is perhaps the only "commodity" commonly perceived to be an effectively unlimited good. While the effectiveness of schools and the effectiveness of increased spending on schools as a device by which to improve schooling may occasionally be questioned, the untapped potential contribution of schooling to the nation constitutes a virtual article of faith.

When, in the late 1950s, the nation felt itself threatened by Soviet achievements in science and technology, education was proclaimed as critical to the reestablishment of U.S. superiority.

When, in the mid-1960s, the nation committed itself to a war on poverty, schools occupied a central position in long-term strategy and in short-term tactics.

When, in the 1970s, the nation entered a prolonged period of economic stagnation and deteriorating productivity, a lack of concern for the quality and vitality of schooling was identified as a significant contributor, suggesting, by implication, that a renewed public-policy commitment to education would restore economic growth.

When, finally, in the early 1980s, concern for lagging technology was reinforced by severe economic recession (overlaid on prior secular stagnation) and the discovery that military capabilities were again ostensibly deteriorating, once again education was proclaimed as the source of renewed economic health and secure defense.

Education, in short, has become the universal nostrum, good for whatever ails society, regardless of how quickly or frequently the nature of the perceived social malaise may change.

Undergirding this proeducationalist stance is the common perception that schooling, and especially higher schooling, is indeed a profitable investment for the individual. While this perception has had substantial justification at various points in the past, the U.S. Bureau of the Census has just published more recent data which, it contends, provides evidence of the continuing profitability of schooling investments.

Notwithstanding the prominence provided by the popular press to the latest Census Bureau report (U.S. Bureau of the Census, 1983a) emphasizing the earnings "gains" associated with higher levels of schooling, that report, in comparison to a previous Census report (U.S. Bureau of the Census, 1974), provides graphic evidence of the decline in the economic rewards associated with college and

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postcollege schooling which has occurred over the past decade.

Consider the estimates of the present value of expected lifetime income for full-year, full-time male workers (with income denominated in thousands of constant 1972 dollars), controlling for educational attainment, presented in Table 1 for the years 1968, 1970, 1972, and 1979.<sup>1</sup> As emphasized in the Census report and in the press accounts, real incomes of those with college-level schooling did exceed those of high school graduates in 1979. However, these income estimates are not adjusted for the out-of-pocket costs of schooling and fail to take into account selectivity biases, i.e., the fact that selection, and self-selection, of college students results, generally, in the more able attending college, when the more able would have higher levels of income even at lower levels of schooling.

More importantly, perhaps, an exclusive focus on estimates for 1979 obscures the fact that, over the period 1972–1979, expected lifetime incomes of the college educated declined dramatically, while those of high school graduates remained virtually constant (declining by less 1.2%). For the college educated the percentage declines, 1972–1979, were 11.2% for those with 16 years of school (college graduates) and 25.4% for those with 17+ years of school (graduate and professional education).<sup>2</sup> While selectivity biases may account for a small part of the 1972–1979 declines for the more highly educated, in that higher proportions of the population had higher levels of schooling in 1979 than in 1972 (which, assuming a stable aggre-

gate ability distribution, implies that levels of ability declined at all levels of schooling), the bulk of the decline undoubtedly reflects real declines for comparable workers over this 7-year period.<sup>3</sup>

As a result of these changes in lifetime incomes, the income gain associated with college-level schooling, by comparison to high school graduation, declined by about 40% for college graduates (for whom the ratio of college to high school lifetime income declined from 1.4 to 1.25) and by about 55% for persons with graduate and professional training (for whom the ratio of college to high school lifetime income declined from 1.81 to 1.37).<sup>4</sup>

That these declines in relative lifetime income are accounted for primarily by declines in the incomes of younger college-educated workers is indicated quite graphically by Table 2, which presents income by year of age and educational attainment for full-time full-year attainment.<sup>5</sup> Thus, for college graduates incomes rose between 1972 and 1979 only for persons age 50 and over. In the case of those with graduate and professional training income rose at age 40 and above, but declines at younger ages were extremely sharp, with, e.g., a drop of approximately one-third below the age of 30.

