DOCUMENT RESUME

ED 058 476 AA 000 780

AUTHOR Goffman, Irving J.; And Others
TITLE The Concept of Education as an Investment. Final Report.
SPONS AGENCY President's Commission on School Finance, Washington, D.C.
PUB DATE Aug 71
CONTRACT OEC-0-71-1346
NOTE 119p.

EDRS PRICE MF-$0.65 HC-$6.58
DESCRIPTORS *Cost Effectiveness; *Economic Factors; *Educational Finance; Evaluation Techniques; *Human Capital; Human Resources; Income; *Investment; Taxes

ABSTRACT

The economic benefits and investment functions of education and its relationship to other human resource investments are reported. In addition, a report on the revenue yields of various taxes related to economic conditions is included. The concept of human investment is discussed from the standpoint of its similarities with physical capital investment, dissimilarities: differences in degree, and dissimilarities: differences in kind. Conceptual problems in evaluating educational investment are related to the economist's use of benefit-cost-analysis and rate-of-return-analysis. Economic and social benefits accruing from education are seen as external benefits. Empirical evidence on rates of return is presented in discussions of internal rate of return, discrimination and rate of return analysis, and the return to increased quality. The question of how education influences the size of a nation's output is discussed as to factors in economic growth, the quantity and quality of productive resources, and the mystery of the econometric residual. Revenue limitations related to economic growth, with particular emphasis on educational programs, are examined as to revenue availability, increasing revenue from available sources, some problems of competing resource demands, and taxpayer revolt. (For related document, see ED 058 473.) (DB)

The Concept of Education as an Investment

Submitted to The President's Commission on School Finance

THIS IS ONE OF SEVERAL REPORTS PREPARED FOR THIS COMMISSION. TO AID IN OUR DELIBERATIONS, WE HAVE SOUGHT THE BEST QUALIFIED PEOPLE AND INSTITUTIONS TO CONDUCT THE MANY STUDY PROJECTS RELATING TO OUR BROAD MANDATE. COMMISSION STAFF MEMBERS HAVE ALSO PREPARED CERTAIN REPORTS.

WE ARE PUBLISHING THEM ALL SO THAT OTHERS MAY HAVE ACCESS TO THE SAME COMPREHENSIVE ANALYSIS OF THESE SUBJECTS THAT THE COMMISSION SOUGHT TO OBTAIN. IN OUR OWN FINAL REPORT WE WILL NOT BE ABLE TO ADDRESS IN DETAIL EVERY ASPECT OF EACH AREA STUDIED. BUT THOSE WHO SEEK ADDITIONAL INSIGHTS INTO THE COMPLEX PROBLEMS OF EDUCATION IN GENERAL AND SCHOOL FINANCE IN PARTICULAR WILL FIND MUCH CONTAINED IN THESE PROJECT REPORTS.

WE HAVE FOUND MUCH OF VALUE IN THEM FOR OUR OWN DELIBERATIONS. THE FACT THAT WE ARE NOW PUBLISHING THEM, HOWEVER, SHOULD IN NO SENSE BE VIEWED AS ENDORSEMENT OF ANY OR ALL OF THEIR FINDINGS AND CONCLUSIONS. THE COMMISSION HAS REVIEWED THIS REPORT AND THE OTHERS BUT HAS DRAWN ITS OWN CONCLUSIONS AND WILL OFFER ITS OWN RECOMMENDATIONS. THE FINAL REPORT OF THE COMMISSION MAY WELL BE AT VARIANCE WITH OR IN OPPOSITION TO VIEWS AND RECOMMENDATIONS CONTAINED IN THIS AND OTHER PROJECT REPORTS.

Final Report
August 1971

THE CONCEPT OF EDUCATION AS AN INVESTMENT

by

Irving J. Goffman, J. Ronnie Davis, John F. Morrall III

A report prepared for the President's Commission on School Finance.

Contract No: OEC-0-71-1346
Contractor: Irving J. Goffman
Department of Economics
University of Florida
Gainesville, Florida 32601

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Irving J. Goffman, J. Ronnie Davis, John F. Morrall III*

Introduction

Fritz Machlup recently pointed out that educational efforts may be regarded as either consumption, investment, waste, or drag.[1] Education is consumption to the extent that it gives present satisfaction to the student or to others, investment to the extent that it promotes either future non-pecuniary satisfaction or future gains in productivity, waste to the extent that it creates neither pleasure nor productivity either now or in the future, and a drag (or a hindrance) to the extent that it renders incompatible individuals' preferences and their employment opportunities. Though we shall touch upon all of these aspects in this examination of the economic returns to education, emphasis will be placed upon the investment characteristic.

Investment is anything that accumulates capital; capital is a stock of assets that yields a stream of income or utility over time; thus, income is the product of capital. Despite its apparent simplicity, most economists, until recently, would have objected to this broad usage of the terms capital and income. However, due mainly to the efforts of T. W. Schultz and Gary Becker, the broader concept of capital has taken a firm position in the mainstream of economic thought.[2] The reason for the revival of interest in the concept of human investment was that investment in plants and equipment could not by itself explain the rapid growth of the presently industrialized countries. When human capital disparities were added to physical capital disparities, most of the differences in per capita incomes between countries could be explained. Looking at the differences in per capita endowments of human capital alone, Anne Krueger, for example, has demonstrated on conservative assumptions that over half of the differences in per capita income between the United States and the less developed countries can be explained by the differences in

their human capital endowments.[3]

The concept of human capital has also caused major reformulations of theories in such diverse areas of economics as international trade, the distribution of income, developmental economics, human migration, the economics of family planning, health economics, on-the-job training, and the economics of education. The length of the list is evidence enough that the rebirth of the concept of human capital has been, among the major theoretical development in economics in the 1960's.

The Concept of Human Investment

Similarities with physical capital investment

An investment in education, in health or in moving to a new area is just as much an investment as a new factory or public bridge. An initial expenditure is undertaken with the hope of generating a higher return of net income in the future. For education, the private costs are the direct tuition and fees associated with schooling, the indirect opportunity costs of not being able to work full time, and the loss of leisure. The higher return is the increase in earnings over what that student would have earned if he had not received the extra education. Implicit in applying investment theory to the individual as well as to the businessman is the assumption that both are attempting to maximize their future incomes (including psychic income) in their investment decisions. Thus, they undertake the investment which yields

them the highest return, given their available information, and they undertake investments (the best first) until the return on investments equals the interest costs of borrowing or the implicit interest cost of using one's own savings.

In addition to being a signal to private individuals indicating where the most profitable investment opportunities lie, persistent differences in rates of return between various types of investment are usually signals to society that market imperfects are resulting in a misallocation of resources. The appropriate public policy response to a higher than average return to primary school should be to invest more resources in primary school education. The rate of return approach is the fundamental analytical tool of the economics of educational investment.

Another less used procedure is to compare present values of the future stream of earnings and educational costs to determine whether an investment is worthwhile or not. In fact, if the estimated future earnings of individuals that are due to educational investment are capitalized, a dollar value of the educational capital stock can be estimated. The value of the capital stock of education and on-the-job training has been estimated at $1.2 trillion while the corresponding estimate of the United States' physical capital stock was $1.27 trillion.[4] If the other forms of human capital are added to the estimate of educational capital, it is apparent that human capital is actually more important to the United States than physical capital.

If one is to use the theoretical structure that has been developed to explain physical capital investment to try to explain human or educational capital investment, one should carefully delineate the differences and similarities between the two building blocks of development and growth. The differences between investment in human capital, and investment in physical capital are mostly in degree, not in kind. Thus, one theoretical structure is useful in understanding all types of investment behavior.

Dissimilarities: differences in degree

The differences in degree are fairly straightforward. First, the concept of opportunity costs is much more important in human capital investment than it is in physical capital investment. The major "cost" of education is the foregone earnings of the student, not the tuition and fees. It is true that there are opportunity costs of modernizing a plant in terms of the foregone output while the plant is closed, but these costs are not measured in years of foregone earnings as they are in education, and, to a lesser extent, in on-the-job training. The importance of this point is that it is harder to estimate opportunity costs than direct costs. Thus, the student, as well as the economist, has more difficulty in determining the correct investment decision.

Second, the risks involved in making human capital investments are much higher than in physical capital, because human capital is more fragile, and the payoff period is frequently of longer duration. A machine can always be repaired when it stops working

by replacing all of its parts, but we have not reached that point yet with man. The payoff period for human capital investment, particularly educational investment, is of longer duration because not only is the period when the investment is actually being made longer (this is related to the point made above on the importance of opportunity costs), but also the period during which the returns are expected to be higher is longer (about forty-five years in the case of a college education). Both of these characteristics of human capital investment increase the risk of such an investment, and, increase, therefore, the difficulty for an investor to make an economically "efficient" decision. Because of the high risks and the tendency for investors to be risk avertors, there is apt to be an underinvestment in human capital relative to physical capital, and, there is likely to be misallocation of investment among alternative types of human capital investment.

Third, many human capital investments are irreversible, whereas most physical capital investments can be "undone."[5] If the wrong computer is installed in a plant, it can be replaced, but once one moves one's family from the South to the ghetto, it is expensive to go back. By the same token, once a Ph.D. is earned in aero-space engineering, it is almost too late to earn an M.D. There is not the continual feedback of information to the investor in human capital that there is to the investor in physical capital. The decisions that the human capital investor must make are more unique to each individual, and more likely to be irreversible.

These factors further complicate the decision making process of the investor, and make our theoretical model less accurate in explaining human capital investment.

Finally, the business investor is likely to have more information available to make his decision than the human capital investor. This point is really a generalization of the above points as they are all related to the information differences of the two types of investment. Risk, time, uniqueness, and irreversibility elements all serve to make the cost of obtaining information higher or even prohibitive for the human capital case. In addition to the effect of these factors, the costs of different types of training and the differential earnings related to various types of educational investments in forms of migration are probably not as well known to potential human capital investors as similar information is to businessmen. It should be pointed out that gathering the information is a form of investment itself[6] and due to the above enumerated characteristics of human capital, this information is less likely to be provided in optimum quantities for human investment than for physical capital investment.

If information is a public good in the sense that the government can provide the same information to more than one individual at practically zero cost, a case can be made for governmental provision to the public at large of information on job opportunities, educational opportunities, and opportunities to increase one's earnings through migration. The fact that the

human capital market does not function as efficiently as the physical capital market does not mean that the theoretical model that treats human capital like any other investment is inappropriate. It does mean that the model should be used with caution when describing human behavior. The model still remains the correct tool for the economist to use in judging whether human capital investment is optimal or not. It is the economist's role to recognize the shortcomings of the individual's decision-making process and fill in the voids, especially with regard to the lack of information.

In as much as the model represents some sort of standard against which to compare actual behavior, the economist can point out where deviations between actual behavior and ideal behavior occur with a view toward correcting the misallocation of resources. In other words, even if the human capital investment model does not perfectly describe the workings of these markets, it still can be used as a device to determine whether or not there is too much or too little investment in such areas as primary schools, high schools, junior colleges, hospitals, etc.

Dissimilarities: differences in kind

The differences in kind between human capital investment and physical capital investment have to do mainly with the legal and institutional restrictions that have been placed on human capital. Human capital can no longer be sold or mortgaged: a bank that makes an educational loan cannot foreclose on the loan and sell

the property. The effect of these restrictions is, of course, to decrease the amount of investment in human capital relative to tangible capital.

Man is, of course, inseparable from his human capital, and his changeable wants and dislikes, as well as those of others, will affect his opportunities and willingness to work. The phenomenon of discrimination is not important in hiring machines. Discrimination limits human capital investment for those who are discriminated against, both directly and indirectly. Directly, discrimination can prevent entry to a given school, and, indirectly, discrimination limits one's employment opportunities once schooling has been completed, especially for those groups discriminated against (mainly Blacks and women), who rationally do not undertake as much human capital investment as they might if they were given more auspicious circumstances. Blacks drop out of school before Whites, because further schooling may no longer be a profitable investment if market discrimination limits the increase in expected earnings of further schooling. Finis Welch has found, in fact, that market discrimination that limits the acquisition of schooling for non-Whites is much more important in explaining the Black-White income differential than the inferior quality of schooling received by non-Whites.[7] Discrimination is a factor causing a misallocation of human investment.

Another difference between man and machine that is not often mentioned is that there is usually some disutility

associated with working or schooling for man,[8] while for physical capital there is apt to be disutility associated with idleness. This difference means that aside from income effects, there is a greater cost to idle machines than to idle men. Rates of return that compare the desirability of investment in human, as opposed to physical, capital are biased in favor of human investment for this reason. Economists have treated a $100,000 investment in bonds and a $100,000 investment in education, both yielding a return of $15,000 a year with equal risks as being equally desirable investments. Yet clearly, the investment in bonds yields one the additional return from leisure, and the freedom of being "one's own man." This factor should be considered when comparing rates of return from education and physical capital investments. However, this effect is neutralized to the extent that people do enjoy their work and schooling.

There are a few other major differences between physical capital and human capital investment that should be mentioned, which are also related to the different legal and institutional environments in which the two types of capital are found. The institution of marriage and the family usually confines one of the partners, most often the wife, to the immediate labor market chosen by the dominant partner.[9] This phenomenon is less important in larger metropolitan areas and where the wife is less specialized. It is perhaps, most acute for husband and wife Ph.D.'s in single university communities. The effect is to cause an underinvestment in education on the part of women and a lower national output.

Tax laws also discriminate against investment in human capital. The direct costs of education are usually not deductible, and when human capital wears out, or becomes obsolete, as it certainly does, it cannot be depreciated and deducted from income as can physical capital. There are also, of course, labor laws establishing maximum work hours for certain types of labor and minimum wages. These do not apply to machines, and, therefore, tend to make investment in machines more profitable then investment in man. Labor unions also restrict the opportunities for work of man, usually more than physical capital. Machines do not belong to unions and do not go out on strike. Thus, most of the laws and institutions that have grown up to protect the worker also, at the same time, bias investment in fabor of physical capital.

Again, these differences, if they are recognized, can be handled by the economist who is trying to determine which areas of investment need emphasis. Most of them work in the direction of causing an underinvestment in education when the private individual is making the investment decision. Therefore, for the above reasons, estimated rates of return to education can be thought of as being biased downwards in comparison with returns to physical capital.

Conceptual Problems in Evaluating Educational Investment

The economist's theory of human capital gives him the analytical tools to arrive at some insights, not only about the relative amount of investment in education vis-à-vis other forms of investment, but also about the allocation of investment funds among different types of education. The instruments we are speaking of are Benefit-Cost Analysis (and its modern off-shoots) and Rate of Return Analysis.

Benefit-Cost Analysis

"Benefit-cost analysis" is simply an attempt to identify and to measure the benefits and costs that would result from alternative courses of action. As such, the idea hardly is a new one--presumably, man always has weighed the pros and cons, the advantages and disadvantages, of alternative actions. But techniques have been improved and refined (almost beyond recognition, in some cases) until now we have different names for some of the different applications of benefit-cost analysis: when courses of action are in national defense planning, it is called "cost-effectiveness analysis"; when the alternatives are relatively complex collections of inter-related parts, it is called "systems analysis"; and when the alternatives are modes of operation with given resources, it is called "operations research."[10]

Originally, the term and concept "benefit-cost analysis" was associated with and applied to natural resource projects, but its most popularized use probably has been in national defense planning. In the late 1940s, the Rand Corporation used "costing" methods in determining for the U.S. Air Force the best strategic bomber for development and next generation use. During the 1950s, however, full-fledged cost-benefit analysis was used widely for the first time in water resource studies.[11] At about the same time, Charles J. Hitch and Roland N. McKean published a highly influential book[12] on efficiency in defense economics which signalled the beginning of a new era of economic analysis applied to the public sector.

Hitch and McKean suggested that economic analysis of military planning involved a comparison of relevant alternatives in terms of the objectives and costs of each, and selection of the best alternative through the application of an appropriate preferredness criterion. In 1961, after Hitch had become Comptroller of the Department of Defense, the defense establishment adopted costing methods, and the techniques which became known as "PPBS" (planning-programming-budgeting system) and "program packaging" were underway. By 1965, more than twenty-five agencies of the federal government were using this approach to some extent.

Recently, applications of the benefit-cost principle have become more and more imaginative as comparisons have been made of among other things, alternative health measures, transportation systems, antipoverty proposals, and educational practices.[13] Regardless of the applications, however, the role of the benefit-cost analysis remains the same--it explicitly compares the estimated benefits of an action with what taking that action costs, at least as long as its use is limited to cases where "what is realized (the benefits) can be expressed in the same units as what is sacrificed in alternatives (the costs)."[14]

In any application, moreover, benefit-cost analysis has certain common elements. It involves the following: (1) the programs, goals, objectives, targets, or beneficial things to be achieved must be identified; (2) the feasible arrangements or systems for meeting these objectives must be identified; (3) the costs of each alternative, or the benefits foregone if one of the alternatives is adopted, must be identified and measured; (4) models must be developed which help to trace out the impact of each alternative on achievements (i.e., on benefits) and costs; and (5) a criterion,

involving both costs and benefits, must be developed which appropriately identifies the preferred alternative.[15] The first four steps, therefore, are the process of identifying and measuring the benefits and costs of feasible alternatives and the final step is the choice mechanism which selects the "best" alternative.

Rate of Return Analysis

There are two main methods used to compare the costs and benefits of alternative investments. One method is to calculate the present values of the costs and the benefits of the investment, and then to take the difference, or form a quotient. The streams of costs and benefits have to be discounted by the interest rate to put the future dollars on an equal footing. A major problem with benefit-cost analysis is that the results are very sensitive to the discount rate used, and there is no single discount rate agreed upon by economists. The second method, that of calculating the the internal rate of return, skirts this problem. Here the two present values of costs and benefits are made equal by solvingg for the discount rate which equates the two figures.

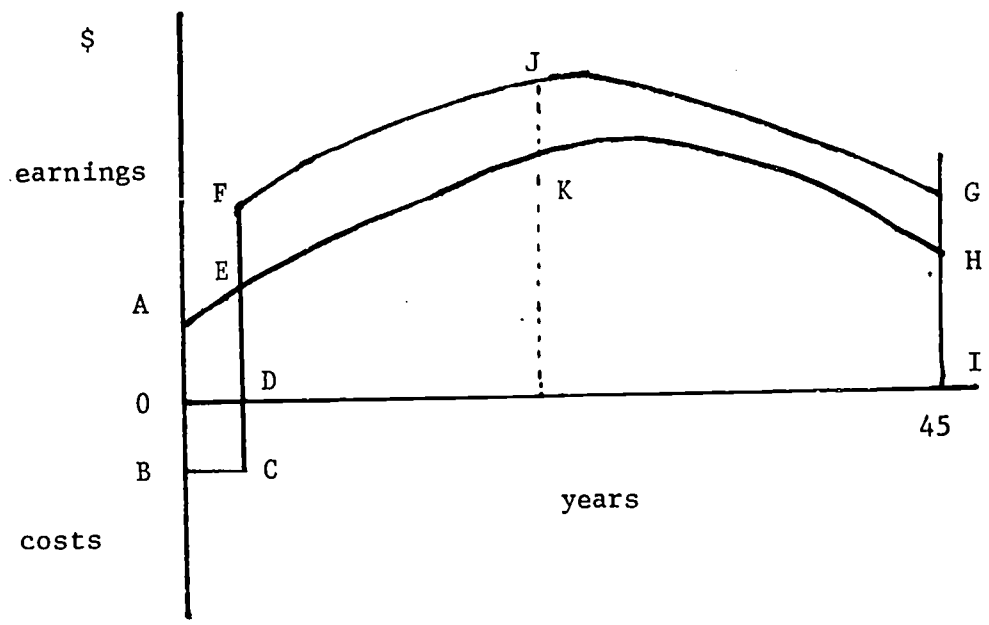
A diagrammatical exposition might make the procedure clearer. Presented in Figure 1 are the lifetime earnings streams of two individuals, similar on all respects except that individual II has had one more year of schooling than individual I. Individual I's lifetime earnings stream would be OAHI, and individual II's lifetime earnings stream is DFGI, which should be compared with the direct costs of tuition and books (ODCB), and the foregone earnings (OAED). The internal rate of return of the investment in education can be calculated most easily by finding the discount rate that equates the present value of the increment in earnings (FEHG), with the present value of the cost of education (AECB). If the internal rate of return is positive, the investment is profitable. This rate of return, however, should be compared to the rates of return on alternative investments, physical and human, before a decision is made to invest or not.

