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# An Economic Evaluation of Vocational Rehabilitation in Louisiana.

Robert Charles Brown
*Louisiana State University and Agricultural & Mechanical College*

# AN ECONOMIC EVALUATION OF VOCATIONAL REHABILITATION IN LOUISIANA

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Robert Charles Brown
B.A., Northwestern State University of Louisiana, 1967
M.A., Louisiana State University, 1969

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ABSTRACT

Vocational Rehabilitation (VR) is a Federal-State program designed to provide a combination of services to physically or mentally handicapped persons to prepare them for employment, and to assure that eligible handicapped men, women, and young people will be provided with skills needed in the job market. VR attempts to coordinate its resources for evaluation, education, therapy and job training in such a way that the disabled person will be brought to the best functioning employment level.

The purpose of this study has been to perform an economic benefit-cost analysis of VR in Louisiana, from both a social and private perspective. This has been accomplished by the construction of benefit-cost ratios. The construction of these benefit-cost ratios has necessitated the measurement of social and private benefits and costs. This was accomplished through the use of regression analysis.

This study attempted to evaluate VR in Louisiana through the use of the experimental-control group methodology. This allowed the avoidance of the problems associated with the before-after technique used in previous studies of VR.

The major conclusion of this study is that VR does produce positive benefits from both a social and private perspective. The examination of the structure of earnings of VR clients showed the great impact that receipt of VR services made on the earnings of the

rehabilitated clients, and the strong complementarity between VR and educational attainment. The benefit-cost ratios that were constructed were higher for males; non-whites, and persons with higher formal educational attainment. However, due to variability of benefits and costs across groups, great care must be taken in the interpretation of these results.

Returns to limited participation in Vocational Rehabilitation were shown to be insignificant. The analysis of determinants of successful rehabilitation showed that males, whites, persons not receiving public assistance, and persons with disabilities other than mental and emotional, are most likely to successfully complete the program.

# CHAPTER I

## THE HISTORY AND INSTITUTIONAL STRUCTURE OF THE LOUISIANA DIVISION OF VOCATIONAL REHABILITATION

Vocational Rehabilitation in Louisiana is a state-federal program with a long history of service that predates almost all other manpower oriented programs of training and rehabilitation. This review of its history and institutional structure is intended to give the reader the necessary basic familiarity with Vocational Rehabilitation (VR) to understand the analysis in the following chapters. Those readers interested in a more extensive analysis of the history of VR, or the philosophical and methodological foundations of rehabilitation counseling and case work, are directed to the many volumes written on those subjects.[1] This chapter briefly

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[1]An excellent comprehensive history of rehabilitation is provided by C. Esco Obermann, A History of Vocational Rehabilitation in America (Minneapolis: T. S. Denison and Co., Inc., 1965). For a short history of VR in Louisiana, see James F. Cochran, "Vocational Rehabilitation in Louisiana" (unpublished thesis, Louisiana State University, 1954). Additional basic background information is provided by John G. Cull and Richard E. Hardy, eds. Vocational Rehabilitation: Profession and Process (Springfield, Ill.: Charles C. Thomas Publisher, 1972); David Malikin and Herbert Rusalem, eds. Vocational Rehabilitation of the Disabled: An Overview (New York: New York University Press, 1969); and Mary E. Macdonald, Federal Grants for Vocational Rehabilitation (Chicago: The University of Chicago Press, 1944). For the relationship between VR and other manpower programs, see Garth L. Mangum and Lowell M. Glenn, Vocational Rehabilitation and Federal Manpower Policy (Washington, D.C.: Joint publication, Institute of Labor and Industrial Relations and the National Manpower Policy Task Force, 1967).

outlines (1) the statutory authorization for Vocational Rehabilitation (VR) in Louisiana; (2) the administrative arrangement for VR in Louisiana; and (3) the process by which VR attempts to render services to its clients.

## General History of Vocational Rehabilitation

### 1917-1923: The Enabling Legislation

The modern state-federal programs of vocational rehabilitation began with the passage of the Vocational Rehabilitation Act of 1920, but two earlier Congressional Acts provided much of the impetus for the 1920 law. In 1917, Congress had passed the Vocational Education Act, known as the Smith-Hughes Act. This legislation created the Federal Board for Vocational Education, which was to later administer VR for both civilian and veterans after World War I. The law authorized federal grants-in-aid to the states for vocational education, and thus set the precedent for federal funding of educational programs of all types, as well as establishing a pattern of vocational education in the U.S.[2] In 1918 the Soldier Rehabilitation Act (Smith-Sears Veterans Rehabilitation Act) authorized the Federal Board of Vocational Education to operate a program for the vocational rehabilitation of veterans.[3]

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[2]Robert A. Lassiter, "History of the Rehabilitation Movement in America" in Vocational Rehabilitation: Profession and Process, J. G. Cull and R. E. Hardy, eds. (Springfield, Ill.: Charles C. Thomas Publisher, 1972), pp. 25-26.

[3]Ibid.

The Acts of 1917 and 1918 augmented the growing sentiment for civilian vocational rehabilitation, to be attained in the passage of the Vocational Rehabilitation Act of 1920 (Smith-Fees Act).[4] The basic concept and provisions of the Smith-Fees Act have remained essentially intact, except for a substantial enlargement of the scope and effectiveness of VR.

The stated purpose of the Vocational Rehabilitation Act is "to provide for the promotion of vocational rehabilitation of persons disabled in industry or in any legitimate occupation and their return to civil employment".[5] The 1920 law was implemented by a modest initial appropriation of $750,000 for the first year, and rather strict limits were placed on the amount that could be spent for administration and supervision of the program. The funds appropriated by Congress were to be allocated to the states in proportion to population, with provisions for minimum amounts for the smallest states.

In order for a state to qualify for a portion of the appropriation, certain conditions had to be met under the 1920 law. First, the state had to place its program for vocational rehabilitation under the supervision and control of a state board. The Act required that each dollar of federal spending must be matched with a like

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[4]C. Esco Obermann, A History of Vocational Rehabilitation in America (Minneapolis: T. S. Denison and Co., Inc., 1965) pp. 225-226.

[5]Public Law 236, 66th Congress, as reproduced in Obermann, Ibid., p. 373.

amount of state funds. States were required to submit to the federal board of supervision a plan outlining (1) the kind of rehabilitation activity that was proposed, (2) the administration and supervision of the vocational rehabilitation program, (3) the methods of study and courses of instruction to be used, and (4) the qualifications of teachers, supervisors, directors, and other administrative officers or employees. The states were also required to submit comprehensive annual reports to the federal board of supervision.[6]

In addition, the states were required to accept, through the legislative branch, all provision of the act. States were required to name the board that had been designated to administer the Vocational Education program to administer the program in cooperation with the Federal Board for Vocational Education - the federal administrator of VR. Finally, states were directed to establish close cooperation between VR and workmen's compensation programs.

The act set forth the definition of disabled persons and rehabilitation as follows:

> That for the purpose of this Act the term 'person disabled' shall be construed to mean any person who, by reason of a physical defect or infirmity, whether congenital or acquired by accident, injury, or disease, is, or may be expected to be, totally or partially incapaciated for remunerative occupation; the term "rehabilitation' shall be construed to mean the rendering of a person disabled fit to engage in a remunerative occupation.[7]

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[6] Ibid., p. 374.

[7] Ibid.

The import of all subsequent major changes in this law have enlarged or liberalized the program, benefits, and funding, and adjusted administration or supervision of the program activities. The most significant and far reaching changes are outlined below, but the most notable feature of VR statutory history is the fact that the basic federal-state arrangement for handling VR has remained essentially the same since its inception.

1924-1942: A Period of Little Change

In 1924, Congress made appropriations for VR for six successive years, and extended the program without change for that period. In 1930, a similar extension for a three year period was affected, but with one important change. The Couzen's Amendment provided that money not matched by state appropriation be reallocated proportionally to states that provided matching funds.[8]

Congress again provided funding and extension of VR in the early 1930's, as the program survived the economizing moves of the early depression years. Conditions were not favorable for any expansion, and none occurred. In 1933, President Roosevelt, by executive order transferred the federal supervisory apparatus of VR to the Department of the Interior, making some changes in the administration of the program. In 1935, however, the Social Security Act authorized that

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[8]Obermann, Ibid., pp. 239-263.

VR become a permanent federal program.[9] Few additional changes were made in VR, except for the establishment of authority for its operation.

The organization of the federal administration was changed again in 1939 when the Office of Education, and with it VR, was transferred from the Department of the Interior to the Federal Security Agency. At the same time VR was separated from vocational education.[10]

## The 1943 Amendment: An Expanded Definition

The first major changes in VR came during the period of World War II. The severe pressure brought upon the civilian labor force by the demands of wartime production seemed to dictate that every potential member of the labor force be rendered fit for employment, if possible. Thus it was that wartime emergency provided the incentive to enlarge this early manpower program.

The Vocational Rehabilitation Act Amendment of 1943 contained a number of changes, the most profound of which was the alteration of the definition of vocational rehabilitation to include "any services necessary to render the disabled individual fit to engage in a remunerative occupation."[11] A major criticism of the original Act of 1920 had been that VR was designed to train the handicapped "around"

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[9] State Department of Education of Louisiana, Division of Vocational Rehabilitation, Biannual Report (Baton Rouge: State Department of Education, 1972).

[10] Cochran, Ibid., p. 22.

[11] Obermann, Ibid., p. 286.

their disabilities, without providing authorization to engage in a program of positive correction. The 1920 law stopped short of an authorization for a program of physical restoration to enhance and augment the training that VR was designed to render. The change in definition, plus larger funding, made this significant expansion of VR activity possible. The 1943 law also listed many of the services that VR had been administratively prohibited from rendering as now being specifically authorized. These included corrective surgery; therapeutic treatment; hospitalization for up to 90 days; transportation, tools, licenses and equipment; prosthetic devices that might be required; and books, training materials and maintenance while undergoing training. A financial needs test was established to determine eligibility for these benefits, but all clients were declared eligible for medical examinations and vocational aptitude analyses at no cost, regardless of financial status. The full cost of rehabilitation of war disabled civilians was to be paid by the federal government. The ceiling on appropriation that had been written into previous VR laws was removed.[12]

The administration of VR was also changed to require vesting administrative authority for VR in the state board that had authority over vocational education. The new law permitted rehabilitation programs for the blind to be administered under state commissions

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[12] Ibid.

for the blind, and it permitted acceptance of rehabilitation clients who were mentally ill or retarded, as well as those with physical disabilities.[13]

The 1954 Amendments: Expanded Research

The Amendments passed by Congress in 1954, (P.L. 83-565) provided the next major step in the development of VR. The 1954 amendments permitted VR, through grants-in-aid to the states, to engage in research and administration projects and training activities to advance state programs. Public and non-profit private research groups were also made eligible for research grants.

While each of the various types of federal grants required local matching funds, the requirements were liberalized so that population, per capita income, and other factors were taken into consideration in the determination of the federal share. The maximum state contribution was set at 40 percent of the total spent on its general rehabilitation program, with the federal share of extension and improvement projects going up to 75 percent. However, the appropriation act of that year put more stringent limits on the federal share.

Another significant provision of the 1954 law was that grants were authorized to colleges and universities to expand curricula to train more rehabilitation professionals. The shortage of such qualified workers was the most serious inhibitor of VR growth in the post

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[13] Ibid., p. 287.

war years.[14] By 1954, administration of VR had passed into the Department of Health, Education, and Welfare.

The Amendments of 1965, 1967 and 1968: An Expanded Clientele

The Vocational Rehabilitation Act Amendments of 1965 had as their chief object the broadening of VR to allow it to serve a larger number of clients. The act authorized grants for the innovation of rehabilitation services, and for the construction and development of rehabilitation facilities and workshops.[15] Also in 1965, the Social Security Act was amended to allow, for the first time, the use of Social Security trust funds by the state VR agencies to pay for services for old age and survivors disability insurance beneficiaries.[16]

The 1967 Amendments were again aimed at a basic expansion of those eligible for VR. The most notable change was that migrants and their families became eligible, and state VR agencies were required to provide services to handicapped individuals without regard to place of residence.[17]

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[14] Ibid., p. 316-317.

[15] U.S. Statutes at Large, Public Law 89-333.

[16] State Department of Education of Louisiana, Division of Vocational Rehabilitation, Biannual Report (Baton Rouge: State Department of Education, 1972).

[17] Ibid.

The Vocational Rehabilitation Amendments of 1968 (P.L. 90-391) extended the basic programs through 1971 and provided for an expansion in several areas. Rehabilitation services were broadened to include follow up services; services to groups of individuals; services to families; to provide for new construction; and to provide for employment opportunities for the handicapped. The basic federal support grants to the states were increased to an 80 percent share of costs, and new authority was enacted to provide for recruitment of the handicapped and the encouragement of individuals to enter rehabilitation work. The law also granted authority for projects in cooperation with industry to train the handicapped.

In 1970, Congress extended until June 30, 1972, the programs already authorized, without major changes.[18] (P.L. 91-610) The provisions of the Act were again extended, without major changes, through Fiscal 1975, through the action of Congress in September, 1973.[19]

## A Brief History of Vocational Rehabilitation In Louisiana

Vocational Rehabilitation began in Louisiana in January, 1921, when the governor accepted the provisions of the Act of 1920 on a temporary basis until the legislature could meet. Formal legislative

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[18] Ibid.

[19] Congressional Quarterly, XXXI (September, 22, 1973), pp. 9-10.

acceptance came in 1922,[20] with the State Board of Education designated as the state administrator of VR. No state funding was provided in the early years; the state matching funds were provided through contributions from interested citizens. The early work was carried on a part time basis by only one Education Department employee, who took on VR work in addition to other regular duties. Contact between the client and the state agency was carried on largely by correspondence.[21]

When VR became a permanent program with the passage of the Social Security Act of 1935, and an increased level of federal funding became available, the Louisiana Legislature realized the need for VR in the state, and in 1936, $20,000 was appropriated for VR. In the next year, five employees of the Education Department were devoting part of their time to VR. In 1941, the VR staff was increased, and a State Supervisor was appointed.[22]

VR in Louisiana did not really become an effective program until the passage of the 1943 federal act that greatly expanded the scope and funding of the federal-state program. While the state did take advantage of the provisions of the act, progress was handicapped because of a lack of qualified personnel. Expansion did occur when qualified persons could be added to the professional staff.[23]

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[20] Cochran, Ibid., pp. 29-30.

[21] Ibid.

[22] Ibid., p. 31.

[23] Ibid., p. 32.

As provided in the 1943 federal act, Louisiana organized a separate administration and supervision for the vocational rehabilitation of the blind. This program was placed, and remains, under the jurisdiction of the State Department of Public Welfare. Because of the differences in administration, supervision, concept and mission, it is not a subject of this inquiry.

Since the passage of the 1943 act, the Louisiana Division of Vocational Rehabilitation, which is still under the administration of the Louisiana State Department of Education, has experienced steady and rapid growth in both professional staff and the number of persons receiving services. This growth has closely paralleled the development of VR at the federal level. The present administrative and operating structure of the Louisiana Division of Vocational Rehabilitation is the subject of the next section.

## Institutional Structure of Vocational Rehabilitation in Louisiana

### Organization of the Louisiana Division of Vocational Rehabilitation

The organization chart of the Louisiana Division of Vocational Rehabilitation (Figure 1-1) will show that VR is under the administration of the State Board of Education, an elected body, and the State Superintendent of Education, also elected, who serves as the secretary to the board and as the chief administrative officer of public education in Louisiana. A full time director and assistant director have responsibility for the on-going operation of the agency. The Staff

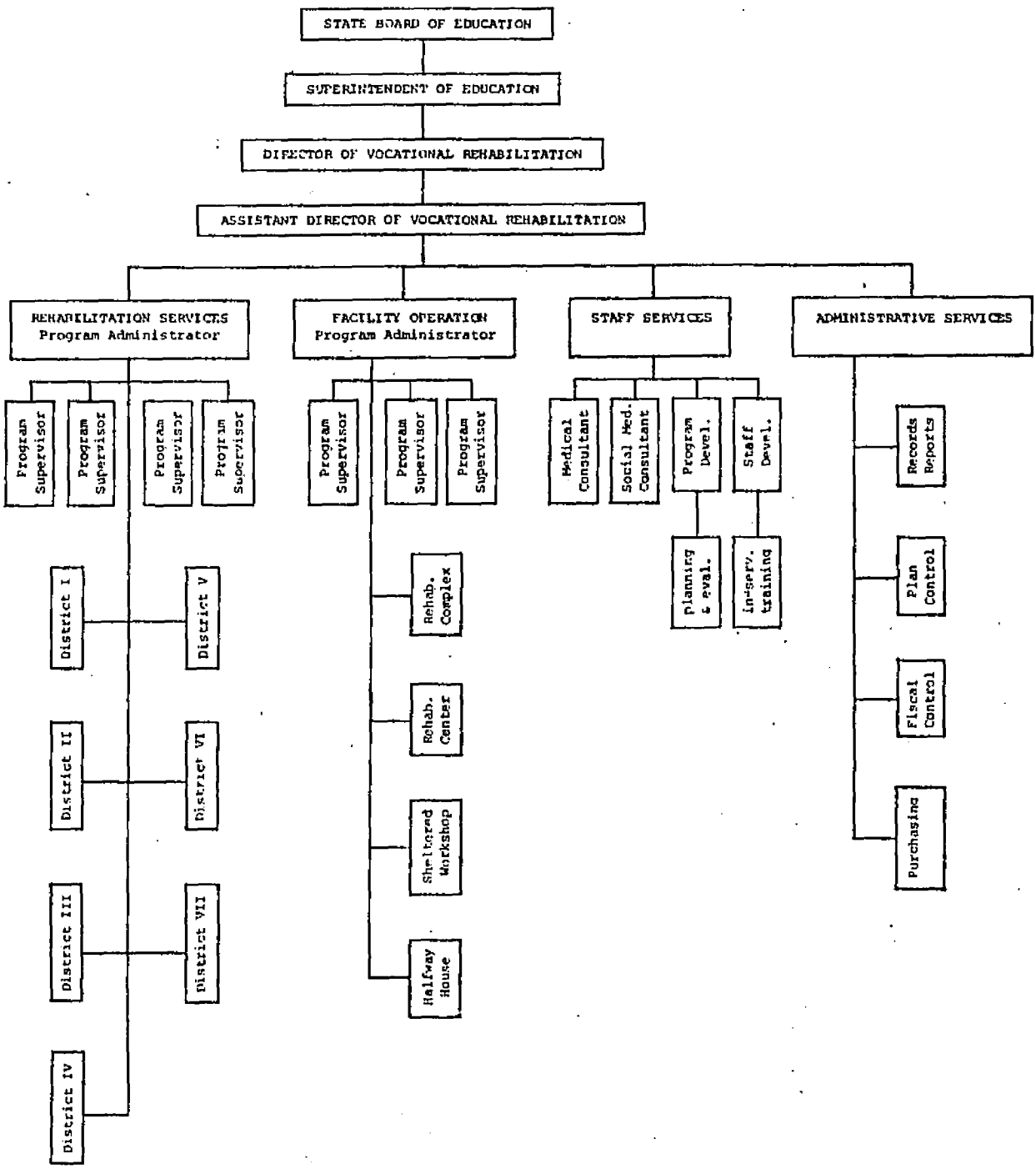
STATE BOARD OF EDUCATION
SUPERINTENDENT OF EDUCATION
DIRECTOR OF VOCATIONAL REHABILITATION
ASSISTANT DIRECTOR OF VOCATIONAL REHABILITATION
REHABILITATION SERVICES Program Administrator
FACILITY OPERATION Program Administrator
STAFF SERVICES
ADMINISTRATIVE SERVICES
Program Supervisor
Program Supervisor
Program Supervisor
Program Supervisor
Program Supervisor
Program Supervisor
Program Supervisor
Medical Consultant
Social Med. Consultant
Program Devel.
Staff Devel.
Records Reports
Plan Control
Fiscal Control
Purchasing
planning & eval.
In-serv. training
District I
District V
District II
District VI
District III
District VII
District IV
Rehab. Complex
Rehab. Center
Sheltered Workshop
Halfway House

Figure 1-1

Services and Administrative Services sections provide internal assistance, planning, control, record keeping, and other services. In addition, there are two operating sections, Facility Operation and Rehabilitation Services.

The Facility Operation Section was created as a direct result of the Vocational Rehabilitation Act Amendments of 1965, which authorized grants to the states to finance such activity. The Facility Operation Section is responsible for "operating State Agency's rehabilitation facilities, developing the State Plan for rehabilitation facilities, processing federal grants for public and private rehabilitation facilities and insuring the effective use of private and publicly operated rehabilitation facilities."[24] It also prepares and keeps under review a state plan that lists all of the public and private facilities available for rehabilitation work in the state. The main import of its work, however, is to augment and facilitate the efforts the Rehabilitation Services Section. The Rehabilitation Services Section is the division in which the actual work of rehabilitation takes place, and thus is the section of major interest to this inquiry.

Like the other sections of VR, Rehabilitation Services maintains central administrative offices at the State Department of Education in Baton Rouge. For purposes of vocational rehabilitation, Louisiana

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[24]Division of Vocational Rehabilitation, "Sixth Annual State Plan for Rehabilitation Facilities," Bulletin No. 1216 (Baton Rouge: State Department of Education of Louisiana, 1972), p. 5.

is divided into seven districts, with district offices in (1) Baton Rouge, (2) New Orleans, (3) Shreveport, (4) Monroe, (5) Alexandria, (6) Houma, and (7) Lafayette. Most of client contact work of the rehabilitation counselors is directed from these district offices.

## The Vocational Rehabilitation Process

The process by which VR attempts to make the handicapped employable is completely dependent upon the professional Vocational Rehabilitation counselor. Through the counselor contact is maintained with clients, eligibility determined, evaluations made or arranged, the plan for vocational rehabilitation formulated, services arranged and delivered and ultimately employment found and placement made. The philosophy of VR is well expressed by this statement from Mangum and Glenn.

> The basic Vocational Rehabilitation philosophy is that each human problem is a unique situation requiring unique solutions. Although a whole battery of services and resources can be focused on the individual, they are not all required in any particular instance. Therefore, the key to providing the proper mix of services at the proper point in time is the individualized relationship which exists between the rehabilitation counselor and the client.[25]

The individual counselor has great authority and latitude in deciding which clients he will serve, and the type, length, and quantity of services to be provided. Fortunately, practically the entire corps of VR counselors are college and university graduates

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[25]Mangum and Glenn, Ibid., p. 14.

from curricula designed to train such workers. While it is not the exclusive job of the counselor to provide the services necessary to rehabilitate his clients, it is his role to act as coordinator of these efforts. Not only must he have the ability to assess the degree of the disability and determine if rehabilitation is possible, but he must be able to formulate a feasible course of action that will result in rehabilitation of the clients. In addition, once such determinations and plans are made, it is the counselor who is responsible for their execution.

> The counselor must possess sufficient administrative and salesmanship capacity to obtain, whether by purchase or without cost to the agency, the services needed and to weld them into a comprehensive program tailored to individual need. Finally, he must have the personal contacts as well as access to a variety of institutional job placement resources to get the client into a realistic employment setting and then provide the required follow-up to assure successful rehabilitation.[26]

Reference to Figure 1-2, which is a flow chart of the VR process, will help to explain the work of VR. The numbers at each stage of the flow chart refer to status codes used by VR in their internal statistical reporting system, i.e., a client in status 00 has just been referred to VR, a client in status 10 is one who has been determined eligible for VR services, etc.

At the beginning of the flow chart is outreach and intake. VR has historically had little experience with searching out and recruitment of the disabled as prospective clients. Rather, over the course

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[26] Ibid., p. 16.

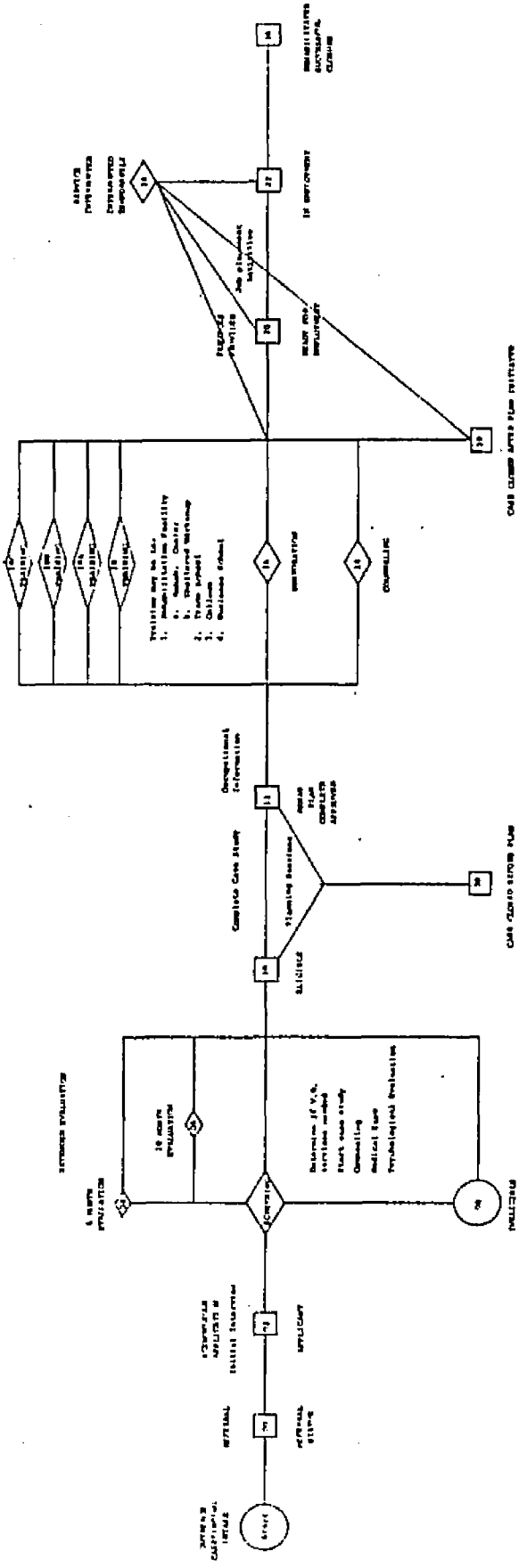

Figure 1-2

of VR development there have evolved relationships with various institutions that refer prospective clients to VR. Because this method has usually produced enough clients to utilize the available resources of the agency, active recruitment has been nil.[27] In Louisiana, the referral sources that recommend the largest numbers of clients have been educational institutions, hospitals, and sanitoriums, public assistance agencies, and interested individuals. Additional referral sources have included health organizations and agencies, the Social Security Administration, Workmen's Compensation, State Employment Service, correctional institutions, physicians, and self referral, as well as some occasional miscellaneous sources.