The failure to recognize (or, more likely, to admit publically) that gross earnings differentials for average workers provide little evidence concerning the returns to schooling of margin workers (the last to elect a higher level of schooling) led to a fraudulent campaign, orchestrated by the U.S. Office of Education, to induce marginal young people to enter col-

**Table 1.** Present Value of Lifetime Income by Educational Attainment, 1968–1979. Male Full-Time Full-Year Workers (Thousands of Constant 1972 Dollars)

| Years of school | 12    | 16    | 17+   | Ratio to 12 Years |       |
|-----------------|-------|-------|-------|-------------------|-------|
|                 |       |       |       | 16                | 17+   |
| Year            |       |       |       |                   |       |
| 1968            | \$219 | \$322 | \$344 | 1.470             | 1.571 |
| 1970            | 226   | 316   | 378   | 1.398             | 1.673 |
| 1972            | 237   | 331   | 429   | 1.397             | 1.810 |
| 1979            | 234   | 293   | 320   | 1.253             | 1.365 |

Note: For derivation, see text.

**Table 2.** Income by Age And Educational Attainment, 1972 and 1979. Male Full-Time Full-Year Workers (Constant 1972 Dollars)

| Year | 1972     |          |          | 1979     |          |          |
|------|----------|----------|----------|----------|----------|----------|
|      | 12       | 16       | 17+      | 12       | 16       | 17+      |
| Age  |          |          |          |          |          |          |
| 25   | \$ 8,525 | \$10,489 | \$16,522 | \$ 9,190 | \$ 9,761 | \$10,710 |
| 30   | 10,044   | 13,666   | 17,190   | 10,022   | 12,121   | 12,876   |
| 35   | 11,227   | 16,210   | 17,987   | 12,781   | 15,290   | 17,917   |
| 40   | 12,074   | 18,122   | 18,913   | 12,606   | 16,345   | 19,083   |
| 45   | 12,585   | 19,402   | 19,968   | 13,215   | 18,301   | 22,001   |
| 50   | 12,760   | 20,050   | 21,152   | 12,957   | 20,638   | 21,279   |
| 55   | 12,599   | 20,066   | 22,464   | 12,871   | 21,056   | 25,173   |
| 60   | 12,102   | 19,449   | 23,906   | 13,385   | 22,096   | 25,319   |

Note: For derivation, see text.

lege in the 1960s, with subway posters and television commercials proclaiming that "you" would sacrifice \$100,000 in lifetime earnings if "you" didn't attend college. In light of subsequent developments, the currently developing campaign, apparently spearheaded, surprisingly, by the Bureau of the Census, is even more fraudulent and flagrantly dishonest.

The one positive aspect of the decline in earnings of the more highly educated is that the degree of discrimination against duller children, especially against the duller children of poor parents by comparison to their brighter peers, implicit in higher education subsidy policies has been significantly reduced. When the student leaves his subsidized schooling and experiences earnings no higher, over his lifetime, than his nonstudent peer, at least society has not taken from the latter to give to the former. Of course, the improvement in equity is purchased at the price of efficiency loss, i.e., society has taken from both and transferred the proceeds to educators, getting nothing in return, sacrificing whatever the educators (and marginal students) might have produced had they not been unproductively devoting themselves to putative education. In short, there are more efficient ways to improve equity than to subsidize schooling to the point that even the schooled fail to benefit.

When, it can be anticipated, a significant fraction even of the beneficiaries of current programs would consider themselves abso-

lutely better off if given these benefits in a fungible form, not constrained to education, the burden of proof that these programs enhance social equity and efficiency falls with particular weight on those who advocate a continuation of existing policies.

Clearly, higher education itself and those other activities (most notably, scientific research and scholarship) with which it is related are of great (although often not well understood) social value and importance. However, the health, vitality, and effectiveness of higher education ultimately will not benefit and in fact will be compromised by the misguided pursuit of misrepresented objectives.