The viability of this procedure for making actual policy decisions depends, of course, upon the quality and validity of the cost and earnings estimates. Some of the difficulties pertaining to the intrinsic nature of human capital have already been mentioned, but a few problems peculiar to educational investment should be examined for possible biases in the rates of return analysis.

The Cost Side

In calculating the cost side in rate of return analysis, the estimate of the direct costs is, perhaps, the most reliable.

Figure 1



However, it is problematical whether the costs are private or social. It is the private costs that influence the individual student to invest in a further year of education or not, but it is the cost to society that is important to the policy maker. For primary and secondary schools, the private direct costs are minor, consisting of books, supplies, and, perhaps, some additional clothing expenses. The social costs include all the private costs plus the direct costs of financing the buildings and paying teachers' salaries and administrative costs. For secondary school students in particular, it is the opportunity costs of foregone earnings that are the main private costs of education. Because there are two types of costs, private and social, one can see that there must be two types of rates of return, the private or internal rate of return, and the social rate of return. There are differences on the benefits side also.

The opportunity costs are the most important cost for the individual, rising with the number of years of education completed. Opportunity costs are also social costs because society foregoes their output. These costs are estimated by comparing similar individuals, one in school and one at work.

A peculiar characteristic of investment in education is that there is thought to be an important consumption element to educational expenditures. There are two components of this consumption element, obtaining the education (the enjoyment of schooling), and the increase in psychic income that education

gives one in later life. If these two items are important, they should be subtracted from costs and added to the benefits of education, respectively. Ignoring them produces a downward bias in rate of return analysis. As pointed out above, there may be some disutility associated with the educational process and some disutility associated with work later on in life. These factors tend to offset the consumption aspects of education. The following is how one well known British writer concludes discussion of the dilemma:

> It would seem that at this stage we simply do not know whether to add or to subtract the consumption-benefits from the investment-benefits of education. This is not to say that we can never find out.... For the time being, however, the consumption hypothesis may be ruled out by Occam's Razor.[16]

The Benefits Side

The identification and measurement of the benefits of education is fraught with many difficulties because some of the benefits to an educated person are economic in nature while some of them are noneconomic, and because many of the benefits do not accrue to the person educated or even to his family, but are conferred on altogether other people.[17] The private benefits of education are those which accrue to the child or to his parents (or guardians); and the external benefits are those which "spill over" to families other than that of the educated, even where it is infeasible to identify the families benefited or the money value of the benefits.[18] The latter effects, variously called "externalities," "spillovers," "neighborhood effects," and "third-party effects," are relevant from a social point of view to any decisions on educational spending. To the extent that they are disregarded, provision of education will be inefficient and inequitable, a point which will be demonstrated below.

Private Benefits

The first task in calculating the benefit side is to estimate the differential lifetime earnings stream by comparing the actual earnings of cohorts standardized except for their differing educational attainments. In Figure 1, this is the estimation of area FEHG. In practice, this is usually done by

looking at the difference in earnings for one year and then extrapolating the differences over the rest of the years. In other words, looking at Figure 1, area FEHG is estimating from the points J and K and from knowledge about the average life-cycle path of earnings. The danger with this procedure is that it implicitly assumes that past earnings differentials will be maintained in the future. A priori, economists would expect that if the demand for a given educational level of manpower were relatively stable over time, then an increase in the supply of this manpower would drive down the actual rate of return to this educational investment. So if an educational investment was pushed because the rate of return calculated from past data was found to be high, it is likely that, due to the long lag in the educational process, the final rate of return would be lower. In some cases, of course, policy makers may overshoot the mark. This result might be one explanation for the current glut of Ph.D.'s on the market. Evidence that will be presented later, however, indicates that there has been no secular decline in the rate of return in the United States to primary and secondary education.

One should still use the cross-section data with caution because there have been recent indications of narrowing of earnings differentials between groupings of different educational levels.[19] These assumptions about the future demand for education are implicitly built into the use of rate of return estimates by policy makers. These assumptions should be made explicit and attention must be paid to the future demand for education if rates of return analyses are to be used for allocative decisions by policy makers.[20]

Another problem that arises in using the differential in earnings to calculate the benefits of educational investment is that labor market imperfections may distort the calculated rates of return so that the social rate of return deviates from the private rate of return. For example, if the "sheepskin effect" is as important as some have alleged, namely, that

employers pay workers with diplomas more than the value of their marginal product, the private rate of return will be higher than the social rate of return and there will be an overinvestment in this type of education from a societal viewpoint.[21] Most economists, however, reject this view.[22] Rate of return analysis actually points out to the economists where the distortions lie, because, with all markets perfectly competitive, all rates of return would be equal. The extremely high rates of return to physicians, first pointed out by Friedman and Kuznets, is evidence that perhaps the American Medical Association has engaged in restrictive practices by limiting the supply of physicians.[23]

A problem much more significant than the first two above is that of identifying groups of individuals identical in all traits except their education. Ideally, in order to measure the true effect of education on earnings, all the other factors affecting earnings must be held constant. This is difficult to do because of the high degree of multicollinearity between education and the other factors that influence earnings. Some of these other factors are ability, financial wealth, parents' education, ambition or perseverance, and other types of human capital. This list is not exhaustive. Most studies try to correct for this effect, which, of course, biases rates of return in favor of educational investment. Children with these traits tend to get a higher than average education, yet they would probably have had higher lifetime earnings than average even if they had not had more than average schooling. The procedure used to correct for ability is to use I. Q. tests and standardize the students that way. If the sample is large enough, and the demographic data rich enough, researchers can also correct for parents' income, education, social class, the student's race, place of birth, health,

etc. Many economists still doubt, however, that it is possible to account for all the intangibles such as perseverance, motivation, and personality that may be correlated with both propensity to attain education and propensity to generate higher incomes than normal. This possible bias must also be kept in mind. In addition to the direct monetary effect on earnings, however, a number of other effects of varying indirectness have been claimed for education by various economists, but notably Weisbrod.

Weisbrod lists four types of benefits (other than increased future earnings) which accrue to the individual and three types which are conferred to the remainder of society.[24] Some of the latter types are "internal" to the family and consequently are private benefits. Those for the individual are (1) the value of the option to continue with further education, (2) the option value of wider employment possibilities, (3) the insurance value of hedging against technological change, and (4) the value of nonmarket benefits.

The value of the option to continue with further education is a type of benefit which one must take care to avoid doublecounting. Weisbrod's point is that a seventh grader who is "deciding" whether or not to study at the eighth grade level must consider not only the returns which would accrue if he were to complete it successfully, but also the value to him of the opportunity to proceed to the ninth grade. If he eventually exercises the option to proceed to the ninth grade, however, the value he assigned to the option must be included in the <u>costs</u> of the ninth grade. To do otherwise would be to count twice some of the benefits of the ninth grade. Weisbrod has made no attempt to measure the value of this option perhaps because of the tendency for it to be

"washed out" or counted already in earnings studies. (He did make some illustrations of the point, using data from Schultz's studies.)[25]

The second benefit which Weisbrod listed was the option value of wider employment possibilities. Here, he seems to have in mind the idea that increased education broadens the range of jobs for which the individual is suited. Although he asserts that a person would attach a positive value to having additional job possibilities, Weisbrod does not measure such values, perhaps because empirically it would be infeasible to distinguish the value of such options and, moreover, because it is not self-evident that this option is "investment." Only to the extent that it reduces uncertainty about anticipated earnings should it be counted in investment calculation. If it only gives a person "satisfaction" to know that other jobs are open to him, then these "psychic" benefits more appropriately would be regarded as consumption.

A closely related benefit which Weisbrod suggests is the insurance value of the hedge against technological change. Whereas the employment option refers to the range of occupations available to a person, the insurance option refers to risks borne in regard to the change of reduced earnings owing to technological changes which give rise to adverse economic effects on his existing occupation. This risk would be reduced if education succeeds in making workers more adaptable to new skills. Again, Weisbrod offers no measurement of this type of benefit. The insurance value also has a consumption element, and only to the extent that it reduces uncertainty about the need to change jobs should such benefits be included in an investment calculation.

Finally, Weisbrod refers to benefits which are nonmarket in nature. He mentions one illustration--the example of literate individuals completing their own income tax returns, arriving at an annual market value of tax return services performed by taxpayers for themselves to be $250 million or a return of about 3.2 percent. There are many problems with this measurement, which O'Donoghue, among others, has cited.[26] Actually, this is a distributional matter. The gains to taxpayers are offset in part by losses to tax accountants, thereby cancelling out part of the effect for the economy as a whole, having little, if any, effect on overall output, and succeeding mainly in redistributing income from accountants to the "rest of the world."

Weisbrod also discusses three types of benefits to persons other than the educated: (1) residence-related benefits, (2) employment-related benefits, and (3) benefits to society in general. Some of the residence-related benefits are "internal" to the family and consequently are private benefits which should be numbered among those already discussed. Two such types of benefits are (1) child-care services to mothers, and (2) benefits which may accrue to any future children of the educated.

For the mother (or father) of a school-age child, a valuable child-care service is provided which makes it possible for the mother (or father) either to seek employment or to engage in leisure or other non-work activities. The effect is in the form of consumption benefits to the extent that mothers (or fathers) choose leisure or simply enjoy reduced anxiety. An economic value is attached to seeking employment. Weisbrod estimated these benefits to be approximately $2 billion annually (which would be treated as a return on primary education) at a time when only $8 billion was spent on primary education.[27]

Benefits accruing to the future children of the educated come through the informal education which educated parents presumably provide their children. Using data on the additional education which children of more educated parents receive, Weisbrod and Swift have estimated the value in higher earnings of this extra education of the child. They then express these higher earnings of the child as a rate of return to the parents' education. The estimates ranged from one-fourth of one percent to eight percent for two-thirds of the cases, and in only about seven percent of the cases studied was the effect negligible. Even the authors urge caution in use of these estimates.[28]

Education in Consumption

There is one other real potentially quantifiable economic benefit to education, other than the effect on earnings, that has been frequently overlooked, and that is the effect of education on the other side of the individual's financial affairs, the expenditure side. Education not only allows one to earn more income, but should also enable one to spend it more efficiently. The recent rash of consumer protection laws have arisen, in part, because of a recognition of this phenomenon, and because of the increasing complexity of consumer decisions in today's technologically advanced world.

This type of benefit might be called education in consumption as it is analogous to Finis Welch's recently coined phrase "education in production."[29] In trying to answer the question: "With the phenomenal rise in average education, why have rates of return failed to decline?" Welch proposes and examines empirically for agriculture, the proposition that increased education allows a farmer to use his other factors of production more efficiently.[30] Thus, education has two effects upon output, the traditional "worker effect" of increasing a factor of production, while holding the others constant (the

economists concept of marginal product), and an allocation effect of allowing the worker to combine the other factors of production more efficiently, or, perhaps, to use "new factors" that otherwise would not be used. From a study on the effect of education on farmers, Welch found that "much of the 'leverage' associated with added schooling is drawn from the dynamic implications of changing technology."[31] The implications of Welch's findings for rates of return analysis are that the rates of return to education should maintain their present level if technological change continues its rapid pace. If technological change slows down, rates of return to education would be likely to fall. Education in production does not bias the rates of return analysis because it is simply a factor determining rates of return.

The analogous concept of education in consumption would bias rates of return calculations, because this affects the consumer's expenditure side, not his income side. A search of the literature reveals that this is an unknown phenomenon, and, thus, the theoretical and empirical work on this topic remains. The idea of education in consumption does logically follow from Welch's pioneering and important study. As consumer buying decisions become more complex with a more technologically advanced environment, the potential saving of income to the educated consumer over the uneducated consumer increases. Rates of return analysis that do not allow for this factor (and none have as yet) understate the true internal rate of return. To the extent that educated consumers are more socially minded (for instance, buying the "ecology" soap instead of Tide), the social rate of return to education will be additionally understated.

Finally, there are certain benefits from education which accrue not to the individual but to the society in which the individual lives.

Externalities

These "externalities" may be regarded initially as effects of goods which, when consumed or produced, either confer benefits or impose costs on persons other than the consumer(s) or producer(s) of those goods. External benefits in consumption, for example, are benefits which contribute to the well-being of people other than the "consumer" himself. To the extent that one person's decisions either benefit or harm others without that person taking into account such benefits or costs, such decisions may lead to underprovision (in the case of external benefits) or overprovision (in the case of external costs), from the social point of view, of the activity involved (and to serious questions about equity).

Economic Benefits

In the case of education, a family may be expected to make decisions based on its expectation of benefits or returns to the family, as these private benefits have been outlined above. And a family would be expected to disregard any benefits or returns conferred on other families. Many economists have pointed out, however, that families other than that of the educated also may benefit from education. This means that "social calculation," where all private and external benefits are considered in comparison to costs, will differ from "private calculation," where only private benefits are considered.

Again, Weisbrod has been at the forefront in listing categories of such benefits. He mentions the following: (1) residence-related benefits to neighbors and taxpayers, (2) employment-related benefits to fellow workers, and (3) society-related benefits to the population in general. The first two categories contain both social (i.e., noneconomic) and economic externalities and most of the benefits of the third category are social externalities.[32]

Weisbrod first suggests that the education of the children of one family may confer benefits on neighbors by (1) inculcating acceptable social values and behavior norms, (2) providing alternatives to unsupervised activities, some of which may have antisocial consequences, and (3) improving the caliber of voluntary community activities.[33] Also, Weisbrod suggests that benefits are conferred on taxpayers because the need for incurring the "avoidance costs" of law enforcement will tend to be less.

Although these types of benefits will be discussed more thoroughly below in the section on Social Externalities, several observations need to be made here. One global observation is that all that can be said in general is that the effects such as those above undoubtedly have an effect on neighbors, but neither their magnitude nor their direction is clear in any particular instance. For example, the social values which children now are taught (from those implicit in sex education to those in what is regarded as the "debunking" of history) are under question and have been challenged seriously by persons outside of the education establishment. Some have even blamed educators for the generation gap. Also, student "unrest" has caused many to wonder if antisocial consequences come only from unsupervised activities. More will be said later on these claims.

Weisbrod suggests that employment-related external benefits are conferred when educating some workers raises the productivity of others.[34] This point requires some elaboration. Production in modern, industrialized economies requires coordination, cooperation, and other interaction of workers, so that the productivity of each worker potentially affects the productivity of every other worker. Additional education of one worker may affect another through emulation of skills and through acquired psychological and motivational factors. Through the simple process of

work association, less educated workers may improve their communication and discipline of the mind, develop flexibility and adaptability, and learn maturity and reliability. Through the less simple process of transfer, educated or more educated workers may contribute to the awareness of and the reception to present knowledge and new ideas.[35]

Measurement of employment-related benefits raises problems. "Simply" measuring the higher earnings of a group after more "educated" personnel have been introduced is not so simple. Earnings may not reflect productivity accurately, especially in cases where only marginal contributions to output are concerned. Also, it may prove to be difficult to isolate the effects of introduction of educated personnel from other changes which occur simultaneously. Employment-related external benefits, like many other "nonmarket" benefits, are not subject to measurement at this time, and it is therefore infeasible to include them in calculations such as the social rate of return. Actually, we cannot be sure that such effects are always unambiguously positive. O'Donoghue, for example, suggests that the "educational ethos" can be inimical to productivity because it downgrades business and economic activities to a much lower status than cultural, academic, intellectual, artistic, or similar activities.[36]

Finally, Weisbrod discusses external benefits which are conferred to society in general.[37] Democracy hardly is feasible without widespread acceptance of a common set of values and without some minimum degree of citizen literacy and knowledge, so that education might be regarded as providing "a minimum standard of citizenship." Education, it commonly is argued, also is important in promoting equality of opportunity. If education is successful in lowering financial and other barriers to entry into previously privileged positions, then education is providing a

return in the form of satisfying a social goal.[38] Measurement of these benefits would be arbitrary, but some aspects of these external benefits of education are discussed further below, particularly the effect of education in poverty reduction, and far more research can be carried out with respect to this distributional element.

Externalities and resource allocation

Whether it is water pollution and smog (cases of external cost and over-provision) or education, a fundamental question raised about externalities is in regard to the effects of consumption or production on persons other than the parties to an exchange. Without some kind of adjustment (such as prohibition, directive, bribery, merger, taxes and subsidies, or regulation[39]), the economy may either overprovide (in the case of external costs) or underprovide (in the case of external benefits) goods and services characterized by externality, at least when judged from the social point of view. The problem of socially efficient and socially equitable provision of education is then twofold: (1) some adjustment must be made to extend expenditures beyond the socially suboptimal level associated with regard only for the private benefit of education to a level approximating that associated with regard for all the benefits--private and external--of education, and (2) some means must be applied to distribute the costs of the socially optimal level of education according to commonly embraced norms of social justice. The traditional solutions for efficient provision of goods characterized by external benefits are (1) to establish minimum standards of performance, (2) to subsidize the producer or consumer of the good, and (3) to enlarge the decision making unit so as to "internalize" the benefits.

1. Minimum standards: The idea of minimum standards is to require consumers to purchase quantities larger than they would if left to their own choice. In the case of education, families might "purchase" less than the socially optimal amount of education for their children if left to their own choice. This traditional solution would prescribe that families be required to provide each of their children with a certain number of student-years of education. Some kind of subsidy almost certainly must be involved with such a requirement, however. Individuals who genuinely cannot pay the costs of meeting required standards could not be asked to divest themselves of their children by selling them to others who can, which is what we do when owners cannot afford to raise buildings, automobiles, and other property to minimum standards.

2. Subsidies: The idea of subsidies is to reduce the cost of such goods to consumers (or producers) and thereby to increase their consumption (or production). By reducing the cost of education, for example, it is hoped that families may respond by consuming a larger (than otherwise) quantity. There is widespread agreement that subsidies and minimum standard of performance are necessary to provide education optimally from the social point of view. The disagreement is over such questions as (1) what should be the level of subsidy, (2) should producers or consumers be subsidized, (3) should the subsidy be selective or "across the board," and (4) what should be the tax base of the subsidy?

