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Assistant Secretary for Planning and Evaluation
Office of Disability, Aging and Long-Term Care Policy

ANALYSIS OF THE BENEFITS AND COSTS OF CHANNELING

May 1986

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EXECUTIVE SUMMARY

The National Long Term Care Demonstration, initiated by the U.S. Department of Health and Human Services in 1980, tested whether a managed approach to providing community-based long term care could help control costs while maintaining or improving the well-being of its clients and their informal caregivers. These effects were expected to derive from more appropriate decisions on institutionalization and the more rational use of services in the community. This report analyzes the benefits and costs of this program, focusing particularly on the net impact of channeling on public and private expenditures for living, medical, and long term care services.

Channeling was designed to work through 10 local projects, each of which used a uniform client-centered case management approach. Two models were tested:

- The basic case management model, which augmented the case management intervention with a small amount of direct service purchasing power to fill service gaps
- The financial control model, which, through the pooling of categorical program funds, permitted channeling case managers to order the amount, duration, and scope of services that they deemed necessary

It was hoped that both models would enable impaired elderly persons to remain in the community rather than enter a nursing home. In the process, the models were expected to help contain long term care costs while enhancing the quality of the lives of clients. The program included an extensive outreach and screening process to identify persons at risk of institutionalization. A comprehensive assessment of each client's needs was conducted, and an appropriate care plan was developed. This plan was then implemented and monitored over time to ensure that the necessary services were delivered.

The demonstration included an evaluation component designed to estimate the impacts of adding channeling case management services to the existing service system. Thus, this benefit-cost analysis, which is one component of that evaluation, examines the additional costs and benefits generated by channeling. These costs and benefits are in addition to those created by the long term care systems in place at the 10 demonstration sites.

The general conclusion of this benefit-cost analysis is that channeling, as it was fielded in the demonstration, led to an increase in total costs for clients, including costs for medical and long term care services and costs for shelter, food, and other daily living expenses. The absolute and relative size of this increase differed substantially by each model. The basic case management model appeared to increase these costs by about \$1,300 per client during the 18-month observation period, which represents an increase of approximately 7 percent over the \$18,500 per-client costs that we estimate clients would have incurred in the absence of channeling.

The financial control model, with its greater expenditures for community services, increased costs by much more: approximately \$3,400 per client during the observation period. We estimate that during this period clients would have incurred average costs of almost \$23,000 per client in the absence of channeling. Thus, the increase generated by this model of channeling represents an increase of roughly 15 percent.

In both models, the government pays for a great deal of the living, medical, and long term care services used by clients, particularly when Social Security, SSI, and food stamp benefits are included. In the absence of channeling, the government would have paid between 65 percent (under the basic model) and 75 percent (under the financial control model) of the living, medical, and long term care costs of clients, excluding payments from social insurance programs. When these social insurance payments are added in with the other costs, the total government costs for the 18 months following enrollment approximately equal the total expenditures for the clients.

Because the per-client estimates are inadequate in several respects for planning an on-going program, we have converted these estimates into estimates of the net cost to the government budget per case month (i.e., the net cost implied by providing channeling services to a client for a month). This conversion encompasses all of the impacts of channeling. Thus, the estimates include effects on all government agencies (i.e., Medicare, Medicaid, channeling, Social Security, and other public agencies). The estimates reflect the direct operating cost of channeling, as well as indirect costs and savings for services (e.g., formal community care and nursing homes) and social insurance (Social Security benefit payments). Our calculations indicate that it would cost the government approximately \$2,500 (under the basic model) and almost \$3,100 (under the financial control model) per case month to operate a permanent channeling program. These costs must be compared with those that the government would have incurred in the absence of channeling: \$2,300 per case month in the basic model sites, and \$2,600 in the financial control model sites. Thus, channeling would increase government costs for clients by 10 percent under the basic model and by 20 percent under the financial control model. These increases in government costs are greater than those for society as a whole because the government costs exclude savings to clients and their families.

In both models, these increased net costs appeared to produce benefits in the form of reductions in the number of unmet client needs and increases in the reported levels of life satisfaction by clients. There were relatively clear indications that the number of unmet needs fell in both models, and that the proportion of clients with severe (i.e., more than three) unmet needs fell significantly. The proportion of clients who reported being satisfied with their service arrangements increased. In addition, channeling seemed to increase clients' reported satisfaction with life, an increase that was observed at 6, 12, and 18 months after randomization.

Primary informal caregivers also seemed to derive benefits from channeling: they reported more satisfaction both with their lives and with the care arrangements for clients. The evidence suggests that primary caregivers did not reduce their efforts

due to channeling under either model. The only observed reduction in effort was a slight reduction for visiting caregivers (who were generally less closely associated with clients) under the financial control model.

The differences among the sites in which the two channeling models were fielded create some uncertainty about the extent to which observed differences between the models can be generalized to a broader context. In general, however, the results indicate that the basic model was more cost-effective. It produced approximately the same increase in measures of life quality as did the financial control model, but its net cost was about one-third that of the financial control model. However, the differences in the availability of services in the sites cloud this issue, since it is unclear whether the financial control model might have generated greater increases in life quality had it been fielded in the less service-rich environment of the basic model sites. Nevertheless, our available evidence indicates that the basic case management model is the more cost-effective of the two.

When the evidence from the channeling demonstration is combined with the findings from previous community care evaluations, two general conclusions emerge about the benefits and costs of channeling-type programs. The first is that these efforts will tend to raise overall costs. Community care programs have largely been unsuccessful in delivering services only to those clients who would enter a nursing home in the absence of community services. This has limited their ability to generate nursing home cost savings. At the same time, they have increased the general level of services provided to community residents, thereby increasing overall costs.

The second conclusion is that these extra services to community residents have apparently increased the quality of the lives of the elderly clients. Further, channeling was found to increase the quality of the lives of primary caregivers and their satisfaction with service arrangements. In addition, the formal services provided by channeling did not appear to cause primary caregivers to reduce their efforts.

These two conclusions must be considered together in order to make the final assessment of channeling or other efforts to expand case management or community care. The net costs of this intervention are now well documented, both in this report and in previous studies. Benefits in the form of increases in life quality have been more difficult to document, but they do appear to exist. The issue for consideration is whether the largely intangible benefits are worth the net costs of producing them.

I. BENEFIT-COST ANALYSIS AND THE NATIONAL LONG TERM CARE DEMONSTRATION

The desire to control the burgeoning costs of long term care, combined with a belief that persons would generally prefer to remain in the community, has provided a powerful motivation for expanding community-based long term care. There is a growing sense that the current system, with its emphasis on institutional care, can be made more humane and less expensive by increasing the availability of community-based alternatives. Of course, it is recognized that community-based services can be expensive and that the number of services and funding sources can bewilder elderly persons seeking assistance. Therefore, case management services have been proposed as a means to facilitate access to services while providing a means to control costs.