#### ACKNOWLEDGMENT

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#### FOOTNOTES

1. The estimates of lifetime income presented in Table 1 are derived from the U.S.

- Bureau of the Census (1974; 1983a). In all cases the estimates are for male full-time full-year workers, expressed as a present value at age 18, discounting at 3% and assuming a zero rate of "productivity growth" (i.e., no secular increase in real earnings by age and educational attainment). In the case of the 1979 estimates the published report presented the present value of 1979 lifetime earnings expressed in 1981 dollars, inflating by the Consumer Price Index (CPI). To convert these estimates to constant 1972 dollars they were first deflated to 1979 using the CPI, and these 1979 estimates were then deflated to 1972 using the Personal Consumption Expenditure (PCE) deflator from the National Income and Product Accounts. Finally, to obtain consistency between the 1972 and earlier reports of lifetime *income*, on the one hand, and the 1979 report of lifetime *earnings*, on the other, the latter was scaled by the 1981 income/earnings ratio of 35–44-year-old full-time full-year male workers, controlling for educational attainment (U.S. Bureau of the Census, 1983b). It should be noted that comparable data for full-time full-year workers are unavailable prior to 1967. However, relative constancy is suggested by estimates for all persons with income over the period 1956 to 1968.
2. For persons with 13–15 years of school (some college), the estimated present value of lifetime income declined by about 5% between 1972 and 1979.
  3. The estimated declines in lifetime incomes of the more highly educated are consistent with the findings of a detailed analysis of lifetime earnings by occupation (Dresch, forthcoming). That study found that, between 1972 and 1977, lifetime earnings had increased modestly for non-professional-technical-managerial (nonPTM) occupations but had declined for all PTM occupations other than physicians, other health professionals and noncollege teach-

ers (although the increase for the latter occupation was of trivial magnitude).

4. For persons with some college but less than graduation, the ratio of college to high school lifetime earnings declined from about 1.15 in the 1960s and early 1970s to about 1.08 in 1979.
5. In contrast to Table 1, which discounted lifetime earnings from 1979 to 1972 using the Personal Consumption Expenditure Deflator, Table 2 was obtained utilizing the Consumer Price Index. As in Table 1 the 1979 estimates were converted from earnings to income, in this case utilizing 1981 income–earnings ratios for 10-year age groups (25–34, 35–44, etc.), controlling for educational attainment.

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# College Enrollment

STEPHEN P. DRESCH

Prior to the 1970s, growth had constituted the norm for American higher education. Between 1880 and 1960, the college-age population (consisting of persons between the ages of eighteen and twenty-four) increased at an average annual rate of 1 percent, doubling in sixty-nine years; during the same period, however, college enrollment (undergraduate, graduate, and professional) grew at an annual rate of 4.4 percent, doubling on the average every sixteen years.

Many would object that a significant and growing proportion of college enrollment is accounted for by persons above the traditional college age, and hence that an exclusive focus on eighteen- to twenty-four-year-old students purposefully excludes an important development. However, enrollment of persons above the traditional college age has been substantially less important, quantitatively, than often alleged (especially for institutions in the academic core of the higher-education system) and will probably become even less important over the next several decades.

Obviously, there are severe limits on the degree to which the growth of college enrollment can proceed at a disproportionate rate relative to that of the total college-age population. Although continuous relative growth is impossible, the limits to growth were being rapidly approached by 1960, followed in the next decade by an acceleration of the process. The growth rate of the college-age population increased to 4.2 percent, and the rate of enrollment growth surged to more than 8.0 percent.

This pattern began to change during the 1970s. The growth of the enrollment rate declined from 4.0 to 1.7 percent, while the growth of the college-age population declined from 4.2 to 1.8 percent. As a result, the rate of growth of enrollment contracted from more than 8.0 percent to 3.5 percent.

The experience of the 1970s suggests that exponential growth was replaced by logistic growth, exhibiting a slow decay in the growth rate as enrollment asymptotically approaches an upper limit. Neither exponential nor logistic growth, unfortunately, is adequate as a basis for understanding the determinants of en-

rollment in higher education. The fundamental flaw in both explanations is the implicit perception of an autonomous process. Even casual observation is sufficient to indicate that the growth of enrollment is organically related to broader social and economic as well as demographic developments.

Increases in the enrolled proportion of the college-age population have made a greater contribution to the growth of enrollment than have previous increases in the general population. Several of the more important factors influencing the college enrollment behavior of young adults that will be examined in this essay are: (1) changes in the academic competence of young adults; (2) systematic shifts in parental and family characteristics; (3) public-policy developments that influence enrollment behavior; and (4) changes in the anticipated long-run returns to investments in human capital of the type represented by a college education. Because developments in each of these dimensions are likely to be adverse, declines in enrollment rates can be expected. Thus a forecast of enrollment rates and levels through the end of the century indicates that declining enrollment rates will magnify the effects for college enrollment of a contracting young-adult population.