First, we really cannot expect people to reveal their demand or willingness to pay for the external benefits of education. This component of education is what economists call "public," meaning that the consumption of the external benefits by one person does not diminish the opportunity of others to consume the same benefits. Put another way, families other than

that of the educated must all adjust to the same quantity of the public component of education--more of the public component of education for one of these other families is more for them all. Under such conditions, each of the "other" families may decide not to reveal its willingness to pay for any benefit provided to it externally on the grounds that it can enjoy whatever external benefits which are forthcoming whether or not it contributes toward the provision of those external benefits. Because of this problem of concealed "preferences," we really cannot know by how much to extend by subsidy the level of educational spending. One of the consequences of moving away from what is regarded as a suboptimal level of provision by means of a subsidy, therefore, might be to end up overproviding education. The optimal level of subsidy, in any event, is indeterminate because of the indeterminary of the total demand for education.

Even if we could determine the optimal level of subsidy, this would not resolve the question of whether to subsidize producers or consumers. Presently, of course, we subsidize the producers of education to the extent that education is offered at a price of practically zero to consumers. An alternative would be to subsidize the consumers in the form of "market-type vouchers," and to allow the market price of education to be determined by competition between rival schools. This proposal[40] has not yet been studied fully, but many have expressed reservations based on uncertainty about the effect of monopoly, particularly in small communities, unwillingness to allow "ignorant" families to exercise consumer sovereignty, and questions about the possible effects on academic freedom.

Since one purpose of subsidies is to satisfy the privately disregarded external benefits, selective subsidization might be preferred over across-

the-board subsidization. For example, areas of study closely connected with citizen quality could be singled out for subsidy, or subsidies might take the form of cash support of youths who otherwise would drop out of programs, since it is such students at whom meeting such objectives is commonly aimed.[41] Selective subsidies have been used in principle, but the consequences of wider or more detailed use have not been explored carefully.

Finally, what base should be used to defray the cost of the subsidy? Subsidies to primary and secondary education usually are defrayed by the property tax. Because the burden of property taxes typically is distributed regressively over income groups, however, there is an obvious paradox: on the one hand, we express an interest in education as a means of reducing inequality of opportunity, while, on the other hand, we finance education in a way which makes income distribution more unequal, thereby making the problem of reducing inequality of opportunity all the more difficult. There are other problems with the choice of tax base. If it is acquiescence we want in moving from a lower to a higher level of provision of education, then the more likely we are to get it as an individual's proportion of the base, ceteris paribus, moves toward a minimum. In other words, we are more likely to gain acquiescence in extending the provision of education if the state-wide sales base is used rather than the local property base, the national income base rather than the state-wide sales base, and so forth.

3. Internalization: The very word "externality" seems to lead naturally and logically to "internalization" as a solution. Internalization refers to enlarging the decision making unit until its size corresponds with

the spillover of benefits (or costs). In other words, if some benefits remain outside when decisions are made by an individual or group, then cannot the benefits be brought inside if we increase the size of the decision making unit? In cases involving individuals, the answer is no. For example, in the case of education, benefits are external to the family, and we cannot increase the size of the family until it is large enough to "capture" all of the benefits. Internalization, when it has been proposed as a "cure-all" for what ails education, has been advanced mostly out of mistaking "geographical spillovers" for externalities.

Geographic spillovers

Weisbrod's most controversial conclusions probably have been those with regard to geographic spillovers. His study[42] and that of Hirsch, et al.,[43] are based on the idea that education may bring benefits to people other than those in the school district which provides the education.[44] Weisbrod's main hypothesis is that migration gives rise to spillovers because the costs of education are borne by the emigrant area and that such spillovers result in underinvestment in education. In other words, he argues that one of the consequences of federalism is that the level of educational provision will fall short of the social optimum. For example, a community might not devote $1,000 of resources to produce an output worth $1,300 to society if only $800 of benefits accrues to persons within the school district. Not only would a community disregard any "spillout" benefits, but any "spillin" benefits as well. To continue the example, a community might not devote the $1,000 of resources even if there were $400 of spillin benefits, more than enough to offset the $300 of spillout benefits. His theory is that a community will extend the provision of education

only to the point where the marginal benefits to the community equal its marginal costs, disregarding any benefits which accrue to other areas (for obvious reasons) and disregarding spillin benefits because they constitute a type of lump-sum benefit which have no influence on marginal decisions to either raise or lower the level of provision within the community.[45]

Weisbrod's hypothesis that geographic spillovers lead to global underinvestment in education has been criticized widely. Malul was critical of his use of data.[46] Haltmann argued that under Weisbrod's circumstances, no community would provide "free" education and that migration is not a cause of non-optimal provision of education.[47] Williams submitted that in some cases(when spillins are taken into account) sub-optimality will be greater than Weisbrod has estimated, and in other cases too much of education will be provided.[48]

As it is with other discussions of the nonmarket benefits (and costs), the effect of geographic spillovers on the level of provision of education is unclear. We are certain neither of the extent nor of the direction which any such effects might take. Certainly federalism has some effect on the provision of education. For example, drawing geographic distinctions may serve in many cases to make "indirect" benefits seem more remote than they really are, thereby mitigating an interest one otherwise might have in the education of the children of other families. Also, dividing sovereignty among myriad units of government makes interference in the decisions of others more difficult, even where one group of citizens has a strong interest (for whatever reasons) in seeing that children in another state or locality are educated better than they actually are being educated.[49]

Social Externalities

Some writers[50] have commented that an increment of education reduces government expenditures on crime prevention and that it mitigates against poverty, reduces government outlay on fire protection, public health, and medical care. Others have criticized severely the omission of such benefits of education in social rate-of-return studies.[51] While it is still not technically feasible to incorporate all such tradeoffs into benefit-cost analysis, the effects of educational spending on crime and poverty reduction should be examined more carefully.

It should be said at the outset, however, that educational spending may affect the demand for (and supply of) a multitude of other publicly-provided goods and services. For example, Shoup asserts the following:

> An increment of education reduces government expenditures on crime prevention on balance, though it may increase certain types of crime, embezzlement, for example. It also reduces government outlay on fire protection, public health, and medical care. Education induces an increase in expenditures on highways and streets, and cultural and recreational facilities. It increases tax revenue automatically, after a considerable lapse of time, by increasing productivity and hence, to some degree at least, national income.[52]

The problem with claims of tradeoffs involving education is that of establishing their relative magnitude and even the direction which they take. In other words, do they constitute costs or benefits to others?

Impact on neighbors and taxpayers

Weisbrod again has been among the more persistent economists who have argued that education reduces crime. He has argued that "insofar as lack of education leads to employment difficulties and crime, law enforcement costs will tend to be high," and education thus may "provide social benefits by reducing the need for incurring these 'avoidance costs,' to the advantage of taxpayers.[53] Benson, in a sumilar vein, argues that social values developed through education affect neighbors: "Education has effects on the caliber of voluntary community activities: choral groups, drama clubs, local art shows, etc."[54] This conventional

wisdom has been challenged seriously in recent years.

Machlup recently suggested that the experience of the last few years, with student riots and rebellions at universities all over the world, at the least should lead to a reconsideration of the assumption which has taken for granted that education increases respect for law and order and promotes a climate conducive to peaceful social, political, and economic development.[55] E. G. West has suggested that the available data not only fail to support the assertion but, if anything, point to a contrary conclusion.[56]

West points out that, in post-war England, crime rates for young people rose rather than fell, despite (or because of) an expansion in education during the period. He cites evidence that the last year of compulsory education was the highest rate of juvenile delinquency, a tendency which was reversed when pupils left school and went to work. When the school-leaving age was raised from thirteen to fourteen in 1947, West claims that "there was an immediate change over in the delinquency record of the 13-year-olds (who until this had been the most troublesome age-group) and the 14-year-olds, who took their place in 1948, and have held it consistently ever since."[57]

Many comments are in order. West's evidence is owing undoubtedly to compulsion and to the suspicion that the delinquents had no desire to attend school. For older age-groups, the external effects on neighbors and taxpayers still may be positive. Even so, many student activities involving their wilful desires to do good may not be interpreted as beneficial. O'Donoghue has pointed out that the student riots may be regarded as "good" or "criminal" by different sectors of the same population.[58]

Others have questioned how such activities as voluntary community activities, choral groups, drama clubs, and local art shows may be counted as external benefits of education. In the first place, the activities are

largely confined, both for participants and spectators, to educated people and simply represent a form of consumption activity for them. It is not even necessarily true that education confers a benefit by extending the individual's range of consumption activities. As Jack Wiseman has argued, "the graduated student now gets psychic return from having been educated to appreciate Bach, but he can no longer tolerate the Beatles."[59] It would be a blatant value judgement to estimate that one consumption activity constituted an improvement over another, thereby conferring a benefit, although it is one that many would be prepared to make.

No one seems to deny, therefore, that education affects neighbors and taxpayers "externally," but there is considerable question as to the value or direction of such effects. By way of generalization, all that can be said at this time is that effects on neighbors and taxpayers are created, but whether they are victims or beneficiaries is not clear in any one instance. Further fruitful research concerning the nature of some of the tradeoffs is certainly called for.

Impact on Poverty Reduction

The traditional belief, of course, is that education tends to equalize the opportunities for financial advancement.[60] This proposition should be examined more closely.

The belief that higher levels of education tend to produce a greater equality in the distribution of income is based on the international and interregional studies of Simon Kuznets.[61] Even Paul Samuelson, in his text, ECONOMICS, makes the statement that both over time and over international cross-sections, equality of the distribution of income increases with per capita income and education.[62] However, increased educational

spending hardly is the most direct way to attack the problem of poverty. Ribich points out that a lengthy chain of events must transpire successfully before additional educational spending is reflected in reduced poverty: (1) spending by government must result in augmented educational resources available to schools, (2) the extra resources must add to learning, (3) the additional learning must lead to increases in the capacity to produce and to earn income, and (4) that capability must result in moving individuals out of poverty or at least mitigate the degree of poverty.[63] Between each of these required links between educational spending and poverty reduction, there is slippage.[64]

Ribich has estimated the "payoff rates" for several types of educational spending. He found that the ratio of estimated total income gains to costs to be only around sixty percent.[65] Ribich also estimates the effect of inducing a given number of individuals to graduate from high school rather than to drop out. By using a $3,000 income figure as the definition of poverty and discounting to present values the entire lifetime stream of total income and poverty income tax reductions, he found that (1) the reduction of the poverty income gap is only one-fifth of the total income gain that would be experiences by a representative sample of whites, and (2) the reduction is just short of two-fifths for a representative group of non-whites. (If the income gains were $1 million, the the expected reduction of the poverty income gap would be between $200,000 and $400,000.) If this relationship held for other educational changes as well, it would be valid to reduce the total returns estimates so that the ratio of poverty gap reduction to costs might be no better than twenty-five percent.[66]

B. R. Chiswick has added importantly to the literature which examines the impact of education on income inequality.[67] Chiswick shows that, other things equal, a higher level of schooling tends to increase income inequality, but that, because the average level of schooling is negatively correlated with the rate of return and with the inequality of schooling, the observed positive relationship between level of school and income inequality has been maintained.[68] Chiswick explains these findings by pointing out that individuals with greater amounts of education are more likely than people with little education to migrate to states with higher income levels, and that this depresses rates of return in states with high education levels, raising them in states with low education levels, causing the negative simple correlation between the average level of education and income inequality.

The implications for policy makers of Chiswick's findings are that it should not be automatically assumed that raising the average level of education will increase the equality of the distribution of income. In fact, the opposite is the more likely result. Two things that should be considered are the way the level of education is raised in a community, i.e., raising the lower or the upper tail of the distribution of the years of education, and, second, the effect of increasing the level of education on rate of returns. Usually one expects that increasing the level of education will lower the rate of returns, but in some cases the resulting increased incomes and economic growth might generate more than enough demand for skilled labor to offset the increase in supply. This occurrence is probably more likely for underdeveloped countries than for the United States.

Edward Denison has criticized the idea that the United States' educational structure promotes equality of opportunity and income.[69] Denison is

mainly criticizing the United States' higher education system when he claims that equality of opportunity requires expenditures on dull students at least as great as the expenditures on bright students. Yet, Denison calculates that the average expenditure of public funds for four years of college on male students who had an A average in high school is $5,811, while the corresponding figure for males and females with a below C- average is $666 and zero, respectively.[70] Public subsidation of ability obviously increases income inequality, because income and ability are already highly correlated. These criticisms also apply to primary and secondary schools that allocate more funds and the better teachers to honors programs or even college preparatory programs.

If promoting a more equal distribution of income is a societal goal, there may well be a trade-off between equity and allocative efficiency. Clearly, educating students with more ability more intensely will result in higher rates of return. In a democratic society the people must decide on this trade-off through the political process, while the role of the economist is to attempt to quantify the trade-off and present it to the people. Much work remains to be completed here.

Not all the policy implications of these various studies on the distributional impact of educational investment are (assuming that it is a goal of society to have a more equitable distribution of income) in conflict with the dictates of rate of return analysis. Indeed, in most respects the equity and allocative considerations reinforce each other, especially with regard to investment in the different levels of schooling. Both Chiswick and Denison would recommend that public educational funds should be reallocated from higher to lower levels of education to increase

income equality. This, of course, is the same conclusion that the evidence from rate of return studies indicates should be undertaken to increase the allocative efficiency of educational investment.

Attempting benefit-cost analysis of alternative government actions often means provision of data regarding costs and gains without any markets to generate the information. It is agreed generally that it is as often infinitely expensive, i.e., impossible, to provide information about marginal evaluations that is comparable in quality to the knowledge generated by markets.[71] This means that many social benefits and costs go unmeasured in studies of education and other services characterized by some degree of externalities which is "unpriced and uncosted." Nonetheless, benefit-cost analysis can be of use in studying services such as education. For one thing, benefit-cost analysis can provide some information, and it can alert officials and citizens to look at education as a problem of choice, even if many of the quantities and values must be filled in on the basis of judgement.[72] But at least it can focus the attention of the policy maker upon the proper matrix.

Conclusion on Externalities

The more difficult component of benefits to measure or even to identify is the category of benefits which accrue not to the family of the educated but rather to other families. To reiterate, such effects are called "externalities," "neighborhood effects," "spillovers," and a variety of other labels. Their nature is to affect the production or consumption activities of others. For example, recall that education may confer external benefits in the following ways: (1) neighbors may benefit because children have fewer hours of unsupervised activities, some of which are

likely to affect them adversely; (2) taxpayers may benefit because education may lead to reduced unemployment, poverty, and crime, the consequences of which involve costs to some extent borne by them; and (3) society at large may benefit because of effects such as that which literacy has on the functioning of a market economy and of a political democracy. Such benefits may be regarded as "social" rather than private in nature; and such wider consequences of education would be relevant to any decisions on educational spending.

These social externalities of education include such things as providing the necessary conditions for a smoothly functioning democracy, inculcating new generations with the traditions and accepted values of society, and, perhaps, promoting equality of opportunity through lower job barriers based on class, racial, and religious grounds. To be complete, some possible social external diseconomies of education should be enumerated. Recent events indicate that education beyond a certain point leads to a questioning of the social, religious, and political beliefs of a society. This makes it harder to govern that society, and democracy may change to anarchy. From the point of view of the existing majority of society, this type of externality is a social cost. In a long-run broad social sense, however, it is not clear whether this externality is a cost or a benefit. To the policy makers currently in power, it must be counted as a social cost.

On the benefits side, the above analysis indicates that the total benefits will be understated by the referring only to the private benefits, and, that, therefore, a public means of support for education is justified. This conclusion is further reinforced when it is noted that private benefits are usually calculated net of personal income taxes. The social return

should, of course, include taxes paid to society. The other major reasons for the conclusion that the calculated private benefits understate the social benefits to education, are the probable importance of the social and economic externalities, coupled with the growing importance of education in reducing the real cost of consumption (the education in consumption proposal). The understatement is also likely to diminish with increasing years of education. This is most clear with the externality argument, especially, because some externalities may become negative at a high enough level of education. Also, the babysitting benefit to mothers is likely to be more important at lower levels of education. This might not be true, however, for the education in consumption hypothesis, because a threshold level of a college education may be required for consumers to appreciably save on the expenditure side while maintaining the same real value of consumer goods as less educated consumers.[73] Further research needs to be done on this question.

On the cost side, to the extent that the government pays for part of the educational costs, the private costs will understate the social costs. Because opportunity costs and private direct costs rise relative to the direct costs paid by the state as the grade of schooling rises from 1 to 12, or 14, if there are junior community colleges, private costs will understate social costs by a decreasing amount as the level of schooling increases.

The net effect of the two offsetting biases of the cost side and the benefit side is probably to continue to cause the internal rate of return (which is not calculated to include the benefits of education in consumption) to understate the true social rate of return that includes the social and economic externalities. There is no way to empirically support this statement

as yet, and, indeed, some economists assume that the internal and the social rates of return are identical.[74] A stronger statement can be made about the relative rates of return biases for different years of education. Most of the biases on both the cost and the benefit sides run in the direction of the internal rate of return underestimating the social rate of return by a decreasing amount with further education. The conclusions are not that void of policy significance because most of the decisions in educational finance will probably be made in allocating a fixed amount of funds allotted to education to the different types of education--primary, secondary, junior college, and higher education--rather than the actual amount to be allotted to all types of education. However, the latter is an important question also, and can be answered with rates of return analysis although with less confidence than the intra-educational allocative questions.

The Empirical Evidence on Rates of Return

Internal Rate of Return

The above qualifications and possible biases should be kept in mind when one examines the empirical evidence on rates of return analysis. The first major attempt at estimating the rate of return to education was made by Gary Becker.[75] For White males, Becker calculated an internal rate of return to college graduation of 14.5% in 1939, and 13% in 1949. Becker is much less sure about the social rate of return, but he sets a lower and upper band of 13% and 25% to the White-male 1939 cohort.[76] Becker calculated a significantly higher internal rate of return to high school graduates, 28% in 1958. Becker's full results are tabulated in Table I.

TABLE I

Private Rates of Return From College and High-School Education For Selected Years since 1939

(per cent)

Year of Cohort	College Graduates (1)	High-School Graduates (2)
1939	14.5	16
1949	13 +	20
1956	12.4	25
1958	14.8	28
1959	] slightly higher than in 1958	
1961		

Source: Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education (New York: Columbia University Press, 1964), p.128.

The return to private physical capital in the United States economy has been estimated at between 10 and 15%.[77] This is after deduction of corporate income tax, but before personal income tax. The evidence indicates that investment, especially through the high school years, compares favorably with investment in physical capital. It is also important to note the significant uptrend in the return to high school.

Several other independently derived estimates for college and high school should be mentioned because they use different techniques, data sources, and years. According to Schultz, Giora Hanoch has the best earnings profiles now available.[78] Hanoch, using 1960 census data, calculated rates of return of 18% to high school, and 10% to college, which he reduces to 16% and 9.6%, respectively, when adjusted for ability and demographic variables.[79] W. Lee Hansen, using 1949 data, estimated rates of return of 15.3% and 11.6% for high school and college, respectively.[80] Differing from the

above estimates in using a longitudinal case study method, Daniel Rogers presents slightly conflicting estimates.[81] Rogers feels that his longitudinal method, which is a follow-up study on 1,827 males, who took intelligence tests in the 8th and 9th grade in eight high schools in Massachusetts and Connecticut in 1935, is far superior to the usual cross-section method. He is also able to control for many more ability character, and demographic variables than previous studies. One problem with his study is that he may have a biased sample, because the sample includes mainly prep schools and academic high schools, which are in only one area of the country. Rogers' results are reproduced in Table II.