The rehabilitation process begins with an application for services by the prospective client. At this point the counselor will begin to keep comprehensive records on all cases. The summary document, or case service report, used for each client in the statistical reporting system of VR is the RSA300. The RSA300, which is illustrated in the Appendix, is the document that provides some of the basic data for this study.

From the initial interview the client moves to the screening process to determine if he meets VR eligibility requirements. In this phase, the counselor gathers basic information on the health, prior occupational history, personal and family history, and intellectual and physical capabilities of the client. The counselor may

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[27] Ibid., p. 18.

utilize medical, psychological, and additional counseling services as needed. The Rehabilitation Services Manual states:

> Eligibility for vocational rehabilitation services is based upon; (1) the presence of a physical or mental disability; (2) the existence of a substantial handicap to employment; and (3) a reasonable expectation that vocational rehabilitation services may benefit the individual in terms of employability.[28]

Clients who are certified as meeting these three requirements are designated as active cases and moved to status 10. The 1965 Amendments resulted in a liberalization of these requirements. It allows individuals whose employability may be questionable (such as spinal or mental retardation cases) to move to the extended evaluation status and receive all but employment related VR services for periods of up to 18 months.

Once a client is determined eligible, the counselor musters the VR resources at his disposal to complete any diagnosis necessary and formulate a formal individualized plan for the rehabilitation of each client. Upon completion of the plan, the client moves to the in-service statuses of training, restoration and counseling. Depending upon the needs of the individual client, a particular plan may call for counseling only, or some combination of counseling, mental or physical restoration (such as surgical or psychiatric treatment, fitting with appliances, etc.), and training (which may take place

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28 Social and Rehabilitation Service, Rehabilitation Services Manual MT#2, Statistical Reporting System (Washington: U.S. Government Printing Office, 1974), p. 7.

at a rehabilitation facility, a college or university, vocational school, etc.). If any of the services deemed necessary are not available from internal VR sources, VR may contract to have services provided through outside public or private agencies.

When the prescribed course of rehabilitation has been completed, the client moves to status 20, (ready for employment). The VR counselor will attempt to help the client locate suitable employment. When employment begins, the client must be observed by VR for a minimum of 30 days in successful employment before he may be considered successfully rehabilitated.

Clients may drop out or be eliminated at several points for reasons of ineligibility, movement to another state or VR jurisdiction, or failure to cooperate with VR. Cases that are unsuccessful in the rehabilitation attempt are closed at status 28.

## Summary

Vocational Rehabilitation in the United States and Louisiana has grown from a very modest program created at the end of World War I, into a large and comprehensive apparatus for the restoration and rehabilitation of the handicapped. The history of VR has followed the same theme since its inception: each succeeding series of changes have served to increase the scope and size of the federal-state program.

The process by which Vocational Rehabilitation attempts to render clients employable is centered on the individual client and the

counselor assigned to the case. Since disabilities are highly individualistic, so are the plans of rehabilitation formulated by counselors for individual clients. Once the course of rehabilitation has been determined, the VR agency acts as a coordinator and a contractor to obtain, through purchase or agreement, whatever services are necessary for each particular case. At the end of the process, the counselor may assist the client in finding employment. The rehabilitant must maintain a satisfactory employment record for a minimum period to be considered successfully rehabilitated.

## CHAPTER II

## THEORETICAL AND METHODOLOGICAL ISSUES

While Vocational Rehabilitation (VR) in the United States has existed since about 1920, it has only been in relatively recent times that economists have devoted significant time and attention to the task of economic analysis of this program. Ronald W. Conley in The Economics of Vocational Rehabilitation[1] has written a rather comprehensive volume to explain the historical development of VR and to make an economic evaluation of the program, including an analysis of factors influencing the success of rehabilitation. Conley's data are primarily taken from the Maryland Division of Vocational Rehabilitation.

Frank Grella performed a cost-benefit analysis of vocational rehabilitation in Connecticut in 1966-67, in which he attempted to calculate both social and private benefits from the program.[2] The methodology in the Grella study was very similar to that used by Conley and the Vocational Rehabilitation Administration in 1967,

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[1]Ronald W. Conley, The Economics of Vocational Rehabilitation.

[2]Steve L. Barsby, Cost-Benefit Analysis and Manpower Programs. (Lexington, Mass.: D. C. Heath and Co., 1972), pp. 41-42.

when the Administration produced their own internal cost-benefit analysis.[3]

In 1970, the published results of an interdisciplinary study of vocational rehabilitation for the disadvantaged, conducted at Florida State University, presented a model for the economic evaluation of vocational rehabilitation.[4] Extensive use was made of regression analysis and other econometric techniques in the development of the model. A closely related study, by Donald M. Bellante, a student of A. F. Holtmann, one of the co-authors of the Florida State interdisciplinary study, appeared in 1972.[5] The Bellante effort was, in part, an attempt to determine upon which groups, on economic efficiency grounds, it would be more desirable to place rehabilitation emphasis. Data for the Bellante study were obtained from the Florida Division of Vocational Rehabilitation.

## The Before-After Versus The Experimental-Control Group Evaluation Approach

Although these studies differ in terms of goals, technique and methodology, they are all linked by one common factor. Each employed

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[3]U.S. Department of Health, Education and Welfare. An Exploratory Cost Benefit Analysis of Vocational Rehabilitation. (Washington, D.C.: Vocational Rehabilitation Administration, 1967).

[4]Charles M. Grigg, Alphonse G. Holtman, and Patricia Y. Martin. Vocational Rehabilitation for the Disadvantaged. (Lexington, Mass.: D. C. Heath and Co., 1970).

[5]Donald M. Bellante. "A Multivariate Analysis of a Vocational Rehabilitation Program." Journal of Human Resources. (Spring, 1972), pp. 226-241.

the "before-after" technique in the measurement of the impact of VR on the earnings and output of the clients. The bases on which benefits derived from VR were calculated are a comparison of earnings and employment data prior to receipt of rehabilitation services, with the same variables after termination of rehabilitation services, for the same group of clients.

That the "before-after" technique would receive such widespread acceptance is due at least in part to the nature of the data available. For each client served by VR, a record is kept of weekly earnings at the time of acceptance for rehabilitation and at the time of closure of the case. All this information appears on a standardized form (Form RSA 300) which is completed for each client. This is the only such information on earnings of vocational rehabilitation clients that is collected and maintained by the vocational rehabilitation agency. It appears, then, that because the data is of a "before-after" nature, and because the "before-after" technique was accepted by many economists, this type of method was chosen in all of the economic evaluations of VR cited above.

This study is intended as an attempt to evaluate VR in Louisiana through the use of benefit-cost analysis which employs the main alternative to the before-after methodology--the experimental-control group technique. In attempting to assess the impact of any program that renders service designed to make people more employable, such as education, training, counseling or therapy, the objective is not to assess changes in variables over time. "Instead", as Hardin has

written, "it is a matter of differences in variables between two simultaneous, yet mutually exclusive states of affairs: When the program exists and when it does not exist, all other exogenous factors being held constant."[6] This presents a problem of how to obtain information on what the program participants employment experience and earnings would have been had the program in question not existed. Many social scientists have attempted to solve this problem by gathering data from a control group that is as nearly comparable to the participants of the program in question (the experimental group) in all respects, except for the fact that the control group members have not received the services offered by the program. These data are then used as the basis of evaluation and comparison.

The major alternative to such a procedure is the before-after, or pre-post strategy, in which each group studied acts as its own control. That is, data are gathered on the program participants before they begin to receive services, and comparable data are gathered on the same subjects after the completion of the services. Evaluations are then made by a comparison of the two sets of data. The implicit assumption of this evaluative technique is that pre-rehabilitation earnings and employment experience are indicative of what these variables would be in the absence of rehabilitation.

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[6]Einar Hardin. "On the Choice of Control Groups." in Evaluating the Impact of Manpower Programs, Michael E. Borus, ed. (Lexington, Mass.: D. C. Heath and Co., 1972, p. 41.

Such before-after comparisons have several serious disadvantages. First, changes in the aggregate level of economic activity may take place over the course of time period that elapses while services are being rendered and follow-up data are being generated. These changes may alter the job markets in question to the extent that pre-rehabilitation earnings and employment become a poor proxy for earnings and employment in the absence of program participation.

Suppose, for example, that participants enter the program and undergo rehabilitation during a period of high unemployment. They then come out of the program and enter the labor force in the midst of a strong recovery in which there is a greatly increased demand for labor services. This presents the problem of determining the degree to which any observed differences in earnings and employment among the rehabilitants are due to the fact of their participation in the program, as opposed to the generally more favorable market for labor services. In this example, the findings of the study would almost assuredly have an upward bias unless some device is employed to separate the various influences at work to improve the employment prospects of the participants.[7]

Secondly, if labor force entrants and reentrants are present among the clients that are served, this could impart a serious upward

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[7]For an example of an attempt to use the before-after technique with such an adjustment device see Loren Scott, "The Economic Effectiveness of On-the-Job Training: The Experience of the Bureau of Indian Affairs in Oklahoma," Industrial and Labor Relations Review. (January, 1970), pp. 220-236. No such adjustments were attempted in previous evaluations of VR programs.

bias. The question of whether these persons would have entered the labor force in any case, regardless of the program impact, cannot be answered using a before-after technique. It is thus possible that the researcher may incorrectly attribute some entries to the program impact, and thereby overstate the accomplishments of the program.

Finally, there may be structural changes in the personal situation of the persons who are served by the program.[8] These changes may be of such a nature as to make before-after comparisons less valid than they might have been in the absence of such personal changes. An example of such a change might be differences in marital status during the period under investigation. The added burden of marriage may tend to have a stabilizing and motivational effect that could alter earnings. This could occur independently from benefits derived from program participation, but the reuslting improvement in earnings might incorrectly be interpreted as being due to program participation.

The chief advantage of the before-after approach is that it tends to eliminate the self-selection bias. In the control group method the fact that one group (the experimental group) chooses to participate in the program under consideration, while the other group (the control group) does not participate, may indicate that there are significant differences in motivation and attitude between

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[8]Glen C. Cain and Robinson G. Hollister, "Evaluating Manpower Programs for the Disadvantaged," in Cost-Benefit Analysis of Manpower Policies, G. G. Somers and W. D. Wood, eds. (Kingston, Ontario: Queens University, 1969), p. 126.

these groups. That is, even though the two groups may be statistically similar, the fact that the members of one group made the decision, either overtly or implicitly, not to participate may indicate that this group is composed of individuals who may have subtle, nonquantifiable differences in attitude and behavior. This difficulty is avoided with the before-after technique because all of the individuals that compose the sample under study are program participants, and thus, all have made the same decision concerning program participation.

## Alternative Control Group Design

The experimental-control group technique attempts to avoid the methodological deficiencies of the before-after approach by drawing comparisons between two groups which are as nearly alike as possible, except for the fact that one group received the services of the program under study and the other one did not. Selecting an appropriate control group is perhaps the most difficult task in employing this methodology. Many sources and designs for the control group are possible and have indeed been used. These control group designs have been described by Hardin as those selected from target populations, "snowball" samples, persons having common prior education, qualified applicants who do not enroll in the program, program dropouts, and enrollees or graduates in other similar programs.[9] Each of these

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[9]Hardin, op. cit., p. 45.

possible sources of control groups, as they might be applied to Vocational Rehabilitation in Louisiana, is considered below.

The target population strategy was employed by Hardin in the evaluation of manpower training programs in Tennessee and West Virginia in the 1960's.[10] It is very similar in most respects to the approach of using qualified nonenrollees as a control group. The implicit assumption is that those who receive services are equivalent to a random sample of all those persons for whom such services were designed; that is, the target population. In these types of studies, some source must be found in which names and background data on qualified nonenrollees can be obtained. This information is then compared to the same data for the program participants. The chief prob ems with this control group design derive from the need to find a source for names and data on qualified non-participants; the fact that possible differences in characteristics between the control and experimental groups may necessitate a high degree of statistical control and manipulation to correct for such differences; and the fact that there is no acceptable method for adjusting for the differences in motivation between those who choose to participate and those who do not choose to participate, i.e., the self-selection bias.

Aside from the self-selection bias, which would be a very important factor in vocational rehabilitation, the difficulty with this strategy for this study is that no one comprehensive source of names

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[10] Ibid., p. 46.

and data on disabled people exists in Louisiana. While centralized records on job applications and unemployment compensation might be utilized in a more ordinary manpower program, the fact that Louisiana Division of Vocational Rehabilitation receives referrals from more than thirteen diverse sources[11] makes such a procedure impractical. An even greater problem is posed by the determination of which disabled persons actually become eligible and qualified for participation. The determination of such eligibility is the object of an elaborate process of evaluation undertaken by vocational rehabilitation itself, and certainly could not be duplicated or reasonably approximated by the manpower researcher.

The experimental-control group methodology may employ a random approach to determine program entrants. For example, all the applicants for a program could be randomly divided into two groups: (1) one that receives the services (experimental) and (2) one that does not receive services (control). The result of this process would be a statistically reliable control group in which the self-selection bias is avoided. Unfortunately, the random selection technique has rarely been used because:

> Aside from the money resources required, the legal problems involved in denying service to an eligible person, the preselection problems, the time period involved,

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[11] Educational Institutions, Hospitals, Health Agencies, Public Assistance, Social Security Administration, Workmen's Compensation Agency, State Employment Service, Correctional Institutions, Self Referred, Physician, Other Individual, Rehabilitation Agency, Other Sources.

> and any number of other substantial problems have all served to limit attempts at impact evaluation, using a statistically valid control group.[12]

The snowball technique refers to a procedure in which the researcher asks program participants to provide names of neighbors or relatives who might be eligible for the program at about the time a particular program commences. If the researcher fails to locate these particular individuals, he makes a search of the immediate geographic area in an attempt to find suitable subjects. While this procedure has worked well for certain MDTA training programs, the difficulty in applying it to a search for a control group of disabled persons is obvious. The very same type of difficulty is present when one attempts to draw a control group from those of similar educational background, such as graduates of some selected group of high schools.

The use of program dropouts as a control group is a possibility in the evaluation of vocational rehabilitation. Like many other programs, VR keeps a minimal amount of information on such persons for some time after they drop out. However, certain considerations make the choice of dropouts as a control group less than desirable. Except for those who leave the program in the very beginning of rehabilitation, it is possible that whatever services they receive before quitting the program will have some impact on the ability to earn and maintain employment. Some might drop out after receiving

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[12]Garth Mangum and David Snedeker, Manpower Planning for Local Labor Markets (Salt Lake City: Olympus Publishing Co., 1974), p. 283.

the most critical phases of counseling, therapy and training, but before completing the process, and some may be forced to withdraw because of external factors. The presence of such cases could seriously bias the findings on theoretical grounds. In addition, the self-selection bias could be present in that dropouts may have different attitudes and levels of motivation than do those who complete the program.

The strategy of using enrollees in other programs as a control group must be rejected in this case because of the uniqueness of VR. It seems very unlikely that any comparable program of a size sufficient to allow for valid comparison could be found within Louisiana that would allow the use of this procedure.

The control group design selected for this study, the pretraining enrollees method, is explained in Chapter III.

## Social Benefits

Most cost-benefit studies involving manpower training programs have utilized the concept of social economic benefits, which asserts that benefits are equal to the contribution to national output that results from the program, over and above any direct government outlays for the program activity. The great difficulty has been that there seems to be no direct way to observe this contribution. The idea of marginal productivity has formed the basis of the method by which the social benefits of manpower programs are generally estimated. This theory essentially states that the payment a marginal unit of a

resource receives is equal to the contribution to revenue of that marginal unit. It follows that if the manpower or training program makes its participants more efficient or productive, the increment in their earnings will closely approximate the increase in the national product attributable to the program.

Given this basic idea, however, there are still two ways, according to Hardin, of viewing the impact that manpower and training programs have upon the national product; one could choose to attempt to measure the impact of such programs on actual production, or alternatively, one could measure the impact on production capacity.[13] If the actual production orientation is adopted, several difficult concepts within the labor market itself must be addressed. First among these is the displacement effect. According to Hardin and Borus, this occurs when a training program enables an unemployed individual to secure a job that would otherwise have been filled by some other person. In the event that the job obtained by the trainee would not have remained vacant had he not filled it--and would in fact have been filled by a non-participant in the program under study--retraining would merely cause one person to be displaced by another, with no resulting increase in the actual national product.[14]

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[13]Einar Hardin, "Benefit-Cost Analysis of Occupational Training Programs: A Comparison of Recent Studies," in Cost-Benefit Analysis of Manpower Policies, G. G. Somers and W. D. Wood, eds. (Kingston, Ontario: Queens University, 1969), pp. 100-102.

[14]M. E. Borus and Einar Hardin, "An Economic Evaluation of the Retraining Programs in Michigan: Methodological Problems of Research," Proceedings of the Social Statistics Section of the American Statistical Association, 1966, pp. 133-134.

The other case is the one in which the vacuum effect is in operation. Suppose that the trainee comes from an occupation where his previous position will easily be filled from the ranks of the unemployed. In this instance, the total earnings of the trainee in his new job will approximate the increment in the actual national product. Retraining has not only improved the employment situation of the trainee, but it has also created a vacuum into which a previously unemployed person may move.[15]

In addition, the possible presence of the vacuum effect has an impact on the social cost concept employed. If this effect is considered to be present, the social cost of foregone earnings while participating in training or rehabilitation must be zero since these foregone jobs may be filled by nonparticipants in the program.

If the actual production approach is used, multiplier effects from increased employment must be taken into account, to allow for all exogenous spending changes. If a productive capacity orientation is adopted, however, multiplier effects are not allowed, and the full value of earnings foregone by the program participants will be included as part of social cost.[16]

Regardless of from which perspective benefits are viewed, the linkage between earnings and benefits is weakened by several other possible factors in the market, in addition to the vacuum and displacement effects. There are circumstances in which the conclusions

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[15] Ibid.

[16] Hardin, Ibid., pp. 100-102.

of the marginal productivity theory are not completely valid, as when effective competition in the labor market is weak or absent. The exclusion of such items as fringe benefits and various forms of imputed income may tend to make wages an understatement of the increment of production attributable to the workers involved.

In addition to the above mentioned difficulties are the even more difficult problems associated with non-market externalities. To the extent that vocational rehabilitation, or any manpower or training program, results in a lowering of unemployment or crime or delinquency, the demands upon public agencies such as the employment service, public safety and social service agencies are reduced. The extent to which resources may be freed from these uses and employed elsewhere is not reflected in the increment of earnings of the program participants.

Mindful of all these considerations, the measure of social benefits used in this study will be the increment in gross earnings of the participants attributable to their participation in VR. This approach measures both the benefits derived from increased capability and productivity, as well as those that result from more regular and sustained employment. Since no reliable or accurate means of estimating vacuum and displacement effects are available, they will be ignored, and it will be assumed that they tend to offset each other.[17]

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[17]While not totally satisfactory, measurement problems have caused this to be the standard approach in manpower program evaluations. See Einar Hardin and Michael E. Borus, "An Economic Evaluation of the Retraining Program in Michigan: Methodological Problems of Research," Proceedings of the 1966 Social Statistics Section

Similarly, since no method for accurately estimating exogenous spending changes and multiplier effects from these types of programs has been firmly established, such effects will be ignored. The linkage between earnings increments and marginal products may possibly be clouded by the presence of some of the market conditions discussed above. This, together with the fact that external benefits and psychic and nonpecuniary returns resulting from reduced social service needs are not measured, suggests that the estimates of social benefits derived from earnings increments should be viewed as a minimum estimate of the benefits that accrue to society.

The method used to estimate the impact of VR on the earnings of participants will be multiple regression analysis. By using this technique, adjustments may be made for demographic differences between the experimental and control groups which may account for differences in individual earnings due to factors other than the receipt of VR.

## Social Costs

Among economists, the most widely accepted concept of cost is that of opportunity cost. As Richard W. Judy has stated: "Every choice of an alternative excludes other opportunities that might have

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Meetings (Washington: American Statistical Association, 1966) and Einar Hardin, "Benefit-Cost Analysis of Occupational Training Programs: A Comparison of Recent Studies," in Cost-Benefit Analysis of Manpower Policies, G. G. Somers and W. D. Wood, eds. (Kingston, Ontario: Queens University, 1969).

been chosen. The value of the best of these foregone opportunities is the true cost of the chosen alternative."[18]

Following this line of reasoning, it must be noted that one of the components of social cost will be the foregone production of these handicapped individuals who chose to participate in VR program. Following some of the same theoretical precepts employed in the section on social benefits, it is assumed that the earnings foregone over the training period accurately measure the value of the foregone production. The measure of these foregone earnings that will be used is the per person average earnings of the control group over the time period VR services are received.

The use of this measure creates some difficulty, however, in terms of the time frame for comparison. Participants in VR may have a program of services designed for them that could last for periods ranging from a few months to a number of years. Since this investigation covers only a twelve month period, the average of foregone earnings computed from control group data will be stated in annual terms. It will therefore be necessary to adjust this average in every case by the length of time of actual participation for each individual in the experimental group. The resulting estimates of foregone earnings for all individual members of the experimental group will be aggregated to form the estimate of foregone earnings for all program participants.

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[18]Richard W. Judy, "Cost: Theoretical and Methodological Issues," In Cost-Benefit Analysis of Manpower Policies, G. G. Somers and W. D. Wood, eds. (Kingston, Ontario: Queens University, 1969), p. 20.

The inclusion of a measure of foregone earnings as a part of social costs assumes that the vacuum effect is not present; that is, that no unemployed person moves into the job previously occupied by the VR client.[19] If the vacuum effect had been assumed to be operative production would remain at a constant level, and there would be little or no output foregone as a result of training and rehabilitation. Since there is no accurate way to measure such an effect, it has previously been assumed not to exist, or to be offset by other effects. It seems reasonable, however, that given less than completely full employment, the tasks already being performed by handicapped persons who need rehabilitation services could be performed by some other available worker. That is, in all probability, the vacuum effect exists. Consequently, the estimate of the foregone output component of social cost derived here should be viewed as the upper limit or maximum of such costs.

The other components of social costs, in the case of VR, are the direct cost of those resources that are devoted to rehabilitation services (including counseling, restoration, and education) and administrative costs. Accounting cost records of these expenditures are maintained by VR, and these records will be used in the calculations of social costs under the assumption that prices are reasonable measures of foregone benefits.[20]

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[19] Hardin, Ibid., pp. 101-102.

[20] For a discussion of the possible problems involved with this assumption, see Judy, pp. 21-22.

Since VR is involved in no activity other than the rehabilitation of its clients, the joint cost problem as such does not occur. VR estimates of per client administration cost will be used in the generation of administrative costs for the experimental group.

Social cost will then be computed as follows:

[2-1] $$C_s = Y_f + R + A$$

where:

$Y_f$ = total foregone output for the experimental group during rehabilitation

R = total direct cost of rehabilitation services for the experimental group

A = total administrative cost

## Private Benefits

The private benefits resulting from the operation of a manpower program are those that accrue directly to the participants. In recent studies, the increase in the net earnings of program participation has been widely used as the measure of the private benefit of such programs.[21]

With many such programs in general, but with vocational rehabilitation in particular, it is very likely that some benefits in the form of non-pecuniary and/or psychic return accrue to the individual participants as a result of the services they receive. In the

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[21]Hardin, Ibid., pp. 102-103.

VR cases in which significant mental and/or physical restoration are rendered through services, these benefits may be so great as to outweigh the resultant gains to net income. These non-pecuniary benefits have been the subject of many inquiries conducted by psychologists, sociologists, educators, counselors, and rehabilitation practitioners.[22] As important as such factors may be from a private viewpoint, and possibly from a social perspective, the measurement and evaluation, and must be left to psychological and sociological researchers.