After increasing from 16 million in 1960 to 30 million in 1980, the college-age population will fall to less than 24 million in the mid-1990s, declining by about 20 percent over fifteen years (at an average annual rate of 1.5 percent). A 25 percent decline in the population of eighteen-year-old persons (from 4.3 to 3.3 million), the primary source of freshman college entrants, will occur between 1980 and 1995. The margins of error associated with these forecasts, it should be noted, are quite small, since all of these persons have already been born and the size of this cohort will not be significantly affected by changes in rates of mortality and international migration.

After 1995 a modest growth of the college-age population can again be anticipated, with the eighteen-year-old cohort approaching 3.8 million in 2000, while the eighteen- to twenty-four-year-old group will increase to about 25 million. Beyond 2000, for obvious reasons, population projections become speculative.

### *Academic Competence*

Perhaps the most consistent finding of studies of enrollment behavior concerns the influence of measured academic competence (ability-cum-achievement) on the probability of college enrollment and completion. To the degree to which academic competence is innately determined, the relationship between ability and college enrollment constitutes a severe constraint on rising college-level educational attainments, simply because these capabilities are not uniformly distributed within the college-age population.

Declining academic competence may be due, in part, to differential rates of fertility decline. For example, academic achievement has generally been found to be closely associated with the educational attainments of parents. Relative

declines in fertility have been greater for the more highly educated. Thus, by 1981 the average thirty- to thirty-four-year-old college-educated woman had had only 1.2 children while women who were high school graduates had had two children, and women who were not high school graduates had had 2.7 children. Similarly, thirty- to thirty-four-year-old wives of college-educated husbands had had 1.6 children, while those with husbands who were high school graduates had had 2.1 children, and those with husbands who did not finish high school had had 2.6 children.

The conventional view of academic competence as a product of familial and school inputs, however, warrants a high degree of skepticism in its application to the interpretation of changing college enrollment rates. The usual statistical models represent academic competence as the passive consequence of predetermined factors, such as genetic endowment, parental and family characteristics, and schooling. A more inclusive model would recognize academic competence as consciously determined by individuals—children as well as parents and teachers—in response to perceived costs and benefits of alternative uses of resources. Thus, cross-sectional evidence suggests that the relative returns to college-level schooling enter significantly into the determination of high school aptitude and achievement and therefore that measured academic competence and college attendance are simultaneously determined. If this is the case, then the conventional finding that measured academic competence is statistically more significant and quantitatively more potent than any other variables explaining college-level educational attainment may be circular, since both are jointly determined by the perceived advantages of education and other factors, such as parental education.

Recognition of the endogenous nature of academic competence and its joint determination with college entry does not negate the adverse effects that may be attributable to such factors as family instability and declining teacher quality. However, it does suggest that the decline observed since the early 1960s may have been partly due to conscious decisions attributable to worsening job prospects for highly educated labor.

#### *Parental and Family Characteristics*

Factors such as parental education, which have conventionally been found to influence academic competence, have also been found to influence directly the probability of college entry and completion. Again, the failure to recognize the joint determination of measured academic competence and educational attainment may lead to significant biases in the estimated effects of various factors. However, for the same reason that the bias in the effect of academic competence is likely to be positive, the biases in the estimated effects of such factors as parental education are likely to be negative. Because a significant fraction of the effect of a variable such as parental education is likely to be captured by measured academic aptitude-cum-achievement, the true effect of parental education is probably greater than commonly found.

In this context, parental education appears to be an important variable, in that rising levels of educational attainment may be self-reinforcing. Higher parental education generally implies higher levels of academic competence and higher rates of college attendance on the part of children, implying levels of academic competence and rates of college attendance of grandchildren that are higher yet. This self-reinforcing process may be significantly attenuated, however, by the relationship between educational attainment and fertility, with fertility rates of the more highly educated quite low relative to those of the less educated. The net effect of rising educational attainments of the parental generation may be much less positive than one might have expected.

Family income also affects the probability of college attendance. However, over the last decade median family income, controlling for the age of the family head, has been virtually stagnant, after almost doubling between 1950 and 1970. Controlling for both age and educational attainment of the family head, family income declined absolutely over the decade of the 1970s for the more highly educated. Thus, declines in income have at least partially canceled the effects of rising parental educational attainment for the college-enrollment probabilities of children. While cyclical recovery may lead to modest increases in median income, the growth of the 1950–70 period is unlikely to recur over the next two decades. However, if fertility rates remain low, income per child may nonetheless rise, partially compensating for the decline in the size of the college-age cohort.