TABLE II

Estimates of Internal Rates of Return
to Investment in Education

	Rogers[a]	
	Unadjusted	Adjusted
From Grade 8 to Grade 12	9.13[a]	6.7[a]
From Grade 12 to 4 yrs. Col.	14.15	8.9

[a]Private rates of return before tax for white males. In each cell, the first figure is for high cost and the second for low cost education.

Source: Daniel C. Rogers, "Private Rates of Return to Education in the United States: A Case Study," Yale Economic Essays, Vol. 9, No. 1, (Spring, 1969), p. 124.

Rogers' main conclusions are that: "Expenditure on education appears to be a viable investment for all levels through college graduation," and "That education pays off for all people about equally well, regardless of intelligence (at least within wide limits)."[82]

Finally, there is a very recent study by Thomas Johnson which uses Hanoch's data but uses a model of investment behavior that assumes that the individual is making continuous decisions as opposed to Becker's discrete model of income generation.[83] Further, Johnson's model uses non-linear estimating techniques and accounts for the depreciation of human capital and the autonomous growth in earnings over time. For White males in the North, the calculated rates of return were 21% and 16% to high school and college, respectively, generally higher than previous estimates, including Hanoch's.[84]

The major conclusion from all these studies is that at least for White males, high school graduation is definitely a good investment, while a college degree is certainly competitive with alternative physical capital investments. When one considers that the evidence indicates that the social rate of return is likely to be higher than the private rate of return, especially for high school, these conclusions are reinforced. It should be noted that most studies have at the same time shown much lower rates of return to graduate education. The rates are low enough in some cases, to call into question the desirability of expanding graduate educational investment. Hunt and Rogers independently estimate the private rate of return to a second degree from zero to 6%, while Johnson's estimate is 10%.[85] A study by Ashenfelter and Mooney, using a follow-up questionnaire on Woodrow Wilson Fellows, provides estimates of rates of return to different types of Ph.D.'s in the range 5 to 11%.[86] Of course, their sample probably biased the rates upwards. In contrast to these estimates, Schultz calculated rates of return to graduate education at about 15%, although he counted graduate stipends as earnings (for which practice he attempts to make a case).[87]

The conclusion with regard to graduate study must be that any more than the current level of investment in graduate education is questionable. Because the social rate of return is not likely to be higher than the private rate and may even be lower due to the states' paying a larger share of the costs, including some of the student's opportunity costs, and, due to the fact that externalities are probably less important, the conclusions, based on the private rate of return analysis, are reinforced.

The pattern of rates of return falling with higher levels of education continues at the junior high and elementary level. Schultz and Hanoch's estimates for the return to elementary school range from 35 to 100%, while Johnson's estimate for the return to junior high school is in the 20 to 25% range.[88] And again the biases discussed in the early part of the paper indicate that the social return is apt to be much higher.

The estimates of returns to education range from a high of 100% for elementary school to a low of zero for some types of graduate education and the pattern of a falling rate of return appears to hold at each level of additional schooling. The implications for policy makers are that relatively more funds should be devoted to the lower levels of schooling than are now being allocated.

Discrimination and Rate of Return Analysis

Another area where rate of return studies have given economists insights is the problem of discrimination. Rate of return studies for Blacks and Whites have been attempted by many economists starting with Becker. Becker concluded that the return to college for Black males in the North was 8.3%, while it was 12.3% in the South.[89] This compares with 14.5% for White-urban males. The best study on comparative rates of return for Blacks and Whites

has been done by Johnson. His procedure allows him to make rigorous statistical tests of equality of the various rates of return. At the .01 level of probability, the hypothesis that the White rate of return in the South to high school, which is 17%, is equal to the non-White rate, which is 13%, must be rejected. A 9% return to Southern Whites attending graduate school is significantly different (in the statistical sense) from the 5% return to Southern Blacks. However, a 19.6% return to Southern Whites graduating from the 8th grade is not "significantly" different from the 18% return for non-Whites.[90]

The explanation for the difference which was given by Becker is that discrimination is more significant in jobs requiring higher amounts of education. Here is a case where the rate of return analysis does point out an imperfection in the market structure, but in this case, one that is not easily amenable to economic solution. If discrimination in jobs, and, perhaps, in quality of schooling (not reflected by lower costs), is the main explanation, then the social rate of return for Whites and non-Whites may be more nearly equal than the internal rate of return. This means that although non-Whites may be getting a correct signal from their own point of view, it is not the correct signal from a societal point of view. A strong case, on strictly economic grounds, can be made for compensatory educational programs for non-Whites at all levels of schooling, and for special programs that encourage non-Whites to pursue additional years of schooling that they would not otherwise undertake.

The order of magnitude of the dead weight loss to the U. S. economy of past and present school and employment discrimination against Blacks can be estimated with the help of recent data published in the American

Economic Review by James Gwartney. Gwartney attempts to explain the income differential in 1959 between Whites and non-Whites by estimating what the income differential would be if non-Whites had the same quantity of education in terms of years, the same scholastic achievement as measured by the Coleman Report, and the same state, rural-urban, and age distributions as the White population. He found that the unadjusted non-White to White income ratio would rise from about 58% to 84%, leaving 16% explained by employment discrimination.[92] In terms of 1960 national income, this amounts to $7.125 billion.[93]

However, this is not the only source of economic discrimination since the quality of education received by Blacks has certainly been lower[94] while the motivation to continue schooling, and indeed to learn, has been stifled by the knowledge of low rates of return and future job discrimination. Thus, one can argue that the lower quantity and quality of education received by Blacks ultimately has its cause in discrimination. Adding the loss due to lower quantity and quality of education adds $4.5 billion and $7.125 billion, respectively, to the dead weight loss of discrimination bringing the total to $18.75 billion. In terms of 1970 GNP, this total would have doubled to $37.5 billion, assuming there has been no significant progress in fighting economic manifestations of discrimination.[95] The costs of providing increased quantity and quality of education to Blacks should, of course, be subtracted from this estimate but given the new phenomenon of unemployed teachers and unused capacity, the social costs of employing unemployed teachers would be quite small, and therefore, the gross social gains of $37.5 billion would probably only slightly overstate the net social gain.

Hansen, Weisbrod, and Scanlon have recently published a study on the relationship between schooling and earnings of low achievers.[96] They used a sample of 2,400 men who had failed to pass the Armed Forces Qualification Test (AFQT), and attempted to "explain" earnings, using regression analysis with various independent variables, including years of schooling, AFQT scores, training and several demographic variables. The authors concluded that learning, as measured by AFQT scores, was more important in explaining earnings for low achievers than simply staying in school. In their words:

> They [low achievers] are unlikely to benefit financially unless an attempt is made to insure that they <u>learn</u> in school rather than merely <u>attend</u> school, and that they are not deprived of other valuable opportunities, such as training programs to enhance their earning power.[97]

To fit this in with the findings on rates of return, it appears that the increased resources that should be invested in primary and secondary education should be allocated to increase quality, rather than quantity, so that attending school can be made a more meaningful "learning" experience than it appears to be now, especially for low achievers.

<u>The Return to Increased Quality</u>

There is specific rate of return evidence on the effects of increasing the quality of education. Quality of schooling can be increased by paying higher salaries and hiring better teachers or improving the physical plant. One estimate of the return to paying teachers (elementary and high school) higher salaries in rural and farm areas made by Welch is between 23 and 26%.[98] Many studies have also examined the link between the quality of school inputs and the output of schooling as measured by verbal achievement scores. This is the problem of estimating the so-called educational production function.[99] Because these studies do not estimate the returns to improved quality of inputs,

they cannot be used to determine the amount of resources that should be allocated to education in general or among different levels of education. Once rate of return analysis has established that more funds should be allocated to a given type of educational investment project, the educational production functions studies can be used to determine how the funds should be allocated among the various inputs. Rate of return analysis can be fairly easily combined with production function studies once the link between higher verbal score and earnings is estimated.

Because estimating educational production functions is in its infancy, most studies stop with verbal scores as a measure of output. Here is another area where further work needs to be done. H. M. Levin, in writing a summary of the literature in this area, concluded that the one clear finding that stood out in almost all the studies of this type was that teacher salary levels and student achievement showed a positive and statistically significant relationship when other measurable influences were held constant.[100] The assumption, of course, is that higher teacher salaries mean better teachers. Levin himself has found that obtaining teachers with higher verbal scores is five to ten times more effective per dollar in raising student verbal scores than obtaining teachers with more experience.[101]

Educational Investment and Economic Growth

To this point, we have concentrated mainly on the allocation and distributional aspects of educational investment. We now turn to another way of evaluating educational investment. How does education influence the size of a nation's output? This is the general question to which we devote the remainder of this report.

Factors in Economic Growth

Economic growth may be regarded as increasing total national product or as raising future output, although any reasonable concern for economic growth must be for increasing per capita real income over time.[102] Increasing national product requires either (1) some addition in the quantity of productive resources, (2) some improvement in the quality of given resources, or (3) some more effective method of utilizing given resources. Since land is assumed to be fixed in quantity, this means that increases in total national product may be due to the use of more or better labor, the use of more or better physical capital, or more efficient use of labor, materials, and machines.

The Quantity of Productive Resources

The use of more labor may contribute to an increase in per capita national product only if the ratio of working to nonworking people increases.[103] This ratio depends in turn on many factors, such as the age composition of the population, the labor force participation rate, the employment rate, and the length of the work week. Education may influence (either postiively or negatively) all of these factors, particularly the labor force participation rate.

In a study of the census weeks of 1940, 1950, and 1960, Bowen and Finegan recently showed that education is associated positively with the U. S. participation rate.[104] In Table III, the 1960 labor force participation rates for males between the ages of thirty-five and fourty-four are shown to increase from 67.2 percent for those with no schooling completed to 98.7 with sixteen years completed. For less than twelve years of schooling completed, the labor participation rates are shown to decline between 1940 and 1960. Two important factors may explain this trend: (1) the increased industrial recognition of certification norms, and (2) the effective expansion of compulsory schooling,

The reason seems evident for the strong, positive relationship between education and the labor force participation rate. By staying out of the labor force, the more educated person has more to lose economically than a less educated person. Generalizations can be hazardous, however. In predominantly agricultural countries, for example, participation in the labor force may often be associated negatively with education. In short, an educated person may refuse to do agricultural work because he is "above" working as a common laborer, but he cannot be absorbed elsewhere in an economy which does not provide any alternative job opportunities.[105] "Overeducated" unemployment may also occur in highly industrialized societies which have produced too many Ph.D.'s, for example.

TABLE III

Schooling and Labor Force Participation:
Males 35-44, Census Weeks of 1940, 1950, 1960

Males 35-44 by years of school completed	Labor Force Participation Rate		
	1940[a]	1950	1960
0	77.7	70.5	67.5
1-4	91.3	91.9	87.1
5-7	93.4[b]	93.8	91.4
8	95.4[b]	95.6	94.4
9-11	96.1	96.2	95.9
12	96.3	97.0	97.7
13-15	96.2	96.6	97.7
16	97.3[c]	97.7[c]	98.7
17+			98.6
Total	94.8	94.6	95.6

Source: Bowen and Finegan, The Economics of Labor Force Participation, p. 60.

[a]The participation rates in the 1940 column are for native-born whites only.

[b]In 1940, data was reported for 5-6 and 7-8 years of school completed.

[c]The 1940 and 1950 reports did not give separate labor force estimates for persons with 17+ years of school completed.

Basically, the use of more physical capital depends on the saving and investment decisions of an economy. Bringing about an increase in the quantity of physical capital calls for the diversion of current resources away from consumption now and consumption in the future. As such, these decisions would be made on the basis of comparisons between individuals' (time) preference for present versus future goods and the productivity of the investment in raising future output. By aggregating all such individual decisions, the growth rate of the economy is determined. This process is referred to as the competitive determination of an economy's growth path.

This "classical" microeconomic version of economic growth focuses, therefore, on bringing about an increase in physical capital and discovering more effective ways of using given resources. Two serious challenges have been levied at this version. The first challenge to competitive determination of economic growth came initially out of the work of John Maynard Keynes and others who were instrumental in imposing a new paradigm on the discipline during and particularly after the Great Depression.[106] Particularly on the basis of work by Harrod and Domar, the nature of this challenge was that, because of the unemployment of resources, the aggregation of individual decisions may lead to a growth rate which is unsatisfactory.[107]

The second challenge to competitive determination of the growth rate grew out of the "externalities" discussion. Not all of the benefits or costs of some growth-related activities may accrue to the individual(s) concerned. Accordingly, the decision would be based on incomplete social data, which is to say that social evaluation of costs and benefits might result in either more or less economic growth. In the 1930s, the argument was that private decisions result in too little growth because of defective

"telescopic" faculty.[108] In the 1970s, however, there is increasing consensus that private decisions may result in too much growth.[109]

In any event, although education may influence both saving and investment decisions, the influence may be either positive or negative. Even so, the influence is likely to be too slight and indirect and slow to be taken into account in educational planning.[110]

The Quality of Productive Resources

In the 1950s, evidence began to accumulate that quantity changes in labor and capital were by no means as dominant or even as significant as had been thought earlier by most economists.[111] There was a large "residual" of growth that could not be explained statistically in terms of the usual inputs. Eventually, it became clear that the residual was greater as the growth rate was larger, i.e., the conventional models worked well only when there was relatively little growth to be explained.[112] Although factors of economic growth other than quantity changes in labor and physical capital had long been recognized, the size of the residual was surprising.[113]

The residual was attributed to technical change, technological progress, or to the increased "productivity" per unit of input employed. (Modern large scale research is now highly organized and is shifting some of the emphasis to "research and development," which of course has many links to education.) It was understood that technological progress (or research and development) had the effect of promoting a change in the quality of capital inputs employed, which in its turn aided in promoting the rate of economic growth.[114]

Education may have some effect on the use of better physical capital. Machlup, for example, mentions that education may train people who then will have the capacity for research and development. Also, education may serve

to make people more capable of using improved machinery as well as more alert to and interested in its availability and use.[115]

A logical extension of the idea of a change in the quality of physical capital was to apply it to labor. As a matter of fact, the aforementioned residual of unexplained economic growth once was referred to as the "human factor." Although the literature of the 1950s did not develop exhaustively the possible ways in which education could affect the contribution of labor to output, it was fully recognized that the rate of growth could be increased not only by increasing physical capital but also by a conscious effort to improve the quality of labor through education. This soon led to attempts to identify and to measure the influence of education on the contribution of labor to economic growth.

Obviously, it is with regard to improvements in the quality of labor that education can make its most direct and significant contribution to economic growth.[116] Machlup lists five positive effects which may be expected: (1) better working habits and efforts, greater discipline and reliability; (2) better health through more wholesome living; (3) improved skills and efficiency, better understanding of work requirements; (4) prompter adaptability to changes; and (5) increased mobility to more productive occupations when opportunities arise.[117] In addition, economic growth may be affected simply by improving the allocation and use of given resources. For example, Denison found for nine countries (including the United States) that they had an excessive allocation of labor to agriculture. National product and national product per employed person was smaller, in other words, than these could have been with a smaller percentage of the labor force allocated to agriculture and a larger proportion to non-farm production.[118] Most of these ways have little or nothing to do with education.

Mystery of the Econometric Residual

Studies of the sources of or contributions to economic growth usually begin by trying to measure the effect on national income of increments in resources and of improvements in their quality and use. The part of an increase in national income that is not "explained" statistically by increments in labor and physical capital is called the "residual." In the early literature, the residual was considered simply as technical progress, and the studies ended there. Other studies began to dissect the residual.[119] "Embodiment" models developed by Robert Solow and others tried to separate the part of technical progress that was "embodied" in newer capital from the part "disembodied" in more efficient production processes and more efficient use of resources.[120] Other studies, such as the pioneering one by T. W. Schultz and those of E. F. Denison, tried to disaggregate the contribution of education.

Stock of Education

T. W. Schultz compared real income in 1929 and 1957 and calculated the portion not "explained" statistically by increments of labor and physical capital.[121] He then compared the "total value of the stock of education" in 1957 with that of 1930 and separated the increase in the stock of education into (1) the part invested in the increased labor force necessary to give each worker the average education of 1930, and (2) the part ("stock of education added") invested in raising the educational level of the average worker.

Schultz applied this method to the longer period of 1900 to 1957 and found that the stock of education has risen from $63 billion in 1900 to $535 billion in 1957 (both series measured in 1956 schooling costs).[122]

These stocks were equivalent to twenty-two percent and forty-two percent, respectively, of "non-human reproducible wealth" in the same years.[123] Clearly, educational capital could be a significant factor of production, and Schultz's study indicated it was becoming relatively more important. For example, the stock of education in the labor force rose over the period by eight and one-half times, whereas physical assets rose by only four and one-half times.

The most basic idea advanced by Schultz was that investment in education has yielded a return in the form of a faster than otherwise rate of growth of national income. The idea itself has been accepted widely by economists and is not in question at this time. On the other hand, there have been warnings about the numerical results ranging from arguments that the empirical evidence is too meager to support the large amount of theorizing[124] to suggestions that Schultz's estimates should be interpreted with care.[125] Despite misgivings about the methodology and data, however, no serious doubt has been cast on the theory itself, and the concepts developed by Schultz have been accepted as clearly relevant to the analysis of the growth process.

Education and the Level of Output

The next logical and important step in this approach was to measure the contribution which changes in the quality of labor have on the level of output. The most ambitious and comprehensive treatment of this aspect is that of Edward Denison, who attempted to assess the contribution of education to economic growth by using the incomes of the educated as an indicator of the returns to education.[126]

Denison's first study dealt with the period 1909-1957, which he separated into two periods, 1909-1929 and 1929-1957. He estimated the growth rate in

real national income to have been 2.82 percent annually during 1909-1929 and 2.93 percent annually for 1929-1957. Denison estimated the sources of this growth as follows: (1) additions to the stock of physical capital were estimated to have accounted for 0.73 and 0.43 percentage points, respectively, for the two periods; (2) changes in the labor force contributed 1.53 and 1.57 percentage points, respectively, made up of both quantity and quality changes; and (3) the major quality change in labor was education, which contributed 0.35 and 0.67 percentage points, respectively. Changes in both capital and labor accounted for growth rates of only 2.26 and 2.00 percent, respectively, however, leaving unexplained sizeable residual "productivity" increases of 0.56 percent and 0.93 percent. Even so, Denison estimated that education was a significant source of economic growth, accounting for twelve percent of total growth in the first period and twenty-three percent in the second period.[127]

A later study by Denison dealing with the United States and eight western European countries for the period of 1950-1962 showed sharply different results. In Table IV, column 4, it can be seen that only for three countries, United States (0.49), Belgium (0.43), and Italy (0.40) did education account for as much as 0.4 to 0.5 percentage points in national income growth per annum. And only for three countries, United States (fifteen percent), Belgium (fourteen percent), and United Kingdom (twelve percent) did education account for as much as ten percent of the total growth rate (see column 7). Only two percent of Germany's total growth is attributed to education. Again, it is all too apparent that it is easier to "explain little growth than much growth.