The chief measure of private economic benefits, then, is the increase in earnings of the individual, less any additional taxes incurred and transfer payments lost as a result of the increase in earnings. VR keeps records on transfer payments receipts for all individuals at closure. Additional data on transfer payments over the twelve month period under examination must be gathered.

The estimate of the portion of income of the experimental group attributable to VR participation is derived from a regression equation in which the dependent variable is annual earnings less taxes plus transfer payments for each individual in the sample.

## Private Costs

Since VR pays all direct expenses of the participants in its programs, the only costs incurred privately are foregone earnings

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[22] See for example, Constantian Safilios-Rothchild, The Sociology and Social Psychology of Disability and Rehabilitation. (New York: Random House, 1970) esp. chapters 4 and 5.

less income maintenance paid by VR in some selected cases for the period of participation. Thus, the previously discussed estimates of such foregone earnings less maintenance payments will be used as the measure of private cost.

## Comparison of Benefits and Costs

The three most widely used methods of comparing benefits and costs are the benefit-cost ratio method, the rate of return method, and the present value of net benefits method.[23] The benefit-cost ratio will be calculated in this study since it has the advantage of focusing on the gain per dollar of expenditure.[24] The benefit-cost ratio is found by dividing the present value of benefits by the present value of costs. Because benefits from VR are expected to occur over some number of years into the future, it is necessary to use a discounting procedure to determine their present value. In VR, almost all costs, on the other hand, are incurred over the relatively short period that rehabilitation services are actually offered. Consequently, the discounting of cost is unnecessary.

The benefit-cost ratio may be stated as:

[2-2]
$$\text{B/C Ratio} = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+i)^t}}{C}$$

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[23] Barsby, Ibid., pp. 8-12.

[24] Ibid., p. 12.

where:

$B_t$ = annual benefit in year t

C = total cost

n = time horizon over which benefits and costs occur

i = discount rate

The decision rule involved is that the higher the benefit-cost ratio, the more desirable the project, i.e., the greater the benefit per dollar spent. The benefit-cost ratio will be calculated for both social and private benefits and costs by substituting the appropriate cost and benefit concepts and discount rate into the above formula. Sensitivity analysis will be employed to construct a grid for the comparison of several appropriate alternatives combinations of time horizon and discount rate for both the social and private benefit-cost ratios.

# CHAPTER III

# THE DATA

## Introduction

This chapter describes the data in this project. Constructing a theoretical model for evaluating a human capital program is a difficult task. This task, however, is often surpassed in difficulty by the development of the data set for measuring costs and benefits. This is particularly true when the appropriate data set requires that income and employment information be obtained from a sample of individuals and that this information be matched across individuals in an experimental-control group framework. Because of its importance, the methodology for gathering the data used in this study is described below.

## Construction of the Control and Experimental Groups: The Pretraining Enrollees Method

The process by which VR evaluates its clients and renders services provides the possibility of constructing a control group that manages to avoid the pitfalls that are a part of the control group designs just discussed. When clients are referred to VR, they undergo an initial interview and screening process. (See Figure 1-2) The screening process is designed to determine if VR services are needed, and if the client is eligible for such services. At this initial

phase of the rehabilitation process medical and psychological evaluations are undertaken, and the case study on the individual client is begun. In some cases, clients are held over for an extended period of evaluation, which could last from three to eighteen months. It is only at the end of this process that a complete plan for the rehabilitation of the client is formulated. Then, the actual services that are designed to make the client employable or more employable are begun.

At the end of the rehabilitation process, cases are closed as either having been successfully rehabilitated or unsuccessfully rehabilitated. To be considered a successful case, the client must maintain satisfactory employment for a 30 day period after services end and job placement is accomplished. Failure to meet these criteria by dropping out while services are in process, having service interrupted, or transferring to another VR district or state before completion of services, are all possible reasons for closing cases as not rehabilitated.

With this information in mind, it is proposed that the control and experimental groups be formulated in the following fashion. The experimental group will consist of cases in which clients had been determined to be eligible and which were closed in the first quarter of the 1974 calendar year. The control group will consist of clients whose cases were opened and were determined to be eligible for services in the second quarter of the 1975 calendar year. No client who has actually begun to receive services before the second quarter

of 1975 will be included in the control group. Basic data will then be gathered for both the control and experimental groups to cover the period from the beginning of the second quarter of the 1974 calendar year to the end of the first quarter of the 1975 calendar year--a period of approximately twelve consecutive months. The control group consists of 1001 cases, and the experimental group contains 1581, for a total sample of 2582.

This procedure offers several advantages aside from the ones already discussed for the control group method in general. First, and very importantly, the self-selection bias will be greatly reduced. In the cases of both the control and the experimental group the participants have shown the inclination and ability to utilize VR services to at least some extent; both have shown approximately comparable initiative and motivation in either seeking out VR, or having their cases referred to VR; and both have cooperated at least through the screening stage where a positive determination on eligibility was made.

Second, in all cases in which the referral process was completed, VR maintains accurate and complete records on such important demographic data as race, age, sex, source of referral, educational attainment, marital status, presence of dependents, presence of public support, family income at referral, place of residence, and type of disability on all cases opened in which the referral process was completed.

Third, it will be known at the completion of the referral process, but before services are rendered, that all the members of both groups are indeed eligible to participate.

Fourth, VR maintains accounting cost data on all cases closed, showing in dollars the total cost of all services rendered.

## Survey of VR Records

After many conversations with VR executives and personnel, and after an extended planning progess, access was gained to VR files which contained copies of the RSA300. Document RSA300 contains basic demographic data on each subject, plus a variety of data on disability, work status, types and costs of services rendered, period of services, etc. (See Chapter I and Appendix). The RSA300 is part of the permanent record on each case maintained by VR.

Because of the type of information needed and the fact that it was necessary to gather some data on currently active cases, the search of VR records and initial data gathering had to be done manually. Additionally, in order to safeguard the privacy of VR clients, it was necessary to make pledges to the LDVR to respect the confidentiality of individual client records.

Though the size of the experimental and control groups was basically established by the number of cases processed during the time periods mentioned, an additional limitation was imposed on the size of the experimental group. Those persons whose cases had been closed due to death, who refused to cooperate or to supply adequate

address information, or who could not be located by the LDVR, were eliminated. It was reasoned that each of these problems was sufficient cause to make the probability of receiving a successfully completed questionnaire virtually nil in each case.

## The Mail Questionnaire

The theoretical foundations of Chapter II dictate that earnings, employment, and transfer payment data on all VR clients included in this study be gathered. This information is not available from VR records. Because the clients were widely dispersed geographically, and financial and time constraints precluded the gathering of the information by direct interview, a mail questionnaire was chosen for the task. In addition to the earnings and transfer payment data, this questionnaire would also have to serve as an instrument with which to update client demographic information--such as marital status and number of dependents--that was subject to change over time.

There are numerous sources that can be consulted with respect to questionnaire design.[1] The nature of the data solicited suggested the need for both simplicity and brevity, while still maintaining an instrument that would retrieve the necessary data.

The need for simplicity was especially important because VR renders services to persons with such a wide variety of disabilities,

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[1]This study made use of John B. Lansing and James N. Morgan, Economic Survey Methods. (Ann Arbor: Institute for Social Research, The University of Michigan, 1971), and A. M. Oppenheim, Questionnaire Design and Attitude Measurement, (New York: Basic Books, Inc., 1966).

cultural backgrounds, and educational levels. There was a real possibility that even the most seemingly straightforward instrument might confuse or deter potential respondants. For example, the educational level of the persons in the sample ranged from zero years of schooling up to and including a number of individuals who were graduates of professional schools, such as law and medicine. Likewise, a very large portion of the sample had reported disabilities that fell into the category of mental, psychoneurotic, and personality disorders. This included the psychotic, psychoneurotic and those suffering from alcoholism and drug addiction, as well as clients with mild, moderate, and severe mental retardation. In addition, the sample covered the cultural mosaic that is Louisiana, drawing from virtually all of the ethnic and racial groupings in the state.

Fortunately, brevity was not only necessary, but it was very practical to have a short questionnaire, as there was to be no attempt to measure attitude toward, or emotional reaction to, the VR agency, personnel or process. Such questions were beyond the scope of this study. Rather, the questionnaire would concern itself only with the question and with the updating of various demographic characteristics.

Because of these unique features, it was thought wise to consult VR officials for assistance in the preparation of the questionnaire. Accordingly, Melvin Meyers, Assistant Director - LDVR, and Author J. Dixon, Director, Special Services Section (i.e. research) of LDVR, provided critical comments and suggestions concerning the proposed questionnaire. The final design appears in Appendix II.

An examination of the information on the RSA300 revealed that three versions of the questionnaire would be necessary. For those members of the control group who have disabling conditions that obviously extended well back into the past (e.g. congenital defects), it was only necessary to gather information on employment, earnings, and transfer payments. In the case of clients for whom the beginning date of the disability was less obvious, a special problem arose. Reference to Chapter II will confirm that the period over which earnings and transfer payments are to be used in calculation of social and private benefits extends from the beginning of the second quarter of the calendar year 1974 (April, 1974) through the end of the first quarter of the calendar year 1975 (March, 1975), i.e., twelve consecutive months. It is possible that some members of the control group, whose cases were opened in the second quarter of 1975, could have become disabled during the period in question. In those cases, post-disability earnings (those which could be used as a valid basis of comparison) would have to be converted into annual terms. This is the reason for the inclusion of question five on the questionnaire sent to that portion of the control group whose disabling condition did not have an obvious date of initiation. (See Appendix II)

In the case of the experimental group, all individuals would receive the third form illustrated in the appendix. This form, in addition to gathering the earnings, employment and transfer data, provides for the updating of information concerning marital status,

number of dependents, and place of residence. This was made necessary by the fact that many of these cases, which were closed in early 1974, had been opened several months, and in some cases several years, prior to the date of closure. An examination of RSA300, plus a look into two of RSA300 are completed at the time of referral or case opening. This being the case, it was necessary to update these three items since they could possibly effect the benefits measure via their influence on earnings.

## Pretest of Questionnaire

The Assistant Director of the LDVR arranged for an opportunity to pretest the questionnaire. After consultation with VR officials, the facility chosen for the pretest was the River-side Evaluation and Training Center in Baton Rouge. The principal advantage of this site, from the point of view of pretesting the questionnaire, was that a very large portion of the clients in attendance at the time the test was to be conducted (July, 1975), had disabilities that fell into the mental and emotional category, including a number who had various degrees of mental retardation. In addition, several of the clients had secondary disabilities of a physical nature. Under the counsel of the VR personnel in charge of the center, and the Assistant Director and the Director of Special Services, it was concluded that this group formed a kind of baseline sample of VR clients, i.e., if these clients could complete the questionnaire with a minimum of difficulty, the questionnaire should not be beyond the capabilities of any non-institutionalized VR client.

Riverside personnel administered the questionnaire to the clients in what they considered to be a relaxed and proper setting. All clients were able to complete the questionnaire within seven to ten minutes with either no assistance or very minimal assistance in only two of twenty cases. Of this group, which consisted of four males and sixteen females and eleven whites and nine non-whites, only three questionnaires were completed in a manner that would have made them non-usable. Considering these results, the brevity and simplicity of the questionnaire, the built in redundancy that tended to act as a safeguard, and the advice of the VR personnel, the instruments were deemed adequate for the proposed purpose, and no changes were made as a result of the pretest.

## Response to the Questionnaire

At this point, preparations were begun for the direct mailing to the entire sample of 2582 individuals. In conjunction with the LDVR, a cover letter was devised. This letter appears in the Appendix II. Each client in the sample was to receive, in addition to the cover letter and questionnaire, a stamped, pre-addressed envelope with which to return the questionnaire.

All files of case information were individually numbered, and the questionnaire received corresponding numbers, so that the annoymity of the client would in fact be protected, and most importantly, so the client would feel confident that this was indeed the case.

The initial mailing to all 2582 clients took place on July 21, 1975. Within an approximate three week period, responses had been received from 757 clients, including 385 from the control group, and 372 from the experimental group. VR personnel had advised that their own internal studies in Louisiana--utilizing direct mail questionnaires--had received a response rate of between 18 and 25 percent. Even though the results obtained in this study compared favorable with this experience, the question of whether to undertake a second mailing then had to be analyzed.

It was noted that the control group responded at a higher rate than did the experimental group. This could be explained in several ways. First, since all of the clients in the control group were currently active with VR (indeed, most were just beginning to receive services by the time the questionnaire was received), they were probably more favorably inclined to respond to a survey which had the endorsement of VR than the experimental group. Second, since all of those cases in the control group were recently opened, the address information in the RSA300 (from which all questionnaires were addressed) was more accurate.

The same two reasons could be used to explain at least part of the lower response rate from the experimental group. Since all of these cases had been closed in the first quarter of the 1974 calendar year, these clients had been separated from VR for at least 15 months, and, in most cases, somewhat longer. In addition, this meant that the address of the client on the RSA300 is entered at time of <u>referral</u>.

This meant that some of the addresses were several years old. The Post Office was unable to deliver 303 of the questionnaires sent to experimental group clients, contrasted with only 10 undeliverable questionnaires.

Considering these facts, it was decided that a second mailing would be undertaken. The second mailing would take the form of a reminder letter, together with a duplicate questionnaire and another self-addressed and stamped return envelope. Because of the much lower response rate of the experimental group and the projected expense of a second mailing, it was determined that the second mailing would go only to the experimental group. After deleting from the 1581 member experimental group the 372 respondents and the 303 clients for whom no current address was available, a list of 906 remaining experimental group members were mailed the reminder package. The second cover letter appears in Appendix III. The second mailing took place on August 15, 1975. Of the 906 that received the second questionnaire, 275 responded. This gave 385 control group responses and 647 experimental group responses or a total of 1032--almost 40 percent of the total 2582 possible cases.

In the process of evaluating returned questionnaires, it was discovered that a sizeable number were not of usable quality. The reasons for voiding questionnaires varied widely. A number of respondents mutilated or obliterated the identification code on the questionnaire. Some gave conflicting information. Some wrote only comments concerning VR, while some simply gave incomplete information.

Upon careful examination 66 control group and 115 experimental group questionnaires were eliminated. This left workable data on 851 VR clients--319 from the control group and 532 from the experimental group.

One additional problem remained concerning the data. Among the control group respondents were 31 clients rehabilitated as "unpaid family workers". VR maintains a category of individuals who are rehabilitated as unpaid family workers, which includes persons who develop various skills for use in the non-market economy. By far the largest portion of such rehabilitants in the experimental group were these who were rehabilitated as homemakers, although a few farm workers were included. The major thrust of rehabilitation of these individuals is to attempt to render them capable of performing their home duties in a normal manner without outside assistance.

A difficulty arises in attempting to place a monetary or market value upon the productive services of these persons. Since they are not in the labor market, the market test typically used by economists cannot be applied. To compound this difficulty, little recent empirical work exists concerning estimates of the value of the services of homemakers. Most of the research done has been of a highly theoretical nature, and most of it has emphasized time allocation theory.[2] It may also be noted that this same problem has plague

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[2]See, for example, Wendy Lee Gramm, "The Demand for the Wife's Non-Market Time," Southern Economic Journal 41, (July, 1974), pp. 124-133, and Gary Becker, "A Theory of the Allocation of Time," Economic Journal 75, (September, 1965), pp. 493-517.

economists engaged in the calculations and estimations of national income accounting.[3] Because of these difficulties, it was decided to omit the 31 unpaid family workers from the sample, so that the final make-up of the sample was 319 in the control group, and 501 in the experimental group, for a total of 820. This represented 31.86 percent of the control group, 31.68 percent of the experimental group, and 31.75 percent of the total sample of 2582 cases.

## The Cost Data

An examination of the RSA300 shows that there is a section in which costs of VR services to clients are listed. This information was useful, but some important supplementary cost data had to be obtained from VR. Further, the costs of individual cases had to be recalculated. Investigation revealed that the overhead costs of counseling and administration were not shown on the RSA300. Likewise, working from the RSA300, it was impossible to obtain separately the costs of maintenance payments (direct living allowances) made to VR clients over the course of their rehabilitation. Reference to Chapter II will show that the computation of social costs requires not only a measure of foregone output (to be discussed below), but also the determination of all direct costs, including administrative and counseling overhead. Also, the calculation of private costs

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[3]William I. Abraham, National Income and Economic Accounting, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), pp. 25-26.

necessitates that any maintenance payments from VR be deducted from after-tax income. It was therefore necessary to obtain such data from a source other than the RSA300.

The LDVR made available copies of the Annual Fiscal Report, submitted to the United States Department of Health, Education, and Welfare, for the years 1970-71, 1971-72, and 1973-74. From these documents, per client expenditures for administration and counseling and monthly average expenditures on maintenance per client were calculated. These data were applied to each case, taking into account the months and years in which these expenditures were made. In this way, the limitations on cost data of the RSA300 were overcome.

The data for foregone income were computed on the basis of incomes reported by the control group. The exact method of computation is given in equation [2-2] in Chapter II.

## Summary

The data for this study were drawn from three primary sources. The experimental group and the control group were constructed through the use of the individual case files of LDVR. These files yielded most of the data on demographic characteristics and costs of rehabilitation services. Data on client earnings, transfer payments and certain demographic items were gathered by a mail questionnaire. Usable questionnaires were returned by 820 clients, or 3.175 percent of the sample of 2582. Additional data on costs were obtained from the Annual Fiscal Report of the LDVR. The utilization of this data for the investigation of the earnings structure of clients, social

costs and benefits, and determinants of successful rehabilitation, is the subject of the chapters that follow.

# CHAPTER IV

# THE EARNINGS STRUCTURE OF VOCATIONAL REHABILITATION CLIENTS IN LOUISIANA

## Introduction

This chapter examines the earnings structure of VR clients in Louisiana. In the first section, attention is given to the comparability of the experimental and control groups. This section also examines possible causes for the differences in the earnings structure of the two groups. The next section is an analysis of the earnings structure. It is followed by a summary and conclusions.

## Comparability of Control and Experimental Groups

Table 4-1 presents a comparison of the chief pre-rehabilitation demographic characteristics of the control group and the experimental group. If the structure of the earnings functions of the two groups and their characteristics had been essentially the same, it might be argued that the simple differences in the gross annual incomes of the two groups would be the payoff to the receipt of VR. However, examination of Table 4-1 shows that this is not likely to be the case. The experimental group is composed of individuals who are slightly older and have completed more years of schooling than the members of the control group. Also, the experimental group contains a higher percentage of males, whites, married persons, and urban residents.

Even if the demographic characteristics of the two groups had been comparable, the relative contribution of each characteristics to an individual's annual earnings may differ across the two groups.

Table 4-1

Comparison of Characteristics of the Control Group and the Experimental Group

| Characteristic | Total Sample (820) | Control (319) | Experimental (501) |
|---|---|---|---|
| Mean Age (years) | 27.48 | 25.23 | 28.91 |
| Percent Male | 55.78 | 47.02 | 61.35 |
| Percent White | 69.06 | 61.44 | 73.90 |
| Mean Years of Schooling | 10.07 | 9.77 | 10.27 |
| Percent Married | 38.24 | 29.15 | 44.02 |
| Percent Urban Residents | 58.83 | 57.99 | 59.36 |

Social benefits are to be measured by the following equation.

$$[4\text{-}1]\quad Y = a_0 + a_1(AGE) + a_2(AGESQ) + a_3(SEX) + a_4(RACE) + a_5(ED) + a_6(MS) + a_7(RES) + a_8(VR) + \mu$$

In this equation, Y, the total gross earnings of each individual in the sample (both experimental and control groups) over the twelve month period under consideration, will be used as the dependent variable. It will be regressed upon the following independent variables.

Dummy variables are used where appropriate to indicate qualitative differences.

AGE. To the extent that younger clients would be less affected by prior employment experience, are closer in time and attitude to educational and training processes, and are more adaptable and less discouraged, it would be expected that the younger handicapped would experience higher earnings than older handicapped individuals.

AGESQ. Age squared will be used to account for the fact that most age-earnings profiles are not linear.

SEX. Historically, males have experienced higher earnings than females. Whether due to discrimination or employee preferences[1] it is expected that females would exhibit lower earnings.

RACE. There is evidence that in Louisiana, as nationwide, non-whites (composed almost entirely of Negroes in Louisiana) generally have lower earnings than do whites.[2]

ED. Educational Attainment on entering VR program. It is normally expected that as educational attainment increases earnings increase. While the validity of such an expectation is not questioned here, a special problem occurs in adjusting for its effect among Vocational Rehabilitation clients. In selected

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[1] James Gwartney and Richard Stroup, "Measurement of Employment Discrimination According to Sex," SEJ (April, 1973), pp. 575-587.

[2] John H. Carson, The Economics of Racial Discrimination in Louisiana: 1950-1971, Occasional Paper #20 (Baton Rouge: Division of Research, College of Business Administration, Louisiana State University, October 1974).

cases, the comprehensive plan of rehabilitation services specifies formal education, in some cases involving attendance at a college or university. To avoid confusion of prior educational attainment with that which is a direct result of Vocational Rehabilitation participation, this variable will be composed of initial educational attainment for the entire sample, including both the control and experimental groups. To include educational attainment resulting from VR services to the experimental group in the demographic adjustment factors would bias the findings downward with regard to the contribution to earnings made by VR.

MS. Marital Status. The added responsibility involved with marriage is likely to be a factor that effects motivation, effort and stability of the client. Thus married individuals are expected to exhibit higher earnings.

RES. Place of Residence: Rural-Urban. Better job opportunities with regard to pay and diversity usually will exist in urban locations. We would then expect urbanites to enjoy higher earnings than those residing in rural areas.

VR. Participation in Vocational Rehabilitation. Participants = 1; non-participants = 0. Given the fact that other key factors thought to influence earnings have been adjusted for through inclusion of the independent variables noted above, the coefficient derived for this variable should show that

portion of income over the period under consideration which was attributable to VR participation.

$\mu$. The usual error term.

Because of the importance of the comparability of the earnings functions of the control group and the experimental group to the methodology of this study, it was necessary to determine whether the earnings functions of the control group and the experimental group are structurally dissimilar. The Chow Test[3] was used to make such a determination. This test involves the estimation of Equation 4-1 (excluding the VR variable) for the control group only, the experimental group only, and for both groups together. The following F ratio was constructed:

$$[4\text{-}2] \qquad F = \frac{Q_3/R}{Q_2/S+T-2R}$$

where:

$Q_1$ = residual sum of squares of total sample

$Q_2$ = residual sum of squares of control group plus residual sum of squares of experimental group

$Q_3 = Q_1 - Q_2$

R = number of regressors in the model

S = number of observations in the control group

T = number of observations in the experimental group

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[3]Gregory Chow, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," Econometrica XXVII, (July, 1960), pp. 591-605.

The calculated F was 7.025, which exceeded the critical value of 2.51 at the 95% level. The results of this test confirm that the control group and the experimental group do indeed have different earnings functions. Consequently, even if demographic characteristics of the two groups were the same, the payoff to VR participation could not be determined by a direct comparison of experimental versus control group earnings. The group of 319 unrehabilitated persons should be referred to as a comparison group rather than a control group in the strictest sense.[4]

This leaves the question of why the structure of earnings is different for the two groups. A possible explanation lies in an examination of Equation 4-1. All of the terms of Equation 4-1 measure changes in the level of earnings of VR clients, with the VR variable measuring the difference in the level of earnings of those who have been rehabilitated, as opposed to those who have not. Figure 4-1A illustrates a change in the level of earnings that might be estimated by the use of the kind of variables in Equation 4-1. Such an analysis would indicate that if a person completes a VR program, this would

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[4]Such results are not unusual in manpower studies. Somers and Stromsdorfer utilized a comparison group in their study of the Neighborhood Youth Corps, and Black, et al. used a similar approach in their study of the Mississippi Labor Mobility Project. Gerald G. Somers and Ernst W. Stromsdorfer, "A Cost-Effectiveness Analysis of In-School and Summer Neighborhood Youth Corps: A Nationwide Analysis," Journal of Human Resources, (Fall, 1972), pp. 446-459. H. Tyrone Black, Loren C. Scott, Lewis H. Smith, and William A. Simon, "On Moving the Poor: Subsidizing Relocation," Industrial Relations, Vol. 14, (February, 1975), pp. 63-77.

cause a discrete rise in the level of earnings at the age at which VR was completed. This is the same as saying that VR causes a change in the intercept of the earnings function.

On the other hand, the differences in the structure of the earnings equations between the two groups may not be due just to an intercept change (as captured by the single VR term). Rather, the receipt of VR may also change the impact that some of the other demographic variables have on earnings. That is, VR may not only cause a change in the intercept of the earnings function, but it may also change its slope. This possibility is graphically illustrated in Figure 4-1. In this figure the earnings functions of a handicapped black without VR (B) and with VR ($B_V$) are compared with the earnings function of a handicapped white without VR (W) and with VR ($W_V$). The RACE variable in equation 4-1 should capture the racial differences in the earnings functions indicated by the distance AB. However, it is possible that the receipt of VR results in different payoffs across racial groups, i.e., the distance EF may be greater than CD. If EF is equal to CD, then the payoff to VR can be captured by the VR variable in equation 4-1. If EF is greater (or less) than CD, this difference in VR payoffs across racial groups can be captured via the use of an interaction term such as RACE x VR.[5]

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[5]For a discussion of interaction terms and qualitative and quantitative variables, see Jan Kmenta, Elements of Econometrics, (New York: The Macmillian Company, 1971), pp. 409-423.