The National Long Term Care Demonstration was an effort to test these ideas. It hoped to generate cost savings and increase the quality of the lives of clients and their caregivers. This was to be accomplished by establishing a case management system that would rationalize the delivery of long term care services. This intervention, termed "channeling," attempted to substitute formal and informal services in the community for institutional care, whenever community care was appropriate. Furthermore, it attempted to enroll and serve those impaired elderly persons who were at risk of entering a nursing home. This combination of community service orientation and careful targeting was expected to produce the desired cost savings and life-quality impacts.

Benefit-cost analysis provides a method for assessing the degree to which the channeling intervention succeeded in meeting its goals. Such an assessment, while admittedly imperfect, provides a basis for assessing whether the impacts of channeling are sufficiently large to justify the program costs. It establishes a comprehensive framework for organizing the available data and assessing the orders of magnitude of the impacts and the relative certainties and uncertainties inherent in the evaluation.

The analysis incorporates both cost-efficiency and humanitarian goals. The cost saving goals are examined by summing up the estimates of channeling's impacts on costs for medical and long term care services as well as impacts on shelter, food, and other living expenses. This summation produces an estimated net cost, reflecting the net impact of channeling on expenditures by and for clients. The success in achieving humanitarian goals is assessed by comparing the net cost estimate with estimates of the impacts on client and caregiver well-being. These well-being impacts are not valued in dollars, so they cannot be aggregated or compared as easily as cost impacts. Nevertheless, the overall success of channeling can be judged qualitatively by assessing whether these intangible effects represent benefits that are sufficiently large to justify the net costs of producing them.

This introductory chapter presents an overview of the channeling intervention and the impacts expected. Chapter II reviews the overall evaluation design and the role of the benefit-cost analysis within that design. Chapter II also provides an overview of the benefit-cost results and the basic methods underlying their estimation. Chapter III examines the benefit and cost components individually to assess their magnitudes and the level of precision with which they are estimated. Chapter IV examines factors that determine the net costs that would be generated after the 18-month period covered by our data. This analysis provides an indication of the long-run net financial commitment implied by enrolling a person in channeling. The last chapter, Chapter V, provides an interpretation of the overall results. It also places these results in the context of other long term care efforts. A series of appendices contain details regarding the specific methods and impact estimates used in developing the benefit-cost analysis.

In describing the channeling intervention, this introductory chapter examines the channeling models, their expected impacts, their implementation, and the characteristics of the individuals enrolled. As mentioned, the demonstration hoped to achieve its desired effects by providing case management and formal community services to frail elderly persons at risk of institutionalization. Our evidence indicates that it succeeded in delivering channeling services and in enrolling a severely impaired population. However, the persons enrolled in the demonstration appear to have had a risk of institutionalization that was lower than expected given their advanced age and extensive impairments.

A. THE CHANNELING INTERVENTION

Channeling could expect to increase the quality of clients' lives by delivering more community services; but it could hope to achieve overall cost savings only if clients used the extra community services to substitute for more expensive institutional services. Thus, channeling tried to direct services to persons who would enter an institution otherwise and attempted to avoid extending benefits to individuals who might merely substitute publicly funded community services for care provided informally by family and friends.

To accomplish this goal, the following core components were included in the channeling intervention:

1. Outreach to identify and attract potential clients at high risk of entering a long term care institution
2. Standardized eligibility screening to determine whether an applicant met each of the following pre-established criteria:
 - Age: must be 65 years of age or older
 - Functional Disability: must have two moderate disabilities in performing activities of daily living (ADL), or three severe impairments in ability to

perform instrumental activities of daily living (IADL), or two severe IADL impairments and one severe ADL disability where cognitive or behavioral difficulties affecting individual ability to perform activities of daily living can count as one of the severe IADL impairments¹

- Unmet Needs: must have an unmet need (expected to last for at least six months) for two or more services or a fragile informal support system not expected to be able to continue to meet the needs of the client²
- 3. Comprehensive in-person assessment to identify individual client problems, resources, and service needs in preparation for developing a care plan
- 4. Initial care planning to specify the types and amount of care required to meet the identified needs of clients
- 5. Service arrangement to implement the care plan through the provision of both formal and informal in-home and community services
- 6. Ongoing monitoring to ensure that services are appropriately delivered and continue to meet client needs
- 7. Periodic reassessment to adjust care plans to changing client needs

These seven core functions were combined with additional features of the demonstration to create two different channeling approaches--the basic case management model and the financial control model.

The basic case management model relied primarily on the seven components above to achieve its results. It tested the premise that the major difficulties in the long term care system were problems associated with information and coordination that could be remedied by intensive, client-centered case management. An additional feature of this model was a small amount of funding (typically \$250,000 for each project over the demonstration period) that was made available to the case managers to purchase services or otherwise meet specific client needs.

The financial control model was more ambitious in its scope, adding several features to the seven basic channeling components. It established a funds pool to pay for a wide range of community-based services. These services included skilled nursing, therapy and home health assistance, personal care, homemaking, meal preparation,

¹ The six ADL activities include bathing, dressing, toileting, transferring, continence, and eating. The seven IADL activities are housekeeping, shopping, meal preparation, taking medicine, traveling, using the telephone, and managing finances. For the purpose of the IADL eligibility criterion, the first two and the last three IADLs were aggregated into two combined categories. Thus, there are four possible IADL areas under which applicants can qualify, plus the cognitive/behavioral impairment category, which counts as one IADL item.

² Over 90 percent of the sample members were eligible because they had unmet needs. There were relatively few persons enrolled who had their needs met by a fragile informal support system (see Carcagno et al., 1986, Chapter VII, Section C).

transportation, and other community-based services. The funds pool combined funds from Medicare, Medicaid, and certain state programs, and enabled case managers to provide needed services without concern for the eligibility requirements of specific programs. Because of the use of Medicare funds, all participants in the financial control model were required to be eligible for Medicare. This funds pool enabled case managers to authorize the amount, duration, and scope of community services purchased using funds-pool dollars, thus giving them access to, and accountability for, the full range of community services. To control costs in this model, two spending limits were imposed. First, a spending cap was placed on average funds-pool expenditures per client; the cost of individual care plans could vary, but the average client expenditure could not exceed 60 percent of the average annual rate for intermediate care facilities (ICFs) and skilled nursing facilities (SNFs) in the area. Second, expenditures for an individual client could not exceed 85 percent of the average rate of ICF and SNF care without special approval. The financial control model also had a requirement that clients share in the cost of services if their income exceeded 200 percent of the state's SSI eligibility level plus the food stamp bonus amount.

The channeling demonstration was fielded by 10 participating states and local agencies. Five channeling projects tested each model. The basic case management model was implemented in:

- Baltimore, Maryland
- Houston, Texas
- Middlesex County, New Jersey
- Eastern Kentucky
- Southern Maine (York and Cumberland counties)

The financial control model was implemented in:

- Miami, Florida
- Greater Lynn, Massachusetts
- Rensselaer County, New York
- Cuyahoga County (including Cleveland), Ohio
- Philadelphia, Pennsylvania

The projects opened their doors to clients between February and June of 1982, and were operational through October 1984. The local projects were phased out of the federal program in-March of 1985, although most continued to operate under other auspices.