TABLE IV

Sources of Economic Growth in Nine Western Nations 1950-62
(As Estimated by Edward F. Denison)

	Growth Rates in Percentage Points per Annum						Proportion of Total Growth Explained by:	
	Contributions of Factor Inputs							
	Total Growth	Physical Capital	Employment	Education	Other Labor Adjustments	Increased Output per Unit of Input	Education	Output per Unit of Input
	(1)	(2)	(3)	(4)	(5)[a]	(6)	(7)	(8)
United States	3.36	.83	.90	.49	-.27	1.41	15	42
Belgium	3.03	.41	.40	.43	-.07	1.86	14	61
Denmark	3.36	.96	.70	.14	-.25	1.81	4	54
France	4.70	.79	.08	.29	.08	3.46	6	74
Germany	7.26	1.41	1.49	.11	-.23	4.48	2	62
Netherlands	4.52	1.04	.78	.24	-.15	2.61	5	58
Norway	3.47	.89	.13	.24	-.22	2.43	7	70
United Kingdom	2.38	.51	.50	.29	-.19	1.27	12	53
Italy	5.95	.70	.42	.40	.14	4.29	7	72

Source: Bowman, "Education and Economic Growth," p. 93, derived in turn from Denison, Why Growth Rates Differ, Tables 21-1 through 21-20.

[a]Adjustments are for mean hours worked and changes in the age and sex composition of the labor force.

Denison's calculations have been highly controversial, and acceptance of them seems based on attitudes toward the validity of his measurement procedures.[128] Objections have been levied at everything from an alleged misapplication of the marginal productivity theory of income[129] to an alleged arbitrariness in allocating increased earnings accounted for by ability and by education.[130] Several observations seem warranted. First, those economists who tend to accept Denison's results as a first approximation (except for detail and misleading claims of accuracy) are generally those who accept the validity of the connection between income shares and marginal contributions to output, and those who do not accept his results even as first spproximations are those who deny the applicability of the connection. Second, it seems clear, if Denison's results can be accepted with caution, that the part played by education can vary widely from time to time and from country to country, regardless of the rate of economic growth. Finally, a large proportion of growth remains unexplained. From Table IV, for example, it can be seen that two-fifths to three-fourths of national income cannot be explained (see column 8). We are still at a loss to explain the real dynamics of economic growth, and the specter of an uncomfortably large residual persists.

Education and Economic Growth: Some Unanswered Questions

Obviously, much remains to be done in identifying and measuring the sources of economic growth and the influence of education on the contribution of labor to economic growth. Three examples may be cited as being particularly in need of serious study -- study which could contribute worthwhile inputs to policy makers.

1. Education Mix: Mary Jean Bowman has stressed an idea which may prove important in the education literature, namely, that studies to date have ignored

the effect of distribution of educational attainment on per capita income.[131]

2. Skill as Adaptation and Innovation: Bowman (et al.[132]), in particular, also has stressed for some time that the essence of growth is that it is a dynamic process, and that the role of education in economic growth lies in preparation for learning and adaptation in order to participate effectively in that growth. It has been suggested that education, by raising the level of adaptability, provides for a rapid diffusion of improved technologies and may explain why the supply of and demand for college-trained persons have moved together in the 1960's. In other words, technical change calls for a relatively high level of rapid learning and adaptation, the capability of which may be adduced by college certification or so it is held in the "conventional wisdom." We need to test these hypotheses.

3. Productivity "Externalities": One source of imprecision in the type of studies which have been undertaken to date is productivity "externalities." In short, especially where production is the result of highly organized human activity, the education of one worker may have favorable effects on the productivity of fellow workers. Such "education" is not caught by measurements of the Denison type.

Summary and Conclusion

Education clearly has important economic dimensions which render it a proper subject for economic analysis. Theodore Schultz recognized this a decade ago when he first began focusing attention upon the investment characteristic of education. The widespread acceptance of this characteristic has resulted in the kinds of economic research summarized in this report. Rate of return analysis, benefit-cost analysis, and measurements of the impact on the incomes of particular

individuals and the society as a whole are the main examples of this.

The policy implications are far reaching. If economic efficiency is truly an important consideration in determining resource allocation in general and specifically with education, then the findings provided by economists are crucial to private and public decision making. The evidence suggests, for example, that higher education shows a fairly stable pay-off over time of about 15 percent, which is very similar to the rate of return on investment in the economy taken in its entirety. High School, on the other hand, appears to show a rising rate of return since World War II, upward of 25 percent for white males, while elementary schooling has been yielding well over 35 percent.

The comparison of the actual allocations with their respective rates of return clearly indicates some serious misallocations in our economic society. Permitting our human capital to deterioriate, maldistributing our educational investments because of social and institutional practices and arrangements, and especially overt and covert racial and sexual discrimination which results in inferior schooling and inferior job opportunities -- all of these have distorted our educational investment decisions. Hard data may help correct these distortions resulting in redirections which would be not only more efficient but also more socially desirable.

Footnotes

*The authors are Professor and Chairman, Associate Professor, and Assistant Professor in the Department of Economics, University of Florida, Gainesville, Florida.

[1]Fritz Machlup, Education and Economic Growth, (Lincoln, Neb.: University of Nebraska Press, 1970), p. 5. Also, cf. Machlup's earlier book, The Production and Distribution of Knowledge in the United States (Princeton, N. J.: Princeton University Press, 1962), pp. 108-110, 115.

[2]See Theodore W. Schultz, "Investment in Human Capital," American Economic Review, LI (December, 1961), pp. 1-17; Schultz, "Reflections on Investment in Man," Journal of Political Economy, LXX (Supplement: October, 1962), pp. 1-8; Gary Becker, "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy, LXX (Supplement: October, 1962), pp. 9-50; and Becker, Human Capital (New York: National Bureau of Economic Research, 1964).

[3]See Anne O. Krueger, "Factor Endowment and Per Capita Income Differences Among Countries," The Economic Journal, LXXVIII (September, 1968), pp. 641-659.

[4]From Schultz, "The Human Capital Approach to Education," in Economic Factors Affecting the Financing of Education, edited by Roe Johns, Irving Goffman, Kern Alexander and Dewey Stollar, (Gainesville: National Educational Finance Project, 1970), p. 35.

[5]Exceptions here might be investments that change the ecology of an area and cause permanent damage.

[6]See George J. Stigler, "Information in the Labor Market," The Journal of Political Economy, LXX (Supplement: October, 1962), pp. 94-105.

[7]See Finis Welch, "Labor Market Discrimination: An Interpretation of Income Differences in the Rural South," The Journal of Political Economy, 75 (June, 1967), pp. 225-240.

[8]There is disutility in the sense that if one was financially secure for life, he would probably not choose the particular occupation that he is in.

[9]The following discussion is based on T. Schultz, "The Human Capital Approach to Education," pp. 18-19.

[10]Roland N. McKean, Public Spending (N.Y.: McGraw-Hill, 1968), p. 135.

[11]Cf. J. V. Krutilla and Otto Eckstein, Multiple Purpose River Development (Baltimore: The Johns Hopkins Press, 1958); and Otto Eckstein, Water Resource Development (Cambridge, Mass.: Harvard University Press, 1958).

[12]Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age (Cambridge, Mass.: Harvard University Press, 1960).

[13]Cf. Alan R. Prest and Ralph Turvey, "Cost-Benefit Analysis: A Survey," Economic Journal, 75 (December 1965), pp. 683-735.

[14]Mary Jean Bowman, "Education and Economic Growth," Economic Factors Affecting the Financing of Education, pp. 87-88.

[15]McKean, p. 136. Also, cf. Selma J. Muskin and William Pollak, "Analysis in a PPBS Setting," Economic Factors Affecting the Financing of Education, pp. 330-331.

[16]M. Blaug, "The Rate of Return on Investment in Education," in M. Blaug, editor, Economics of Education (Baltimore: Penguin Books, 1968), p. 167.

[17]The discussion of economic and social spillovers follows very closely, J. Ronnie Davis, "The Social and Economic Externalities of Education," Economic Factors Affecting the Financing of Education, pp. 59-81.

[18]Two comments are in order. First, since children legally are not responsible members of society, education primarily is a task of adult society. Second the benefits may be either positive or negative.

[19]For example, see U. S. Department of Labor, Manpower Report of the President (Washington: U. S. Printing Office, 1970), p. 167.

[20]A start on developing a framework for analyzing the future demand for education has been made by Kenneth E. Boulding in "Factors Affecting the Future Demand for Education," in Johns, et al., editors, pp. 1-28.

[21]For an exposition of this position, see Ivar Berg, The Great Training Robbery (New York: Praeger Publishers, Inc., 1970).

[22]For a strong criticism of Berg's position, see Mary Jean Bowman, "Education and Economic Growth," in Johns, et al., editors, pp. 105-110.

[23]Milton Friedman and Simon Kuznets, Incomes From Independent Professional Practice (New York: National Bureau of Economic Research, 1945).

[24]Burton A. Weisbrod, "Education and Investment in Human Capital," Journal of Political Economy, Supplement 70 (October 1962), pp. 106-123; External Benefits of Public Education, (Princeton, N. J.: Industrial Relations Section, Department of Economics, Princeton University, 1964). Also, for a very similar study, cf. Werner Z. Hirsch, et al., Spillover of Education Costs and Benefits (Los Angeles: Institute of Government and Public Affairs, UCLA, 1964).

[25]Cf. Weisbrod, "Education and Investment in Human Capital."

[26]Martin O'Donoghue, Economic Dimensions of Education, (Chicago: Aldine-Atheneum, 1971).

[27]Weisbrod, External Benefits of Public Education, p. 29

[28]Burton A. Weisbrod, and William J. Swift, "On the Monetary Value of Education's Intergeneration Effects," Journal of Political Economy, 73 (December 1965), pp. 643-649.

[29]See Finis Welch, "Education in Production," Journal of Political Economy, 78 (January-February, 1970), pp. 35-59.

[30]Ibid., p. 36.

[31]Ibid., p. 55.

[32]Weisbrod also claims, under the residence-related external benefits the child-care services to mothers and the informal education for future children of the educated. If children were the decision-makers, these benefits might be considered to be external. Because parents make such decisions, certainly the first and probably the second are internal to the family, which is the decision-making entity. Only the benefits listed by Weisbrod which seem truly external to the family are discussed here.

[33]Weisbrod, External Benefits of Public Education, pp. 30-31.

[34]Ibid., p. 32.

[35]Cf. Hirsch, et al., p. 336.

[36]O'Donoghue, p. 92.

[37]Weisbrod, External Benefits of Public Education, pp. 32-34

[38]Economic and other barriers also might be removed from education and training themselves. Cf. James S. Coleman: "Equal Schools or Equal Students," The Public Interest, 1 (Summer 1966), p. 72.

[39]For a summary of alternative adjustments, cf. Otto A Davis and Morton I. Kamien, "Externalities, Information and Alternative Collective Action," Public Expenditures and Policy Analysis, ed., Robert H. Haveman and Julius Margolis (Chicago: Markham Publishing Company, 1970), pp. 74-95.

[40]Two strong advocates of such a scheme are Friedman and Buchanan. Cf. Milton Friedman, Capitalism and Freedom, (Chicago: University of Chicago Press, 1962); and James M. Buchanan and Nicos E. Devletoglou, Academia in Anarchy (N. Y.: Basic Books, 1970).

[41]Cf. John D. Owen, "Education for Majority Voting?", Public Choice 6 (Spring 1969), pp. 65-66.

[42]Weisbrod, External Benefits of Public Education.

[43]Hirsch, et al.

[44]Whatever these "spillovers" are, some argue they are not externalities. Shoup has called these simply "a geographical concept involving only one service at a time, a service or disservice--rendered over an area only part of which is

(footnote 44 continued)
within the boundaries of a political group, that is, within the boundaries of the governmental unit that decides upon and dispenses the service." Carl S. Shoup, Public Finance (Chicago: Aldine, 1969), p. 97. Weisbrod nonetheless refers to benefits which accrue inside the school district as "internal" benefits and those which accrue to persons outside the district as "external" benefits.

[45]Hirsch, et al., p. 414 dispute this. They argue that spillovers lead to underinvestment in some instances and to overinvestment in others. Hirsch, et al.

[46]R. Malul, "Review of B. A. Weisbrod, External Benefits of Public Education," Journal of Political Economy, 73 (December 1965), pp. 667-668.

[47]A. G. Holtmann, "A Note on Public Education and Spillovers Through Migration," Journal of Political Economy, 74 (October 1966), pp. 524-525.

[48]A. Williams, "The Optimal Provision of Public Goods in a System of Local Government," Journal of Political Economy, 74 (February 1966), pp. 18-33.

[49]Cf. James M. Buchanan, The Public Finances (Homewood, Ill.: Irwin, 1970), pp. 417-432.

[50]Cf. Weisbrod, External Benefits of Public Education, p. 133; and Shoup, op. cit., p. 133.

[51]For example, cf. Paul L. Dressel, "Comments on the Use of Mathematical Models in Educational Planning," Mathematical Models in Educational Planning (Paris: OECD, 1967), pp. 275-288.

[52]Shoup, loc. cit.

[53]Weisbrod, op. cit., p. 31.

[54]Charles A. Benson, The Economics of Public Education (Boston: Houghton Mifflin, 1961), p. 145.

[55]Machlup, pp. 55-56.

[56]E. G. West, Education and the State (London: Institute of Economic Affairs, 1965); and Economics, Education and the Politician (London: Institute of Economic Affairs, 1968).

[57]West, Education and the State, p. 36.

[58]O'Donoghue, p. 90.

[59]Jack Wiseman, "Cost Benefit Analysis in Education," Southern Economic Journal, Supplement, 32 (July 1965), p. 1-14.

[60]For example, see Ronnie Davis, pp. 67, 68.

[61]See Simon Kuznets, "Economic Growth and Income Inequality," American Economic Review, 45 (March, 1955), pp. 1-28; and _____, "Quantitative Aspects of Economic Growth VII," Economic Development and Cultural Change, (January, 1963), pp. 1-80.

[62]Paul Samuelson, Economics, 8th edition, (New York: McGraw-Hill Book Company, 1970), pp. 112-113. However, Samuelson also points out that income inequality has not declined in the United States since 1945. This despite a "phenomenal rise in average education over this period." (See Welch, "Education in Production," p. 36.

[63]Thomas I. Ribich, "The Effect of Educational Spending on Poverty Reduction," Economic Factors Affecting the Financing of Education, pp. 207-208.

[64]Cf. Ibid., pp. 208-233.

[65]Thomas I. Ribich, Education and Poverty (Washington: Brookings, 1968), pp. 34-99; also ibid., pp. 226-230.

[66]Ribich, "The Effect of Educational Spending on Poverty Reduction," pp. 230-231.

[67]See B. R. Chiswick, "The Average Level of Schooling and the Intra-Regional Inequality of Income: A Clarification," American Economic Review, LVIII (June, 1968), pp. 495-500, and _____, "An Interregional Analysis of Schooling and the Skewness of Income," in W. Lee Hansen, pp. 157-191.

[68]Chiswick, p. 495.

[69]Edward Denison, "An Aspect of Inequality of Opportunity," Journal of Political Economy, 78 (September-October, 1970), pp. 1195-1202.

[70]Ibid., p. 1199.

[71]Cf. Roland N. McKean "The Use of Shadow Prices," Problems in Public Expenditure Analysis, ed., Samuel B. Chase, Jr. (Washington: Brookings, 1968), pp. 33-37; also McKean, op. cit., p. 73.

[72]Cf. McKean, Public Spending, pp. 128-129.

[73]Welch, p. 55, found that there was no education in production effect for high school graduates in farming while there was a significant effect for college graduates.

[74]For example, Schultz holds this view. See Schultz, p. 50.

[75]Becker, Human Capital.

[76]Ibid., p. 78 and 120.

[77]See D. W. Jorgenson and Z. Grillichs, "The Expansion of Productivity Change," Review of Economic Studies, 34 (July, 1967), pp. 249-83.

[78]Schultz, p. 50.

[79]See Giora Hanoch, "Personal Earnings and Investment in Schooling," (unpublished Ph. D. dissertation, University of Chicago, 1965), and Hanoch, "Personal Earnings and Investment in Schooling," Journal of Human Resources (Summer, 1967), pp. 310-29.

[80]See W. Lee Hansen, "Total and Private Rates of Return to Investment in Schooling," Journal of Political Economy, 71 (April, 1963), pp. 128-140.

[81]Daniel C. Rogers, "Private Rates of Return to Education in the United States: A Case Study," Yale Economic Essays, 9 (Spring, 1969), pp. 89-134.

[82]Ibid., pp. 127, 128.

[83]See Thomas Johnson, "Returns From Investment in Human Capital," American Economic Review, LX (September, 1970), pp. 546-560.

[84]Ibid., p. 558.

[85]Rogers, p. 124; Shane Hunt, "Income Determinants for College Graduates and the Return to Educational Investment," Yale Economic Essays, 3 (Fall, 1963), pp. 305-357; Johnson, p. 558.

[86]Orley Ashenfelter and Joseph Mooney, "Some Evidence on the Private Returns to Graduate Education," ," The Southern Economic Journal, XXXV, (January, 1969), pp. 247-256.

[87]Schultz, p. 48.

[88]Ibid., and Johnson, p. 558.

[89]Becker, p. 94.

[90]Johnson, pp. 557, 558.

[91]James Gwartney, "Discrimination and Income Differentials," The American Economic Review, LX, (June, 1970), pp. 396-408. Also see his "Changes in the Nonwhite/White Income Ratio--1939-1967" in the same journal (December, 1970), pp. 872-883.

[92]Gwartney, p. 402.

[93]This figure and the following aggregate estimates were calculated by the authors by applying Gwartney's estimates to national income figures for 1960 as found in U. S. Bureau of the Census Statistical Abstract of the United States 1966 (87th edition), Washington, D. C., 1966.

[94]Finis Welch has estimated that during the fifties in the South, the nonwhite to white total current expenditure per pupil ratio was only 52%. See his "Labor-Market Discrimination: An Interpretation of Income Differences in the Rural South," p. 237.

[95]A more accurate estimate must await the arrival of the 1970 census data.

[96]See W. Lee Hansen, Burton A. Weisbrod, and William J. Scanlon, "Schooling and Earnings of Low Achievers," American Economic Review, LX (June, 1970), pp. 404-418.

[97]Hansen, p. 417.

[98]Schultz, p. 48.

[99]For an excellent discussion of all the problems of estimating an educational production function and for one of the first attempts at doing so, see Samuel Bowles, "Towards an Educational Production Function," in W. Lee Hansen (editor), Education, Income and Human Capital (New York: National Bureau of Economic Research, 1970), pp. 11-70, and the discussion that follows.

[100]Henry M. Levin, "The Effect of Different Levels of Expenditure on Educational Output," in Johns, et al., editors, pp. 173-206. This was also a conclusion of the Coleman Report. See James S. Coleman, et al., Equality of Educational Opportunity, O. E. 38001 (Washington: U. S. Office of Health, Education and Welfare, 1966), p. 316.

[101]See Henry M. Levin, "A Cost-Effectiveness Analysis of Teacher Selection," The Journal of Human Resources, 5, (Winter, 1970), pp. 24-33.