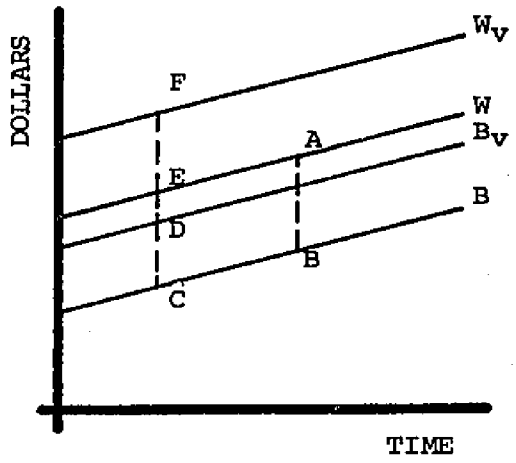


Figure 4-1

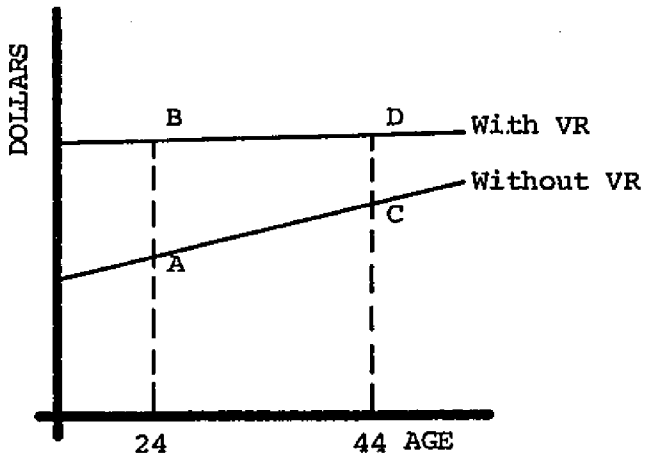


Figure 4-2A

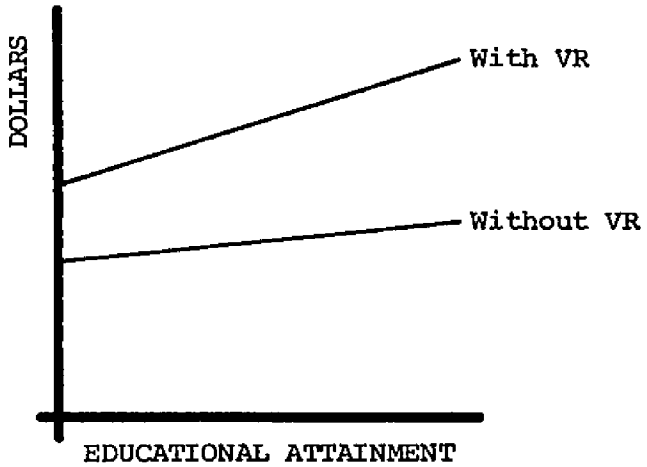


Figure 4-2B

The EF-CD gap differential in Figure 4-1 may exist not only for the racial characteristic, but it may also exist across the sex, marital status, and place of residence characteristics. Certainly, the gap-differential across the race and sex lines could be another by-product of discriminatory behavior toward women and minority groups. It is possible that without VR, handicapped whites and males may be restricted to offering their work effort in the secondary labor market. The receipt of VR, however, enables them to break into the primary labor market where the possibility of promotion, continuous on-the-job training, and fair supervision are greatly enhanced. To the extent that handicapped non-whites and females are less able to make this secondary-to-primary labor market transition, the EF-CD gap illustrated in Figure 4-1 will exist.

It is more difficult to establish theoretical reasons why the EF-CD gap may be present for different marital status or place of residence conditions. In the case of marital status, it seems plausible that the added responsibility of marriage, together with the effects of rehabilitation, might provide the impetus that had not existed before rehabilitation, for the passage of rehabilitant into the primary labor market, in much the same fashion as the race and sex cases above. Likewise, the higher level of opportunity and the wider variety of employment available in the urban area might interact with rehabilitation to enable the previously handicapped to enter the mainstream of employment more easily than the rural rehabilitant.

The receipt of VR may also result in different impacts across age groups. For example, it is likely that younger handicapped individuals would enjoy greater returns from VR because they are more enthusiastic about their economic future and perceive that they will have a longer work-life over which to achieve the gains from VR than is the case for older handicapped persons. An AGE x VR interaction term should measure this effect to the extent that it exists. Figure 4-2A illustrates this phenomenon when the VR cross-section data are used. A handicapped 24 year old person may obtain an increase in earnings of AB as a result of VR while a 44 year old person may achieve only an increase of CD.

Because of the complementary aspects of investments in human capital, one might expect that the higher one's formal educational attainment the greater the payoff to the receipt of VR. Such an expectation is depicted graphically in Figure 4-2B, and would be empirically captured through an ED x VR interaction term.

In an attempt to gain some insight into the structure of the earnings functions of the VR clients in the sample, each of the interaction terms set forth above were added individually to Equation 4-1. The results of this procedure are the subject of the next section.

## Examination of the Structure of Earnings

Table 4-2 contains the results from the computation of Equation 4-1 before the interaction terms were added. All of the terms measure

differences in the level of earnings of the individuals in the sample across the various economic and demographic characteristics they represent. The signs of the AGE and AGESQ variables conform to the standard nonlinear effect of work experience (and its proxy, age) on income. However, in Table 4-2, these coefficients are not significant. (In the case of AGE and AGESQ, one-tailed "t" test was applied). These results show, then, that for VR clients, contrary to many studies of other workers, earnings do not rise as age increases.[6] In terms of Figure 4-2A, the age-earnings function of VR clients would appear to be relatively flat, much like the line segment BD. A likely explanation for this unusual result is that handicapped persons make little investment in human capital as job experience is gained. It is also possible that job experience in the handicapped is not correlated with age.

Males have generally experienced higher earnings than females, whether due to discrimination by employers or other causes.[7] The results in Table 4-2 confirm that this is also the case with the

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[6]Gary Becker, Human Capital, (New York: National Bureau of Economic Research, 1964), pp. 138-145. Also, Lester C. Thurow, Investment in Human Capital. Belmont, California: Wadsworth Publishing Company, Inc., 1970), pp. 60-63. Giora Hanoch, "An Economic Analysis of Earnings and Schooling," Journal of Human Resources, (Fall, 1967) pp. 310-329.

[7]See, for example, James Gwartney and Richard Stroup, "Measurement of Employment Discrimination According to Sex," Southern Economic Journal, (April, 1973), pp. 575-587. Also, B. G. Makiel and J. A. Makiel, "Male-Female Pay Differentials in Professional Employment," American Economic Review (September, 1973), pp. 693-705.

Table 4-2
Demographic and Economic Characteristics Regressed Upon Gross Income

| Independent Variable | Coefficient ("t" value) |
|---|---|
| Intercept | -3680.12 (-4.50)[a] |
| AGE | 57.78 (1.13) |
| AGESQ | -1.00 (-1.52) |
| SEX | 1627.88 (7.75)[a] |
| RACE | 952.29 (4.12)[a] |
| ED | 193.41 (6.46)[a] |
| MS | 1418.90 (5.98)[a] |
| RES | 469.38 (2.25)[b] |
| VR | 2811.50 (12.56)[a] |

n = 820

$R^2$ = .38

F = 62.78[a]

a = significant at the 99% level
b = significant at the 95% level

individuals in this sample, since the coefficient of SEX is large, positive and significant. Differences in earnings between whites and non-whites have been found to exist in Louisiana.[8] The hypothesis that white VR clients experience higher earnings than non-white VR clients in Louisiana is confirmed by the data in Table 4-2.

Many economists have conducted studies which suggest that there are positive returns to education.[9] It was hypothesized that as years of formal schooling completed increased, so would the earnings of the individuals in the sample. Special care had to be taken in the construction of these data in the case of VR clients. In many of the rehabilitation plans written and implemented for individuals by VR, use is made of formal educational facilities, up to and including colleges and universities. To avoid confusing the effects of prior educational attainment with education that was prescribed as part of an individualized rehabilitation plan, years of formal schooling completed at the beginning of VR contact with the client was used as the education variable. The attainment has a positive effect on earnings. Table 4-2 shows that the coefficient of the ED variable was significant and positive.

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[8]John A. Carson, The Economics of Racial Discrimination in Louisiana, 1950-1971, Occasional Paper #20 (Baton Rouge: Division of Research, College of Business, LSU, October, 1974).

[9]See, for example, Becker, pp. 69-123. Also see Hanoch, pp. 310-329; H. S. Houthakker, "Education and Income," Review of Economics and Statistics, (February, 1959), pp. 24-28; Herman P. Miller, "Annual and Lifetime Income in Relation to Education," American Economic Review (December, 1960), pp. 962-986.

Following Borus and Hardin, it seems reasonable to expect that marital status would be positively associated with earnings in that those who are married and living with spouses would have greater financial pressures than single persons.[10] This hypothesis is supported by the data. If, as it seems reasonable to expect, greater employment and earnings opportunities exist in the urban areas vis-a-vis rural areas in Louisiana, the coefficient on the residence variable RES should be positive. The data and analysis support this hypothesis.

The coefficient of the VR variable was large and highly significant. This supports the original hypothesis that rehabilitation does effect the level of earnings of VR participants in a positive way. However, to attempt to understand the connection between rehabilitation, demographic characteristics, and earnings, the effect of the interaction terms postulated above must be examined.

Table 4-3 contains the coefficients produced by the interaction terms when they are added individually to equation 4-1. When AGEVR, the interaction term formed by AGE x VR, is added to the regression, it does not produce a significant coefficient. This suggests that the relations between age and rehabilitation is not an important factor in the earnings function of VR clients.

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[10]Einar Hardin and Michael E. Borus, The Economic Benefits and Costs of Retraining, (Lexington, Mass.: D. C. Heath and Co., 1971), pp. 56-57.

Table 4-3

Demographic and Economic Characteristics

Regressed Upon Gross Income

| Independent Variable | Coefficient ("t" value) | Coefficient ("t" value) | Coefficient ("t" value) | Coefficient ("t" value) |
|---|---|---|---|---|
| Intercept | -3680.12 (-4.50)[a] | -3803.22 (-4.64)[a] | -3204.18 (-3.90)[a] | -3360.5 (-4.10) |
| AGE | 57.78 (1.13) | 52.51 (1.03) | 55.03 (1.08) | 61.18 (1.20) |
| AGESQ | -1.00 (-1.52) | -0.68 (-0.99) | -0.97 (-1.48) | -1.03 (-1.57) |
| SEX | 1627.88 (7.75)[a] | 1636.83 (7.80)[a] | 726.50 (2.22)[b] | 1612.3 (7.72) |
| RACE | 952.29 (4.12)[a] | 935.95 (4.05)[a] | 929.12 (4.05)[a] | 183.99 (0.53) |
| ED | 193.41 (6.46)[a] | 196.45 (6.56)[a] | 193.38 (6.51)[a] | 201.52 (6.74)[a] |
| MS | 1418.90 (5.98)[a] | 1371.40 (5.74)[a] | 1373.48 (5.82)[a] | 1373.4 (5.81)[a] |
| RES | 469.38 (2.25)[b] | 460.28 (2.20)[b] | 503.08 (2.42)[b] | 519.88 (2.49) |
| VR | 2811.50 (12.56)[a] | 3664.82 (6.44)[a] | 2024.67 (6.48)[a] | 1892.5 (5.03)[a] |
| VAGER | | -30.69 (1.63) | | |
| VSEXR | | | 1513.37 (3.58)[a] | |
| VRACER | | | | 1369.07 (3.03)[a] |
| n | 820 | 820 | 820 | 820 |
| $R^2$ | .38 | .38 | .39 | .38 |
| F | 62.78 | 56.21 | 58.05 | 57.40 |

a = Significant at the 99% level, two-tailed test

b = Significant at the 95% level, two-tailed test

c = Significant at the 95% level, one-tailed test

Table 4-3 (Continued)

| Independent Variable | Coefficient ("t" value) | Coefficient ("t" value) | Coefficient ("t" value) |
|---|---|---|---|
| Intercept | -1657.24 (-1.86) | -3948.28 (-4.79)[a] | -3529.47 (-4.30)[a] |
| AGE | 26.70 (0.52) | 88.84 (1.68) | 63.01 (1.23) |
| AGESQ | -0.54 (-0.02) | -1.35 (-1.99)[b] | -1.07 (-1.61) |
| SEX | 1615.17 (7.82)[a] | 1613.25 (7.70)[a] | 1643.93 (7.82)[a] |
| RACE | 1063.24 (4.66)[a] | 974.07 (4.22)[a] | 987.04 (4.27)[a] |
| ED | 22.53 (0.51) | 187.40 (6.25)[a] | 194.19 (6.50)[a] |
| MS | 1334.93 (5.71)[a] | 678.53 (1.63) | 1443.94 (6.08)[a] |
| RES | 522.39 (2.54)[a] | 507.64 (2.43)[b] | -6.12 (-0.01) |
| VR | -182.49 (-0.30) | 2418.20 (8.42)[a] | 2335.87 (6.90)[a] |
| VEDR | 302.52 (5.29)[a] | | |
| VMSR | | 1033.99 (2.18)[b] | |
| VRESR | | | 782.28 (1.82) |
| n | 820 | 820 | 820 |
| $R^2$ | .40 | .38 | .38 |
| F | 60.79 | 56.59 | 56.34 |

a = Significant at the 99% level, two-tailed test
b = Significant at the 95% level, two-tailed test
c = Significant at the 95% level, one-tailed test

The addition of SEXVR (SEX x VR) to the regression produces the expected result. The coefficient of SEXVR is highly significant and positive, which means that male rehabilitants experienced higher earnings due to VR than did female rehabilitants. This confirms the original hypothesis and fits well with the findings on male-female pay differentials cited earlier. It was also noted that the coefficient of the SEX variable, which measures the differences in the intercept of the earnings function due to sex differences of the total sample is reduced in magnitude and significance as a result of the addition of SEXVR. This is a further indication that a part of the difference in the earnings of rehabilitants comes from the reciprocal effects between SEX and VR services.

Like the addition of SEXVR the introduction of RACEVR (RACE x VR) into the regression produces a positive and highly significant coefficient of a large magnitude, indicating that the combined effects of rehabilitation services and the white racial characteristics produce higher earnings than the combination of rehabilitation services and the non-white characteristic. As with the case of SEXVR, the level term that adjusts for race (RACE) across the entire sample is much reduced in magnitude and significance. This reaffirms the importance of the RACEVR variable.

The introduction of EDVR (ED x VR) produced some unique results. As in the two previous cases, the coefficient of the interaction term was positive, large, and highly significant. The coefficient of the level term ED became insignificant, as did the coefficient of VR.

This all seems to suggest that when educational attainment is disassociated with rehabilitation services, ED has no significant effect on the incomes of the handicapped persons in the sample. As a further test of this finding, Equation 4-1, excluding the VR variable, was computed separately for the experimental group and the comparison group. The results of this computation showed that the ED variable was not significant for those unrehabilitated persons in the comparison group, but was highly significant for the rehabilitated persons in the experimental group. This confirmed the finding that without VR, educational attainment had no impact on the earnings of handicapped persons. This is a clear indication of the high value of VR services, and the complementary nature of rehabilitation services and formal education.[11]

A similar situation was encountered when the MSVR interaction variable (MS x VR) was added. The level term, MS, produced an insignificant coefficient, pointing out that the marital status of a handicapped person had no effect on income in the absence of rehabilitation. The coefficient of the MSVR variable, however, was highly significant, large and positive, suggesting that the combination of marriage and VR produced a large increase in the earnings of the clients in the sample. In this instance however, the VR level term was large, positive and highly significant. Again, separate

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[11]It must be noted, however, that the correlation coefficient (T) between VR and EDVR was .875.

regressions were computed for the experimental group and the comparison group, following Equation 4-1, and again the results were the same as in the case of educational attainment. The MS variable was insignificant for the comparison group, but highly significant and positive for the experimental group, confirming again that marriage has an effect on the earnings of the disabled only when it is combined with VR.

One possible explanation for this unusual result is that the counseling and therapy rendered by VR have the effect of heightening the sense of responsibility of the rehabilitant. When the disabled client is made to feel more accountable through his VR experience, the interaction of VR and marital status produces an effect that was absent before rehabilitation. Certainly a major part of any program of rehabilitation must include therapy designed to affect the attitude of the client toward work, and to assist the individual in making the psychological adjustment to self-supporting employment. Perhaps this subtle psychological process is a part of what is being captured by the MSVR variable. At any rate, it offers a plausible explanation for this unusual result.

The last interaction variable to be added, RESVR (RES x VR) did not produce a significant coefficient, indicating that there is no compounding effect between VR and place of residence.

The above findings concerning interaction terms make it clear that benefits from VR vary substantially across demographic and economic characteristics. In view of this, it seemed prudent to

test for the possibility that benefits also varied across groups based upon major disabling conditions. Accordingly, such a test was constructed and carried out.

The division of the sample into disability groups requires some explanation and elaboration. The LDVR maintains a three digit classification system for disabilities which is broken down into six major divisions: (1) visual impairments; (2) hearing impairments; (3) orthopedic deformity or functional impairment, except amputations; (4) absence or amputation of major or minor members; (5) mental, psychoneurotic and personality disorders; and (6) other disabling conditions for which etiology is not known or not appropriate.[12] This last category might include such disabling conditions as cardiac disorders, speech impairments, and blood diseases.[13]

Because of the relatively small numbers of cases included in the total sample in categories (1) and (4) above, and because of similarities between the disorders and corrective measures in categories (1) and (2), and categories (3) and (4), the disabilities were regrouped into four major divisions. These are: DIS1, which include VR categories (1) and (2); DIS2, which includes VR categories (3) and (4); DIS3, comprised of VR category (5); and DIS4, which included VR category (6). Thus, in the text and tables that follow, DIS1 is

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[12]Rehabilitation Services Administration, Statistical Reporting System, Rehabilitation Services Manual MT#2. (Washington, D.C.: Government Printing Office, 1974), pp. 23-29.

[13]Ibid.

comprised of those with hearing and visual disabilities; DIS2 includes clients with orthopedic impairments, including amputations; DIS3 is composed of those with mental and emotional disorders; and DIS4 includes all other disabling conditions.

To test whether there were significant differences in earnings attributable to VR between disability groups, a new interaction variable, DIS x VR, was created. Because of the presence of four disability groups, a dummy variable scheme using DIS1 x VR as a base was employed. Then a regression using Equation 4-1, with the new dummy interaction variables added, was computed. The results of this test appear in Table 4-4. Table 4-4 shows that DIS3VR was significant, indicating differences in earnings associated with VR between groups based on major disabling condition. Table 4-4 indicates that clients in categories DIS2 and DIS4 derived higher benefits than did clients in DIS1. Clients in DIS3 derived much lower benefits than the clients in DIS1.

## Summary and Conclusions

The purpose of this chapter was to examine the structure of earnings of the VR clients in the sample. That examination has revealed that benefits to VR participation vary widely across demographic and economic characteristics. Because the variation of benefits is so strong across different sex, race, education, marital status and disabilities characteristics, the calculation of one single benefit-cost ratio for the entire VR program, as measured by the level change associated with the VR variable, is not proper.

Table 4-4

Demographic Variables Regressed Upon Gross Income

| Independent Variable | Coefficient | "t" value |
|---|---|---|
| Intercept | -3302.24 | -4.03[a] |
| AGE | 71.58 | 1.41 |
| AGESQ | -1.24 | -1.87 |
| SEX | 1511.99 | 7.31[a] |
| RACE | 973.97 | 4.30[a] |
| ED | 143.98 | 4.58[a] |
| MS | 1163.78 | 4.94[a] |
| RES | 560.80 | 2.74[a] |
| DIS2 | 82.45 | 0.19 |
| DIS3 | -256.49 | -0.93 |
| DIS4 | 209.66 | 0.78 |
| VR | 2737.87 | 4.56[a] |
| DIS2VR | 1150.34 | 1.63 |
| DIS3VR | -1277.73 | -1.86[b] |
| DIS4VR | 1133.16 | 1.48 |

$n_2$ = 820
$R^2$ = .41
F = 40.97

a = Significant at the 99% level, two-tailed test
b = Significant at the 95% level, two-tailed test
c = Significant at the 95% level, one-tailed test

Although such a calculation was one of the original goals of this project, the findings of this chapter dictate that this study must proceed to a calculation of benefit-cost ratios for various subgroups of the sample. This is the subject of the next chapter.

# CHAPTER V

# THE BENEFITS AND COSTS OF VOCATIONAL REHABILITATION: SOCIAL AND PRIVATE

This chapter is formulated for the purpose of determining the social and private benefits and costs of Vocational Rehabilitation (VR) for various subgroups of individuals. Social benefits and costs of VR are determined first for each of the subgroups, social benefit-cost ratios are constructed, and comparisons are made across various cells. Then the same order is followed in the presentation of private benefits, costs, and benefit-cost ratios. Summary and conclusions are included in the final section.

## Social Benefits to Subgroups

One of the major conclusions reached in the previous chapter on the structure of earnings of VR clients, was that due to the interaction between VR and various socio-economic characteristics of the rehabilitants, computation of one social benefit figure for the entire sample was not proper. The analysis in Chapter IV also showed that all of the interaction terms postulated, except AGEVR and RESVR, were significantly related to the earnings of VR clients. Therefore, based on these findings, equation [5-1] was formulated for the estimation of social benefits to VR.

$$[5\text{-}1] \quad Y = a_0 + a_1(AGE) + a_2(AGESQ) + a_3(SEX) + a_4(RACE) + a_5(ED) + a_6(MS) + a_7(RES) + a_8(DIS2) + a_9(DIS3) + a_{10}(DIS4) + a_{11}(VR) + a_{12}(SEXVR) + a_{13}(RACEVR) + a_{14}(EDVR) + a_{15}(MSVR) + a_{16}(DIS2VR) + a_{17}(DIS3VR) + a_{18}(DIS4VR) + \mu$$

The dependent variable, Y, is the total gross earnings of each individual respondent to the questionnaire over the twelve month period under consideration. It was regressed upon the independent variables shown in the equation, all of which have been defined in Chapter IV. Because AGEVR and RESVR were found not to be significantly related to earnings and benefits, they were omitted from equation [5-1]. The empirical counterpart of equation [5-1] is shown in Table 5-1.[1]

Although the introduction of the interaction terms resulted in a reduction of the magnitude and significance level of several of the level terms in equation [5-1], as compared to the results of the estimation of equation [2-1] in the previous chapter (See Table 4-2), the signs of all of the level terms except VR remained the same. The purpose of the inclusion of these terms is to hold constant across

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[1] An equation similar to [5-1], except with AGEVR and RESVR included was calculated. The results showed AGEVR to be significant and negative, but application of an F test showed that this equation did not have significantly higher explanatory power than equation [5-1]. Moreover, when the average age of the experimental group, 28, was plugged into this equation, the simulated benefits did not differ from those given in the text. It must be noted, however, that if benefits are estimated for different age groups, significantly higher or lower benefit estimates could be obtained.

the entire sample differences in the characteristics of the VR clients that might effect earnings. The social benefits from VR (defined in Chapter II as that portion of annual gross income attributable to participation in VR) is equal to the derivative of equation [5-1] with respect to VR. The attention of this section is focused on these benefits.

In order to estimate the social benefits from VR for various subgroups of the sample, a simulation process was used. This procedure involved the substiaution of values corresponding to the characteristics of the subgroup in question into equation [5-1]. Then, all of the terms containing VR were summed to obtain the estimate of social benefits to an individual with the assumed characteristics. The results of this simulation process appear in Table 5-2.