B. THE EXPECTED EFFECTS OF CHANNELING

The channeling models outlined in the previous section were expected to affect four areas: community-based service use (including both formal and informal services), nursing home use, hospital use, and the quality of life of channeling clients and the

family and friends who cared for them (informal caregivers). It was expected that savings from the reduced use of nursing homes and hospitals would offset any extra costs from the increased use of formal community-based services. Furthermore, case managers hoped to moderate increases in community-based service costs by working with informal caregivers to help them continue to provide care to clients.

Channeling was designed to have five central mechanisms that would produce these effects. Both models embody all five mechanisms to varying degrees, but the first three mechanisms are case management mechanisms common to both models, whereas the last two are financial mechanisms embodied primarily in the financial control model. These five mechanisms were expected to lead clients to substitute community services for institutional services, an effect that would, it was hoped, lead to the desired cost savings and improvements in life quality.

The three case management mechanisms were problem identification, information/advocacy, and support. The core functions of initial needs assessment, ongoing monitoring, and periodic reassessment enabled case managers to identify serious health problems and mismatches between clients' needs, services, and service providers. Case managers could act to correct any such problems by providing information about services and funding sources, and by helping clients and their families apply for assistance. The case managers also acted as advocates for clients and worked to ensure that providers were responsive to client needs. The case managers also provided emotional support and encouragement to clients and informal caregivers. The case managers' periodic checking on clients and their availability in times of need were intended to reassure clients that their needs would be met and to reinforce informal caregivers' capacity to provide care.

The two financial mechanisms were service price reduction and financial control. For covered services authorized by a case manager, channeling reduced to zero the price paid by clients in financial control sites.³ In basic case management sites, the gap-filling funds could be used to reduce the prices of community services. These effective price reductions not only lowered the overall price of community care, but also reduced the price of nonmedical community services (such as homemaking, personal care, and transportation) relative to the prices of medical community services (such as nursing or home health aide care), which are often paid by Medicare or Medicaid. The financial control mechanism constrained this price reduction mechanism by placing a cap on expenditures (either directly, as in the financial control model, or indirectly, as in the basic case management model that had only limited gap-filling funds). The constraining effect of these caps was enhanced in channeling because it operated by making the case manager the person accountable for service authorization and cost control.

All five of these mechanisms were expected to increase the use of community services. For those persons at risk of institutionalization whose service needs could be

³ For clients who were required to cost share (about 5 percent of all financial control model clients) the effective price was reduced, but not to zero. Cost sharing is discussed in Carcagno et al. (1986), Chapter VIII, Section C.

appropriately met in the community, channeling would induce and enable them to substitute community care for institutional care. In addition, for those persons who were not at risk of institutionalization but who had unmet needs, channeling would increase the use of community services.⁴ The stronger price reduction mechanism of the financial control model was expected to generate larger increases in community-based service use.

The channeling mechanisms were expected to reduce the use of nursing homes as they increased the use of community services. They also sought to reduce hospital use by reducing the number of persons remaining in hospitals solely because of inadequate care at home or a shortage of nursing home beds.⁵ As a consequence of changes in nursing home use and the identification of medical problems, channeling might also be expected to increase the rise of other medical services.

Improvements in life quality were expected to result from the increases in community residence which would enable persons to remain in their own homes and avoid the often debilitating effects of involuntary relocation to a nursing home. Furthermore, the improved monitoring and support were expected to reduce the anxiety that clients and caregivers had about the stability of their service arrangements. Also, the strain on informal caregivers was expected to be reduced through the provision of respite care. This caregiver support, along with the increased availability of community services, was expected to encourage caregivers to maintain or increase their informal caregiving. These efforts were considered essential for achieving overall cost savings because they reduced the tendency to substitute formal services for informal care.

C. IMPLEMENTATION OF THE CHANNELING INTERVENTION

Channeling was expected to achieve its goals by providing case management services to impaired elderly persons at risk of institutionalization. In assessing the implementation of this intervention, we consider the delivery of services and the characteristics of enrollees separately.

1. *Delivery of Case Management Services*

The channeling intervention appears to have been implemented as intended under the demonstration. Data collected in a series of on-site interviews with channeling project staff and providers indicate that all seven core functions were delivered to

⁴ One factor that might have mitigated the tendency of this effect to increase costs is the possibility that case managers would be able to substitute less costly community services for those that would otherwise have been consumed.

⁵ Channeling also was expected to influence hospital use through the problem identification mechanism. However, the net impact of this influence was uncertain. It was expected that case managers would identify medical problems that would otherwise have gone unchecked, but it was unclear whether this would reduce hospital use by fostering the early resolution of these problems or whether it would increase hospital use by ensuring that needed hospital care was provided.

clients. There were, however, some difficulties in the early stages of implementation.⁶ In particular, the monitoring and reassessment components of channeling were not fully implemented during the early months of the demonstration because emphasis was placed on building the caseload, and the gap-filling service component for the basic case management model was subject to some delays due to lags in authorizing the basic case management projects to expend funds.

The result of the demonstration was a clear increase in the amount of case management provided to clients, despite the fact that the demonstration projects were fielded in communities that already had some case management services available.⁷ Furthermore, as discussed in Chapter II and Chapter III, treatment group members received more formal community-based services than did controls. Thus, the demonstration achieved its goal of increasing access to and use of community services.

2. Clients Enrolled in the Demonstration

Baseline data indicated that the demonstration successfully identified an extremely frail group experiencing severe physical limitations. Consistent with the eligibility criteria, sample members reported major limitations in functioning--with over 22 percent unable to undertake any of the five common activities of daily living (eating, getting out of bed or a chair, toileting, dressing, or bathing), 52 percent incontinent, and 81 percent restricted in their mobility. There was also overwhelming dependence in meal preparation (87 percent), transportation (87 percent), shopping (95 percent), and housekeeping (97 percent). These impairments were associated with a high number of unmet needs for services; sample members reported an average of 3.4 such needs at the time they applied.

Linked to problems of functioning were physical health problems. Sample members reported the presence of medical conditions, such as heart trouble (48 percent), stroke (30 percent), cancer (11 percent), arthritis (71 percent), diabetes (20 percent), nerve problems (24 percent), high blood pressure (42 percent), and paralysis (14 percent). In the two months before entering channeling, over 47 percent of the sample had been admitted to a hospital and 6 percent to a nursing home. Overall, the sample spent an average of over 10 days in a hospital and almost 2 days in a nursing home over that two-month period.

The channeling sample was poor. At the baseline interview, 57 percent reported incomes below \$500 per month (which included spouse income where applicable), with income for the sample averaging only \$542 per month. As further indicators of poverty, 56 percent reported no assets, and 25 percent reported Medicaid eligibility.

Coupled with these functional and financial limitations were isolation and stress. Over one-third of the sample lived alone, and 27 percent reported they were often

⁶ Carcagno et al. (1986) detail the design and implementation of the channeling models.