[102]As all know who have choked on air fouled by increased production, there are serious weaknesses in the popular presumption that a rise in per capita real income is a "good thing" in itself. The problem is that no provision is made for "negative goods" or "bads" in the commonly employed indices of measurement. For a widely-acclaimed discussion of the costs of economic growth, cf. E. J. Mishan, The Costs of Economic Growth (London: Staples Press, 1967) and Technology and Growth (N.Y.: Praeger, 1970). For attempts to design indices which capture the positive and negative "signs," i.e., the pluses and minuses of economic and social change, cf. Toward a Social Report (Washington: U. S. Department of HEW, 1969).

[103]Population increases have been emphasized in the discussion of economic growth and development since the eighteenth century. Adam Smith, generally regarded as the progenitor of modern economics, was optimistic that a growing population made possible an increasing division and specialization of labor. As the labor force expanded, each worker could become more and more a specialist by concentrating on or mastering a few skills or even one, and by that means foster increased productivity. Smith's unbounded optimism was countered by the pessimism of Thomas Robert Malthus and David Ricardo, both of whom regarded population growth an anathema leading to aboslute declines in per capita income to the point where no economic progress could take place. In their theories, population made unrealized demands on food supply so that there would be recurring waves of endemic starvation and misery. The only class accumulating wealth would be landowners who, as wastrels, were not likely to invest in real capital formation. And capital investment was one of only a few ways to avoid the specter of the "stationary state," which was a condition of such utter despair that it earned for economics its renown as the "dismal science."

[104]William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation (Princeton, N. J.: Princeton University Press, 1969), pp. 53-62.

[105]Cf. W. Arthur Lewis, "Education and Economic Development," Readings in the Economics of Education, ed. Mary Jean Bowman, et al. (Paris: UNESCO, 1968), pp. 135-145. Also, for international comparisons of education, labor, and economic growth, cf. Frederick Harbison and Charles A. Myers, Education, Manpower and Economic Growth (N.Y.: McGraw-Hill, 1964).

[106]Cf. John Maynard Keynes, The General Theory of Employment Interest and Money, (N.Y.: Harcourt, Brace & World, 1936).

[107]Cf. Roy Harrod, "An Essay in Dynamic Theory," Economic Journal, 49 (March, 1939), pp. 14-33; and Evsey D. Domar, "Capital Expansion, Rate of Growth and Employment," Econometrica, 14 (April, 1946), pp. 137-147.

[108]Cf. A. C. Pigou, Economics of Welfare, (London: Macmillan, 1932), p. 25.

[109]Cf. Mishan, Technology and Growth.

[110]Machlup, p. 7. Also, cf. Martin O'Donoghue, pp. 101-104.

[111]Cf. Robert Solo, "Technical Change and the Aggregate Production Function," Review of Economics and Statistics, 39 (August 1957), pp. 312-320; Olavi Niitamo, "Development of Productivity in Finnish Industry, 1925-1952," Productivity Measurement Review, no. 16 (February 1959), pp. 35-50.

[112]For an excellent but intricate summary and critique of this literature, cf. Mary Jean Bowman, "Education and Economic Growth," Economic Factors Affecting the Financing of Education, eds. Roe L. Johns, et al. (Gainesville, Fla.: National Educational Finance Project, 1970), especially pp. 85-86.

[113]The results led many economists to question the validity of models using the "Cobb-Douglas production function" and of the data to which they were applied. Cf. John Vaizey, The Economics of Education (N. Y.: The Free Press of Glencoe, 1962), p. 39.

[114]Cf. O'Donoghue, pp. 105-107.

[115]Machlup, p. 8.

[116]However, many economists have looked more to unmeasured improvements in the quality of physical capital than in the quality of labor. Cf. Bowman, pp. 89-90.

[117]Machlup, pp. 7-8.

[118]Edward F. Denison. Why Growth Rates Differ (Washington: The Brookings Institution, 1967), p. 202.

[119]For a brief and lucid account of the methodology of such studies, cf. Machlup, pp. 10-15.

[120]Cf. Robert M. Solow, Capital Theory and the Rate of Return, (Amsterdam: North-Holland, 1963).

[121]Theodore W. Schultz, "Education and Economic Growth," Social Forces Influencing American Education, ed. Nelson B. Henry (Chicago: University of Chicago, 1961), pp. 46-88.

[122]T. W. Schultz, "Rise in the Capital Stock Represented by Education in the U. S., 1900-1957," Economics of Higher Education, ed. Selma J. Mushkin (Washington: U. S. Department of HEW, Office of Education, 1962), pp. 93-101.

[123]Cf. Theodore W. Schultz, "The Human Capital Approach to Education," Economic Factors Affecting the Financing of Education, p. 34.

[124]M. J. Bowman, "Human Capital: Concepts and Measure," Economics of Higher Education.

[125]Machlup, pp. 13-15.

[126]Cf. Edward F. Denison, The Sources of Economic Growth in the United States and the Alternatives Before Us, (N.Y.: Committee for Economic Development, 1962); Why Growth Rates Differ; "Measuring the Contribution of Education to Economic Growth," The Residual Factor and Economic Growth, (Paris: Organisation for Economic Cooperation and Development, 1964), pp. 13-55. Denison's technique basically is to feed rates of return to education into a production function of the Cobb-Douglas type. The kinds of results yielded by this approach rest upon many analogies with capital theory, the validity of marginal productivity hypothesis, and the acceptability of his methods of measuring education inputs, all of which have been challenged widely.

[127]For the second period, Denison distributed the residual over a range of other factors, the two most important of which were "advances in knowledge" and economies of scale, accounting for 0.58 percent and 0.35 percent, respectively. If advances in knowledge are considered to be educational in nature, then the relative importance of education is even greater. For a highly readable summary of Denison's work, cf. O'Donoghue, op cit., pp. 107-109. Also, because of the wide variance of his results with those of Denison's, cf. Hector Correa, The Economics of Human Resources (Amsterdam: North-Holland, 1963), p. 172.

[128]For detailed criticism of Denison's methodology and calculations, cf. The Residual Factor and Economic Growth, which unintentionally was a symposium on his work.

[129]Nicholas Kaldor, for example, argued that the extreme conditions of "perfect" competition and the absence of "external" economies were basic but unfulfilled assumptions of Denison's assumption that income received is a measure of the contribution to output which a particular factor makes. Also, he argued that labor's marginal product exceeds its average product because short-run fluctuations in employment are accompanied by more than proportional fluctuations in output, and therefore cannot have anything to do with its share in incomes. Cf. Nicholas Kaldor, "Comments on Mr. Ingvar Svennilson's Paper," The Residual Factor and Economic Growth, pp. 138-143.

[130]Denison allocated sixty percent of higher earnings to education and forty percent as an adjustment for other influences such as ability. He has not been convincing in arguing that this assumption flows from any plausible data.

[131]Bowman, "Education and Economic Growth," pp. 96-100.

[132]Bowman, pp. 110-111. Also cf. R.R. Nelson and E. S. Phelps, "Investment in Humans, Technological Diffusion, and Economic Growth," American Economic Review, 56 (May 1956), pp. 69-76.

Final Report
August 1971

REVENUE LIMITATIONS RELATED TO ECONOMIC GROWTH

Particular Emphasis on Educational Programs

by

Irving J. Goffman and Frederick O. Goddard

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Contract No: OEC-0-71-1346
Contractor: Irving J. Goffman
Department of Economics
University of Florida
Gainesville, Florida 32601

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Introduction

Since the end of World War II, state and local expenditures have risen continuously and at a rate exceeding that of GNP or of Federal, non-defense expenditures. In 1948, total state and local expenditure was $17.7 billion while in 1968-69 it was $116.7 billion.[1] Some of this growth is due to inflation and population growth but even with inflation taken out it represents an increase in per capita expenditures in excess of 180 percent.[2] The American public has demanded, and government has provided, more and better education, highways, welfare, police and fire protection, and other public services. There is no reason to expect this trend to abate. The President's Council of Economic Advisors projects a growth of 26 percent in state and local expenditures by 1975.[3] If such growth is to continue, funds must be found to finance it.

State and local governments have five sources of funds for financing specific projects: taxes, debt, intergovernmental grants-in-aid, user fees, and reallocations from other projects. Debt and reallocations from other government projects are not likely sources of finance for long run growth of education expenditures. Debt has been and will continue to be an important component of the financing of education, but debt is only a postponement of payment and state and local governments need to be able to anticipate growing sources of other revenue if they are to use increasing debt to finance immediate school expenditures. Reallocations from other government projects seems unlikely in light of recent trends in public concern for social problems such as pollution, poverty, law and

order, and transportation and urban redevelopment. At the same time the public has become disgruntled over what is viewed as a deterioration of quality and control in the schools and a lack of appreciation on the part of students for educational opportunities already provided. In short, education received much public attention and priority during the 1960's, but it may not receive the same relative support during the coming decade. Other social problems have come to the fore and non-educational programs are becoming increasingly competitive for the limited revenues of state and local governments.

If expenditures for education are to grow then, the revenues must come from taxes, grants-in-aid, or user charges. Each of these is examined in turn below.

Revenue Availability

Taxes are and will remain the primary source of revenue for state and local expenditures. In 1967, 66.7 percent of total state and local receipts were from their own taxes.[4] State and local governments can obtain the increases in tax revenues needed to finance growing expenditures in two ways. First by increasing the applied rates for existing tax systems and by introducing new tax systems, and second by having tax systems that produce growing revenues as a result of growth in national income. This second method of obtaining increased revenues depends upon the income elasticity of a tax system. It will be seen that while all taxes have some positive elasticity (that is, revenues increase with increases in community income), few taxes have an elasticity sufficient to assure the revenue growth needed to meet anticipated growth of expenditures without new tax systems or tax rate increases.

In considering increased tax revenues, whether from legislative action or economic growth, it is not the direct increases in revenue from a specific tax that is important, but rather the total, direct and indirect, impact upon the government's revenues. It is possible, indeed probable, that an increase in revenues for one tax system will lower the revenue obtained from other tax sources. For example, an increase in sales tax revenues is in part offset by any deductions allowable in computing income taxes.[5] In addition, a tax may, by its effects on incentive or mobility, cause an unacceptably large excess burden upon the citizenry, that is, a burden in excess of the immediate pecuniary burden of the levy. The most important of these effects for state and local governments involves decisions relative to the location of individuals and businesses. Finally, the actual usable revenues obtained from a tax are reduced by the amount that must be expended to administer the tax. This includes costs of assessment, collecting, auditing and enforcement.

Property Tax

The traditional tax for support of education in the United States is the property tax. In 1969, local governments received 86 percent of their tax revenue from this source, and school districts received 99 percent of their tax revenue from property taxes.[6] In many respects the property tax is a good tax for local governments and thus for school districts. This follows partly by default, since no other tax is readily available to local governments and other taxes, when imposed, tend to have unacceptable excess burdens. Economists do not completely agree upon questions of incidence of any tax, and the property tax is no exception, but the evidence does not seem to show that the tax is overly regressive, or indeed that it is any more regressive than any other tax

than the personal income tax.[7] The property tax also is a reasonably stable form of revenue. This last feature is especially important for local governments.

Nevertheless, there are several reasons why the property tax cannot be expected to yield significant revenues for growth in educational expenditures. First, the very fact that this tax is so widely used means that there remains less opportunity to capture revenues by broadening its use. Secondly, in many communities, public opinion is very much against any increase in property tax rates and recent years have seen significant movements for relief from already existing rates. The reasons for this movement are many and some of them, common to all taxes, are covered in a later section. Two, however, are particular to the property tax.

The property tax constitutes a high "excise" tax upon housing. Since housing is widely conceived of as a "necessity" and the nation seems to have a shortage of quality housing, many would argue that increased use of the property tax will conflict with other national goals just as important as education. A more serious objection is that property taxes have an adverse effect upon the problem of the deterioration of the central city. If slum areas are cleared, and modern facilities put in their place the rise in property taxes can be so severe as to make the change unprofitable.

A final and very important reason that property taxes are unlikely to yield sufficient revenues to cover expected growth in local government revenues, is that local governments are constrained in their use of any tax by the threat of the relocation of individuals and businesses to avoid the tax. Local governments are, of course, keenly aware of this

fact. To some extent this problem is not quite as serious for the property tax as it is for other taxes. Individuals can buy outside local jurisdiction to avoid a sales tax without losing the benefits of residence, but this is not true of the property tax.

Sales Taxes

The sales tax is the primary source of revenue for state governments. In 1970, this tax was used by 45 states containing 98 percent of the nation's population. The sales tax yields about 30 percent of total state tax revenues (but only about 4 percent of local government revenues).[8] Rates applied varied from 2 to 6 percent of sales.[9] The sales tax has by no means been as fully exploited as a source of revenue by the states as has the property tax by local governments. Very considerable growth in revenues is possible through this tax, although its potential lies almost entirely at the state level. Thus if the sales tax is to be a source of revenue for educational expansion, it must be through the medium of state grants to local government.

The sales tax may meet equity standards better than the property tax. Assuming that this tax is shifted forward, its burden lies on consumption and is more likely to tax individuals according to their ability to pay than is the property tax. It must be noted that this equity is between individuals of the same income class. The sales tax does not necessarily provide for more equity between income classes and is possibly more regressive than property taxes.[10] The sales tax can be made less regressive, though not progressive, by such measures as exemption of food purchases. These exemptions, however, can cause serious erosion of the taxes' ability to provide increased revenues through economic growth and to reduce the degree of neutrality of the tax system with respect to free market allocation and consumer choice.

The most significant constraint on the use of sales taxes is the problem of mobility of consumers. If sales taxes in two adjoining markets are significantly different, it can be expected that consumers will shift their activities to the lower tax area. This expectation has been supported empirically.[11] Its most dramatic verification was the instant development of widespread smuggling following an increase of New York cigarette taxes in the 1960's. It is this constraint that prevents significant use of the sales tax by local government.

Personal Income Taxes

Like the sales tax, the personal income tax is more appropriate for use at the state than local level of government. The reasons are much the same as those for the sales tax. The use of any tax is constrained by threat of mobility, but there is no reason to believe that current effective income tax rates in any state are anywhere near the level that would cause serious problems. As of January, 1970, 41 states were using the personal income tax, though only 37 were using it in an effective manner. Local income taxes were significant in only 7 states.[12]

The personal income tax is potentially the most equitable tax source for general revenues for two reasons: First, since its base is the commonly accepted bases for ability to pay, equity between individuals within an income group can be assured. Second, the degree of progressiveness is easily established by alterations in the rate structure. Potential progressivity of tax rates is not as important in a redistributative sense as might be expected. Deductibility of state tax payments from the Federal income tax base moderates considerably the overall progressive impact of the tax. The use of progressive rate is a very important feature of this tax, though, in that this can assure that the tax will yield revenue growth

equal to or greater than growth in GNP. The income tax (including corporate income) is the only tax that can (with properly designed rates) thus assure the state of revenue growth sufficient to meet anticipated growth of state expenditures.

Much has been made in the popular press of the argument that states cannot use the personal income tax because it has been "pre-empted" as a tax source by the Federal Government. Other than as a reflection of voter attitudes, there is little in this argument. All tax payments ultimately come out of income, and the burden of a given levy cannot be made smaller by choosing some other base. Indeed the opposite is true, since administrative costs and indirect excess burdens are higher for all other taxes than for the income tax. This means that for a given amount of net revenues, a state can impose a smaller dollar levy with the income tax than with any other tax.

If the only factor that deterred states from utilizing the personal income tax was the size of the Federal income tax, then one would expect increases in state use of this tax following Federal income tax reform or reductions. This has not happened. Reduction of Federal tax levels does not appear to be a viable way of aiding state governments with their fiscal problems.

Corporate Taxes

Most states have some form of tax on corporations. In 42 states this takes the form of a corporate income tax, in three states a gross revenue tax, and in two states an effective corporate franchise tax.[13] Of all forms of tax on corporations, the income tax is by far the best. It has many of the good features of the personal income tax and is, as

indicated above, the only tax other than personal income that can have a high income elasticity.[14] Corporate franchise and gross revenue taxes have little to recommend them. The incidence of these taxes are difficult to predict, they are likely to generate bad incentive effects, and their burden is likely to affect different firms in a highly capricious manner. Current forms of these taxes are tolerable only because their rates (and yields) are low -- but there is no reason for any additional states to adopt them.

Other Taxes

The only other taxes at the state level that are productive of substantial revenues are excise taxes on gasoline, tobacco, and alcohol. The gasoline tax has been traditionally tied to trust funds for highway and street expenditures. Used in this way, this is a good tax in terms of both equity and efficiency. While gasoline taxes can not be recommended as a source of revenue for education or general expenditures, some possibility does exist for releasing general revenues now spent on highways through increased reliance on gasoline taxes for that purpose.

Tobacco and alcohol taxes impose large excess burdens upon users of these commodities, but this is generally viewed as offsetting social losses involved in the consumption of tobacco and alcohol. These taxes do not offer any promise of substantial new revenue because the rates generally already approach levels yielding maximum tax receipts.

There is a great variety of other taxes in use by one or more of the states. Some of these, such as intangible property taxes, have nothing to recommend them under any circumstances. Others, such as inheritance taxes, taxes on special types of business (insurance, utilities),

and taxes on paramutual betting, may usefully contribute to state policy but are unlikely to be sources of substantial new revenue.

Grants-in-Aid

Federal grants-in-aid to state and local government have grown from $1.1 billion in 1946 to over $24 billion in 1970.[15] In the past five years, such aid has more than doubled (from $11.1 billion), but such growth has not been projected through 1975. The President's Council of Economic Advisors has projected total Federal grants-in-aid of $30 billion for 1976.[16] This represents a growth of 25 percent in the next five years (This projection is in 1969 prices, and thus represents a real growth in state purchasing power.) If the President's proposal for reform of Federal aid to states is passed, states will have more freedom to determine the allocation of these funds. Whether this results in more or less funds for education will depend upon state policy. One objection to reliance upon grants-in-aid, currently argued by Representative Wilbur Mills, is that it reduces accountability --- that is, the taxing and spending agents are divorced and taxpayers have less control over the use of their funds. This argument has some merit and is considered in a later section.

State grants-in-aid to local governments have been increasingly used to augment the limited tax capacity of local governments. This trend can be expected to continue, but the extent of this aid is directly related to the ability of state governments to obtain greater state revenues.

User Charges

All levels of government have historically relied upon user charges and fees to finance a great variety of government services. These vary

from direct prices for sales of electricity, water, and bridge tolls, through payroll withholdings for social insurance, to fees for licenses. These user charges are highly recommended methods of obtaining revenue in those cases where costs can be allocated to individual users. In such cases the user charge promotes efficiency in resource use and is widely considered to be the most equitable method of finance (on a benefit principle -- individuals pay according to benefit received). Increased reliance on user charges, where applicable, will release some funds for more general expenditures.

Tuition

Tuition charges or other fees are used by all states for partial financing of the costs of higher education. In recent years proposals have been forthcoming for the use of tuition in elementary and secondary education, but with the costs to parents offset in large part by tuition vouchers from the government.[17] Since no support exists for the use of tuition without compensating vouchers, this can not be viewed as an alternative source of funds. Increased use of tuition for higher education, with increased financial aid for needy individual students, could, however, by reducing general revenue funds needed by colleges and universities provide for some diversion of these funds into elementary and secondary education.