Deciding when to have children may have significant influences on college-enrollment behavior. The “sibling squeeze” (the rising proportion of children from families with two or more children of college age at the same time), reflecting the high fertility rates in the 1950s and 1960s, is frequently offered as an explanation for the decline in college-attendance rates—of men but not of women—observed over the past fifteen years. Just as the sibling squeeze tightened as a result of high fertility, it will relax as a result of fertility declines, with ostensibly favorable consequences for enrollment rates. However, given the capacity to redistribute financial resources over time, the important change has involved the rise and subsequent decline in the number of children in a family rather than the timing of birth per se. In short, the interval between births is irrelevant to the issue of the family’s desire or capacity to finance the education of its children.

### *Public Policy*

From the late 1950s through the late 1970s, changes in federal policy favored college attendance. It can be conservatively estimated that by 1980 more than one-half of all undergraduate students were receiving some form of recognized federal financial assistance, and a saturation point was being rapidly approached. The costs of this federal assistance were increasing explosively, especially as the cumulative impact on the federal budget of prior subsidized lending became apparent.

Despite the pervasiveness of federal aid, its impact on college attendance rates is open to some question. For example, W. Lee Hansen has argued that there is no evidence that enrollment rates of low-income high school graduates were significantly affected by the introduction of direct federal grants in the early 1970s.<sup>1</sup> While this conclusion can be challenged on the grounds that enrollment rates would have declined significantly in the absence of increases in federal student assistance, it is true that, whatever the impact of federal student assistance on enrollment rates in the past, further increases in enrollment rates can be induced only by further increases in the level and coverage of federal student assistance. However, since 1981 the tendency has been to reduce the level of support and to contract coverage. Thus, eligibility for federally guaranteed loans has been made contingent on the "need" of students from higher-income families, while social-security educational benefits are being phased out. In short, during the 1980s, federal higher-education policy cannot be expected to induce increases in enrollment rates but may be responsible for significant declines.

Economic policies aside, federal actions beyond the explicit domain of educational policy also have significant consequences for enrollment rates. For example, near the end of the Vietnam War, the military draft probably did exert a positive influence on college enrollment rates of young men. Less obvious but possibly more significant influences were exerted by high and rising rates of income taxation (which served both to reduce the relative risks of human capital investment and to raise expected returns to human relative to physical capital investment). In effect, an income tax reduces the relative variance in the returns to more risky investments. Moreover, because income that is not overtly "earned" is not subject to tax, investments in human capital that take the form of forgone earnings, constituting perhaps two-thirds of the total cost of an investment in a college education, are accorded instantaneous depreciation for tax purposes, while other investments can be depreciated only over longer periods.

Comparable consequences flow from relatively rapid increases in the minimum wage, which reduced both the employment opportunities for high school graduates and the forgone earnings associated with college attendance as well as the training opportunities provided by employers as alternatives to formal schooling. As in the case of educational policy, it is unlikely that future developments in the policies concerning taxes and the minimum wage will help increase enrollment rates. Actual developments are likely to be unfavorable, especially if there is any significant move toward indirect taxation (e.g., a value added tax) or toward a lower minimum wage for minors.

While short-term, cyclical economic developments cannot be attributed solely to federal monetary, fiscal, and related policies, these policies do significantly affect the economy, even if the effects are often unintended. These short-term economic impacts cause public policy to exert its most pervasive influence on college-enrollment behavior. The critical variable is the unemployment rate, a primary determinant of the sacrifice in earnings entailed by school attendance,

quantitatively the most important component of the costs of schooling. From a level of 3.5 to 4.0 percent in the late 1960s, the aggregate unemployment rate moved erratically upward, rising to 5.9 percent in 1971, declining to 4.9 percent in 1973, rising again to 8.5 percent in 1975, declining to 5.8 percent in 1979, and finally rising to almost 11 percent in late 1982 and early 1983. Moreover, unemployment rates for persons of college age have consistently averaged about twice the overall unemployment rate.

The increase in the unemployment rate from 5.6 percent in 1974 to 8.5 percent in 1975 probably contributed significantly to the unanticipated 10 percent increase in college enrollment in 1975. However, although the unemployment rate remained high in 1976, at 7.7 percent, enrollment actually declined by 1.0 percent. In short, sustained increases in unemployment rates appear to contribute to increases in enrollment rates. With the slow declines in unemployment rates in the mid-1980s, it is implausible to expect that unemployment will provide a stimulus to enrollment over this period.