⁷ The service environment and the increased use of case management are examined by Carcagno et al. (1986) and by Brown and Phillips (1986).

lonely. During the year before baseline, a majority of sample members (86 percent) had experienced a major stressful life event, such as the death of a spouse or close friend or relative, or the onset of a major illness. Finally, a high proportion of the sample (44 percent) reported being dissatisfied with their lives.

These statistics indicate that channeling clearly identified an impaired population with serious health problems and low income. However, this population did not appear to have a high risk of institutionalization. As is discussed later (and in Wooldridge and Schore, 1986), fewer than 25 percent of the control group had a nursing home stay during our observation period. In addition, the evidence suggests that clients would have received many formal community services as well as some case management even in the absence of channeling. Thus, the demonstration seemed to attract a needy and very frail population that, in general, tended to live and receive services in the community. This tendency limited the extent to which channeling could create savings by substituting community for institutional care.

This situation characterizes most of the community-based long term care demonstrations. Weissert (1985) noted that available evidence indicates that most of the persons using community care use it as an add-on to rather than as a substitute for institutional care. He concluded that the vast majority of community care recipients in previous demonstrations were not at risk of institutionalization and would have remained in the community even without community care services. He reviewed eight demonstrations and found that fewer than 25 percent of control group members entered a nursing home (for these demonstrations, the fraction of control group members entering a nursing home during the relevant observation periods ranged from 2.1 percent to 23 percent). Thus, this constraint on the ability of community care to generate systemwide cost savings appears to be common.

II. OVERVIEW OF THE EVALUATION AND BENEFIT-COST ESTIMATES

Our analysis indicates that both models of channeling, as they were fielded in the demonstration, increased average long term care expenditures per client. In the basic case management model sites, the increase was approximately 7 percent over the estimated average expenditure level expected in the absence of channeling, which would have been approximately \$18,500 per client over the 18-month observation period. In the financial control model sites, the increase was larger, due to the greater expenditures for formal community services at these sites. The increase was almost 15 percent over the estimated average expenditure level expected in the absence of channeling, which would have been approximately \$23,000 per client. In both models, the services purchased with these additional expenditures generated small reductions in the average number of unmet client needs and small increases in the level of life satisfaction reported by clients and informal caregivers.

The above paragraph provides a simple statement of the benefit-cost findings. However, it does not reflect the large number of underlying estimates and assumptions used to derive those findings, nor does it provide a sense of the imprecision inherent in analyses of social programs such as channeling. In the remainder of this benefit-cost report, we provide a background for our conclusions by discussing these underlying assumptions, the impact estimates used in the analysis, and a framework for judging the level of confidence that can be placed in the findings. In doing so, we provide a more complete basis for assessing the extent to which the channeling intervention achieved its objectives--to reduce overall costs and to increase the quality of the lives of both clients and their informal caregivers.

This chapter begins the process by providing the framework and background necessary to interpret the various impacts and costs included in the benefit-cost analysis. In Section A we delineate our basic strategy for estimating the impacts of channeling. Section B then describes the accounting framework that lies at the heart of our analysis. In describing this framework, we present an overview of the benefit-cost estimates so as to provide an appropriate context for interpreting the impact estimates. The individual impact estimates and the uncertainty surrounding them are then examined separately in Chapter III.

A. EVALUATION DESIGN

The evaluation sought to examine the extent to which channeling, as it was fielded in the demonstration, affected the expenditures, resource use, and well-being of clients. As the first step in our evaluation design, we assigned eligible applicants randomly to either a treatment or a control group. We followed both groups for 18 months through a series of in-person interviews, augmented by several sets of records

data. The activities, expenditures, and attitudes of treatment and control group members were then compared to derive estimates of the impacts of channeling.

Three aspects of this evaluation design are particularly important to the benefit-cost analysis. First, the evaluation was designed to draw a specific comparison: the difference between what actually happened to persons who were offered channeling services and what would have happened to those persons in the absence of channeling. Second, the design established a method for drawing this comparison accurately. Finally, the design called for a sufficiently large sample size to provide relatively precise measures of the impacts of the program. We discuss these three aspects separately in subsection 1, subsection 2, and subsection 3.

1. The Demonstration and the Comparisons Underlying the Evaluation

The evaluation was designed to assess as accurately as possible the channeling intervention as it was implemented in the demonstration. Thus, it was designed to draw some very specific comparisons between what actually happened and what would have happened in the absence of channeling. Furthermore, these comparisons were specific about the individuals and alternatives being compared. The persons included in the evaluation were those individuals who lived in one of the ten demonstration sites, volunteered to participate in the program, and were judged by the projects to be appropriate. The alternatives being compared reflect the operation of the demonstration projects and the service environments of the demonstration sites.

The specific nature of these comparisons has important implications for interpreting the evaluation findings. Two particularly important implications arise from the way channeling was fielded. First, not all persons who were offered channeling services actually received those services: some found alternative services, others died or moved out of the area, and others were determined to be ineligible at the in-person baseline assessment. Second, because channeling-type agencies already existed in some sites, as did agencies that provided some services similar to the core channeling services, some clients would have received case management services even in the absence of channeling.

Thus, the experimental design underlying the evaluation can be used only to estimate whether channeling generated impacts relative to the existing long term care system that was previously used by those who applied to and were determined to be eligible for channeling. It does not enable us to assess whether channeling generated impacts relative to a no-case-management or a no-formal-community-service-use scenario. Nor does it address the impacts on the long term care system as a whole or what the potential impacts would be on different groups (i.e., groups that include those who did not apply to or were ineligible for this particular demonstration). Finally, because it addresses the impacts associated only with the 10 judgmentally selected projects, the results cannot be extended directly to other sites or assumed to equal the results that might be produced by different organizations.

Despite these limitations, the results of the evaluation provide an accurate assessment of a large, multi-site community-based care program. These results--when combined with those from the channeling process analysis (Carcagno et al., 1986), the studies on channeling case management (Schneider et al., 1985), and the preceding long term care demonstrations (see Chapter V)--provide a sound basis for assessing the effectiveness of channeling as a vehicle for reducing long term care expenditures and improving the well-being of elderly persons.

2. *The Experimental Design, Data Collection Effort, and Analytical Methods*

The technique for drawing an accurate comparison between what actually happened in the demonstration and what would have happened in the absence of channeling is based on the random assignment of eligible applicants to either a treatment or a control group. Treatment group members were given the opportunity to receive channeling services; control group members were precluded from enrolling in channeling but were free to obtain any other services (including case management) that were available in their community. Random assignment should ensure that treatment and control group members are identical in terms of measured characteristics (such as basic demographic characteristics, prior service use, current ADL impairments, and income) and unmeasured characteristics (such as attitudes toward community care and the propensity to become ill). The two groups should also be identical in terms of influences that change over time, including those due to general trends (such as improvements in training techniques and technologies in the health care industry) and those due to program changes (such as changes in reimbursement policies under Medicare and Medicaid). This underlying similarity along all measured and unmeasured dimensions--except the opportunity to receive channeling services--enables us to use the experience of the control group to measure what would have happened to the treatment group in the absence of the demonstration. Thus, the differences between the treatment and control groups measure the impact of channeling.