There is considerable merit in this proposal for increased use of tuition for higher education. Quite aside from revenue gains, fundamental equity questions are involved. Because of enrollment patterns, the benefits of higher education accrue in large part to middle and upper income groups. In higher cost educational programs (the prestige state universities, medical schools, graduate schools) this tendency is much more

pronounced. Students from lower middle and lower income families are conspicuously absent from precisely those schools that place the greatest financial drain on state funds. Given the regressive to proportional nature of state taxes, the overall effect is an educational subsidy of rich families by poor families.[18] The use of increased tuitions for higher education would impose the costs of this service upon those who benefit and release significant amounts for expenditure elsewhere -- perhaps elementary and secondary education. Because only a minority of students come from lower income families, these state funds released would be far greater than any sums needed to provide aid to qualified low income students.

A final factor in considerations of reallocations of public support for education involved the issue of taxpayer revolt. There appears to be increased resentment among the rank and file taxpayers for their tax dollars subsidizing apparently unappreciative and financially well-off college youth. This is examined in a later section.

Increasing Revenue from Available Sources

The preceeding section showed that, grants-in-aid aside, any substantial increase in revenues for education must come from four tax sources: the property tax at the local level, and the personal and corporate income and sales taxes at the state level. Some, not insignificant, revenues can be obtained through tightening up other tax systems and through increased use of user charges, but primary reliance must be placed upon one or all of these taxes. This section examines the possibilities of increased revenues through these taxes. Also examined is the extent to which grants-in-aid can be expected to stimulate local spending (as opposed to tax relief).

There are two ways by which increased revenues can be obtained from property, sales and income taxes. First, tax revenues will increase for a given tax system with growth of the economy. Second, reform of existing systems, including increases of current rates in some states to levels comparable to those in other states can generate immediate and very substantial new revenues. Each of these is examined in turn.

GNP Elasticities of Various Taxes

Formally defined the elasticity of a tax with respect to another variable is the percent change in tax revenue divided by the percent change in the other variable. The most common elasticity measurement for taxes is income elasticity. If E_y is income elasticity, then

$$E_y = \frac{\% \text{ change in revenue from tax}}{\% \text{ change in total income in state.}}$$

Alternatively, the percent change in GNP might be used in the denominator of the above equation. If income elasticity, E_y, is equal to one, then a ten percent increase in GNP would be accompanied by a ten percent change in tax revenue. An elasticity greater than one would indicate that tax revenues would grow at a greater rate than GNP, thus if $E_y = 1.2$, a ten percent growth in GNP would bring forth a twelve percent growth of tax revenues.[19] The tax elasticities may be calculated for either a specific tax or for the total state tax system. Since state expenditures have been growing faster than GNP, it is necessary for the income elasticity of the total state tax system to be greater than one if these expenditures are to be met without rate increases or the introduction of new taxes.

Other useful forms of elasticity estimates are per capita income elasticity, population elasticity, and rate elasticity. These indicate

the percent change in tax revenue brought forth by a one percent increase in per capita income of the state, population of the state, and the legal rate at which the tax is applied (An increase from a four to a five percent sales tax would represent a 25 percent increase in tax rates.).

There has been a number of studies of tax revenues elasticities. Table 1 reproduces part of a table of estimates published in 1965 by the Advisory Commission on Intergovernmental Relations.[20] Part of the reason for a range of estimates is the problem of treating rate and base changes during the observed period. Since 1965 further estimates have been made using more sophisticated statistical techniques to handle this problem.

Income Taxes -- Robert Harris and Neil Singer have both estimated income elasticities for the personal income tax in six states.[21] Their results are very close; Harris found an average elasticity of 1.82 and Singer 1.78. The lowest estimate was for Delaware (1.2) and the highest estimate was for Arkansas (2.4). One would expect this variation in the income elasticity of personal income taxes since elasticity depends upon the degree of progressiveness of the rate structure and this varies widely among states. Selma Mushkin and Gabrielle Lupo found the GNP elasticity of personal income taxes to be 1.7 and the income elasticity to be 1.8.[22] These results all point to the "high" estimate in Table 1 as being more nearly correct. Mushkin and Lupo estimated corporate income tax GNP elasticity at 1.3, again supporting the "high" figure in Table 1.

Property Taxes -- Estimates of the income elasticity of property taxes have varied from as low as .22 to as high as 1.3. The reason for this is that assessed values may not keep up with increases in market values. Short term elasticities, then, will be low. It is the longer

TABLE 1

GROSS NATIONAL PRODUCT ELASTICITIES
OF THE MAJOR CATEGORIES OF
STATE GENERAL REVENUE

Revenue Source	Elasticity Estimates		
	Low	Medium	High
Income taxes	1.5	1.65	1.8
personal	1.1	1.2	1.3
corporate			
Property taxes	0.7	0.9	1.1
Sales taxes	0.9	0.97	1.05
general	0.4	0.5	0.6
motor fuel	0.4	0.5	0.6
alcoholic beverages	0.3	0.35	0.4
tobacco			

Source: Advisory Commission on Intergovernmental Relations, Federal-State Coordination of Personal Income Taxes (Washington: U.S. Printing Office, 1955), p. 42.

term growth potential that is of interest here, so only those elasticity estimates designed for the long term are relevant. Mushkin and Lupo estimated GNP elasticity of the property tax to be one if the lag in reassessment observed between 1956 and 1961 continued, and 1.2 if this lag is eliminated. Again the results of their study support the "high" estimates in Table 1. The GNP elasticity of property taxes does vary between states. Mushkin and Lupo obtained a low estimate of 0.7 in South Dakota and a high estimate of 2.2 in Oklahoma for residential property. This variation is due to many factors some of which are variations in the efficiency of reassessment, variations in population trends, and variations in types of local economy.

Sales Taxes -- In the case of sales taxes Mushkin and Lupo obtained results that are between the "medium" and "high" estimates of Table 1. They found the income elasticity of general sales taxes to be one, and the income elasticities of specific excise taxes to be, for motor fuels and for alcohol, 0.6, and for tobacco products, 0.5.

Some conclusions can be drawn from the preceeding analysis. Studies undertaken since the data in Table 1 was compiled seem to indicate that the "high" estimates in that table are more nearly correct. Using these estimates then it is clear that local governments and school districts, since they must rely almost entirely upon property taxes, can finance their expenditures without rate increases or outside aid only if their expenditures grow no faster than GNP. This condition is very unlikely to be met. We can expect, therefore, that local governments, in the absence of sufficiently increasing grants-in-aid, will have to go to the voters for rate increases on a continuing basis.

State governments will be able to finance growing expenditures without increased tax rates or Federal aid only to the extent that use of the personal income tax increases overall tax income elasticity to a level equal to the income elasticity of state expenditures (including state grants-in-aid to localities). The GNP elasticity of total state and local expenditures from 1965 through 1969 was 1.56. If the GNP elasticity of all other state revenues was one (it is actually less than one), state governments would have to collect over 60 percent of their total tax revenues from the personal income tax in order to have an overall revenue elasticity of 1.56. In fact only about nine percent of total state and local revenues exclusive of Federal aid was collected from the personal income tax.[23]

Revenue Potential of New Taxes

By no means can it be said that the states are currently taxing at their maximum ability. As indicated above localities because of problems of tax competition and mobility probably do not have much room for expansion of tax bases or for rate increases. This is not the case for states. States do not have nearly the constraints from tax competition or mobility that localities have. And, in general the states have not exploited the tax opportunities available to them. It has already been stated that thirteen states make no effective use of the personal income tax; most of the others could considerably expand revenues from this source through reform and rate increase. In 1969 only 25 states had a tax rate for the top income bracket that was six percent or more.[24]

Of the 45 states that have a sales tax, only 21 apply a rate of four percent or more to the sales base, and only eleven have a sales tax system that collects as much as 2.5 percent of the state's personal income.[25]

Six states have sales tax rates of five percent and one has a rate of six percent. The experience of these states does not suggest measurable economic disturbances from these rates. John Due estimated that if all fifty states would adopt a broad-based state sales tax of five percent, their total revenue based on 1969 figures would increase by $10.3 billion (actual sales tax revenues in 1969 were $12.2 billion). This represents about a 90 percent increase in revenues from this source.

Table 2 reproduces Due's table summarizing his estimates.[26] Due recommends that, in addition to increasing rates to five percent, the tax be applied to consumer services and all food and clothing exemptions be eliminated. This last would be partially offset by allowing a refund to lower income families through the state income tax system. If all his recommendations were adopted, including a recommendation that local sales taxes be replaced by state grants, total state and local revenues from the sales tax would still increase by more than 70 percent.

Due has also estimated the increase in revenue obtainable from broadening the personal and corporate income tax systems. For the personal income tax, "If the Oregon levy is taken as a model, with rates from 4 to 10 percent and exemption of $600 per person, the states as a whole would obtain $20.1 billion from the tax instead of the present 7.6 billion...."[27] This represents a 164 percent increase in revenues from this source. One must keep in mind that because the state tax is deductible from the Federal tax base, a 4 to 10 percent state rate, while collecting considerable revenues, will not impose a corresponding burden upon state citizens. For the same reason, progressive rates, while increasing the GNP elasticity of the tax, will not impose a correspondingly larger burden upon higher income groups.

TABLE 2

SUMMARY OF ESTIMATED ADDITIONAL REVENUE FROM SALES TAXES

	Millions of Dollars
Total Sales Tax Revenue 1969 fiscal year	$12,296
Additional Revenue:	
From increases in state sales tax to 5%	6,350
From extention of tax to consumer services	1,600
From elimination of food and clothing exemption	2,390
Total	10,340
Additional Gain from Each 1% of Tax Revenue:	
With existing coverage	3,700
With elimination of food and clothing and taxation of consumer services	4,500
Possible Offsets:	
Elimination of local sales taxes	1,300
Establishment of credit for sales tax paid on minimum expenditures against income tax liability, at $10/person, limited to lower incomes	250

Source: Based on data in U. S. Bureau of the Census, State Tax Collections in 1969.

Due also recommended "Establishment of the corporate income tax in those states not now using it, replacing capital stock and gross receipts taxes where these are used " and "use of a rate of perhaps 7 percent in those states now using lower figures. These two changes would add about $2.5 billion to state tax revenue."[28] This would almost double current revenues from corporate taxes.

There is considerable room for growth, then, in the state tax systems. If all of Due's recommendations were in force, state and local government could have collected $23.8 billion more in 1969 than the $114.6 actually obtained. This represents an amount equal to more than half the total expenditures on education in 1969, and a 20 percent increase in total revenues from all sources. In addition the uniform adoption of broad-based income taxes and elimination of sales tax exemptions would significantly increase the GNP elasticity of total state tax systems.

A study by John B. Legler and Perry Shapiro produced evidence that supports Due's recommendations.[29] Legler and Shapiro regressed the total tax revenues of eight states on eight independent variables. These were: the tax rates for sales, motor fuels, alcohol, tobacco, and personal and corporate income, state income per capita, and state population. One of their results was quite interesting. The population elasticities for those states with a food exemption for the sales tax was quite lower than for states without food exemptions (an average population elasticity of 1.25 versus 2.68). This seems to indicate that states with high population growth would be well advised to follow Due's recommendation of eliminating food exemptions. It is precisely the states with high population growth that are experiencing the greatest needs for growth in

government expenditures. In addition, there is no particular connection between population growth and growth in per capita income so that the needed revenue will not necessarily be forthcoming from other sources.

Grants-in-aid

The President's Council of Economic Advisors projects a 34 percent growth in real GNP and a 25 percent growth of Federal aid to state and local government between 1970 and 1976.[30] If this projection is accurate, it forecasts a tapering off of the growth of Federal aid to state and local governments. There is no way to predict with confidence future t trends in grants-in-aid given their political determination. Some empirical evidence does exist, however, concerning the effectiveness of grants-in-aid as a device to stimulate spending at lower government levels.

Statistical studies in 1942 found that 72 percent of the variation in state and local expenditures could be explained by differences in three factors -- population density, percent of population in urban areas, and per capita income. By 1957 these three factors explained only 53 percent of the variation.[31] Seymour Sachs and Robert Harris discovered that by adding grants-in-aid to the statistical determinants 87 percent of the variation was explained.[32] Clearly, grants-in-aid have a significant impact upon expenditures. But these results do not indicate clearly the amount that total expenditures will increase for a one dollar increase in aid from a higher government level. Such information is conveyed by a stimulation coefficient.

A stimulation coefficient is the amount of the induced increase in expenditures per dollar of aid. If this coefficient is greater than one, then a dollar of aid brings forth more than a dollar of expenditures and the aid can be said to have stimulated additional effort at the lower

governmental level. If this coefficient is less than one, then, although some additional expenditure was generated, part of the aid was used for tax relief and no stimulation was present.

Jack Osman attempted to estimate the degree of stimulation of Federal aid to state and local government for 1960. Table 3 presents a summary of Osman's results.[33] It is immediately apparent from this table that for all functions direct aid did stimulate state or local government effort. This stimulation was greatest for direct aid to education ($4.11 of additional state and local effort for each $1.00 of Federal aid) and lowest for highways and public welfare ($0.37 of extra state effort). Expenditures on education were also stimulated by Federal aid to non-educational functions: A dollar of non-educational aid was accompanied by a $0.33 increase in expenditures on local schools. These results must be highly satisfying to those who wish to stimulate education expenditures through Federal activity.

These results have not gone unchallenged. George Bishop studied the effects of state aid to local school districts in six New England states. He found that in every case a dollar of state aid brought forth less than a dollar of increased expenditure. Thus, the local school districts were using part of the state aid for tax relief and their local effort actually decreased. The degree of reduction in local effort varied from $0.20 per dollar of state aid in Massachusetts to $0.60 per dollar in Maine.[34]

David Smith, using much the same type data as Osman, but for 1965, obtained results that are rather the opposite of Osman's findings.[35] Smith's results are summarized in Table 4. Notice that the coefficient for education, though positive, is not statistically significant. Thus

TABLE 3

STIMULATION COEFFICIENTS FOR FEDERAL AID
TO STATE AND LOCAL GOVERNMENT,
OSMAN'S RESULTS

Function	Amount of expenditure increase on a function per dollar of aid: Direct to function	to all other functions
Total General	1.93	N.A.
Total Education	5.11	0.51
Local Schools	2.70*	0.33
Higher Education	2.59*	0.14
Highways	1.37	**
Public Welfare	1.37	**
Health & Hospitals	2.08	**
General Control	N.A.	0.07
Interest	N.A.	0.04

*Total aid to education, data did not separate aid to local schools, state school boards, and higher education.

**No statistically significant relation

N.A. -- Not applicable

Source: Jack W. Osman, "The Dual Impact of Federal Aid on State and Local Government Expenditures," National Tax Journal, 19, December, 1966, p. 366.

TABLE 4

STIMULATION COEFFICIENTS OF FEDERAL AID
TO STATE AND LOCAL GOVERNMENT,
SMITH'S RESULTS

Function	Stimulation coefficient of direct aid to function
Total General	1.66**
Education	(1.68)†
Highways	1.17**
Public Welfare	1.52**
Health & Hospitals	-0.29*
Non-aided Functions	1.39**

**Statistically significant at .01 level
*Statistically significant at .10 level
†Not statistically significant

Source: David L. Smith, "The Response of State and Local Government to Federal Grants," National Tax Journal, 21, September, 1968, p. 355.

Smith concludes that "...Federal aid to education is not associated with increased state-local spending from their own sources for the function... in 1965, most education grants were for special programs or projects carrying few, if any, matching requirements, or were for Federally impacted areas."[36]

Perhaps some of the difference between Smith's and Osman's findings are explained by changes in Federal policy between 1960 (Osman's data) and 1965 (Smith's data). James A. Wilde has formulated a theoretical analysis of the impact of grants-in-aid which predicts that such aid will have a stimulative effect if the aid is tied to matching efforts on the part of lower government, but that if no such matching requirement is enforced, part of the aid will be used for tax relief.[37] If Wilde's predictions are correct, then untied Federal grants or revenue sharing will prove to be relatively ineffective in stimulating state and local expenditures or in solving national problems. On the other hand, the traditional approach using matching requirements, while accompanied by the problems of a centralized bureaucracy, will stimulate state and local effort and increase total expenditures below the Federal level by a multiple of the Federal outlay.

There is a possible compromise between these two approaches. An increase in the amounts of state tax payments that can be credited against Federal income tax liabilities would stimulate state efforts while avoiding centralized bureaucratic decisions and allowing local decisions as to the best specific use of the new funds.[38] Such a plan, if applied to property taxes imposed for education, would stimulate educational efforts while allowing local school boards to maintain autonomy from both Federal and state bureaucracies.

Some Problems of Competing Resource Demands

State general expenditures amounted to $68.0 billion in fiscal year 1969.[39] Of this amount $27.2 billion or nearly 40 percent went to education. This amount includes $14.9 billion in aid to local schools. State expenditure for highways took 18 percent of the total, public welfare 16 percent, and hospitals 5 percent. Education is in a particularly vulnerable position with respect to competing resource demands because of the sheer size of the educational program. Those who wish to expand their own programs can not help but cast their eyes at the education budget as a source of "economy."

Between 1968 and 1969, total state expenditures grew by 12.6 percent; while expenditures on education grew 11.8 percent; highways, 5.6 percent; public welfare, 25.6 percent; and hospitals, 10.8 percent.[40] While highways made up the second largest part of state expenditures, this function is growing at a pace much slower than most state expenditures. Further, highway expenditures are to a large extent financed from user taxes through trust funds and thus is not a potentially troublesome competitor with education for state funds.

Public welfare, the third largest state function, offers the most competition with education. Its phenomenal growth of 25.6 percent was double the growth of education. (Between 1967 and 1968, this function grew by 20.4 percent.) Growth rates of health, 16.3 percent; police, 15.2 percent; general control, 17.9 percent; and veterans' services, 55.4 percent; all exceeded that of education. In addition, the functions of forestry and parks, airports, water transportation, and libraries all had rates of growth exceeding that of education in one but not both of the years 1967-68 and 1968-69.[41]

TABLE 5

GROWTH IN STATE AND LOCAL GOVERNMENT EXPENDITURES,
1965 to 1969

Function	Growth Rate 1968-69	67-68	66-67	65-66
Combined State & Local				
Total All Functions	13.2	9.7	9.3	9.6
Education	14.5	8.7	13.8	16.4
Highways	6.2	4.3	8.6	4.9
Public Welfare	23.4	19.9	21.5	7.1
Hospitals	11.6	13.1	11.8	9.7
Health	14.3	12.1	9.7	9.0
Local Government Only				
Fire Protection, Sanitation and Sewers, and Local Parks	11.5	8.0	3.4	7.6

Source: U. S. Department of Commerce, Bureau of the Census, Government Finance in 1968-69 (Washington: U. S. Printing Office, 1970), pp. 18-19.

Table 5 presents a summary of the growth in total state and local government expenditures between 1965 and 1969. In using this table, it must be remembered that 1968-69 was a year of high inflation, so that the higher growth rates of this year do not indicate correspondingly higher real rates of growth. Examination of Table 5 reveals that educational expenditures grew 3-6 percent more than total expenditures in the first part of this period, but failed to grow significantly faster than the total in the latter part of the period. Instead, since 1966, it has been the public welfare function that has grown twice as rapid as the total. Some of this growth of public welfare has been a reflection of the Federal policy.