In the 1960s and 1970s, state policies were much more passive but no less favorable. Enrollment in public colleges and universities rose more than fourfold between 1960 and 1980, while levels of tuition and fees (in dollars of constant purchasing power) remained roughly constant. State appropriations for institutions increased from less than \$3 billion in 1965 to more than \$20 billion in 1980, for an increase in real terms of about 200 percent. However, it is unlikely that state policy will become more favorable, and state fiscal exigencies may well result in relative declines in support for higher education, especially in the industrial states in the Northeast. As a result, the levels of tuition and fees in public institutions may well increase significantly, and restrictions may be placed on enrollment in the segments of public systems of higher education that are in high demand.

Dresch and Waldenberg estimated the effects of prospective changes in state and federal policies on effective tuition rates for the period 1982 to 1988. According to their projections of tuition less institutionally awarded and direct federal grants, public tuition is expected to increase from \$600 to \$1,200 (1982 dollars) in four-year institutions and net private four-year college tuition from \$2,700 to \$3,000 for the period FY 1982 to FY 1988.<sup>2</sup> While these effective net tuition projections can be viewed only as suggestive of prospective developments, it is clear that state and federal policies may result in substantial increases in student costs, severely affecting the level (and distribution) of enrollment.

A stylized overview of the net effects of current public policies on the costs and financing of a representative year of higher education is shown in table 1. More than half of the \$8,500 in government subsidies is rarely recognized because it consists of unemployment scholarships (the reduction in forgone earnings due to unemployment), tax expenditures or subsidies, and loan subsidies.

Future policy developments are likely to have marginally and possibly severely adverse effects on enrollments. The "invisible" contributions of the gov-

TABLE 1  
*Stylized Overview of the Financing of a Year of Higher Education*

| <i>Source</i>                     | <i>Amount</i>   |
|-----------------------------------|-----------------|
| <i>Government subsidies</i>       |                 |
| State                             |                 |
| Institutional subsidy             | \$ 3,000        |
| Federal                           |                 |
| Unemployment scholarship          | 2,500           |
| Overt grant                       | 1,000           |
| Grant implicit in loan            | 1,000           |
| Tax expenditure (subsidy)         | 1,000           |
| Total federal                     | <u>\$ 5,500</u> |
| Total government                  | <u>\$ 8,500</u> |
| <i>Student/family-borne costs</i> |                 |
| True loan                         | \$ 1,000        |
| Work                              | 2,000           |
| Private transfer                  | 1,500           |
| Reduced consumption/savings       | 2,000           |
| Total student/family-borne costs  | <u>6,500</u>    |
| Total costs                       | <u>\$15,000</u> |

ernment in financing higher education – notably unemployment scholarships, tax subsidies, and loan subsidies – are likely to decline most precipitously. Thus the overall impact of public policy will be to reduce the enrollment rates of the college-age population.

#### *The Labor Market and Long-term Returns to Human Capital*

Economic factors constitute perhaps the most pervasive influences on the college-attendance behavior of young adults. Abstracting from short-run, cyclical economic developments, the long-term economic rewards for college completion can be viewed as a function of relative demands for different educational classes of labor and the educational composition of the labor supply. Between the late 1920s and the late 1960s, shifts in the structure of labor demand and of labor supply were mutually accommodating, producing virtual stability in the earnings of more relative to less highly educated labor. Since 1970, however, the economic rewards associated with a college education have declined radically, reflecting the explosive increase in the relative representation of college graduates in the labor market at a time of comparative stability in the structure of labor demand.

The college-educated proportion of the population between the ages of twenty-five and sixty-four increased from 9.1 percent in 1960 to 12.1 percent in 1970 and further to 18.2 percent in 1979. The impact this rapid post-1970 increase in educational attainments has had on the lifetime incomes of college

TABLE 2  
*Present Value of Lifetime Income by Educational Attainment, 1968-79*  
*Male Full-time, Full-year Workers*  
*(thousands of constant 1972 dollars)*

| Year | Years of Schooling |       |       | Ratio to 12 Years |       |
|------|--------------------|-------|-------|-------------------|-------|
|      | 12                 | 16    | 17 +  | 16                | 17 +  |
| 1968 | \$219              | \$322 | \$344 | 1.470             | 1.571 |
| 1970 | 226                | 316   | 378   | 1.398             | 1.673 |
| 1972 | 237                | 331   | 429   | 1.397             | 1.810 |
| 1979 | 234                | 293   | 320   | 1.253             | 1.365 |

SOURCE: Derived from U.S. Bureau of the Census (1974, 1983a).