The experimental design was implemented as follows. To enter the project, individuals who were referred to or who applied to channeling were screened to determine whether they were eligible and interested in participating. If so, they were assigned randomly to either a treatment or a control group. After random assignment (on average, about a week later), both treatment and control groups received a baseline assessment. Channeling program staff administered this assessment to the treatment group, for which it served the dual function of an initial needs assessment for case management and the source of baseline information for the research effort; research staff administered the same assessment instrument to the control group.

It should be noted that we use the term "client" throughout this report to refer to all individuals who were determined eligible and were offered the opportunity to receive channeling services. Most, but not all, of such persons actually received some channeling services (see Carcagno et al., 1986, Tables V.3 and VIII.8). This focus is consistent with the impact analyses, which compared all treatment group members, regardless of their participation, with all control group members.

Both groups were followed up with interviews administered by research staff at 6 and 12 months after random assignment. The half of the sample who enrolled earlier were interviewed again at 18 months after random assignment. These interviews collected measures of formal and informal service use and well-being. In addition, records data--which were collected from the channeling projects, Medicare and Medicaid records, provider billing records, and official death records--were used to obtain complete service use and cost data, as well as information on mortality. The interviews also identified the primary informal caregivers for a subsample of both treatment and control groups; these caregivers received a baseline interview and two followup interviews at 6 and 12 months.

We used multiple regression techniques to analyze the data on treatment and control group members.⁸ Essentially, this analytical technique compares the mean outcomes for both groups, controlling for the effects of individual characteristics and other a priori factors that can be expected to affect the outcomes. Furthermore, regression analysis enables us to correct (at least partially) for any biases that could be due to the different rates of attrition that were exhibited by the treatment and control groups.⁹

The impact analyses used the regression analysis to test whether channeling had an effect on service use, costs, and the quality of life. In doing so, the analyses relied on standard rules of statistical inference to assess whether the estimated differences were likely to indicate real impacts--that is, whether a relatively high probability existed that the estimated treatment-control differences were the effects of the channeling intervention, rather than due to chance. In the impact analysis, an estimate was considered significant if it was found to be statistically different from zero at a 95 percent level of confidence.

In the benefit-cost analysis, we are concerned primarily with the relative magnitudes of the various impacts and their relative sizes compared with the costs of producing them. Thus, we are interested in the best estimates of the true effects, not just the extent to which an estimated effect is likely to differ from zero. The estimates derived from the regression analysis described above provide such estimates, and we use these estimates regardless of whether they are statistically significant.

While our comparison of the impacts includes estimated differences even when they are not statistically significant, we are still very much concerned with statistical precision. For the benefit-cost analysis, it is essential to know the range of likely values

⁸ Brown (1986) discusses the methods used to make the impact estimates. In addition, the various impact analysis technical reports discuss any specific problems or procedures used to make these estimates. We refer to these technical reports in Chapter III, in which we discuss the specific impact estimates used in the benefit-cost analysis.

⁹ The estimates could be biased if differential and nonrandom attrition from the treatment and control groups occurred, or if systematic differences existed in the quality of data across groups. In the Brown et al. (1986) analysis of these issues, they generally found little evidence of biases of this sort, and their analysis corrected for those that were found.

(i.e., the statistical confidence interval) for an estimate rather than simply whether this range includes zero as a possible value. For example, Wooldridge and Schore (1986) estimated that treatment group members in the basic case management model of channeling spent an average of \$165 less on nursing home use than Aid control group members during the first six months following their enrollment. This estimate is statistically significant, and, consequently, the probability is less than 5 percent that the true effect is zero and the estimated effect is due to chance. Nevertheless, considerable uncertainty still surrounds this estimate. The 95 percent confidence interval, which is centered at \$165, ranges from \$15 to \$315. While the midpoint of this range is the most likely value and is the single best estimate of the impact, a reasonable probability still exists that the true impact differs by as much as \$150, an amount that could have implications for a comparative analysis of benefits and costs. This concern over the precision of the impact estimates is important regardless of statistical significance.¹⁰

3. Sample Size for the Evaluation

Another determinant of precision is the size of the sample used to make the estimates. In general, larger sample sizes yield more precise estimates. The large sample available for the evaluation, over 5,600 individuals, enables us to draw relatively precise impact estimates. The exact size of the available sample and the resulting precision varied according to the outcome under examination, because of missing data for some individuals and because of the differential coverage of the various data sources. Table II.1 presents the maximum total sample available (including treatment and control group members) for estimating the impacts of channeling on the major outcomes examined in the evaluation.

The available sample size is largest for the impacts estimated from records data --that is, impacts on hospital use, other medical service use, and mortality. These records data were comprehensive and generally not subject to attrition problems. The impacts estimated on the basis of interview data represented smaller samples. In particular, the interview sample available at 18 months is generally only half the size of the sample available in earlier periods, because only those sample members who enrolled in the first half of the demonstration were scheduled to be interviewed 18 months after enrollment. Thus, estimates for the period from 13 to 18 months after randomization are less precise than those for earlier periods.

The sample size figures presented in Table II.1 generally reflect the samples that were used to estimate costs, but there are several exceptions. In particular, some cost estimates relied on data collected in searches of provider records for a randomly selected 20 percent subsample. For most analyses, this smaller sample size did not create problems because interview or other records data were used in conjunction with the provider records data to obtain accurate estimates. Problems arose when such

¹⁰ As another example, consider the estimated impact on average nursing home expenditures over the first six months under the financial control model. The impact estimate was a reduction of \$8, with a 95 percent confidence interval of plus or minus \$143. Thus, even though this estimate is not statistically significant, a fairly large range of estimates are still plausible. The single best estimate remains, of course, the point estimate of \$8.

corroborating data were unavailable. In addition, a few cases exhibited high expenditure levels, due to large private expenditures for formal community services; such cases may be disproportionately represented in the small provider records sample, creating potentially misleading estimates. We will discuss these cases in Chapter III, in which we present the individual impact estimates.