Table 5-2 presents estimates of social benefits based upon disability group, race, sex, marital status, and educational attainment. All of these classifications are self-explanatory or have been defined previously. Benefit estimates range from a high of $5376 per year for married white males with 12 years education in DIS4, to a low of $0 per year for single non-white females with six years education in DIS3. Table 5-2 shows that in general, males derive higher benefits than females, whites derived higher benefits than non-whites, married persons derived higher benefits than single persons, and those with more education prior to rehabilitation derived higher benefits. None of these results are contrary to what one would expect, given the

TABLE 5-1

ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS REGRESSED UPON GROSS ANNUAL INCOME

| Independent Variable | Coefficient | "t" Statistic |
|---|---|---|
| INTERCEPT | -1268.13 | -1.37 |
| AGE | 58.06 | 1.11 |
| AGESQ | -0.99 | -1.46 |
| SEX | 657.78 | 2.05b |
| RACE | 578.85 | 1.70 |
| ED | 26.52 | 0.58 |
| MS | 791.11 | 1.95b |
| RES | 651.96 | 3.21a |
| DIS2 | 171.75 | 0.42 |
| DIS3 | -13.35 | -0.04 |
| DIS4 | -93.24 | -0.34 |
| VR | -1008.33 | -1.08 |
| SEXVR | 1403.49 | 3.39a |
| RACEVR | 793.07 | 1.77 |
| EDVR | 218.31 | 3.62a |
| MSVR | 402.77 | .85 |
| DIS2VR | 847.54 | 1.21 |
| DIS3VR | -582.76 | -0.84 |
| DIS4VR | 1170.09 | 1.55 |

N = 820

$R^2$= .43

F = 34.55a

a = significant at the 99% level

b = significant at the 95% level

TABLE 5-2

SOCIAL BENEFITS FROM VOCATIONAL REHABILITATION

| ED | Married Males | Single Males | Married Females | Single Females |
|---|---|---|---|---|
| | | DIS1 (Hearing and Visual) | | |
| | | Whites | | |
| 6 | 2893 | 2496 | 1495 | 1093 |
| 9 | 3552 | 3150 | 2149 | 1747 |
| 12 | 4206 | 3804 | 2803 | 2401 |
| | | Non-Whites | | |
| 6 | 2105 | 1703 | 702 | 300 |
| 9 | 2759 | 2357 | 1356 | 954 |
| 12 | 3413 | 3011 | 2010 | 1608 |
| | | DIS2 (Orthopedic) | | |
| | | Whites | | |
| 6 | 3745 | 3343 | 2342 | 1940 |
| 9 | 4399 | 3997 | 2996 | 2594 |
| 12 | 5053 | 4651 | 3650 | 3248 |
| | | Non-Whites | | |
| 6 | 2952 | 2550 | 1549 | 1147 |
| 9 | 3606 | 3204 | 2203 | 1801 |
| 12 | 4260 | 3858 | 2857 | 2455 |
| | | DIS3 (Mental and Emotional) | | |
| | | Whites | | |
| 6 | 2316 | 1914 | 913 | 511 |
| 9 | 2970 | 2568 | 1567 | 1165 |
| 12 | 3624 | 3222 | 2221 | 1819 |
| | | Non-Whites | | |
| 6 | 1523 | 1121 | 120 | 0 |
| 9 | 2177 | 1775 | 774 | 372 |
| 12 | 2831 | 2429 | 1428 | 1026 |
| | | DIS4 (All Others) | | |
| | | Whites | | |
| 6 | 4068 | 3666 | 2665 | 2263 |
| 9 | 4722 | 4320 | 3319 | 2917 |
| 12 | 5376 | 4974 | 3973 | 3571 |
| | | Non-Whites | | |
| 6 | 3275 | 2873 | 1872 | 1470 |
| 9 | 3929 | 3527 | 2526 | 2124 |
| 12 | 4583 | 4181 | 3180 | 2778 |

findings of the last chapter, the literature concerning previous evaluations of manpower programs, and the literature on discrimination.

Studies by economists that document the effect of discrimination upon the earnings of non-whites and females are legion and have established that present and past patterns of discrimination resulted in generally lower earnings for these groups.[2] The results in Table 5-2 show the non-white and female clients derive lower benefits than whites and males.

The effect of prior educational attainment upon the benefits derived from VR is clear. The evidence presented here only reaffirms the findings in Chapter IV. The large and highly significant coefficient of the EDVR variable in equation [5-1] (See Table 5-1) shows that social benefits from VR increased markedly (by about $218) for each year of educational attainment at acceptance to VR. While this

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[2]For example, see John H. Carson, The Economics of Racial Discrimination in Louisiana: 1950-1971, Occasional Paper #20 (Baton Rouge: Division of Research, College of Business Administration, Louisiana State University, October, 1974); Joan Gustafson Haworth, James Gwartney, and Charles Haworth, "Economy, Productivity, and Changes in Discrimination During the 1960's," American Economic Review (March, 1975), pp. 158-168; John P. Formby, "The Extent of Wage and Salary Discrimination Against Non-White Labor," Southern Economic Journal 35 (October, 1968), pp. 140-150; Finis Welch, "Labor-Market Discrimination: An Interpretation of the Income Differences in the Rural South," Journal of Human Resources, 2 (Summer, 1967), pp. 319-329; and Richard B. Freeman, "Changes in the Labor Market for Black Americans," Brookings Papers on Economic Activity #1, (1973), pp. 67-132.

is an altogether expected result,[3] an additional factor acts to augment the importance of educational attainment in the case of VR. In selected cases, the comprehensive plan of rehabilitation services specifies formal education, which may involve attendance at a college or university. It should be recognized that these formal educational opportunities are highly dependent upon the level of educational attainment at acceptance to VR. For this reason, in addition to all of the standard ones, benefits tend to increase dramatically with prior educational attainment. In Table 5-2, three levels of educational attainment have been selected for computation. These correspond to completion of grammar school, junior high, and high school. VR benefits increase for all clients as educational attainment increases.

The effect of marital status on benefits received from VR was also examined in Chapter IV, and, as in the case of educational attainment, the evidence presented here serves to reinforce that developed in the previous chapter. While it is very likely that certain psychological effects are being captured by the MSVR variable (as noted in Chapter IV), there is at least some additional

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[3]This has been the case in most manpower programs. See Steve L. Barsby, Cost-Benefit Analysis and Manpower Programs (Lexington, Massachusetts, 1971). Also see Lester C. Thurow, Investment in Human Capital, (Belmont, California: Wadsworth Publishing Company, Inc., 1970).

evidence to suggest that being married has a positive effect on the benefits derived from manpower programs.[4]

Table 5-2 shows that the highest level of benefits was derived by those clients in disability category DIS4 (other and miscellaneous disorder). Categories DIS2 (orthopedic impairments), and DIS1 (hearing and visual problems) and DIS3 (mental and emotional difficulties) followed in order. The benefits derived by clients in DIS4 and DIS2 were of a similar magnitude, with those of DIS1 being considerably smaller, and benefits from DIS3 being significantly lower--on the average a full $1752 per client lower than those of DIS4.

The significantly higher payoffs to participants in DIS2 and DIS4 could possibly be explained by several factors. First, and most obvious, is the fact that the average number of months of training was significantly higher for clients in these two categories. For the entire experimental group, the average number of months spent in training was thirteen. But this average was 19.3 for DIS4, and 16.4 for DIS2. This compares to 9 months for DIS1 and 8.3 months for DIS3. Secondly, it is possible that the clients in DIS4, a kind of catch all category that includes all "other" disabilities, may have been less severely handicapped than the other clients in the sample. Unfortunately, available VR records do not indicate the extent of disability,

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[4]Stephen R. Engleman, "Job Corps: Some Factors Affecting Enrollee Earnings," Industrial Relations 11 (May, 1972), pp. 205-206. Engleman also cites Jan E. Dizard, Patterns of Unemployment in Berkley, California (Berkley: Survey Research Center, University of California, 1968), pp. 117-118.

only the nature of the disabling condition. Thus, for this particular group of clients, those in DIS4 and DIS2 could have higher payoffs simply because they are less severely handicapped.

Another possible explanation of these results lies in the institutional structure of VR. The VR process, outlined in Chapter I, is a system in which the VR counselor plays the paramount role. The counselor determines which clients shall be eligible to receive services, and he also determines the plan for rehabilitation for each client assigned to him. In essence, the counselor determines the kind and amount of service rendered. It is thus possible that the disparity between the payoffs of various disability groups could at least partially be the product of counselor bias in the selection of potential clients and formulation and execution of the individual plans for rehabilitation. Whatever the situation, it would seem that the exploration of such a possible counseling bias is more properly the bailiwick of the counseling and social work academe.

One further possibility remains as an explanation for the lower payoffs associated with clients in DIS3. The experimental group contained 54 individuals whose cases were closed as unsuccessfully rehabilitated. Of this group of unsuccessful rehabilitatees, 33 were in the DIS3 category. This means that the experimental group of 173 clients in the DIS3 category was more heavily weighted with clients whose cases were closed unsuccessfully.

While the above institutional factors and an examination of the data do provide reasonable explanations as to the possible reasons for differences in payoffs between disability groups, a more complete explanation for these differences must await a detailed analysis of the role of the handicapped in the Louisiana labor market.[5]

## Social Costs

Social costs determination for each individual in the experimental group is set forth in equation [5-2].

$$[5\text{-}2] \qquad C_S = R + A + COUN + Y_f$$

where:

R = total direct cost of rehabilitation services for the experimental group

A = total administrative cost

COUN = cost of counseling services

$Y_f$ = foregone output attributable to the experimental group during rehabilitation

The item R (direct cost of rehabilitation services) is reported on the RSA300 for each individual in the experimental group. To

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[5]An excellent and fairly comprehensive survey of this type of literature is provided by Saad Z. Nagi, William H. McBroom, and John Collette, "Work, Employment, and the Disabled," The American Journal of Economics and Sociology, 31 (June, 1972), pp. 21-34; also, George N. Wright, Kenneth W. Reagles, and Kenneth R. Thomas, "The Wood Country Project: An Expanded Rehabilitation Program for the Vocationally Handicapped," International Labour Review, 104 (July-August, 1971), pp. 23-35.

make comparisons between social costs and benefits for subgroups like those used in the previous section, it was necessary to estimate costs for those subgroups. Accordingly, the process began by using the reported R figures from each rehabilitation's RSA300 as the dependent variable in equation [5-3].

$$[5\text{-}3] \quad R = a_0 + a_1(AGE) + a_2(SEX) + a_3(RACE) + a_4(ED) + a_5(RES) + a_6(DIS2) + a_7(DIS3) + a_8(DIS4) + \mu$$

AGE--Age of the client in years. Following the work of Bellante, it was expected that there would be a negative relation between age and costs, as more ambitious (and thus more closely) rehabilitation programs are likely to be assigned to and undertaken by the younger, more adaptable clients.[6]

SEX and RACE are previously defined. (males = 1, females = 0; whites = 1, non-whites = 0). Again, following Bellante, it was expected that the fact that non-whites and females "face an inferior situation causes them to be restricted to a lower order of skills, which, in turn, are less expensive to train for."[7] Thus, it is hypothesized that higher costs would be associated with males and whites.

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[6]Donald M. Bellante, "A Multivariate Analysis of a Vocational Rehabilitation Program," Journal of Human Resources (Spring, 1972), p. 235.

[7]Ibid., p.

ED--Represents years of educational attainment at acceptance. As in the above cases, those with more education are best suited to a higher order of trainings. That is, those with the best preparation are the ones most likely to receive more extensive training (such as college or university education) which would be corresponding more expensive. Thus, is theorized that costs would increase with years of educational attainment.

RES--Place of residence (urban = 1, rural = 0). Due to the more limited training opportunities likely to be available in rural areas, it was expected that rural costs would be lower, producing a positive coefficient for this variable.

DIS--A dummy variable scheme was utilized to determine if costs varied between disability groups.

The results obtained from computation of equation [5-3] are illustrated in Table 5-3. All variables have the anticipated sign, and the AGE, ED, RES, and DIS variable are highly significant. The results for the DIS variables are somewhat surprising at first glance. Earlier data were reported which showed that for the experimental group the average number of months spent in VR was: DIS1 = 9 months; DIS2 = 16.4 months; DIS3 = 8.3 months; and DIS4 = 19.4 months. (One might expect, then, that R for DIS1 might be lower than DIS2 and DIS4 and higher than DIS3). Yet, the results in Table 5-3 indicate that R is smaller for DIS4 than DIS1!

One explanation for these seemingly contrary results is that the raw group averages were not adjusted for differences in client

characteristics across disabilities. Equation [5-3] makes such an adjustment, and the results illustrated in Table 5-3 confirm that varying client characteristics (in particular with respect to age, education, and residence) were factors contributing to R differentials.

An investigation of the structure of these R costs might also provide an explanation for their variance across disabilities. In particular, do DIS3 direct rehabilitation costs exceed those of DIS1 because of intensive or extensive factors. That is, it may be that the materials and other requirements for DIS3 rehabilitation are such that monthly expenditures (i.e., intensive costs) are higher than for DIS1. Or, the costs differences reflected in Table 5-3 may be due to extensive cost factors, i.e., DIS3 clients may simply require more months to rehabilitate than DIS1 clients. Certainly, the disability R differentials may also be the result of a combination of these two factors.

In attempt to isolate the structure of the R costs, equation [5-3] was reestimated twice. In the first instance the dependent variable was monthly direct rehabilitation costs, i.e., R for each client divided by the number of months that client was on VR rolls. If there are significantly difficult monthly expenditures (intensive costs) across disability groups this should be reflected in statistically significant coefficients on the DIS variables. To determine if extensive costs vary across disability groups, equation [5-3] was estimated with number of months on VR rolls (MTS) as the dependent variable.

TABLE 5-3

DEMOGRAPHIC CHARACTERISTICS REGRESSED
UPON DIRECT REHABILITATION COSTS(R)

| Independent Variable | Coefficient ("t" Value) |
|---|---|
| Intercept | 433.79<br>(1.58) |
| AGE | -12.44<br>(-2.69)a |
| SEX | 85.72<br>(0.83) |
| RACE | 101.45<br>(0.88) |
| ED | 47.45<br>(3.07)a |
| RES | 271.94<br>(2.67)a |
| DIS2 | -9.16<br>(-0.09) |
| DIS3 | 204.21<br>(2.41)b |
| DIS4 | -420.35<br>(-4.70)a |

n = 501

$R^2$ = .13

F = 9.30a

a = Significant at the 99% level

b = Significant at the 95% level

The empirical results for these two equations are shown in Table 5-4. They demonstrate that DIS4 direct rehabilitation costs are lower than DIS1 because of both extensive and intensive factors. DIS4 clients take fewer months to rehabilitate and their monthly expenditures are significantly lower than for DIS1 clients. Apparently DIS1 R costs are less than for DIS3 for primarily extensive reasons only. That is, DIS3 clients require more months to rehabilitate.

The data from Table 5-3 were used to compute the estimates of R across various subgroups that are shown in Table 5-5. The computation of R for subgroups was achieved through the use of simulation similar to that employed to estimate social benefits in the previous section. Throughout Table 5-5, the age 28 (the mean age of the clients in the experimental group) was used in the simulation for the calculating the values shown. This same assumption concerning age is made in all the calculations that follow in this chapter.

The items A (administrative cost) and COUN (counseling cost) involve some computation and adjustment. As noted in Chapter III, individual client records do not include itemized breakdowns of costs of an overhead nature. These costs include both the cost of administration and the extensive counseling services provided by VR. It was necessary to take the gross figures for administrative and counseling cost from the Annual Report of the Louisiana Division of Vocational Rehabilitation. These overhead-type costs are, for each client, a function of the number of months that clients spend on VR rolls. To allocate these costs, it was necessary to compute, from the Annual

TABLE 5-4
DEMOGRAPHIC CHARACTERISTICS REGRESSED UPON
MONTHLY DIRECT REHABILITATION COSTS AND MONTHS ON VR ROLLS
(n = 501)

| Independent Variable | Monthly Expenditure Equation | Months Equation |
|---|---|---|
| | Coefficient ("t" value) | Coefficient ("t" value) |
| Intercept | 2.52 (0.17) | 33.17 (7.12)a |
| AGE | 0.81 (3.32)a | -0.48 (-6.14)a |
| SEX | 2.95 (0.54) | 1.83 (1.04) |
| RACE | -1.63 (-0.26) | 2.34 (1.19) |
| ED | 0.68 (0.83) | 0.35 (1.36) |
| RES | 9.15 (1.70) | 0.35 (0.20) |
| DIS2 | 13.98 (2.72)a | -2.28 (-1.38) |
| DIS3 | -2.88 (-0.64) | 2.93 (2.04)b |
| DIS4 | -4.69 (-2.99)a | -8.01 (-5.26)a |

$R^2$ = .05

F = 3.51a

a = Significant at the 99% level

b = Significant at the 95% level

TABLE 5-5
DIRECT REHABILITATION COSTS

| | MALES | | FEMALES | |
|---|---|---|---|---|
| ED | Urban | Rural | Urban | Rural |
| | | DIS1 (Visual and Hearing) | | |
| | | Whites | | |
| 6 | 829 | 558 | 744 | 473 |
| 9 | 971 | 700 | 886 | 615 |
| 12 | 1113 | 842 | 1028 | 757 |
| | | Non-Whites | | |
| 6 | 728 | 457 | 643 | 372 |
| 9 | 870 | 599 | 785 | 514 |
| 12 | 1012 | 741 | 927 | 656 |
| | | DIS2 (Orthopedic) | | |
| | | Whites | | |
| 6 | 820 | 547 | 735 | 464 |
| 9 | 962 | 691 | 877 | 606 |
| 12 | 1104 | 833 | 1019 | 748 |
| | | Non-Whites | | |
| 6 | 719 | 448 | 634 | 363 |
| 9 | 861 | 590 | 776 | 505 |
| 12 | 1003 | 732 | 918 | 647 |
| | | DIS3 (Mental and Emotional) | | |
| | | Whites | | |
| 6 | 1033 | 762 | 948 | 677 |
| 9 | 1175 | 904 | 1090 | 819 |
| 12 | 1317 | 1046 | 1232 | 961 |
| | | Non-Whites | | |
| 6 | 932 | 661 | 847 | 576 |
| 9 | 1074 | 803 | 989 | 718 |
| 12 | 1216 | 945 | 1131 | 860 |
| | | DIS4 (All Others) | | |
| | | Whites | | |
| 6 | 409 | 138 | 324 | 53 |
| 9 | 551 | 280 | 466 | 195 |
| 12 | 693 | 422 | 608 | 337 |
| | | Non-Whites | | |
| 6 | 308 | 37 | 223 | 0 |
| 9 | 450 | 179 | 365 | 94 |
| 12 | 592 | 321 | 507 | 236 |

Report, a per client expenditure for both A and COUN on a monthly basis, and then allocate these costs to members of the experimental group based upon the number of months spent in VR. The months equation reported in Table 5-4 was used for determining the number of months each client in a subgroup would spend on the VR rolls.

The Annual Report of the LDVR for the period in question revealed an average monthly cost of administration of $4.45 per client, and an average monthly cost for counseling of each client of $10.26. These two amounts were together multiplied by the months in VR for various subgroups to produce the combined cost of counseling and administration for subgroups presented in Table 5-6.

The calculation of foregone output ($Y_f$) was achieved through the estimation of the earnings equation [2-1] (excluding the VR term) for the comparison group only. Such an equation can be used to estimate what a VR client's gross annual salary would have been had he not received VR. Assuming individuals are paid according to their marginal products, this gross annual earnings estimate should be a reasonable reflection of the value of the goods and services the non-rehabilitated person would have produced. The results of this computation appear in Table 5-7. These results could be used to compute foregone output for various subgroups, but because the dependent variable, annual gross income of the individuals of the comparison group, is in yearly terms, these estimates would be of an annual nature. Because VR services may extend over periods of time that do not correspond exactly to one year, the estimates for foregone output

TABLE 5-6
COST OF COUNSELING AND ADMINISTRATION

| | MALE | | FEMALE | |
|---|---|---|---|---|
| ED | Urban | Rural | Urban | Rural |
| | | DIS1 Whites | | |
| 6 | 385 | 380 | 358 | 354 |
| 9 | 401 | 395 | 375 | 369 |
| 12 | 417 | 411 | 391 | 385 |
| | | Non-Whites | | |
| 6 | 351 | 347 | 325 | 320 |
| 9 | 367 | 361 | 341 | 335 |
| 12 | 383 | 378 | 357 | 351 |
| | | DIS2 Whites | | |
| 6 | 351 | 347 | 325 | 320 |
| 9 | 367 | 216 | 341 | 335 |
| 12 | 383 | 378 | 357 | 351 |
| | | Non-Whites | | |
| 6 | 317 | 313 | 291 | 286 |
| 9 | 333 | 328 | 307 | 301 |
| 12 | 350 | 344 | 323 | 317 |
| | | DIS3 Whites | | |
| 6 | 428 | 423 | 401 | 397 |
| 9 | 444 | 438 | 417 | 411 |
| 12 | 460 | 454 | 433 | 428 |
| | | Non-Whites | | |
| 6 | 394 | 389 | 367 | 363 |
| 9 | 410 | 404 | 383 | 378 |
| 12 | 426 | 420 | 400 | 394 |
| | | DIS4 Whites | | |
| 6 | 267 | 263 | 241 | 236 |
| 9 | 283 | 278 | 257 | 251 |
| 12 | 300 | 294 | 273 | 267 |
| | | Non-Whites | | |
| 6 | 233 | 229 | 207 | 202 |
| 9 | 250 | 244 | 223 | 217 |
| 12 | 266 | 260 | 239 | 233 |

TABLE 5-7
FOREGONE EARNINGS: DEMOGRAPHIC CHARACTERISTICS REGRESSED UPON GROSS ANNUAL INCOME OF COMPARISON GROUP

| Independent Variable | Coefficient ("t" value) |
|---|---|
| Intercept | -1093.38 (-2.36)a |
| AGE | 83.62 (1.60) |
| AGESQ | -0.89 (-1.26) |
| SEX | 738.81 (3.62)a |
| RACE | 629.20 (2.91)a |
| ED | 44.29 (1.50) |
| MS | 352.49 (1.20) |
| RES | 240.00 (1.16) |
| DIS2 | 48.73 (0.18) |
| DIS3 | 17.02 (0.09) |
| DIS4 | 23.84 (0.13) |

n = 319

$R^2$ = .13

F = 4.67a

a = Significant at the 99% level

were converted to monthly terms and these monthly income figures were multiplied by the estimates of months in VR obtained from the months equation in Table 5-4. The result was the figures for foregone output for subgroups shown in Table 5-8.

The computation of social costs by equation [5-2] was accomplished by aggregating the costs of direct rehabilitation services in Table 5-5, counseling and administrative costs in Table 5-6, and foregone output in Table 5-8. These social costs for subgroups are presented in Table 5-9.

The reasons for the wide variations in the cost figures between subgroups is a matter of controversy. Bellante flatly states, as previously noted, that the reason for the lower cost figures for non-whites is "the fact that non-whites face an inferior situation which causes them to be restricted to a lower order of skills, which, in turn, are less expensive to train for. Consequently, average expenditures for non-whites are lower than those for whites . . ."[8] While such a statement cannot be confirmed by the data that VR maintains on costs of rehabilitation, it does serve to point out the degree of variability of explanations for the cost of rehabilitation that the unique VR process might permit. As has been discussed previously, the Vr process centers around the client-counselor relationship to an extent that is probably not duplicated in any other manpower program. Recall that it is the VR counselor who formulates each individual

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[8] Ibid.