NOTE: Estimates are expressed as a present value at age eighteen, discounting at 3 percent and assuming a zero rate of "productivity growth" (i.e., no secular increase in real earnings by age and educational attainment).

graduates compared with high school graduates is indicated in table 2. While the estimated cross-sectional lifetime real earnings of high school graduates declined by 1.2 percent between 1972 and 1979, the real earnings of college graduates declined 11.2 percent, while those with graduate or professional training declined 25.4 percent. Over this seven-year period the relative real earnings gain associated with a college education, compared with a high school education, declined by about 40 percent, and by about 55 percent for persons with graduate and professional training. These declines in relative lifetime real income are accounted for primarily by declines in the incomes of younger college-educated workers. Between 1972 and 1979, incomes rose only for college graduates age fifty and over and for persons with graduate and professional training age forty and over. For the most highly educated, declines at younger ages were extremely sharp, with, for example, a drop of approximately one-third for those below the age of thirty.

Partly because of these sharp declines in the relative earnings of younger college-educated workers, the proportions of eighteen- and nineteen-year-old men enrolled in college declined from 39.1 percent in 1969 to 31.3 percent in 1979. For twenty- and twenty-one-year-old men and for twenty-two- to twenty-four-year-old men, the declines in enrollment over this period were from 32.3 to 27.8 percent and from 18.2 to 16.3 percent, respectively.

As indicated previously, the contracting market for highly educated labor may well explain not only declining enrollment rates but also the decline in measured academic capabilities. A cross-sectional analysis of the determinants of standardized test scores of 1971-72 high school seniors and of 1972-73 high school juniors relying on interregional variations in the lifetime earnings of college relative to high school graduates, found the elasticity of test scores with respect to the ratio of college to high school graduates' lifetime earnings to be

approximately 0.5 for men and approximately 1.0 for women. In essence, if the rewards for going to college were relatively low in the region, this was reflected in a lesser investment in the development of academic skills and competencies in high school.

Whether or not cross-sectional findings are applicable in determining the geographic covariation in relative earnings and test scores to the explanation of temporal changes in these variables, it is interesting to note that the declines in Scholastic Aptitude Test (SAT) scores observed over the same period are consistent with the declines in the relative lifetime earnings of college graduates. Thus a decline of about 10 percent in relative lifetime earnings from 1970 to 1980 would imply a 5 percent decline in test scores of men and a 10 percent decline in test scores of women. Actual declines in composite SAT scores over this period were 5.1 percent for men and 7.2 percent for women—declines that are remarkably consistent with predictions based on the estimated cross-sectional relationships.

Evidence supports the contention that changes in the relative labor-market conditions confronting the highly educated have significant implications for the educational behavior of young adults. This is not a case of unidirectional causality; changes in educational behavior (e.g., college entry and completion rates) induced by labor-market developments, will significantly alter the relative supplies of different educational classes of workers and thus contribute to the future state of the highly educated labor market. The effects that the relationship between the labor market and educational behavior will have on the future college enrollment for two representative classes will be examined in the next section.

#### *Forecasting Interrelated Enrollment and Labor Market Developments*

The most important impact on future college enrollment may come from the changing relative earnings of college-educated persons. Two models of the relationships between (a) college-completion rates of young adults, (b) the educational composition of the adult population, and (c) the relative earnings of the college educated attempt to capture the broad outlines of secular changes and abstract entirely from short-term cyclical developments, although they ignore such potentially important factors as changes in relative levels of college tuition and in student financial assistance, not to mention changes in parental and family characteristics that may have a significant influence on educational attainments.

The focus of the educational-adaptations model underlying the forecasts is the educational composition (college/noncollege) of the active adult population (AAP) between the ages of twenty-five and sixty-four. That composition determines the earnings of college graduates relative to those of nongraduates, which in turn determine the college-educated proportions of twenty-four-year-old entrants into the AAP. In the demography-technology (DT) model, relative earnings directly determine the educational attainments of labor-force entrants.