TABLE II.1: Maximum Sample Sizes and Data Sources for Major Outcome Areas							
Outcome Area/Report	Data Sources	Maximum Sample Sizes					
		Basic Case Management			Financial Control		
		6 Months	12 Months	18 Months	6 Months	12 Months	18 Months
Formal Community Care ^a (Corson et al., 1986)	Individual Interviews Medicare/Medicaid Records Provider Records Channeling Project Cost Records	2441	2471	1194	2597	2614	1196
Nursing Home Use (Wooldridge and Schore, 1986)	Individual Interviews Medicare/Medicaid Records Provider Records	2184	2294	1119	2409	2458	1129
Hospitals and Other Medical Services (Wooldridge and Schore, 1986)	Medicare/Medicaid Records Provider Records	2712	2712	1415	2842	2842	1372
Client Quality of Life (Applebaum and Harrigan, 1986)	Individual Interviews	2015	1753	685	2162	1870	720
Mortality (Wooldridge and Schore, 1986)	Death Records Searches	3124	3124	1619	3202	3202	1546
Caregiver Quality of Life (Christianson, 1986)	Caregiver Interviews	728	661	-- ^b	903	822	-- ^b
Informal Care (Christianson, 1986)	Individual Interviews	2441	2471	1194	2597	2614	1196
	Caregiver Interviews	728	661	-- ^b	903	822	-- ^b
<p>NOTE: The data sources are described fully in the individual technical reports cited in the table. In addition, we discuss these data sources in the relevant sections of Chapter III.</p> <p>a. As discussed in Chapter III, some key elements of the analysis of formal community care were based only on the small provider records sample. This leads to much greater uncertainty for those outcomes than indicated by the sample sizes shown here.</p> <p>b. Informal Caregiver Survey was not repeated at 18 months.</p>							

B. ACCOUNTING FRAMEWORK

In most cases, a benefit-cost analysis can focus on the extent to which a program increases the goods and services available to society (i.e., social resources)--an approach similar to the approach underlying the estimation of gross national product (GNP). This approach assumes that benefits and costs that reflect measured changes in the value of social resources capture all the important impacts of the program under study. For channeling, this assumption is inadequate because the desired impacts on the quality of life are not captured by measures of the net change in resource use.

We address this problem by using an approach that divides the analysis into two parts. The first focuses on the net resource cost of channeling--that is, the measured change in social resources due to the intervention. The second part examines the impacts on the quality of the lives of clients and their caregivers. The final conclusions

combine these two parts and rest on judgments about whether the impacts on life quality, which are not valued in dollars, are sufficiently large to justify the net cost of producing them.

Of course, assessments of whether channeling produces benefits that exceed its costs will depend on the perspective adopted. Clients can be expected to find channeling desirable as long as any increases in their well-being are worth more than any additional costs they incur as a result of channeling. Medicaid, which pays for much of the nursing home care that clients might use, would view the program as a success if it reduced total Medicaid expenditures. Similarly, Medicare and other government programs would find channeling appealing if it reduced their costs. A government-wide perspective would examine whether gains to one agency were offset by costs to another; it would judge success on the basis of the overall net cost to the government. Finally, a broader social perspective would seek to balance the interests of all groups by assessing whether the gains to whomever they accrued outweighed any costs to other groups in society.¹¹

To keep the various benefit-cost comparisons straight, we use an accounting framework that incorporates all the major impacts of channeling (measured and unmeasured) and the various perspectives. This framework imposes a logical rigor on the analysis and serves as the basis for interpreting the findings. The framework seeks to include all the important impacts, even if they are not measured in the analysis. In this way, those items that are excluded can easily be identified, and judgments can be made about whether the overall conclusions would be altered if those items had been included.

This framework is laid out in Table II.2 and Table II.3, which also present, for each channeling model, the estimated control group means for the 18 months following random assignment.¹² These means reflect the expenditures associated with all control group members, including those who died prior to the end of the 18-month observation period. They indicate the expected value of the expenditures that the average client would have made during this period in the absence of channeling.¹³ To correct for the effects of inflation, we have expressed all values in 1984 dollars (see Appendix D for our rationale and the relevant procedures).

¹¹ A social judgment might want to weigh the benefits and costs to some groups differently from those for other groups. Several approaches have been proposed for doing so, based either on the budget decisions of legislatures or on public opinion pools (see Gramlich, 1981, and Weisbrod, 1978). Our study does not attempt to place different weights on the various constituencies involved in channeling. Nevertheless, we do provide estimates of the benefits and costs to these groups so that weights can be applied if desired.

¹² For purposes of converting the streams of expenditures into their equivalent value at the time of random assignment, we have discounted all dollar values using a 5 percent real annual rate of interest (i.e., a rate that is net of inflation). The effect of this discounting is small over the 18-month period. This process is described in detail in Appendix D.

¹³ Again, as noted earlier, we use the term “client” to include all eligible persons who were offered channeling services, regardless of the extent to which they actually participated.

TABLE II.2: Estimated Living, Medical, and Long Term Care Costs Per Person During Months 1-18, Control Group Means: Basic Case Management Model (1984 dollars)							
Cost Component	Government Budget					Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a	Total Government		
A. OBSERVED COSTS							
Channeling Case Management Services	0	0	0	0	0	0	0
Formal Community-Based Services	1,483	398	0	664	2,545	535	3,079
Community Room and Board	0	0	0	179	179	3,950	4,129
Alternative Case Management ^c	0	0	0	192	192	0	192
Nursing Home	224	1,127	0	11	1,362	1,073	2,434
Hospital	5,911	316	0	0	6,226	389	6,615
Other Covered Medical Services ^d	1,488	217	0	0	1,706	297	2,003
Social Security ^e	0	0	0	5,722	5,722	-5,722	0
SSI and Food Stamps	0	0	0	576	576	-576	0
Cost for the Observation Period	9,106	2,057	0	7,343	18,506	-53	18,453
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. QUALITY OF LIFE DURING THE OBSERVATION PERIOD^g							
Clients							
At baseline, clients had an average age of 79 years, and 56 percent had very severe or extremely ADL impairments. 43 percent of the clients reported more than 3 unmet needs at baseline, and 13 percent were dissatisfied with their service arrangements. The average monthly income at baseline was \$538, and 60 percent reported being "pretty or completely satisfied" with life. After 18 months, 12 percent were in the nursing home and 39 percent had died							
Informal caregivers							
83 percent of the clients had an informal caregiver at baseline, with the average person having 1.8 caregivers. Clients received an average of 4.2 visits per week from caregivers who lived outside their home, and these visiting caregivers spent an average of 11.2 hours per week providing care. For primary caregivers, 34 percent were "not too" satisfied with the formal service arrangements or had no such service arrangements. The primary caregivers typically provided 4.5 hours of care and 1.9 hours of socializing on days they provided care. 67 percent of the primary caregivers were "pretty or completely satisfied" with life.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<p>a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small.</p> <p>b. This perspective also includes clients' private insurance and friends.</p> <p>c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services.</p> <p>d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare and Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid.</p> <p>e. Includes payments from Veterans pension programs as well.</p> <p>f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers.</p> <p>g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986).</p>							