TABLE 5-8
FOREGONE OUTPUT

| | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Married | | Single | | Married | | Single | |
| ED | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| | | | | DIS1 | | | | |
| | | | | Whites | | | | |
| 6 | 4270 | 3703 | 3510 | 2952 | 2488 | 1976 | 1781 | 1277 |
| 9 | 4750 | 4142 | 3958 | 3362 | 2881 | 2334 | 2142 | 1606 |
| 12 | 5254 | 4620 | 4430 | 3808 | 3298 | 2724 | 2527 | 1965 |
| | | | | Non-Whites | | | | |
| 6 | 2652 | 2147 | 1959 | 1463 | 1082 | 632 | 442 | 13 |
| 9 | 3050 | 2509 | 2325 | 1795 | 1392 | 912 | 719 | 250 |
| 12 | 3471 | 2904 | 2714 | 2158 | 1725 | 1218 | 1020 | 525 |
| | | | | DIS2 | | | | |
| | | | | Whites | | | | |
| 6 | 3991 | 3469 | 3298 | 2784 | 2342 | 1874 | 1701 | 1242 |
| 9 | 4450 | 3886 | 3725 | 3173 | 2714 | 2211 | 2041 | 1550 |
| 12 | 4932 | 4343 | 4176 | 3598 | 3110 | 2624 | 2405 | 1888 |
| | | | | Non-Whites | | | | |
| 6 | 2484 | 2023 | 1771 | 1405 | 1049 | 643 | 475 | 78 |
| 9 | 2860 | 2363 | 1884 | 1717 | 1337 | 902 | 731 | 307 |
| 12 | 3260 | 2737 | 1999 | 2059 | 1650 | 1188 | 1012 | 561 |
| | | | | DIS3 | | | | |
| | | | | Whites | | | | |
| 6 | 4801 | 4176 | 3928 | 3600 | 2811 | 2241 | 2020 | 1458 |
| 9 | 5315 | 4648 | 4409 | 4052 | 3237 | 2632 | 2414 | 1820 |
| 12 | 5853 | 5160 | 4914 | 4542 | 3687 | 3055 | 2832 | 2211 |
| | | | | Non-Whites | | | | |
| 6 | 3001 | 2438 | 2224 | 1696 | 1275 | 765 | 550 | 49 |
| 9 | 3431 | 2832 | 2622 | 2062 | 1618 | 1079 | 861 | 334 |
| 12 | 3886 | 3260 | 3045 | 2459 | 1985 | 1420 | 1196 | 643 |
| | | | | DIS4 | | | | |
| | | | | Whites | | | | |
| 6 | 3003 | 2595 | 2475 | 2076 | 1705 | 1352 | 1213 | 869 |
| 9 | 3396 | 2948 | 2837 | 2400 | 2012 | 1624 | 1487 | 1111 |
| 12 | 3814 | 3340 | 3223 | 2760 | 2343 | 1929 | 1785 | 1383 |
| | | | | Non-Whites | | | | |
| 6 | 1796 | 1450 | 1335 | 998 | 719 | 427 | 310 | 34 |
| 9 | 2108 | 1726 | 1615 | 1245 | 942 | 621 | 501 | 192 |
| 12 | 2443 | 2035 | 1918 | 1522 | 1189 | 842 | 717 | 381 |

TABLE 5-9
SOCIAL COSTS

| | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Married | | Single | | Married | | Single | |
| ED | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| | | | | DIS1 | | | | |
| | | | | Whites | | | | |
| 6 | 5484 | 4641 | 4724 | 3890 | 3590 | 2803 | 2783 | 2104 |
| 9 | 6122 | 4937 | 5330 | 3827 | 4142 | 3318 | 3402 | 2590 |
| 12 | 6784 | 5873 | 5960 | 5061 | 4717 | 3866 | 3946 | 3107 |
| | | | | Non-Whites | | | | |
| 6 | 3731 | 2951 | 3038 | 2267 | 2025 | 1324 | 1410 | 705 |
| 9 | 4287 | 3469 | 3562 | 2755 | 2518 | 1761 | 1845 | 1099 |
| 12 | 4866 | 4023 | 4109 | 3277 | 3009 | 2225 | 2304 | 1532 |
| | | | | DIS2 | | | | |
| | | | | Whites | | | | |
| 6 | 5162 | 4363 | 4469 | 3678 | 3402 | 2658 | 2761 | 2026 |
| 9 | 5779 | 4793 | 5054 | 4080 | 3932 | 3152 | 3259 | 2491 |
| 12 | 6419 | 5554 | 5663 | 4809 | 4486 | 3723 | 3781 | 2987 |
| | | | | Non-Whites | | | | |
| 6 | 3520 | 2784 | 2807 | 2166 | 1974 | 1292 | 1400 | 727 |
| 9 | 4054 | 3281 | 2778 | 2635 | 2420 | 1708 | 1814 | 1113 |
| 12 | 4613 | 3813 | 3352 | 3135 | 2891 | 2152 | 2253 | 1525 |
| | | | | DIS3 | | | | |
| | | | | Whites | | | | |
| 6 | 6262 | 5361 | 5379 | 4785 | 4160 | 3315 | 3369 | 2532 |
| 9 | 6934 | 5990 | 6028 | 5394 | 4744 | 3862 | 3921 | 3050 |
| 12 | 7630 | 6660 | 6691 | 6042 | 5352 | 4444 | 4497 | 3600 |
| | | | | Non-Whites | | | | |
| 6 | 4327 | 3488 | 3550 | 2395 | 2489 | 1704 | 1764 | 988 |
| 9 | 4915 | 4039 | 4106 | 3269 | 2990 | 2175 | 2233 | 1430 |
| 12 | 5528 | 4625 | 4687 | 3824 | 3516 | 2674 | 2727 | 1897 |
| | | | | DIS4 | | | | |
| | | | | Whites | | | | |
| 6 | 3679 | 2996 | 2851 | 2477 | 2770 | 1641 | 1778 | 1158 |
| 9 | 4230 | 3506 | 3671 | 2958 | 2577 | 2070 | 2200 | 1557 |
| 12 | 4807 | 4056 | 4216 | 3476 | 3024 | 2533 | 2666 | 1987 |
| | | | | Non-Whites | | | | |
| 6 | 2337 | 1716 | 1876 | 1264 | 1149 | 629 | 740 | 236 |
| 9 | 2808 | 2149 | 2309 | 1668 | 1530 | 932 | 1089 | 503 |
| 12 | 3301 | 2616 | 2776 | 2103 | 1935 | 1588 | 1463 | 850 |

plan for rehabilitation, and thus, for all practical purposes, determines the amount, type, and cost of the services that the client will receive. Rehabilitation counseling is an academic discipline with a theory and practice that has been well developed over an extended period. Perhaps it is true that some groups face situations that cause them to receive less extensive training because of factors such as race, sex, or type of disability. But, given the great subjectivity inherent in the formulation of individualized plans for rehabilitation, it could also be the case that some particular group tends to be more or less severely disabled, has different motivational characteristics, or even is subjected to some non-specific bias or prejudice on the part of the VR counselor. The point of matter is this: because expenditures are determined largely by counselor discretion, and because low expenditures could, as shall become apparent, produce high benefit-cost ratios, great caution should be exercised in making judgments concerning rehabilitation costs across various subgroups of VR clients.

This great individuality with which rehabilitation plans are written provides at least a partial explanation for the relatively low $R^2$ figures obtained in some of the regressions. That is to say, it is very difficult to formulate a model that utilizes the available information, which explains a large percentage of the variation in VR costs. This is due partly to the fact that existing variables do not capture very well that variation in rehabilitation costs and efforts that is due to counselor discretion in the handling of individual cases and the formulation of unique plans for rehabilitation.

## SOCIAL BENEFIT-COST RATIOS

The preceding calculations of benefits and costs make it possible to construct benefit-cost ratios according to the following equation:

[5-4]
$$\text{B/C Ratio} = \sum_{t=1}^{n} \frac{\frac{B_t}{(1+i)^t}}{C}$$

where:

$B_t$ = annual benefit in year t

C = total cost in year t

n = time horizon over which benefits occur

i = discount rate

All of the benefits calculated previously are in annual terms. Because benefits are expected to occur over some period into the future, it is necessary to use a discounting procedure to determine their present value, as in equation [5-4]. Because the VR costs are incurred over the relatively short span of rehabilitation and do not extend into the future the discounting of costs is unnecessary.[9]

Because of the absence of long-range follow-up data, it cannot be stated that the benefits derived from VR will remain constant year

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[9]The period of time over which costs are actually incurred averages slightly more than one year per client. While strictly speaking this period is in excess of one year, the differences involved in discounting of cost would be very small. It should be pointed out that these small differences serve only to make the benefit cost ratios a more conservative measure.

after year into the future. Likewise, the question of how far into the future these benefits are likely to occur remain unanswered.[10] In this situation, in many manpower studies, sensitivity analysis has been employed. That is, various time horizons and discount rates are assumed, and a matrix of benefit-cost ratios is constructed. In order to keep data presentation to a reasonable level, such a technique was not used here. Instead, modest assumptions concerning the time horizon of benefits and rate of discount were made. It was assumed that benefits remain constant from year to year, and that these benefits extend ten years into the future. Since there is some considerable disagreement concerning discount rates,[11] a conservative ten percent rate was chosen. The benefit-cost ratios for social be efits and costs appear in Table 5-10.

Examination of Table 5-10 shows that social benefit-cost ratios range from 0 for unmarried non-white females of 6 years education in

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[10]To determine the time pattern of benefits would require a substantial and costly longitudinal data base. At least one manpower program evaluation found that the benefits from program participation actually rise over time. (Michael E. Borus and Einar Hardin, "Time Trends in the Gains from Retraining," 1967 Proceedings of the Indiana Manpower Research Conference, 1967, p. 81). If comparable behavior exists from the Louisiana Vocational Rehabilitation program, the benefits to the program would be underestimated here, and the benefit-cost ratios would have to be considered conservative estimates.

[11]See, W. J. Baumol, "On the Social Rate of Discount," American Economic Review (September, 1968), pp. 788-802. Also, R. Turvey and A. R. Prest, "Cost-Benefit Analysis: A Survey," Economic Journal (December, 1965), pp. 683-735.

TABLE 5-10
BENEFIT-COST RATIOS - SOCIAL BENEFITS

| | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Married | | Single | | Married | | Single | |
| ED | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| | | | | DIS1 Whites | | | | |
| 6 | 3.24 | 3.83 | 3.24 | 3.94 | 2.55 | 3.27 | 2.41 | 3.19 |
| 9 | 3.56 | 4.42 | 3.63 | 5.05 | 3.18 | 3.97 | 3.85 | 4.14 |
| 12 | 3.80 | 4.40 | 3.92 | 4.61 | 3.65 | 4.45 | 3.73 | 4.74 |
| | | | | Non-Whites | | | | |
| 6 | 3.46 | 4.38 | 3.44 | 4.61 | 2.10 | 3.25 | 1.30 | 2.61 |
| 9 | 3.95 | 4.88 | 4.06 | 5.25 | 3.30 | 4.73 | 3.17 | 5.33 |
| 12 | 4.30 | 5.21 | 4.50 | 5.64 | 4.10 | 5.55 | 4.33 | 6.51 |
| | | | | DIS2 Whites | | | | |
| 6 | 4.45 | 5.27 | 4.59 | 5.58 | 4.23 | 5.41 | 4.31 | 5.88 |
| 9 | 4.67 | 5.63 | 4.85 | 6.01 | 4.68 | 5.84 | 4.89 | 6.39 |
| 12 | 4.83 | 5.59 | 5.04 | 5.94 | 4.99 | 5.86 | 5.14 | 6.68 |
| | | | | Non-Whites | | | | |
| 6 | 5.15 | 6.51 | 5.58 | 7.23 | 4.82 | 7.36 | 5.03 | 9.69 |
| 9 | 5.46 | 6.75 | 7.08 | 7.47 | 5.59 | 7.92 | 6.10 | 9.94 |
| 12 | 5.67 | 6.86 | 7.07 | 7.56 | 6.07 | 8.15 | 6.69 | 9.89 |
| | | | | DIS3 Whites | | | | |
| 6 | 2.27 | 2.65 | 2.18 | 2.45 | 1.34 | 1.69 | 0.93 | 1.24 |
| 9 | 2.62 | 3.04 | 2.61 | 2.92 | 2.02 | 2.49 | 1.82 | 2.34 |
| 12 | 2.91 | 3.34 | 2.95 | 3.27 | 2.55 | 3.07 | 2.48 | 3.08 |
| | | | | Non-Whites | | | | |
| 6 | 2.16 | 2.68 | 1.94 | 2.87 | 0.29 | 0.43 | 0 | 0 |
| 9 | 2.72 | 3.31 | 2.65 | 3.33 | 1.59 | 2.18 | 1.00 | 1.57 |
| 12 | 3.14 | 3.76 | 3.18 | 3.90 | 2.49 | 3.28 | 2.31 | 3.32 |
| | | | | DIS4 Whites | | | | |
| 6 | 6.79 | 8.34 | 7.90 | 9.09 | 7.21 | 9.97 | 7.82 | 12.00 |
| 9 | 6.85 | 8.26 | 7.23 | 8.97 | 7.91 | 9.85 | 8.14 | 11.51 |
| 12 | 6.87 | 8.14 | 7.24 | 8.79 | 8,07 | 9.63 | 8.23 | 11.04 |
| | | | | Non-Whites | | | | |
| 6 | 8.61 | 11.72 | 9.40 | 13.96 | 10.01 | 18.28 | 12.20 | 38.27 |
| 9 | 8.59 | 11.23 | 9.38 | 12.99 | 10.14 | 16.65 | 11.98 | 25.94 |
| 12 | 8.53 | 10.76 | 9.25 | 12.21 | 10.09 | 12.30 | 11.66 | 20.08 |

DIS3, up to 38.27 for single non-white females of 6 years education in DIS4. In general, as in the case of social benefits, the benefit-cost ratios are highest for DIS4 and lowest for DIS3. Non-whites produce higher ratios than whites, and married persons generally produce higher ratios than single persons. While rural clients generally derived lower benefits, the proportionately lower costs of rehabilitation for rural clients produced higher benefit-cost ratios for them than for urban clients.

In view of the above results, one might be tempted to recommend that rehabilitation efforts should be first concentrated in the direction of non-whites and males. A note of caution should be injected here, however. Quite aside from the humanitarian, legal and ethical dilemma that such a course of action would involve, it could lead to a less than desirable allocation of resources on purely economic grounds. To begin with, the above results are average benefit-cost ratios, not marginal benefit-cost ratios. Optimizing decisions require marginal data. Thus, these results should be viewed as only indicative and not confirming.

Second, at least one recent piece of research has indicated that there is a strong "vintage effect" at work with respect to non-white returns to schooling in the South. That is, recent non-white graduates enjor much higher returns to education, whether due to increases in educational quality, lessened discrimination, judicial and political

changes, or other more obscure causes.[12] Since so many services rendered by VR are either educational in nature or closely related thereto, it does not seem unreasonable to suspect that the same secular trend may be at work enhancing the returns to VR for minorities. At the very least, this provides a caveat against overly simplified interpretations of the above data.

## Private Benefits

Private benefits from manpower programs are those that accrue directly to the participants. As cited previously the most widely used measure of such benefits is the increase in income of program participants that is attributable to VR participation. This increase in income must be net of any additional taxes that are incurred and any transfer payments lost as a result of participating in VR.

To estimate private benefits from participation in VR in Louisiana, equation [5-1] was reestimated, except that the dependent variable was changed to NYNC--annual gross earnings of each individual in the sample, less taxes plus transfer payments. NYNC was calculated for the period in question from the data gathered by questionnaire and RSA300's for both comparison and experimental groups. The results of the regression analysis appear in Table 5-1. The same

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[12] Finis Welch, "Black-White Differences in Returns to Schooling," The American Economic Review, LXIII (December, 1973), pp. 893-907.

simulation process that was used for the estimation of social benefits was employed to estimate private benefits across subgroups. The results of this procedure appear in Table 5-12.

A comparison of private benefits in Table 5-12 with social benefits in Table 5-2 reveals basically comparable results except that, since net income is smaller, all of the magnitudes are somewhat reduced. However, in several cases, estimated private benefits exceed estimated social benefits for the same subgroup. An examination of the data reveals at least a partial and tentative reason for this occurance. The measure of private benefits used in this study is the increase in net annual income that is attributable to participation in VR. In all cases, this is estimated by an equation similar to equation [5-1], but using net annual income as the dependent variable. Net annual income was deinned in Chapter II as gross annual income, less taxes, plus transfer payments. Net annual income was calculated in this fashion for each individual in the sample using data from both the questionnaire and VR records. While the results obtained in Table 5-12 are the product of simulation based on the coefficient values reported in Table 5-11, the actual data revealed that in several subgroups of the data set, mean net annual income exceed mean gross annual income. Average gross annual income and average net annual income for non-white females was $1435.95 and $1924.73, respectively, while for non-whites in DIS3 the corresponding figures were $1274.27 and $1636.53. This can be attributed to the fact that these four subgroups within the sample were recipients

TABLE 5-11
ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS REGRESSED
UPON NET ANNUAL INCOME

| Independent Variable | Coefficient | "t" Statistic |
|---|---|---|
| Intercept | -1504.95 | -1.97b |
| AGE | 95.64 | 1.23 |
| AGESQ | -1.21 | -1.27 |
| SEX | 674.71 | 2.56a |
| RACE | 292.25 | 1.04 |
| ED | 25.68 | 0.68 |
| MS | 645.42 | 1.94b |
| RES | 560.51 | 3.36a |
| DIS2 | 162.80 | 0.48 |
| DIS3 | 71.85 | 0.31 |
| DIS4 | -65.25 | -0.29 |
| VR | -234.34 | -0.30 |
| SEXVR | 1140.70 | 3.35a |
| RACEVR | 635.56 | 1.72 |
| EDVR | 137.09 | 2.76a |
| MSVR | 394.10 | 1.01 |
| DIS2VR | 791.02 | 1.37 |
| DIS3VR | -539.88 | -0.94 |
| DIS4VR | 1043.88 | 1.68 |

n = 820

$R^2$ = .46

F = 38.15a

a = Significant at the 99% level

b = Significant at the 95% level

TABLE 5-12
PRIVATE BENEFITS TO VOCATIONAL REHABILITATION

| ED | Married Males | Single Males | Married Females | Single Females |
|---|---|---|---|---|
| | | DIS1 Whites | | |
| 6 | 2757 | 2363 | 1617 | 1223 |
| 9 | 3168 | 2774 | 2028 | 1634 |
| 12 | 3579 | 3185 | 2439 | 2045 |
| | | Non-Whites | | |
| 6 | 2122 | 1728 | 982 | 588 |
| 9 | 2533 | 2139 | 1393 | 999 |
| 12 | 2944 | 2550 | 1804 | 1410 |
| | | DIS2 Whites | | |
| 6 | 3548 | 3154 | 2408 | 2014 |
| 9 | 3959 | 3565 | 2819 | 2425 |
| 12 | 4370 | 3976 | 3230 | 2836 |
| | | Non-Whites | | |
| 6 | 2913 | 2519 | 1773 | 1379 |
| 9 | 3324 | 2930 | 2184 | 1790 |
| 12 | 3735 | 3341 | 2595 | 2201 |
| | | DIS3 Whites | | |
| 6 | 2218 | 1824 | 1078 | 684 |
| 9 | 2629 | 2235 | 1489 | 1095 |
| 12 | 3040 | 2646 | 1900 | 1506 |
| | | Non-Whites | | |
| 6 | 1583 | 1189 | 443 | 49 |
| 9 | 1994 | 1590 | 854 | 460 |
| 12 | 2405 | 2011 | 1265 | 871 |
| | | DIS4 Whites | | |
| 6 | 3800 | 3406 | 2660 | 2266 |
| 9 | 4211 | 3817 | 3071 | 2677 |
| 12 | 4622 | 4228 | 3482 | 3088 |
| | | Non-Whites | | |
| 6 | 3165 | 2771 | 2025 | 1631 |
| 9 | 3576 | 3182 | 2436 | 2042 |
| 12 | 3987 | 3593 | 2847 | 2453 |

of sizeable enough transfer payments to create the results stated the records available on the indvviduals in these subgroups were not extensive enough to determine if there was some underlying reason or set of reasons as to why these categories of individuals should be net receivers of transfer payments. It can only be noted that the reported income and transfer payment receipts of persons in these subgroups produce the observed results.

## Private Costs

VR pays virtually all direct expenses involved in rehabilitation of its clients. Hence, the only costs that must be privately borne are the net foregone earnings for the period of participation. However, in some selected cases, depending upon need, VR makes maintenance payments to its clients. This represents a positive gain to the recipient; or it may be viewed as a negative private cost. Thus, such maintenance payments must be subtracted from net foregone income to give an accurate representation of private costs. Private costs were calculated by equation [5-5].

[5-5] $$C_p = NY_f - MAIN$$

where:

$C_p$ = private costs

$NY_f$ = after tax foregone income

MAIN = maintenance payments

A procedure similar to that used for the calculation of foregone output in the case of social costs was employed to estimate $NY_f$ for subgroups. However, in this instance, the net annual income was used as the dependent variable in an equation similar to equation [2-1] (excluding the VR term). The equation was estimated using comparison group data since the objective is to gain an estimate of what the VR clients sould have earned had they not participated in VR. The results of this calculation appear in Table 5-13. From these results, the simulation procedure can be used to construct the set of after tax foregone income figures for subgroups in the sample.

The calculation of maintenance payments presented a problem similar to that encou tered with overhead costs. The RSA300 specified which clients receive maintenance, but the amount of maintenance is not noted. This meant that the Annual Report for the years in question had to be consulted, and a per-client average maintenance payment figure derived and applied to those cases in the experimental group who receive maintenance--in the same fashion as was done with administrative and counseling costs. However, to be able to determine maintenance payments for subgroups, the following model was postulated.

$$[5\text{-}7] \quad MAIN = a_0 + a_1(AGE) + a_2(SEX) + a_3(RACE) + a_4(ED) + a_5(RES) + a_6(DIS) + \mu$$

TABLE 5-13
DEMOGRAPHIC CHARACTERISTICS REGRESSED
UPON NET ANNUAL INCOME

| Independent Variable | Coefficient ("t" Value) |
|---|---|
| Intercept | -2178.21 (-2.97)a |
| AGE | 131.15 (1.75) |
| AGESQ | -1.42 (-1.20) |
| SEX | 728.72 (3.92)a |
| RACE | 331.93 (1.68) |
| ED | 34.53 (1.28) |
| MS | 326.84 (1.23) |
| RES | 345.00 (1.83) |
| DIS2 | 100.52 (0.42) |
| DIS3 | 92.44 (0.58) |
| DIS4 | -0.45 (-0.00) |

n = 820

$R^2$ = .43

a = Significant at the 99% level

where:

AGE--Age in years. It was expected that younger clients for whom more ambitious program of rehabilitation are likely to be planned, would receive higher maintenance payments. This follows from the fact that more elaborate rehabilitation services (such as college or university training) may necessitate extended periods away from the home residence, and the need for maintenance would thus be greater.

SEX and RACE--Because males and whites are more likely to be involved in more extensive plans of rehabilitation for reasons cited previously, it is likely that these more extensive plans would call for maintenance payments to a greater extent.

ED--Those clients with greater educational attainment at entrance to VR are usually the recipients of a higher order of training as part of their rehabilitation. Again, this type of training is more likely to involve the need for maintenance payments. It was expected that the sign of this variable would be positive.

RES--Residents of urban areas usually enjoy greater opportunities which, for reasons already discussed, involve them more frequently in elaborate rehabilitation plans, thus, increasing the likelihood of maintenance payments being made.

DIS--Because there are differences in costs and approaches to the rehabilitation of different disabilities, this variable is included to determine if these differences also lead to differences in maintenance payments. It was expected, for instance,

that clients in DIS3 (mental and emotional) whose disability is more likely to necessitate treatment away from the home, would receive higher maintenance payments than clients with other diabilities.

Table 5-14 shows the results of the calculation of equation [5-6]. All variables have the anticipated sign.

The calculation of private costs by equation [5-5] involved the simulation of $NY_f$ and MAIN from the results of Table 5-13 and 5-14. Then, for each subgroup, the MAIN estimates were subtracted from the $NY_f$ figures to give $C_p$. The net result of this process is shown in Table 5-15. As was the case with social costs, the annual data were adjusted to allow for length of time spent by various subgroups in the VR program.

The private cost estimates follow the same general pattern as the e timates of social costs. Again, it is well to point out that to a large extent the private costs are influenced by the highly individualized rehabilitation plans written for each client at the discretion of the VR counselor assigned to the case.

## Private Benefit-Cost Ratios

Equation [5-4] was applied to private benefits and costs in the same fashion as was the case with social benefits and costs. The private benefit-cost ratios produced appear in Table 5-16. These ratios follow the same general pattern as those in Table 5-10, except that, due primarily to lower private costs, they are somewhat higher in most instances.