The model was calibrated so as to conform with the simulated college educated share of the AAP to actual observations over the period 1960 to 1972. Estimates of the actual educational composition were available for eleven years of the thirteen-year calibration period. The mean error was 0.18 percentage points over the full calibration period. The forecast values for the period 1973 to 1979 are, on average, 0.36 percentage points less than the actual values. However, the discrepancies decline significantly after 1977. Thus the conformance of the simulated and actual educated shares of the AAP is reasonably good for both the calibration and forecast periods.

The model does not provide a forecast of college and university enrollment. Instead, it predicts the college-educated proportion of the twenty-four year-old group, which constitutes the subsequent year's pool of entrants into the AAP. Thus the model assumes that educational attainments are determined before the age of twenty-five and are unalterable thereafter—a highly stylized characterization of the process. Obviously, persons over the age of twenty-four do receive college degrees. However, if this stylization is reasonably predictive, as it appears to be with reference to the educational composition of the twenty-five- to sixty-four-year-old population, then the divergence of the model from reality may be of little consequence.

For the entire period 1961 to 1981 the DT index of the twenty-four year old college graduates exhibits substantially more rapid growth than any of the various enrollment indices. The model does, however, correctly anticipate the substantial decline in growth rates after 1970 and the enrollment plateau that occurred at the end of the decade.

The initial version of the model, developed in and underlying the forecasts of DT, assumed a homogeneous twenty-four-year-old cohort, ignoring the consequences of unequal distribution of ability as discouraging to educational attainments, even in response to labor-market demands for the highly educated. A more refined version of the model—ability-fertility (AF)—recognized the declining average and marginal ability as larger proportions of the cohort completed college.

For the period 1960 to 1972 (the calibration period) the AF forecast of the college-educated proportion of the twenty-five- to sixty-four-year-old population tracks the actual proportion as well as the DT forecast. After 1972, however, the AF forecast falls progressively further below the actually reported proportion. If the data are not contaminated by systematically biased misreporting of educational attainments or changes in the educational participation patterns, which result in increasing proportions of nongraduates reporting sixteen or more years of school, then it would appear that the AF forecast is inferior to the less-sophisticated DT forecast. The two models predict enrollment declines of 45 to 55 percent and 25 to 30 percent respectively.

Both forecasts oversimplify reality. Neither recognizes the quite different recent trends in college entry and completion rates of men and women. Moreover, there is no unambiguous means of determining which is more accurate. In addi-

tion to forecasting enrollment declines of 30 to 50 percent, the models predict a decline of between 5 and 7 percent in the cross-sectional present value of lifetime earnings of college graduates relative to high school graduates over the period 1961 to 1977. As table 2 indicates, this predicted decline is roughly consistent with the approximate 10 percent decline in the present value of college relative to high school graduates' lifetime income observed between 1972 and 1979.

The models predict further declines in the relative earnings of college graduates between 1977 and 1990. Thus the economic status of young college graduates can be expected to continue to deteriorate. As a result, the children of upwardly mobile middle-class parents will find their material aspirations and expectations increasingly frustrated, even to the point that many children of the 1960s cohort of young adults will earn less real income than their parents. This development could have major social and political consequences.

### *Conclusion*

The path of college enrollment through at least the mid-1990s will change radically. As the declining growth of the 1970s clearly indicates, institutional structures and patterns of organizational and individual behavior adapted to continuous growth are likely to change. While the inevitability of the prospective contraction may be questioned, a careful review of likely developments in a number of important dimensions – such as the labor market, public policy, and the family – leads to the conclusion that a significant, probably severe, contraction will occur. This contraction will end before the turn of the century. However, many of the influences that caused the contraction will endure. Whether those influences will hinder the effectiveness of the higher-education system remains to be seen. Changes occurring in the 1980s will certainly be as dramatic as any in the past. Whether these changes enhance or weaken the future vitality of academe is still an open question.

### NOTES

1. See W. Lee Hansen, "Impact of Student Financial Aid on Access," in this volume, pp. 84–96.
2. Stephen P. Dresch and Adair L. Waldenberg, "ERES: Disaggregated Simulations of Enrollment and Financial Prospects for American Higher Education, 1982 to 1988," in *Proceedings* (of an NCES-sponsored conference on the uses of institutional data in higher education research), ed. Lloyd Andrew, forthcoming.