TABLE II.3: Estimated Living, Medical, and Long Term Care Costs Per Person During Months 1-18, Control Group Means: Financial Control Model (1984 dollars)							
Cost Component	Government Budget					Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a	Total Government		
A. OBSERVED COSTS							
Channeling Case Management Services	0	0	0	0	0	0	0
Formal Community-Based Services	2,466	402	0	401	3,269	250	3,519
Community Room and Board	0	0	0	271	271	4,107	4,378
Alternative Case Management ^c	0	0	0	240	240	0	240
Nursing Home	224	1,073	0	22	1,319	1,102	2,422
Hospital	8,246	515	0	0	8,760	558	9,318
Other Covered Medical Services ^d	2,244	215	0	0	2,459	413	2,872
Social Security ^e	0	0	0	6,086	6,086	-6,086	0
SSI and Food Stamps	0	0	0	588	588	-588	0
Cost for the Observation Period	13,180	2,204	0	7,608	22,992	-243	22,749
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. QUALITY OF LIFE DURING THE OBSERVATION PERIOD^g							
Clients							
At baseline, clients had an average age of 80 years, and 60 percent had very severe or extremely severe ADL impairments. 53 percent of the clients reported more than 3 unmet needs at baseline, and 11 percent were dissatisfied with their service arrangements. The average monthly income at baseline was \$547, and 52 percent reported being "pretty or completely satisfied" with life. After 18 months, 13 percent were in a nursing home and 33 percent had died.							
Informal caregivers							
78 percent of the clients had an informal caregiver at baseline, with the average person having 1.7 caregivers. Clients received an average of 3.8 visits per week from caregivers who lived outside their home, and these visiting caregivers spent an average of 10.5 hours per week providing care. For primary caregivers, 35 percent were "not too" satisfied with the formal service arrangements or had no such service arrangements. The primary caregivers typically provided 4.5 hours of care and 2.1 hours of socializing on days they provided care. 59 percent of the primary caregivers were "pretty or completely satisfied" with life.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<p>a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small.</p> <p>b. This perspective also includes clients' private insurance and friends.</p> <p>c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services.</p> <p>d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare and Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid.</p> <p>e. Includes payments from Veterans pension programs as well.</p> <p>f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers.</p> <p>g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986).</p>							

The accounting framework includes seven perspectives. The first four--Medicare, Medicaid, channeling, and other public programs--are combined in the fifth perspective

to produce a total government perspective.¹⁴ The sixth perspective encompasses clients and their families. Here, again, we include all persons who were offered channeling services, regardless of whether they actually received those services (that is, the "client" group includes all treatment group members and their families). The seventh perspective aggregates all the other perspectives to yield a social perspective. We have defined these perspectives in a manner whereby the sum of the benefits and costs to various government and client perspectives will represent the net benefit or cost to society as a whole. Impacts that result in a benefit or cost to one group and an offsetting benefit or cost to another group will cancel each other out in this summation process, and will thus be excluded from the social perspective.¹⁵

In this framework, the channeling perspective is separated from the Medicare, Medicaid, and other public perspective in order to highlight the costs of providing channeling services. However, it should be mentioned that the financial control model projects received 94 percent of their funds from Medicare and Medicaid, and the basic projects received 15 percent of their funds from other public sources (see Thornton, Will, and Davies, 1986, Table III.5). Thus, shifts in the distribution of government costs must be interpreted carefully.

From the social perspective, our estimates indicate that, in the absence of channeling, clients would have used substantial resources over the 18-month period following enrollment. In the basic case management sites, we estimate that clients would have incurred costs worth over \$18,000 per person for medical and long term care services and for food and shelter while in the community.¹⁶ In the financial control sites, these expenditures would have been slightly higher, almost \$23,000 per person, during the 18 months after randomization. Most of these higher resources would have been paid for by the government; in particular, Medicare would have paid approximately 50 percent of the total.

The costs included in these totals are the major costs that were expected to be affected by channeling.¹⁷ They include expenditures for all major medical and long term

¹⁴ In defining these five groups, we have included the perspectives of all persons who are not clients (or their families and friends) with the "other public programs" perspective. Thus, impacts on the expenditures of private charities or individuals other than clients and their families will be included here with the impacts on the expenditures of government agencies other than Medicare, Medicaid, and channeling. For example, alternative case management services paid for by grants from private foundations are included here, even though they are not "government" costs. In private-pay patients in nursing homes subsidized Medicaid patients, these costs would also belong in this category (although we have not estimated such costs in our evaluation). This reflects, in part, our general inability to separate the impacts on these private organizations from those on other public programs. In general, these expenditures were small; we will highlight those instances in which there are substantial impacts on these private organizations and individuals.

¹⁵ As mentioned in an earlier footnote, we have weighted all groups in society equally in our benefit-cost analysis. Thus, a dollar of benefit or cost to one group is assumed to equal a dollar of benefit or cost to any other group.

¹⁶ We use the expression "costs worth ..." since these estimates, as well as all other dollar-denominated estimates, are expressed in 1984 dollars and have been discounted to the point of randomization. Appendix D discusses these adjustments, which, in fact, have a relatively small effect on the estimated values.

¹⁷ All the costs and outcome estimates included in Table II.2 and Table II.3 are discussed in Chapter III.

care goods and services, as well as community housing, food, and clothing. The first category that is listed contains the cost of channeling case management, which, of course, would have been zero in the absence of channeling. The second category includes the costs of formal community services (nursing, home health aides, delivered meals, etc.). The estimates indicate that clients would have received substantial community services even in the absence of channeling. We estimate that clients in the basic sites would have received formal community services worth over \$3,000 per person during the observation period, while clients in the financial control sites would have received about \$3,500 worth of these services.

Those persons who lived in the community would also have incurred costs for room and board, including costs for food and clothing and costs for housing and utilities. These costs would also have been substantial in the absence of channeling; we estimate that expenditures for these items would have been worth over \$4,100 during our 18-month observation period.

Some clients would also have received case management services in the absence of channeling. Many of these persons would have received these services along with other formal services provided by nurses, home health aides, hospital discharge planners, and other formal service providers. The case management costs for such providers are included in the relevant cost component (e.g., formal community services or hospital services). In other cases, individuals would have received case management services as a separate service. We have accounted for these costs of separate case management services in the fourth category of the framework. While some individuals may have received substantial assistance from this source, we estimate that the average cost per client would have constituted only a relatively small fraction of total costs in the absence of channeling. We estimate that these services were worth about \$190 per client in the basic sites, and about \$240 per client in the financial control sites.

The areas in which channeling was expected to generate savings were nursing home and hospital costs, the fifth and six categories. We estimate that expenditures for hospital use would have been very large in the absence of channeling: in the basic case management sites, average expenditures would have been over \$6,600 per client during the 18-month observation period; in the financial control sites, they would have been even larger, over \$9,300 per client during the period. For nursing homes, expenditures in the absence of channeling were not nearly so great, averaging about \$2,400 per client in both groups of sites.

Channeling was also expected to affect the use of other covered medical services, Social Security and Veterans benefits, and transfers from the Supplemental Security Income (SSI) and food stamp programs. Medical services covered by Medicare or Medicaid include doctors, drugs, supplies, and other medical services. These services were used substantially. We estimate that, in the absence of channeling, clients would have used approximately \$2,000 per person worth of these services in the

basic model sites and almost \$2,900 per person in the financial control sites.¹⁸ Benefits from Social Security were also substantial. We estimate that, in the absence of channeling, clients in both groups of sites would have received roughly \$6,000 worth of these benefits (including benefits from Veterans Administration programs) during the observation period. Participation in the SSI and food stamp programs would be much lower. In the absence of channeling, benefits from these programs would have averaged less than \$600 per person over the 18-month observation period. Combined, Social Security and transfers accounted for the bulk of the clients' income.