TABLE 5-14
DEMOGRAPHIC CHARACTERISTICS REGRESSED
UPON MAINTENANCE PAYMENTS

| Independent Variable | Coefficient ("t" Value) |
|---|---|
| Intercept | 307.06 (2.38)a |
| AGE | -8.29 (-3.76)a |
| SEX | 74.11 (1.51) |
| RACE | 36.15 (0.66) |
| ED | 15.05 (2.07)b |
| RES | 38.96 (0.80) |
| DIS2 | -15.49 (-0.33) |
| DIS3 | 60.14 (1.49) |
| DIS4 | -143.70 (-3.42)a |

n = 501

$R^2$ = 2.10

a = Significant at the 99% level

b = Significant at the 95% level

TABLE 5-15
PRIVATE COSTS OF VOCATIONAL REHABILITATION

| | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Married | | Single | | Married | | Single | |
| ED | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| | | | | DIS1 | | | | |
| | | | | Whites | | | | |
| 6 | 4511 | 3740 | 3804 | 3041 | 2749 | 2049 | 2059 | 1416 |
| 9 | 4897 | 4101 | 4160 | 3348 | 3079 | 2333 | 2391 | 1655 |
| 12 | 5329 | 4471 | 4562 | 3715 | 3402 | 2647 | 2684 | 1913 |
| | | | | Non-Whites | | | | |
| 6 | 3434 | 2762 | 2789 | 2101 | 1885 | 1259 | 1266 | 671 |
| 9 | 3796 | 3051 | 3121 | 2386 | 2141 | 1473 | 1515 | 857 |
| 12 | 4151 | 3396 | 3446 | 2702 | 2439 | 1735 | 1783 | 330 |
| | | | | DIS2 | | | | |
| | | | | Whites | | | | |
| 6 | 4273 | 3567 | 3628 | 2930 | 2660 | 2023 | 2041 | 1435 |
| 9 | 4675 | 3915 | 4000 | 3251 | 2955 | 2273 | 2329 | 1657 |
| 12 | 5069 | 4301 | 4365 | 3581 | 3293 | 2575 | 2637 | 1929 |
| | | | | Non-Whites | | | | |
| 6 | 3264 | 2632 | 2659 | 2057 | 1817 | 1256 | 1282 | 729 |
| 9 | 3592 | 2933 | 2979 | 2308 | 2084 | 1479 | 1499 | 926 |
| 12 | 3961 | 3244 | 3319 | 2613 | 2350 | 1709 | 1794 | 1126 |
| | | | | DIS3 | | | | |
| | | | | Whites | | | | |
| 6 | 5244 | 4386 | 4429 | 3609 | 3291 | 2504 | 2553 | 1775 |
| 9 | 5450 | 4752 | 4846 | 3947 | 3627 | 2822 | 2860 | 2066 |
| 12 | 5878 | 5183 | 5283 | 4348 | 4010 | 3141 | 3214 | 2356 |
| | | | | Non-Whites | | | | |
| 6 | 4067 | 3285 | 3343 | 2569 | 2305 | 1617 | 1630 | 926 |
| 9 | 4463 | 3631 | 3682 | 2889 | 2618 | 1862 | 1913 | 1168 |
| 12 | 4851 | 4021 | 4068 | 3211 | 2923 | 2159 | 2189 | 1436 |
| | | | | DIS4 | | | | |
| | | | | Whites | | | | |
| 6 | 3110 | 2571 | 2619 | 2088 | 1836 | 1368 | 1394 | 945 |
| 9 | 3432 | 2860 | 2911 | 2331 | 2094 | 1580 | 1622 | 1118 |
| 12 | 3792 | 3166 | 3241 | 2626 | 2353 | 1822 | 1851 | 1312 |
| | | | | Non-Whites | | | | |
| 6 | 2257 | 1809 | 1828 | 1372 | 1188 | 794 | 793 | 422 |
| 9 | 2547 | 2034 | 2080 | 1585 | 1380 | 944 | 970 | 544 |
| 12 | 2838 | 2307 | 2349 | 1829 | 1660 | 1134 | 1220 | 705 |

TABLE 5-16
PRIVATE BENEFIT-COST RATIO

| | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Married | | Single | | Married | | Single | |
| ED | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| | | | | DIS1 Whites | | | | |
| 6 | 3.75 | 4.52 | 3.81 | 4.77 | 3.61 | 4.84 | 3.64 | 5.30 |
| 9 | 3.97 | 4.74 | 4.09 | 5.09 | 4.04 | 5.34 | 4.19 | 6.06 |
| 12 | 4.12 | 4.91 | 4.29 | 5.26 | 4.40 | 5.66 | 4.68 | 6.56 |
| | | | | Non-Whites | | | | |
| 6 | 3.79 | 4.72 | 3.80 | 5.05 | 3.20 | 4.79 | 2.85 | 5.38 |
| 9 | 4.10 | 5.10 | 4.21 | 5.50 | 3.99 | 5.81 | 4.05 | 7.16 |
| 12 | 4.35 | 5.32 | 4.54 | 5.79 | 4.54 | 6.38 | 4.85 | 26.25 |
| | | | | DIS2 Whites | | | | |
| 6 | 5.10 | 6.11 | 5.34 | 6.61 | 5.56 | 7.31 | 6.11 | 8.62 |
| 9 | 5.20 | 6.21 | 5.47 | 6.73 | 5.86 | 7.62 | 6.39 | 8.99 |
| 12 | 5.29 | 6.24 | 5.59 | 6.82 | 6.02 | 7.70 | 6.60 | 9.03 |
| | | | | Non-Whites | | | | |
| 6 | 5.48 | 6.80 | 5.82 | 7.52 | 5.99 | 8.67 | 6.60 | 11.62 |
| 9 | 5.68 | 6.96 | 6.04 | 7.80 | 6.43 | 9.07 | 7.33 | 11.86 |
| 12 | 5.79 | 5.79 | 6.18 | 7.85 | 7.56 | 10.40 | 7.53 | 12.01 |
| | | | | DIS3 Whites | | | | |
| 6 | 2.59 | 3.10 | 2.53 | 3.10 | 2.01 | 2.64 | 1.64 | 3.36 |
| 9 | 3.01 | 3.39 | 2.83 | 3.47 | 2.52 | 3.24 | 2.35 | 3.25 |
| 12 | 3.17 | 3.60 | 3.07 | 3.73 | 2.91 | 3.71 | 2.87 | 3.92 |
| | | | | Non-Whites | | | | |
| 6 | 2.39 | 2.96 | 2.18 | 2.84 | 1.18 | 1.68 | 0.18 | 0.32 |
| 9 | 2.74 | 3.37 | 2.65 | 3.38 | 2.00 | 2.81 | 1.47 | 2.41 |
| 12 | 3.04 | 3.67 | 3.03 | 3.84 | 2.65 | 3.60 | 2.44 | 3.72 |
| | | | | DIS4 Whites | | | | |
| 6 | 7.50 | 9.08 | 7.99 | 10.02 | 8.90 | 11.94 | 9.98 | 14.73 |
| 9 | 7.53 | 9.04 | 8.05 | 10.06 | 9.01 | 11.94 | 10.14 | 14.71 |
| 12 | 7.48 | 8.97 | 8.01 | 9.89 | 9.09 | 11.74 | 10.25 | 14.46 |
| | | | | Non-Whites | | | | |
| 6 | 8.61 | 10.75 | 9.31 | 12.41 | 10.47 | 15.67 | 12.63 | 23.74 |
| 9 | 8.62 | 10.80 | 9.40 | 12.33 | 10.84 | 15.85 | 12.93 | 23.06 |
| 12 | 8.63 | 10.61 | 9.39 | 12.07 | 10.53 | 15.42 | 12.35 | 21.38 |

## Summary

The results of the measurement of benefits to vocational rehabilitation to subgroups produced results of the variety that would be expected, given the literature on discrimination. In general, males derive higher benefits than do females, and whites obtained higher payoffs to participation than did non-whites. In addition, married persons, those with more education, and urban residents derived higher benefits than their counterparts.

The determination of costs is so closely bound up with the VR institutional process and the client-counselor relationship that generalizations concerning cost for various subgroups would be tenuous at best. However, the combinations of low benefits and even lower costs did produce the ironic result of high benefit-cost ratios for clients from rural areas. A comparison of these benefit-cost results with those obtained from other studies is one of the subjects of the final chapter.

# CHAPTER VI

# THE PAYOFF TO LIMITED PARTICIPATION AND THE DETERMINANTS OF SUCCESSFUL REHABILITATION

This chapter examines two separate but related questions. First, does limited participation in Vocational Rehabilitation (VR), that is, the termination of an individual plan for rehabilitation short of successful completion, produce benefits for the participants. Secondly, an examination of the experimental group is conducted to attempt to determine which client characteristics are most closely associated with successful completion of the rehabilitation process.

## Returns to Limited Participation

All cases opened by VR are closed as either having been successfully rehabilitated, or not rehabilitated. For a case to be closed as rehabilitated, several minimum criteria must be met. These are:

> (1) have been declared eligible, (2) have received appropriate diagnostic and related services, (3) have had a program of vocational rehabilitation services formulated, (4) have completed the program insofar as possible, (5) have been provided counseling as an essential rehabilitation service, and (6) have been determined to be suitably employed for a minimum of 60 days.[1]

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[1] Social and Rehabilitation Service, Rehabilitation Services Manual MR#2, Statistical Reporting System, (Washington: U.S. Government Printing Office, 1974), pp. 10-11.

Failure to meet one or more of these requirements at closure results in a case being considered not rehabilitated. In the formulation of a test to determine if limited participation in VR has a significant social and/or private payoff, the cases of interest would be those that have met criteria (1), (2), and (3), above, but for some reason were unable to meet one or all of the final three stipulations. These cases correspond exactly to those VR clients classified as Status 28 (See Figure 1-2).

The hypothesis was that limited participation would yield some benefits to VR clients. The counseling and evaluation, and even the determination of the exact handicap of the individual should heighten awareness of job and work potential. Additionally, if restoration and therapy are prescribed, even partial completion of such processes should yield some positive result. Finally, if education and training are a part of the rehabilitation plan, the resultant increase in preparedness for employment should have an impact on earnings potential.

The experimental group data developed from the survey of VR clients for this study contained 54 cases which were labeled Status 28. To test whether the limited (and by VR definition unsuccessful) participation of these individuals produced positive social and/or private benefits, the remaining 447 "successful" cases in the experimental group were deleted from the sample, and equation [4-1] was estimated with the comparison group data and the 54 cases from Status 28. The results of this test are presented in Table 6-1.

TABLE 6-1
PAYOFF TO LIMITED PARTICIPATION IN VOCATIONAL REHABILITATION
DEMOGRAPHIC AND ECONOMIC VARIABLES REGRESSED ON GROSS
AND NET ANNUAL INCOME

| Independent Variable | Social Benefits Coefficient | Social Benefits "t" Value | Private Benefits Coefficient | Private Benefits "t" Value |
|---|---|---|---|---|
| Intercept | -1313.03 | -1.78 | -1897.39 | -2.83 |
| AGE | 50.27 | 1.06 | 116.16 | 1.69 |
| AGESQ | -0.55 | -0.85 | -1.25 | -1.12 |
| SEX | 719.73 | 3.63a | 724.88 | 4.01a |
| RACE | 611.49 | 2.91a | 327.87 | 1.71 |
| ED | 45.47 | 1.58 | 36.76 | 1.40 |
| MS | 538.13 | 1.96b | 406.60 | 1.62 |
| RES | 129.55 | 0.67 | 211.87 | 1.21 |
| DIS2 | 38.93 | 0.15 | 92.95 | 0.35 |
| DIS3 | 12.10 | 0.07 | 93.22 | 0.60 |
| DIS4 | 14.99 | 0.08 | 3.08 | 0.02 |
| VR | 186.29 | 0.15 | 654.27 | 0.60 |
| SEXVR | -327.72 | -0.56 | -78.89 | -0.14 |
| RACEVR | -337.01 | -0.61 | 188.80 | 0.37 |
| EDVR | 15.89 | 0.22 | -58.57 | -0.91 |
| MSVR | 11.73 | 0.01 | 11.73 | 0.01 |
| DIS2VR | 650.07 | 0.67 | 650.07 | 0.67 |
| DIS3VR | -211.85 | -0.24 | -211.85 | -0.24 |
| DIS4VR | 0.15 | 0.00 | 0.15 | 0.00 |
| n | 374 | | 374 | |
| $R^2$ | .12 | | .18 | |
| F | 2.82a | | 4.44a | |

a = Significant at the 99% level

b = Significant at the 95% level

In both the social and private benefits equations, the variables containing VR, which show that increment in income attributable to participation in the rehabilitation program, is not statistically significant. The signs on the other coefficients conform to a priori reasoning. The $R^2$'s for both social and private benefits estimates are noticeably lower than those obtained from previous regression estimates, which suggests that there are important income determinants for this sample which have not been captured or are not quantifiable.

The conclusion that must be drawn from this analysis is that unsuccessful participation in VR has little significant effect on either gross or net participant earnings, and thus the social and private benefits of such participation are insignificant. These results could be taken as an indication to both VR participants and practicioners of the importance of successful completion of the prescribed program of rehabilitation for all clients.

## Determinants of Successful Rehabilitation

The question of the determinants of successful rehabilitation is investigated in this section. VR classifies as successfully rehabilitated those persons who have completed the prescribed course of training and/or therapy, and who achieve a satisfactory employment record for a period of at least thirty days after the end of training and job placement. Those who do not complete training, or who do not maintain satisfactory employment, are classed as not rehabilitated.

This method of measuring success of VR corresponds very closely to the graduation rate measure that has been used so frequently in previous manpower studies. A successful rehabilitant is thought to add to his skill level and enhance his prospects for continuous employment and higher earnings. As pointed out by Gunderson, however, it may be misleading to assume that the participant who does not successfully complete the program receives no benefit from his participation. He may be a person with some desirable qualities that enable him to leave to take a job before training is complete. It is also possible that the training may not be of sufficiently high quality to make a contribution to his future employability. However, these persons might still be considered as unsuccessful participants in the sense that theprogram objectives of increasing the skill and employability of the client through his participation are not fulfilled.[2]

The attempt to isolate the determinants of successful rehabilitation was made through the estimation of equation [6-1].

$$[6\text{-}1]\quad S = a_0 + a_1(AGE) + a_2(AGESQ) + a_3(SEX) + a_4(RACE) + a_5(ED) + a_6(MS) + a_7(RES) + a_8(DEP) + a_9(PSS) + \mu$$

In equation [6-1], S is a dichotomous dependent variable for successful rehabilitation (1 = successful rehabilitation, 0 = unsuccessful rehabilitation, or Status 28).

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[2]Morley Gunderson, "Determinants of Individual Success in On-the-Job Training," Journal of Human Resources, (Fall, 1973), pp. 473-474.

AGE = As with the estimation of income, to the extent that younger clients would be closer in time and attitude to educational and training processes, it would be expected that younger clients would be more successful at rehabilitation efforts.

AGESQ = An additional age variable to account for the non-linearity of experience, age and successful rehabilitation.

SEX = Based on the results of previous studies of VR,[3] it is hypothesized that females are more likely to successfully complete the program. Thus, the anticipated sign is negative. 1 = male.

RACE = Previous work has indicated that whites are more likely to complete VR successfully than non-whites.[4] The expected sign is positive. 1 = white.

ED = Educational Attainment on entering VR. Better educated clients should be better preprared for rehabilitation programs, and thus should complete the program at a higher rate.

MS = Marital Status. The added responsibility of marriage should be an incentive for successful completion of VR. This sign of this coefficient should be positive. 1 = married.

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[3] Donald M. Bellante, "A Multivariate Analysis of a Vocational Rehabilitation Program," The Journal of Human Resources (Spring, 1972) pp. 230-231.

[4] Ibid.

RES = Rural versus urban residence. Urban residents, with more varied opportunities available to them, would be expected to be more successful, so that the anticipated sign is positive. 1 = urban.

DEP = Number of dependents. The presence of dependents could be a motivational factor important as an incentive to complete VR training.

PSS = Public assistance status of clients. Those receiving public assistance, with all of the complications this implies, may be more likely to be discouraged, less motivated, and thus less likely to complete the VR process. 1 = receiving public assistance.

The sample of 501 cases in the experimental group contained 54 cases closed as not rehabilitated (Status 28), and 447 cases closed as successfully rehabilitated.

Conceptually, equation (6-1) could be used, via regression analysis, to determine the relative importance of each of the independent variables listed with regard to successful rehabilitation. However, because of the presence of the dichotomous dependent variable S, several difficulties occur when ordinary least squares regression analysis is used. These difficulties are all associated with the violation of assumptions of the classical regression model which are

"crucial to the interpretation of the estimates produced by the regression technique".[5]

To begin with, the regression model requires that the error terms have a normal distribution, which will not be the case when a dichotomous dependent variable is used. Also, the expected value of the residuals is not zero, which indicates that there is no reasonable assurance that the regression coefficients will be unbiased. Finally, the assumption that the dependent variables have constant variance, for all levels of the independent variable, is violated. This would mean that the regression calculation of sample variance would be a biased estimator of population variance.[6] The results of all this is that the standard tests for statistical significance become unreliable.

These difficulties may be avoided by performing certain transformations on the data. One such transformation is via the probit model. Probit analysis assumes that the relationship between independent and dependent variables can be expressed as a sigmoid representing the cumulative normal distribution. This approach involves the transformation of the dependent variable into a series of probit weights. The weight transformation is conducted in such a fashion as

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[5]John C. Blydenburg, "Probit Analysis: A Method for Coping with Dichotomous Dependent Variables," Social Science Quarterly, 51 (March, 1971), pp. 889-899.

[6]Ibid.

to impart two properties to the measure of the dependent variable: (1) the relationships between the variables are linearized and (2) the limit on the range of the dependent variable is, for all practical purposes, removed.[7] In effect, then, probit analysis transforms and linearizes the dependent variable, so that regression upon the independent variables is possible by the use of maximum likelihood techniques without violation of the assumptions of the classical regression model.[8]

Equation [6-1] was estimated with the use of probit transformations. The results of this estimation appear in Table 6-2.

The statistic "-2.0 Times Log Likelihood Ratio" is distributed in probit analysis as chi-square with A degrees of freedom, where A is defined as the number of independent variables in the model. This statistic can be used to construct a test analogous to that tested by the F-ratio in a regression model. That is, if the chi-square value is greater than that which could be expected from sampling errors, then the hypothesis that all of the estimates of the model are not due to chance is accepted.[9] In Table 6-2 the value 79.638 exceeds

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[7] Ibid.

[8] The seminal work on probit analysis is D. J. Finney, Probit Analysis, (Cambridge: Cambridge University Press, 1962). This work provides a very detailed explanation of the theory and procedure of probit.

[9] Blydenburgh, Ibid.

Table 6-2

Determinants of Successful Rehabilitation: Demographic and Economic Variables Regressed on Success in Rehabilitation

| Independent Variable | Maximum Likelihood Estimate | Standard Error | MLE / SE |
|---|---|---|---|
| Constant | 1.3699 | 0.7730 | 1.772b |
| AGE | -0.0413 | 0.0467 | -0.885 |
| AGESQ | 0.0007 | 0.0006 | 1.214 |
| SEX | -0.6879 | 0.1921 | -3.580a |
| RACE | 0.4824 | 0.1944 | 2.481a |
| ED | 0.0765 | 0.0228 | 3.349a |
| MS | 0.3031 | 0.2229 | 1.360 |
| RES | 0.0736 | 0.1763 | 0.418 |
| DEP | 0.0841 | 0.0700 | 1.202 |
| PSS | -1.0971 | 0.1970 | -5.568a |

-2.0 Times Log Likelihood Rates = 79.638

a = significant at the 99% level
b = significant at the 95% level

the critical value at the 99.5% confidence level. Thus, the hypothesis that the estimates are not due to random chance is accepted.

The results in Table 6-2 show that neither of the age variables were significant or of a large magnitude. The same is true of the MS, RES, and DEP variables. ED, on the other hand, produced a very small positive coefficient, which, however, was significant. These results tend to suggest that the characteristics most closely associated with success were SEX, RACE, and PSS.

In the case of SEX, females would have a higher probability of successful rehabilitation, as the coefficient on the SEX variable is relatively large and negative. Non-whites would be less likely to be successfully rehabilitated than whites, as the RACE variable produces a large and positive coefficient that is statistically significant. Recipients of public assistance are apparently much less likely to be rehabilitated successfully. This variable produced the largest and most highly significant coefficient.

In an attempt to perhaps shed some further illumination on this problem, the equation was reestimated for each disability group separately. These results appear in Table 6-3. These results are made less useful by the fact that the number of unsuccessful cases in three of the disability categories was very small, casting very serious doubt on the reliability of these estimates.

As an alternative procedure, equation [6-2] was again estimated for the entire experimental group, but with dummy variables added to represent disability categories, with DIS 1 being used as the base,

Table 6-3

Determinants of Successful Rehabilitation by Droubility Group

| Independent Variables | Coefficient (MLE/SE) | | | |
|---|---|---|---|---|
| | DIS 1 | DIS 2 | DIS 3 | DIS 4 |
| Constant | -302.22 | 2.28 | -0.86 | 45.97 |
| | (-2.25)a | (0.96) | (-0.57) | (0.79) |
| AGE | 19.08 | -0.001 | 0.12 | -4.78 |
| | (2.28)a | (-0.01) | (1.26) | (-1.03) |
| AGESQ | -0.19 | -0.0001 | -0.002 | 0.16 |
| | (-2.27)a | (-0.08) | (-1.57) | (1.84)b |
| SEX | -22.50 | -0.43 | -0.77 | -71.87 |
| | (-0.86) | (-0.88) | (-2.84)a | (-2.39)a |
| RACE | 14.51 | 0.14 | 0.69 | 32.74 |
| | (2.17)a | (0.28) | (2.40)a | (2.81)a |
| ED | 0.20 | -0.02 | 0.05 | 2.21 |
| | (0.19) | (-0.29) | (1.85)b | (2.16)a |
| MS | -9.75 | 0.41 | 0.18 | 2.58 |
| | (-0.23) | (0.99) | (0.48) | (0.20) |
| RES | -4.18 | 0.45 | 0.03 | 19.89 |
| | (-1.56) | (1.13) | (0.13) | (2.49) |
| DEP | 16.31 | -0.03 | 0.09 | 7.97 |
| | (0.75) | (-0.26) | (0.86) | (2.68)a |
| PSS | -13.04 | -1.49 | -0.98 | -49.32 |
| | (-0.79) | (-3.35)a | (-3.53)a | (-2.35)a |
| -2.0 Times Log Likelihood Ratio | (39.12) | (24.53) | (39.41) | (31.52) |
| Number Successful | 87 | 133 | 138 | 88 |
| Number Unsuccessful | 5 | 12 | 33 | 4 |

a = significant at the 99% level
b = significant at the 95% level

and thus having its value subsumed in the constant. The results of this procedure appear in Table (6-4).

Little difference is noted between these results and those presented in Table (6-2). Only the category DIS 3 produced a significant coefficient. The sign of this coefficient was negative, indicating that those in this category would be less likely to be successfully rehabilitated than a DIS 1 client.

These results both confirm and confound the hypotheses that would likely be made concerning successful rehabilitation. It would be expected that non-whites and persons in DIS 3 (emotional and mental) disorders would be less likely to be successfully rehabilitated because of discrimination against the former, and difficulty of rehabilitating the latter. Likewise, persons receiving public assistance could have some disincentive to successfully complete the program, since their opportunity costs might be smaller and they could ultimately rely on the public assistance payments.

The fact that females are much more likely to be rehabilitated than males, however, is difficult to interpret. It is most probable that the women in this sample were more stable and had fewer alternatives to completing the course of rehabilitation. But it is also possible that they were less severely disabled than their male counterparts. Unfortunately, a more detailed examination of the available data on the unsuccessfully rehabilitated yielded no additional explanatory factors.

Table 6-4

Determinants of Successful Rehabilitation: Demographic and Economic Variables Regressed on Success in Rehabilitation

| Independent Variable | Maximum Likelihood Estimate | Standard Error | MLE / SE |
|---|---|---|---|
| Constant | 1.68571 | 0.79447 | 2.122b |
| AGE | -0.02195 | 0.04847 | -0.453 |
| AGESQ | 0.00041 | 0.00062 | 0.664 |
| SEX | -0.71423 | 0.19715 | -3.623a |
| RACE | 0.56781 | 0.20227 | 2.807a |
| ED | 0.05471 | 0.02482 | 2.204b |
| MS | 0.23205 | 0.23046 | 1.007 |
| RES | 0.09012 | 0.18027 | 0.500 |
| DEP | 0.07727 | 0.07066 | 1.093 |
| PSS | -1.11227 | 0.20143 | -5.522a |
| DIS 2 | -0.42723 | 0.30231 | -1.413 |
| DIS 3 | -0.64450 | 0.28576 | -2.255b |
| DIS 4 | 0.13398 | 0.36477 | 0.367 |

-2.0 Times Log Likelihood Ratio = 89.674

a = significant at the 99% level
b = significant at the 95% level

One additional possibility was explored. A variable for the length of time for rehabilitation was added to equation (6-2). TRAIN is expressed in terms of the number of months that VR services were actually received. The results appear in Table (6-5).

The addition of TRAIN produced very little change from the previous analysis, and the coefficient on the TRAIN variable itself was relatively small and not statistically significant. This result is not surprising, however, when one considers the wide range of disabilities and individually designed courses of rehabilitation of the VR clients. That length of time of services rendered is not related to success, in the face of such variability of training and disability, would not be seen as an unexpected result.

## Summary

Returns to limited participation in Vocational Rehabilitation were shown to be insignificant. The analysis of determinants of successful rehabilitation showed that these characteristics most closely associated with success, or the lack thereof, in VR, are sex, race, public assistance status, and mental and emotional disability.

The conclusion to be drawn from this analysis, and a comparison of these results with the work of others, is the subject of the next, and final, chapter.

Table 6-5

Determinants of Successful Rehabilitation: Demographic and Economic Variables Regressed on Success in Rehabilitation

| Independent Variable | Maximum Likelihood Estimate | Standard Error | MLE / SE |
|---|---|---|---|
| Constant | 1.54638 | 0.80442 | 1.922b |
| AGE | -0.01934 | 0.04884 | -0.396 |
| AGESQ | 0.00043 | 0.00063 | 0.679 |
| SEX | -0.71724 | 0.19769 | -3.628a |
| RACE | 0.55143 | 0.20389 | 2.705a |
| ED | 0.05244 | 0.02471 | 2.123b |
| MS | 0.21428 | 0.23336 | 0.918 |
| RES | 0.06735 | 0.18261 | 0.369 |
| DEP | 0.08474 | 0.07079 | 1.197 |
| PSS | -1.11301 | 0.20178 | -5.516a |
| DIS 2 | -0.47202 | 0.30787 | -1.533 |
| DIS 3 | -0.65159 | 0.28885 | -2.256a |
| DIS 4 | 0.08053 | 0.37462 | 0.215 |
| TRAIN | 0.01320 | 0.00844 | 1.564 |

-2.0 Times Log Likelihood Ratio = 92.556

a = significant at the 99% level
b = significant at the 95% level

# CHAPTER VII

# SUMMARY AND CONCLUSIONS

It would be useful at this point to briefly recapitulate the findings of the previous chapters. This, along with a recognition of some of the limitations of the study, is done in the first section of this chapter. The second section presents a comparison between the findings of this study and previous works concerning benefits and costs of Vocational Rehabilitation. The final section presents the conclusions and policy recommendations resulting from this study.

## Recapitulation

Vocational Rehabilitation (VR) is a Federal-State program designed to provide a combination of services to physically or mentally handicapped persons to prepare them for employment, and to assure that eligible handicapped men, women, and young people will be provided with skills needed in the job market. VR attempts to coordinate their resources for evaluation, education, therapy and job training in such a way that the disabled person will be brought to the best functioning employment level.

The modern Federal-State system of VR began in 1920, and its legislative history is characterized as a series of acts designed to broaden its scope, purpose and implementation. The 1940's provided

the decade in which VR in Louisiana, as in the nation as a whole; matured into the comprehensive program that is known today.

The purpose of this study has been to perform an economic benefit-cost analysis of VR in Louisiana, for both a social and private perspective. This has been accomplished by the construction of benefit-cost ratios. The construction of these benefit-cost ratios has necessitated the measurement of social and private benefits and costs. In addition, the returns to limited participation and determinants of successful rehabilitation have been examined.