Determining Trends: The Lack of Empirical Projections

The data given above indicate the nature of recent trends, but there is no assurance that these trends can be projected into the 1970's. There is, in general, a lack of empirical analysis on the determinants of government expenditures by functions. Nothing comparable to the GNP elasticities of taxes exists for expenditure by function. Thus, the economist has in his bag of numbers only past trends, and projections from these have been as often wrong as right.

The previously mentioned studies by Fabricant, Fisher, Sachs and Harris, Osman, and Smith all indicate some of the more important characteristics of communities or states that seem to explain variations in their expenditures. All of these studies were cross-sectional studies, that is, the data used was all for one given year with the variation to be explained appearing as variations among states. Some of the more significant results are summarized in Table 6.

TABLE 6

SUMMARY OF FINDINGS OF THE DETERMINANTS OF VARIATIONS IN STATE AND LOCAL EXPENDITURE FROM CROSS-SECTION ANALYSIS

	Determinant*				
Function	Per Capita Income	Percent Urban	Federal Grants	Population Density	Percent Low-Income**
Total	2,3,4		*	*	1
Education	3,4		*	*	1
Local Schools	2,3		*		1
Higher Education			3	1	
Highways	4	1	2,3,4		
Public Welfare	4	1	2,3	*	
Health & Hospital	2,3,4		*		1
Police		2			1
Fire Protection		2		*	1
Sewerage & other Sanitation					1

*The numbers 1 through 4 indicate that a determinant was found to be the most significant one for explaining variation in a function by one of the following investigators:

1. Fisher (Federal grants not included in this study.)
2. Sachs & Harris
3. Osman
4. Smith

An asterisk indicates that at least one investigator found the determinant of some statistical significance for the indicated function.

**Percent of families in low-income (poverty) status. This determinant had a negative impact in all cases.

Sources: Glenn W. Fisher, "Interstate Variation in State and Local Government Expenditure," National Tax Journal, 17, March, 1964, pp. 57-74. Seymour Sachs and Robert Harris, "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds," National Tax Journal, 17, March, 1964, pp. 75-85. Jack W. Osman, "The Dual Impact of Federal Aid on State and Local Governments," National Tax Journal, 19, December, 1966, pp. 362-72. David L. Smith, "The Response of State and Local Governments to Federal Grants," National Tax Journal, 21, September, 1968, pp. 349-57.

The data in Table 6 confirms the earlier assertion that the primary variables explaining variation in state and local government expenditures are per capita income, percent urban, population density, and Federal grants (percent low income amounts to much the same thing as per capita income). Other explanatory variables of some significance in the studies but not in Table 6 were: population growth (significant for local schools, highways, and police), percent of population in local schools, and percent of population over 65 years of age (public welfare). All of these, however, were of small significance. The trends given above indicated that public welfare was the primary potential competitor with education for funds. Table 6 offers little enlightenment here, though, since it indicates that the most important factors for this function are per capita income (also the most important factor for explaining education) and Federal grants. It does little good, however, to know that Federal grants are important unless future Federal government policy can be accurately forecast. Health and hospitals are equally unpredictable as competition for education on the basis of Table 6. It is of some interest that police and fire protection are functions of percent urban and population density. These are competitors with education at the local level by virtue of common property tax financing, and the national trend is quite definitely toward greater urbanization and increased population density in many states.[42]

Obviously cross-sectional studies do not provide us with any key insights into the problem of future expenditure trends. Perhaps time-series analysis might provide some information, but with one exception no work of this sort has been done. Roy W. Bahl, Jr. and Robert J. Saunders did analyze data from 1957 through 1960 using the annual changes in the variables found important in the cross-sectional studies. Their results

showed that over time none of these variables were significant except changes in Federal grants.[43]

Given the current state of economic analysis of state and local expenditures, empirical analysis can only indicate that growth of expenditures for particular functions will be largely determined by the emphasis placed upon those functions by the Federal government through its grant-in-aid programs. The nature of this emphasis cannot be accurately forecast beyond the current budget message.

Taxpayer Revolt

Prior to the 1966-67 fiscal year, voters consistently approved school bond proposals in about 72 percent of elections representing from 70 to 80 percent of the proposed dollar value. The year 1966 marked the beginning of a downward trend, however, so that by 1968-69 only 56.8 percent of school bond proposals were passed, representing only 42.6 percent of dollar value proposed.[44] The actual amount approved fell from $2.65 billion in 1966 to $1.70 billion in 1969; this even though enrollments, income and prices had risen. Clearly the American voter is less willing than ever to vote new property taxes for the support of education. Whether this means less support for education or less support for government in general is the topic of this section.

A Conceptual Framework for Analysis -- Government Benefits vs. Costs

The economic theory of public finance suggests that ultimately collective decisions are the result of individual calculations comparing individual benefits of public action to individual costs. This does not mean that altruistic motives are assumed away, but rather that individuals support or oppose public policy on the basis of whether or not the value of the public policy to them as individuals (including any altruistic value) exceeds the costs to them as individuals (including any psychic costs of harm or injustice to others). Further it is only on the basis of this individual support that a given public policy remains viable.

Economic analysis does not admit the existence of absolute needs, whether in public or private consumption. Instead, all consumption leads to benefits which must be weighed against costs or other alternative benefits derivable from a different use of limited resources. The function

of experts, then, is not to determine what social policy needs to be, but rather to set forth information about the alternatives available so that intelligent public choice is possible.[45] The media and politicians play an important role in transmitting this information to the public.

That this individualistic weighting of priorities actually becomes the basis for public policy is provided for in several ways in our society. One way, of course, is the voting system allowing individuals to register their pleasure or displeasure over the policies enacted by their representatives. It is not necessary that a specific issue be on the ballot. Letters, lobbying, and other contacts between voter and representative provide information; the ballot provides primarily a means of awarding or withholding approval. Legislators react to individual preferences because of their need for votes to remain in office.[46]

Another method of influencing public policy has been termed "voting with one's feet." Charles M. Tiebout developed a model of individual choice of government which, briefly, has citizens who believe the benefits of public policy in a given community to be significantly less than public costs moving to another community where public policy is more to their liking.[47] Such movements have in fact played an important role in the development of our country and its regional differences today. One of the fundamental consequences of our Federal system, is the degree to which this system provides alternative mixes of public policy for the citizen. Unless the population had homogeneous tastes, and this is not the case, a centralized system requiring uniform standards over the whole of society would necessarily entail a loss of welfare.

Possible Interrelationships of Actions by Different Levels of Government

The revolt by local property taxpayers against school bond issues after 1966 was not the only symptom of a taxpayer revolt. State governments have been under increasing citizen pressures for parsimony, and in 1969, with national interest and support, Congress voted wide reforms and reductions in Federal taxes. The revolt is a widespread one affecting all levels of government. There are two possible explanations for this wide revolt against national tax policies.

First, it has been proposed that the revolt is against too high total taxes. Two key occurrences in the late 1960's could have contributed to a public belief that taxes were too high. One was the inflation following the Vietnam deficit of 1967 and the attending large increases in the money supply. This inflation caused an actual increase in the amounts of income taxes paid, so that taxes in fact were higher than before. (The progressive rate structure of the Federal income tax system automatically brings forth tax revenue increases -- this is the source of the large GNP elasticity of income taxes.) Because the inflation represented higher prices but not correspondingly higher real output, taxes had increased not only in actual amount but as a percentage of real income. Government in short was taking a larger share of the pie.

This effect can also be expected to lead to increased taxpayer resistance against state and local taxes. Since the taxpayer's real income after Federal taxes is lower, he can be expected to reduce his desired expenditures on goods in general including public goods. That is, in the general belt-tightening the taxpayer can be expected to decide in favor of less public as well as private consumption. To this extent,

increased Federal taxes do lead to a reduced demand for state and local expenditures.

The late 1960's was also a period of large increases in Federal expenditures. Any time public programs are increased one can expect that the valuation or estimate of benefits placed upon marginal increments of government expenditures will decrease. Thus, taxpayers might have felt taxes were too high in the sense that the marginal benefit-cost ratio had fallen below that justifying current tax-expenditure levels. This source of taxpayer revolt against Federal policy should not have any effect upon demand for state and local expenditures that are not related to Federally supplied goods and services.

The second possible source of national antagonism against taxes is a general belief that the tax system is unfair or inequitable. The Federal tax system has been based largely upon the ability-to-pay principle of taxation -- that is, that taxpayers should pay in proportion to their ability to make a tax sacrifice. In this country general belief seems to hold that such a tax system should be progressive, but there is no unanimous agreement on the degree of progressivity. Public debate during 1969 revealed the widespread belief that many in the top income brackets were not paying their share. When people believe that they are being asked to pay more than their fair share, we can expect them to resist increasing the program that so treats them unfairly.

Revolt Against Specific Taxes

The increasing refusal of communities to vote school bond issues can be interpreted in part as a revolt against the inequities of a specific tax -- the property tax. Certainly distribution of the burden of this tax bears little relation to the benefits acquired from

education (or to the benefits from many other government projects). In addition, this tax amounts to a discriminatory excise on a particular and important good -- housing. Netzer has estimated that this excise averages from 17 to 27 percent of annual use value of residential property.[48] Compared to a 3 percent excise tax on other goods, this is high indeed. Taxpayer resistance to other specific taxes might be for similar reasons.

Another reason for taxpayer revolt against a specific tax might be that they are revolting in fact against the complexity of the tax or the excess burden imposed upon them by the administration of the tax. It is important that the payment of a tax be kept convenient for the taxpayer. Payroll withholding for the Federal income tax is a good application of this principle. Intangible property taxes are particularly obnoxious in this regard. A complex tax system also makes it difficult for the taxpayer to assure himself that he and others are in fact paying their fair share. If the taxpayer cannot assure himself of this, he will oppose the tax regardless of his support of the use to which funds raised are applied.

Revolt Against Specific Spending Programs -- Education

Another explanation for recent taxpayer revolts is that individual tastes for public services have in fact shifted. That is, taxpayers have voted against school bond issues (and defense expenditures and welfare programs) not simply because they objected to the taxes but because they have decided that they want less, or at least less growth, of this function. There are five important factors that might have led to such a change in tastes.

First, the widespread occurrence of student rebellion has undoubtedly brought forth public dissatisfaction with the results of the use of their tax dollars for education. Regardless of the extent to which the education establishment is to blame for current disorders, taxpayers tend to place the blame upon it. The average taxpayer may not in fact have reduced his support of education as it might be operated because of student disruptions. But when he is asked to support education, he is limited to supporting what exists, not what he might wish to exist. In the longer run his wishes for change in the operation of schools might be realized, but in the short run his only means of control lies with his control of the purse.

The second factor is the inherent liberalism of the educational process. In the best of times this factor lends to some antagonism between the taxpayer and the educator. By its very nature education promotes more liberal values than those held by many citizens. Education must place high values upon individual and intellectual freedom, and the study of our culture's history leads to an increased humanistic orientation. In recent years this normal gap has been widened by a drive to make modern education more relevant to the immediate solution of social ills. Thus education has been injected into the middle of political controversy over the best means of running society. Whether or not this trend is wise (and many do not believe it is) it cannot but erode general support for education. To the extent that education joins sides in political issues it must lose the support of those taxpayers on the other side of the issue.

A third factor that possibly has led to a reduction of public support of education is the increasing length of stay in school. This

has in effect created a new class within society. It is a new leisure class of people too old (over 17 years of age) to be constrained by rules normally governing younger students yet a class that does not bear the full individual responsibilities of adulthood, that is, the responsibilities of providing for one's financial needs. Such a class has, of course, always existed, but until recent times it was small. The enormous increase in the percent of college-age youths actually enrolled in universities, colleges, and junior colleges has made this a large and significant social class and one more apt to create resentment and conflict. Again the taxpayer may support lower levels of education, but his opportunity to financially support or oppose may only apply to the whole package of educational programs.

A fourth factor that had undoubtedly contributed to a reduction of public support for public education is the tying of education to racial integration. As Federal pressure for integration extends to the non-South, we can expect this factor to become important on a nationwide scale. This factor is closely related to the second factor above. Again those who oppose integration will be induced to oppose educational expenditures as part of their political strategy. The main difference between this factor and the second one is that in the case of integration the decisions are being largely made outside the educational establishment. Many would argue that this factor is a necessary cost of obtaining a social reform at least as important as increased education. The reduction of racial discrimination and conflict is undoubtedly a very important social goal and there is some level of costs in terms of loss in other goals that is justified. But rational policy-making requires that the costs be considered in judging the extent to which the tradeoff in goals will be pursued.

The fifth factor leading to reduction of support for local education is parental dissatisfaction with the results of current educational programs. There are all too many cases of the failure of the schools to teach the elementary skills in reading, mathematics, and spelling. These cases are not confined solely to ghetto schools. Parents have also objected to what seems to be a failure of the schools in developing a sense of self-discipline and good work habits in students.

Footnotes

*The authors are Professor and Chairman and Assistant Professor, respectively, in the Department of Economics, University of Florida, Gainesville, Florida.

[1]Economic Report of the President, 1971 (Washington: U. S. Printing Office, 1971), p. 281.

[2]Michael Levy and Juan de Torres, Federal Revenue Sharing with the States (New York: National Industrial Conference Board, 1969), p. 12.

[3]Economic Report of the President, 1971, p. 95.

[4]Werner Z. Hersh, The Economics of State and Local Government, (New York: McGraw-Hill, 1970), p. 84. State and local receipts from Federal grants-in-aid in 1967 was 16.8 percent of total receipts.

[5]John B. Legler and Perry Shapiro, "The Responsiveness of State Tax Revenue to Economic Growth," National Tax Journal, 21, March, 1968, pp. 46-47.

[6]John F. Due, "Alternative Tax Sources for Education," Economic Factors Affecting the Financing of Education, edited by Roe Johns, Irving Goffman, Kern Alexander and Dewey Stollar (Gainesville: National Education Finance Project, 1970), p. 294.

[7]Dick Netzer, Economics of the Property Tax (Washington: The Brookings Institution, 1966), Chap. 3. Some of the differences in estimates of the degree of regressivity or progressivity of a tax stem from different definitions of the base used to compute tax ability to pay. The results are, for example, more progressive if permanent rather than current income is used or if adjustments are made to include imputed rents from owner used property and nontaxable income (such as social security payments) as well as earned income from employment or capital.

[8]John F. Due, loc. cit., p. 301.

[9]Ibid., p. 300.

[10]The sales tax will appear to be less regressive than the property tax only if the imputed rental value of owner occupied homes is omitted from the income base upon which the computations are made. See James A. Maxwell, Financing State and Local Governments (Washington: The Brookings Institution, 1965), pp. 131-132, for a comparison of these two taxes.

[11]William Hamovitch, "Sales Taxation: An Analysis of the Effects of Rate Increases in Two Contrasting Cases," National Tax Journal, 14, December, 1966, pp. 411-420.

[12]John F. Due, loc. cit., p. 319.

[13]Ibid., p. 322.

[14]One of the key positive features of the personal income tax, however, is not shared by the corporate income tax. The burden of the personal income tax is not shifted and lies entirely with the legal taxpayer. The incidence of the corporate income tax is not known. Theory indicates that the burden may be partially or wholly shifted to consumers, but there has been no conclusive empirical evidence of this.

[15]Economic Report of the President, 1971, p. 280.

[16]Ibid., p. 95.

[17]National Goals Research Staff, Toward Balanced Growth: Quantity with Quality (Washington: U. S. Printing Office), 1970, p. 95.

[18]Douglas M. Windham, Education, Equality and Income Redistribution (Lexington, Mass.: Heath Lexington Books, 1970), pp. 33-51.

[19]The reverse also holds. If a tax has a GNP elasticity of 1.2, then a recession that reduced GNP by ten percent would reduce the tax revenues by twelve percent. Thus a government's ability to meet expenditures might be impaired just when increased expenditures for relief are fast being demanded.

[20]Advisory Commission on Intergovernmental Relations, Federal-State Coordination of Personal Income Taxes (Washington: U. S. Printing Office, 1965), p. 42.

[21]Robert Harris, Income and Sales Taxes: The 1970 Outlook for State and Localities (Chicago: Council of State Governments, 1966). Neil M. Singer, "The Use of Dummy Variables in Estimating the Income-Elasticity of State Income Tax Revenues," National Tax Journal, 21, June, 1968, pp. 200-204.

[22]Selma J. Mushkin and Gabrielle C. Lupo, "Project 70: Projecting the State-Local Sector," Review of Economics and Statistics, 49, May, 1967, p. 243.

[23]Economic Report of the President, 1971, p. 281.

[24]John F. Due, loc. cit., pp. 317-318.

[25]Ibid., p. 300.

[26]Ibid., p. 309.

[27]Ibid., p. 320.

[28]Ibid., p. 324.

[29]John B. Legler and Perry Shapiro, op. cit., pp. 46-56.

[30]Economic Report of the President, 1971, pp. 95, 281.

[31]Solomon Fabricant, Trends of Government Activity in the United States Since 1900 (New York: National Bureau of Economic Research, 1952), pp. 122-131. Glenn W. Fisher, "Interstate Variation in State and Local Government Expenditure: A Preliminary Analysis," National Tax Journal, 14, December, 1961, p. 349.

[32]Seymour Sachs and Robert Harris, "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds," National Tax Journal, 17, March, 1964, pp. 75-85.

[33]Jack W. Osman, "The Dual Impact of Federal Aid on State and Local Government," National Tax Journal, 19, December, 1966, pp. 362-372.

[34]George A. Bishop, "Stimulative Versus Substitutive Effects of State School Aid in New England," National Tax Journal, 17, June, 1964, pp. 133-143.

[35]David L. Smith, "The Response of State and Local Governments to Federal Grants," National Tax Journal, 21, September, 1968, pp. 349-357.

[36]Ibid., p. 356.

[37]James A. Wilde, "The Expenditure Effects of Grant-in-Aid Programs," National Tax Journal, 21, September, 1968, pp. 340-348.

[38]This plan would operate by allowing a direct credit of some fixed percentage of state or local taxes to be subtracted from Federal income tax liabilities. This credit would be in addition to the already existing deductions of tax payments from the Federal income tax base.

[39]U. S. Department of Commerce, Bureau of the Census, State Government Finances in 1969 (Washington: U. S. Printing Office, 1970), p. 2.

[40]Ibid., pp. 2-3.

[41]Ibid., pp. 2-3.

[42]"Urbanization" as used here would include the suburbs as well as the central city.

[43]R. W. Bahl and R. J. Saunders, "Determinants of Changes in State and Local Government Expenditures," National Tax Journal, 18, March, 1965, pp. 50-57.

[44]National Goals Research Staff, loc. cit., p. 94.

[45]James M. Buchanan, "Taxpayer Constraints on Financing Education," Economic Factors Affecting the Financing of Education, edited by Roe Johns, Irving Goffman, Kern Alexander, and Dewey Stollar (Gainesville: National Educational Finance Project, 1970), pp. 266-274.

[46]See Anthony Downs, An Economic Theory of Democracy (New York: Harper, 1957) for a complete presentation of the theory of governmental behavior within a democratic framework.

[47]Charles M. Tiebout, "A Pure Theory of Local Expenditures," Journal of Political Economy, 64, October, 1956, pp. 416-424.

[48]Dick Netzer, Economics of the Property Tax, loc. cit., p. 30.

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