In addressing the questions of the measurement of economic benefits and costs of VR, a methodological precedence different and more appropriate than that used in previous analyses of VR was adopted. Each of the past evaluations of VR employed the before-after technique in the measurement of the impact of VR on the earnings and employment data prior to receipt of rehabilitation services with the same variables after termination of rehabilitation services--for the same group of clients--was the basis on which benefits derived from VR were calculated.

This study attempted to evaluate VR in Louisiana through the use of the main alternative to the before-after methodology--the experimental-control group technique permitted. The avoidance of serious disadvantages of the before-after method, such as changes in the aggregate level of economic activity between the before and after periods, the presence of labor force entrants and reentrants in the

sample, and changes in certain relevant characteristics of the individuals comprising the sample.

The most difficult problem associated with this methodology was the selection of a control group. The control group in this study was formulated from the cases of clients who had been determined eligible for VR and had cases opened in the second quarter of the 1975 calendar year. No client who had actually begun to receive services prior to this time was included. The experimental group included cases that were closed in the first quarter of 1974 to the beginning of the second quarter of 1975. Among the advantages of this procedure were the elimination of self-selection bias and the availability of basic data from VR records. After the data were secured, statistical analysis showed that available data did not yield a true control group, but instead a comparison group--a result which is quite common when this methodology is used in the manpower area.

Examination of the earnings structure of the VR clients in the sample revealed some unusual results. Earnings were not significantly related to age, which seemed to indicate that VR clients did not build up human capital while gaining work experience. In addition, earnings were related to education only for those persons who had been successfully rehabilitated, indicating the high value of VR services, and the complimentary nature of VR services and formal education.

The measure of social benefits from VR was hypothesized to be the increment in gross earnings of the participants which was attributable to their participation in VR. The method used to estimate the impact of VR on the earnings of participants was multiple regression analysis. This technique allowed adjustments to be made for demographic differences which could account for differences in earnings between the experimental and comparison groups. The measure of social costs used was the foregone output of the experimental group plus direct costs of rehabilitation services and administration. The measure of private benefits was an estimate of the portion of net income of the experimental group that was attributable to VR participation, estimated through multiple regression. Foregone earnings, less maintenance payments, were the chief measures of private costs.

The analysis of the data produced estimates of benefits that were in most cases (except for those clients who did not complete the program) positive and relatively large. When benefit-cost ratios were constructed they ranged from a low of 0 upward to over 50 for various subgroups of the sample. Private benefits were observed to be higher, and they produced higher benefit-cost ratios, than did social benefits-to-costs. These higher private benefits occurred because net income of the clients, the dependent variable used in the estimation of private benefits, was made larger by the addition of transfer payments. In addition, private costs were generally much lower than social costs.

The analysis of the subgroups showed that males generally produced higher benefit-cost ratios than females, non-whites higher than whites, those with more education higher than those with less, and rural residents higher than urban residents. Clients in DIS3 produced the lowest ratios, while clients in DIS4 produced the highest.

When returns to limited participation were examined, the estimates produced were not statistically significant. That is, program dropouts from VR experience benefits that, if positive at all, are very small.

In findings of this study, as in any that make use of regression analysis, are subject to the general limitations of this statistical technique. However, the available statistics indicated that autocorrelation was not a difficulty, and likewise, multicollinearity proved not to be a problem, since at every stage of the analysis correlate matrices were constructed to test for this possibility. The use of probit analysis in the section on determinants of successful rehabilitation allowed an avoidance of the problems associated with dichotomous dependent variables.

Beyond these factors, the most serious limitation of this study was doubtless the question of reliability of the data on wages and employment that were gathered by direct mail questionnaire. While a personal interview approach would perhaps have been more satisfactory, the resource limits imposed on the project dictated that this alternative could not be considered. However, a comparison of the data from the questionnaires with VR data on earnings at case closure

contained on the RSA300, showed that in all cases the earnings data reported were quite plausible. Thus, in the absence of evidence to the contrary, the validity of the data is believed to be well within acceptable bounds.

As was the case with previous studies of VR, some factors which were not quantifiable could not be considered, even though their influence may be important to measures of program success. For example, no consideration could be given to the degree of disability of the client. Nor was entry made into the muddy and difficult-to-measure areas of the psychic benefits and costs associated with program participation. However, it should be noted at this point that this study was not subject to most of the serious limitations of other studies of VR, which is the subject of the next section.

## Comparison with the Results of Previous Studies of VR

One of the first independent economic evaluations of VR was performed by Ronald W. Conley. This study appeared first as a doctoral dissertation, then as a book,[1] and finally in an updated version in a professional journal.[2] First, using data from the Maryland Division of Vocational Rehabilitation, and then national data from the Rehabilitation Services Administration, Conley produced a before-after study of

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[1]Ronald W. Conley, The Economics of Vocational Rehabilitation, (Baltimore: The Johns Hopkins Press, 1965).

[2]Ronald W. Conley, "A Benefit-Cost Analysis of the Vocational Rehabilitation Program," The Journal of Human Resources, (Spring, 1969) pp. 226-251.

VR. His methodology necessitated many assumptions concerning the distribution earnings-at-closure over time, the life expectancy of VR clients, etc. Basically, Conley took the difference in earnings at opening and closure, projected this over some time period, and compared these figures with the costs of VR. Conley did not attempt to make simultaneous adjustments for characteristics that might account for differences in earnings across groups of clients, but rather attempted to determine the effect that characteristics such as race and sex might have, by isolating each of these factors and considering them individually. In the most recent revision of his work, Conley estimated that the ratio of undiscounted social benefits to costs was approximately eight. When a discount rate of four percent was employed, the ratio of social benefits to costs was four.[3]

Frank Grella performed a cost-benefit analysis of VR in Connecticut.[4] The Grella study represents more than a cost-benefit analysis of VR, however. Using data from Connecticut Division of Vocational Rehabilitation, Grella attempted, as a major objective, to apply the concept of a systems approach to the entire VR process. One of the results of this attempted structuring of the VR institutional setup into a systems theory framework was that benefit-cost analysis was performed. Grella's benefit-cost analysis was the same basic before-

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[3] Ibid.

[4] Frank Carmen Grella, "An Application of Cost-Benefit Theory and Systems Theory to Vocational Rehabilitation in Connecticut," (unpublished Ph.D. dissertation, University of Massachusetts, 1969).

after approach that had been employed by Conley and in the internal study conducted by the Vocational Rehabilitation Administration in 1967.[5] Barsby contends that Grella used non-standard definitions of cost and benefits in his analysis. Barsby has reworked Grella's data, using a more standard approach and has determined that these data yield a social benefit-cost ratio of 4.2 (assuming a four percent discount rate).[6] This result is very similar to that obtained by Conley.

Donald M. Bellante performed benefit-cost analysis on data from the Florida Division of Vocational Rehabilitation in 1969.[7] Bellante's work represented an attempt to apply multivariate analysis to the VR data, so that simultaneous adjustments could be made for differences in client earnings as the chief measure of VR benefits. While Bellante's methods are much more statistically sophisticated than those used in the previous two studies, the basic methodology is of the before-after type.

Bellante, like Conley and Grella, made use of the fact that VR records (the RSA300) report earnings of clients at the time cases are

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[5]U.S. Department of Health, Education and Welfare. An Exploratory Cost Benefit Analysis of Vocational Rehabilitation, (Washington, D.C.: Vocational Rehabilitation Administration, 1967).

[6]Steve L. Barsby, Cost-Benefit Analysis and Manpower Programs, (Lexington, Massachusetts: C. C. Heath and Company, 1972), pp. 141-143.

[7]Donald M. Bellante, "A Cost-Benefit Analysis of the Florida Federal-State Vocational Rehabilitation Program," (unpublished Ph.D. dissertation, Florida State University, 1971).

opened and at closure. Bellante's basic approach was to take the difference in these two amounts, and capitalize this over a period of time approximating the remaining work life of the client. These projections were then compared to cost data, and benefit-cost ratios were constructed.

Comparison of the results of this study with these produced by Bellante is made difficult by several factors. First, since Bellante had access to the records of a sample of 13,888 clients, he was able to use a much more extended system of classification for the construction of subgroups, especially with respect to disability. Secondly, like Conley and Grella, Bellante chose to use a discount rate of four percent in the capitalization of all benefits from all groups. The benefit-cost ratios were generally higher for younger clients; much higher for males across every classification; higher for non-whites than for whites; positively related to the number of years of schooling completed by the clients; and higher for urban residents when compared to rural clients.

With respect to disability, Bellante observed higher benefit-cost ratios for the visually handicapped and those with mental disorders and slightly lower ratios for amputees and persons with digestive disorders. While Bellante constructed many benefit-cost ratios based on an extended classification of subgroups, the value of these ratios ranges from a low of approximately two to highs in the range of 49.[8]

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[8]Donald M. Bellante, "A Multivariate Analysis of a Vocational Rehabilitation Program," The Journal of Human Resources, (Spring, 1972), pp. 236-237.

Even though a lower rate of discount was used, the result of these studies are almost uniformly lower than those produced by this inquiry. The reason for the higher benefit-cost ratios produced in this study--as compared to the works of Conley, Grella and Bellante--lies in the fact that this work made use of an experimental-control group methodology, instead of the before-after methodology employed by the others. Reference to Chapter I will show that the VR process involves the requirement that in order for a case to be closed as successfully rehabilitated, the client must maintain employment for a period of 60 days after training is completed and job placement is made. It is only at the end of this time that the case is closed by VR, and a record is made of the level of earnings of the client for the 60 day period. All of the previous studies of VR involved the projection of life-time change in earnings based on the 60 day sample of earnings recorded at closure. In this investigation, earnings data were gathered for a longer period. In the case of both the experimental group and the control group, data on earnings were gathered for a period of twelve consecutive months. This covered the period immediately following case closure for the experimental group, and the period immediately preceeding case opening for the control group. This compares with a 60 day survey of post-VR earnings, and a one-point-in-time measure of pre-VR earnings, for all previous studies of VR. That a procedure so different from the one utilized in this study would produce different results, is not unexpected. The results

of this study, as compared to previous works on VR, tend to indicate that the payoffs to VR participation are even greater than those computed by other methods.

## Conclusions

The major conclusion of this study must be that VR does produce positive benefits from both a social and private perspective. The examination of the structure of earnings of VR clients showed the great impact that receipt of VR services made on the earnings of the rehabilitated clients, and the strong complementarity between VR and educational attainment. The benefit-cost ratios that were constructed indicate that VR is a very worthwhile investment of public funds. Whether more funds should be pumped into the program depends on what alternative used are available for these monies. Comparisons of benefit-cost ratios produced in this study with those associated with other investments of public funds are handicapped by the lack of comparable benefit-cost ratios. Reference to surveys of similar evaluations of other man-power programs reveals that the benefit-cost ratios produced here are generally higher than similar estimates for such programs. For example, Borus et al. produced benefit-cost ratios for the Neighborhood Youth Corps in Indiana that ranged from 0 to 5.0. Rasmussen found ratios from .6 to 27.7 for MDTA On-The-Job Training in 24 SMSA's; and the Office of Economic Opportunity estimated ratios of .4 to 1.5 for the Jobs Corps.[9]

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[9]Barsy, Ibid., pp. 109-144.

These data seem to indicate that it would be quite safe to recommend that VR be continued in Louisiana. It must be noted, however, that this decision is based strictly on a comparison of average benefit-cost ratios across manpower programs. Optimally, the resource allocation decision should be based on a comparison of marginal benefit-cost ratios. These are not available, but their construction would represent a fruitful area for future research.

It should also be pointed out that VR is not only an on-going program, but that it experienced a significant growth in the number of clients served in the period just preceding that covered by this study. Table 7-1 indicates the number of clients receiving services in each of five fiscal years immediately prior to this study. The findings of this study suggest it would be safe to say that this growth had been justified.

This leads to the question of expansion of VR. Given the above cited evidence, it would seem wise to recommend that VR be expanded. This question must, however, be viewed from another perspective as well. What percentage of the eligible disabled in Louisiana are receiving VR services? While this represents a direction for future research, it can be recommended that the number of sources of referral of clients (discussed in Chapters I and II) be expanded, and that outreach efforts consistent with the resources and facilities available, be undertaken. The benefit-cost ratios also seem to suggest that this outreach might take the direction of giving special attention to the rehabilitation of males in general, and clients in DIS2 and DIS4.

TABLE 7-1

NUMBER OF CLIENTS RECEIVING SERVICES FROM VR

BY FISCAL YEAR 1970-1975

| Fiscal Year | Number of Clients |
|---|---|
| 1970-71 | 22,477 |
| 1971-72 | 24,953 |
| 1972-73 | 22,368 |
| 1973-74 | 25,374 |
| 1974-75 | 28,681 |

Source: Annual Financial Report for Vocational Rehabilitation, State of Louisiana, 1970-75.

The previously stated caveats against over-emphasis of this particular point are again noted and re-emphasized, however. This should also be undertaken in light of the findings of the determinants of successful rehabilitation. Since women are more likely to successfully complete VR than men, whites more likely to complete than non-whites, and persons not on public assistance much more likely to complete VR than persons receiving public assistance, emphasis on the outreach toward those with the characteristics associated with success would be wise. Again, however, this should be done in a fashion that does not unduly discriminate on the basis of race or sex, and does not violate legal and ethical standards against such discrimination. Also, the conflicting nature of the evidence concerning outreach (i.e., that males produce higher benefit-cost ratios, but are less likely to complete VR successfully) would seem to speak for a general system of outreach, as opposed to one exclusively aimed at clients with certain characteristics.

The findings of this study which show that returns to limited participation in VR are insignificant, indicate very strongly that all clients entering VR should be encouraged in the strongest possible terms to complete the process. It could be recommended that perhaps some version of the evidence produced by this study could be made available in some accessible form to beginning clients, so that they would be aware of the value of completing the program.

The findings of this study do suggest some additional directions for new research, in addition to similar evaluations of programs that

compete with VR for funding. The most obvious, and perhaps most beneficial, would be a long term follow-up study of VR clients, to determine the long run effects of VR participation. After all, benefits in this study were based on projections of earnings measured only one year after closure. This is akin to forecasting the future course of a rocket when it is only 1000 feet off the ground. The comparison of the results of this study with prior VR investigations reveals how sensitive the results are to elongation of the post VR period.

In addition, more extensive works concerning the place of handicapped workers in the Louisiana labor market could be of benefit in decision making, with respect to future VR efforts at rehabilitation. This could take the form of studies of the occupational structure of the handicapped, and the investigation of possible employer discrimination against these workers, in hiring, compensation, and promotion policy. Also of possible interest could be interdisciplinary studies which seek to measure motivational factors, the degree of disability and its relationship to cost-benefit, and non-pecuniary benefits to society and individuals, which at present seem not to be quantifiable and measurable.

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# APPENDIX

OE 7985 (R 7-69)

# DEPARTMENT OF EDUCATION
## DIVISION OF VOCATIONAL REHABILITATION

158

Form RSA 300 Revised July 1, 1969

Agency Code ____ *
Case Number ____

CASE SERVICE REPORT: FEDERAL-STATE PROGRAM OF VOCATIONAL REHABILITATION

### PART 1 (TO BE RECORDED AT TIME OF FIRST REFERRAL)

A. Last Name | First Name | Initial

B. Address: Street and Number

City | County | (Code*) | Zip Code

C. Referral Date ____ D. Referral Source ____ *

E. Age ____ dob ____ F. Sex: 1 ☐ Male; 2 ☐ Female

G. Disability as Reported (describe)

Code *

### PART 2 (TO BE RECORDED AT COMPLETION OF REFERRAL PROCESS)

A. Soc. Sec. No. ____

B. SSDI Status at Referral ____ *

C. Race ____ *

D. Date Referral Process Completed ____

E. Months in Statuses 00 02 ____

F. Spanish Surname: Yes ☐ 1; No ☐ 2

G. Outcome of Referral Process:

NOT ACCEPTED Reason ____ *

1 ☐ from (00); 2 ☐ from (02)

Client Referred to ____ * or

Referral Not Appropriate ☐ 00

*If closed from status 00, complete Items 3.A. thru 3.C. If closed from status 02, complete items 2.H. thru 2.R. and items 3.A. thru 3.C.*

G. Outcome of Referral Process (continued)

ACCEPTED FOR: 03 ☐ 6-mos. Ext. Eval. (04); 04 ☐ 18-mos. Ext. Eval. (06); 05 ☐ VR Services (10)

*Complete items 2.H. thru 2.R. DO NOT COMPLETE ANY OF PART 3 AT THIS TIME.*

H. Disabling Condition (describe)

1. Major

Code *

2. Secondary

Code *

I. Previous Closure within 36 months:

No ☐ 1; Yes-Outcome: Rehab. ☐ 2; Not Rehab. ☐ 3

If Yes-Months Since Last Closure ____ *

J. Marital Status ____

K. Number of Dependents ____

L. Total Number in Family ____

M. Highest Grade Completed ____ *

N. Work Status ____

O. Weekly Earnings ____ $ ____

P. Total Monthly Family Income (including earnings) ____ *

Q. Public Assistance: Type ____ *; Mo. Amt. ____ $ ____; Time on P.A. ____ *

R. Primary Source of Support ____ *

### PART 3 (TO BE RECORDED AT TIME OF CLOSURE)

A. Federal Special Program Identification*

| None | TF | AFR | MMS | MAW | PO | WIN | | | | SUM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | //// |
| 000 | 001 | 002 | 004 | 010 | 020 | 040 | 100 | 200 | 400 | |

B. Cost of Case Services (Dollars)

| | |
|---|---|
| 1. All Services - Total | |
| 2. Rehabilitation Facilities - Total | |
| 3. Social Security Trust Funds - Total | |
| 4. Extended Evaluation - Total | |

C. Social Security Trust Funds Cases Only:

1. Social Security Claim Type ____ *

If Claim Type Code 2, 3, or 4; enter Wage Earners': Last Name | First Name | Initial

Social Security Number

2. Check (x) if Administrative Costs only ☐ (includes counseling, guidance, and placement)

D. Date Ext. Eval. Completed (If applicable) ____

E. SSDI Status at Time of Closure ____ *

F. Work Status ____ *

G. Weekly Earnings ____ $ ____

H. Public Assistance: Type ____ *; Mo. Amt. ____ $ ____

I. Occupation (title) ____

Code ____ *

*These Items are to be coded

J. Number of Months on Agency Rolls:

1. In extended Evaluation (statuses 04 or 06) ____
2. From Acceptance to Closure (Statuses 10-24) ____
3. In Training (status 18) ____
4. Ready for or in Employment (Statuses 20-22) ____

K. Outcome of Extended Evaluation or VR Services

1. ☐ Closed from Ext. Eval. (status 08): Reason ____ *
2. ☐ Closed Rehabilitated (status 26)
3. ☐ Closed Not Rehabilitated (status 28): Reason ____ *
4. ☐ Closed Not Rehabilitated (status 30): Reason ____ *

L. Services Provided: Indicate (x) if applicable

| TYPE OF SERVICE PROVIDED OR ARRANGED FOR BY AGENCY | | | WITH COST ONLY (1) | WITHOUT COST ONLY (2) | WITH & WITHOUT COST (3) |
|---|---|---|---|---|---|
| 10 | | Diagnostic and Evaluation | | | |
| 11 | | Restoration (Physical or Mental) | | | |
| 12 | TRAINING | College or University | | | |
| 13 | | Other Academic (Elem. or HS) | | | |
| 14 | | Business School or College | | | |
| 15 | | Vocational School | | | |
| 16 | | On-the-Job | | | |
| 17 | | Personal & Voc. Adjustment | | | |
| 18 | | Miscellaneous | | | |
| 19 | | Maintenance | | | |
| 20 | | Other services | | | |
| 21 | | Services to other family members | | | |

M. State Agency Special Program Identification*

| | | |
|---|---|---|
| | | |

STATE OF LOUISIANA
DEPARTMENT OF EDUCATION
LOUIS J. MICHOT, SUPERINTENDENT
DIVISION OF VOCATIONAL REHABILITATION
421 NORTH STREET-EDUCATION BUILDING
P. O. BOX 44371
BATON ROUGE, LOUISIANA 70804

July 21, 1975

Dear Vocational Rehabilitation Client:

In cooperation with the Louisiana Division of Vocational Rehabilitation I am conducting an independent study to help determine how well Vocational Rehabilitation is serving the people of Louisiana. Enclosed with this letter you will find a questionnaire which is part of that study. Please answer all questions. ALL REPLIES WILL BE KEPT STRICTLY CONFIDENTIAL. Please do not put your name on the questionnaire. Just answer all questions, put the questionnaire in the envelope provided, and drop it in the mail. The return postage has already been paid, so it will cost you nothing.

No personal information from this questionnaire will be given to any other government agency. The information will be used only for research into how well Vocational Rehabilitation is serving you and the public.

Please help out by taking a minute to complete and mail the questionnaire.

Sincerely yours,

Robert C. Brown

Robert C. Brown

RCB:ekw

Enclosures

Please answer the following.

1. Put a check beside all of the months in which you were employed (held a job) between April, 1974 and March, 1975.

| | | | |
|---|---|---|---|
| ___April 74 | ___July 74 | ___October 74 | ___January 75 |
| ___May 74 | ___August 74 | ___November 74 | ___February 75 |
| ___June 74 | ___September 74 | ___December 74 | ___March 75 |

___Did not have a job during this time.

2. Were you unemployed (out of work) at any time between April, 1974 and March, 1975?

___Yes How long? Weeks _____ OR Months _____
___No

3. When you were working, what was your pay before deductions?

Weekly $_____ OR Monthly $_____

___Did not have a job.

4. Between April, 1974, and March, 1975, did you receive any payments from social security, old age, veterans benefits, unemployment, disability, workmen's compensation, aid for dependent children, public assistance, or welfare?

___Yes Monthly amount $_____. How many months? _____
___NO

Please answer the following:

1. Put a check beside all of the months in which you were employed (held a job) between April, 1974 and March, 1975.

| | | | |
|---|---|---|---|
| ___April 74 | ___July 74 | ___October 74 | ___January 75 |
| ___May 74 | ___August 74 | ___November 74 | ___February 75 |
| ___June 74 | ___September 74 | ___December 74 | ___March 75 |

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Weekly $_____ OR Monthly $_____

___Did not have a job.

4. Between April, 1974, and March, 1975, did you receive any payments from social security, old age, veterans benefits, unemployment, disability, workmen's compensation, aid for dependent children, public assistance, or welfare?

___Yes Monthly amount $_____. How many months? _____
___No

5. Did your diability exist before April, 1974?

___Yes
___No If no, when did it begin _____?

Please answer the following:

1. I am (check one)

___married ___widowed ___divorced ___have never been married

2. Number of dependents (How many people other than yourself do you support? Check one.

___0 ___3 ___6 ___9
___1 ___4 ___7 ___10
___2 ___5 ___8 ___more than 10

3. Put a check beside all of the months in which you were employed (held a job) between April, 1974 and March, 1975.

| | | | |
|---|---|---|---|
| ___April 74 | ___July 74 | ___October 74 | ___January 75 |
| ___May 74 | ___August 74 | ___November 74 | ___February 75 |
| ___June 74 | ___September 74 | ___December 74 | ___March 75 |

___Did not have a job during this time.

4. Were you unemployed (out of work) at any time between April, 1974, and March, 1975?

___Yes How Long? Weeks _____ or Months _____

___No

5. When you were working, what was your pay before deductions?

Weekly $_____ OR Monthly $_____

__Did not have a job.

6. Between April, 1974, and March, 1975, did you receive any payments from social security, old age, veterans benefits, unemployment, disability, workmen's compensation, aid for dependent children, public assistance, or welfare?

___Yes Monthly amount $_____. How many months? _____

___No

7. In what Parish do you now reside?

_____

August 15, 1975

Dear Vocational Rehabilitation Client:

About three weeks ago you received a letter asking for some information about you to be used in a study of Vocational Rehabilitation, but your reply has not yet been received.

In order to complete the study, information about your work and wages is badly needed. This information is needed even though you may not have seen your counselor for many months, and even if you have not been active in Vocational Rehabilitation recently.

Enclosed is a copy of the first letter you received, along with another questionnaire and another stamped, self-addressed envelope. If you have trouble answering any of the questions, please ask your family or a friend to help you. Please remember that all information you give is kept strictly secret and confidential.

Your information could be very important in helping other people who might be Vocational Rehabilitation clients in the future.

Your cooperation is greatly appreciated.

Sincerely,

Robert C. Brown

Robert C. Brown

RCB:mjb

# VITA

Robert Charles Brown was born February 9, 1945. He graduated from Coushatta High School, Coushatta, Louisiana, in 1963. He attended Northwestern State College of Louisiana on an academic scholarship, graduating with a B.A. in 1967.

After serving as a graduate assistant in the Department of Economics, he received the M.A. from Louisiana State University in 1969. The next years were spent as instructor of economics at Northwestern State University.

He has served as a graduate assistant and dissertation fellow with the Department of Economics at Louisiana State University since 1972. He is currently a candidate for the degree of Doctor of Philosophy.

Brown is married to the former Jill Lestage. They are the parents of one son, Charles Hugh.

**EXAMINATION AND THESIS REPORT**

Candidate: Robert Charles Brown

Major Field: Economics

Title of Thesis: An Economic Evaluation of Vocational Rehabilitation in Louisiana

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

June 18, 1976