Unlike the other cost components included in Table II.2 and Table II.3, the treatment of Social Security and transfer payments depends on the analytical perspective adopted. These payments represent costs to the government and income to clients. To indicate this difference, we have included them as costs from the other government and total government perspectives and as benefits (negative costs) from the client perspective. Thus, this transfer of income does not appear in the social perspective, since it is a redistribution of income rather than a use of social resources.

The framework also includes two outcome areas that are unobserved. The first is unmeasured resource costs, primarily drug and medical expenditures not covered by Medicare or Medicaid and the costs incurred by volunteers who assisted sample members. We omitted these costs because satisfactory data or methods for estimating their value were not available. Their exclusion implies that our total cost estimates in Table II.2 and Table II.3 understate the actual costs incurred by the control group over the 18-month observation period. However, as we discuss in Chapter III, channeling probably had little effect on those costs, and, consequently, their omission is unlikely to affect the conclusions of the benefit-cost analysis, which examines the changes in the costs and benefits due to channeling.

The second unobserved outcome area in the accounting framework is the benefits and costs that occur after the observation period. Channeling was a long-term program whose purpose was to provide ongoing services to impaired elderly persons. Thus, costs and benefits can be expected to continue after the program. We can estimate these future outcomes only by extrapolating from trends observed in the 18 months of data that are available, a process that involves numerous assumptions and a relatively high level of uncertainty. We have not made a point estimate of these costs. Rather, in Chapter IV, we examine the impacts of the program that will determine these future costs and indicate their possible magnitude.

The accounting framework also includes the quality of the lives of clients and their informal caregivers. For clients, several measures of the quality of life are available: their satisfaction with services and environmental conditions, social/psychological well-being, and level of functioning. For informal caregivers, we have examined the limitations on their personal lives and employment imposed by their

¹⁸ As we discuss in Chapter III, these other covered medical services probably exclude approximately 40 percent of all expenditures for all other medical services (covered and uncovered). Thus, these types of services were actually used to a greater extent than is indicated by the estimates of covered medical services presented herein.

caregiving responsibilities, as well as their satisfaction with life and with service arrangements, and the strains they experience due to caregiving. These intangible outcomes are discussed in Chapter III.

Channeling was expected to alter all the outcomes listed in the framework. It was expected to enhance the well-being of clients and caregivers while also increasing the average net expenditures for the first three components: channeling case management, formal community services, and community room and board. It was expected to reap its major cost savings by reducing the use of nursing homes, although it was also expected to lead to a net reduction in the time spent in hospitals, particularly for individuals who were in the hospital waiting for the arrangement of appropriate community services. Finally, some small savings were expected from reductions in the use of alternative case management.

Table II.4 and Table II.5 present the estimated impacts of the basic case management and financial control models of channeling on each outcome area. Both models generated an estimated net increase in the well-being of clients and their informal caregivers. The net cost of producing these well-being outcomes was just over \$1,300 per client under the basic model—an increase of approximately 7 percent in total expenditures. The net cost under the financial control model was higher, almost \$3,400 per client (a 15 percent increase in total costs), due primarily to the greater increase in formal community services delivered in those sites.

Again, it is important to remember that we have used the term "client" to refer to all persons who were offered channeling services, and that some of these persons did not actually receive channeling services (Carcagno et al., 1986, Table VII.8). For example, 11 percent of the persons who were enrolled in the treatment groups at the basic case management sites and 7 percent of those in the financial control sites did not complete their baseline assessment (primarily because of refusals to participate and deaths). Consequently, the costs per participant would have been higher than our estimated costs per client who was offered channeling services. Our per-client estimates indicate the expected net change in costs that are due to offering channeling services to the persons who were enrolled in the demonstration.

We discuss these benefit-cost estimates and their various components in the remaining three chapters. Throughout our discussion, the estimates presented in Table II.4 and Table II.5 provide a frame of reference for interpreting the relative magnitudes and uncertainties of the specific impact estimates. In particular, the estimated costs of the channeling case management (approximately \$1,200 per client over the 18-month observation period) are, used as a base from which the estimated cost savings that this case management approach tried to generate can be judged. Moreover, the net cost estimates (approximately \$1,300 per client in the basic model and \$3,400 in the financial control model) can be used to judge the degree to which changes in specific impact estimates might alter the overall conclusions of the benefit-cost analysis. Chapter III uses this framework to assess the individual impact estimates. Chapter IV considers the potential magnitude of the net costs that might arise beyond the 18-month

observation period and how they might influence conclusions based only on the 18 months of observation. Finally, we bring all the elements together in Chapter V, to provide an interpretation of the benefit-cost estimates.

TABLE II.4: Estimated Net Costs and Benefits Per Client of Channeling During Months 1-18, by Analytical Perspective: Basic Case Management Model (1984 dollars)							
Cost Component	Government Budget					Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a	Total Government		
A. OBSERVED COSTS							
Channeling Case Management Services	0	0	1,170	0	1,170	0	1,170
Formal Community-Based Services	225	-37	298	-45	441	-266	175
Community Room and Board	0	0	0	33	33	83	116
Alternative Case Management ^c	0	0	0	-192	-192	0	-192
Nursing Home	-40	16	0	-3	-27	-258	-284
Hospital	252	-76	0	0	177	20	197
Other Covered Medical Services ^d	137	-32	0	0	106	41	147
Social Security ^e	0	0	0	55	55	-55	0
SSI and Food Stamps	0	0	0	-10	-10	10	0
Net Cost for the Observation Period	574	-128	1,468	-162	1,752	-424	1,328
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Net Cost After the Observation Period	---	---	---	---	---	---	---
C. OBSERVED LIFE-QUALITY OUTCOMES^g							
<p><u>Clients</u> Mortality was unaffected by channeling. For survivors, channeling had a small (between 2 and 10 percent) impact on the percent of clients who were “pretty or completely satisfied” with life. The average number of reported unmet needs was generally lower among clients (by as much as 20 percent), and the number of persons with more than 3 unmet needs was between 22 and 34 percent lower among clients. Satisfaction with service arrangements was generally higher among clients, by as much as 48 percent. There were essentially no impacts on ADL functioning level. Average income was also unaffected.</p>							
<p><u>Caregivers</u> There was no evidence of substitution of formal for informal care. There was no apparent impact on the amount of informal financial assistance. The life quality of primary caregivers increased according to some measures: overall life satisfaction rose, caregiver satisfaction with service arrangements increased, and caregiver worry about obtaining help was reduced somewhat. There were no evident impacts on reports of perceived caregiver financial, emotional, or physical strain.</p>							
<p>NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.</p>							
<p>a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare and Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986).</p>							

TABLE II.5: Estimated Net Costs and Benefits Per Client of Channeling During Months 1-18, by Analytical Perspective: Financial Control Model (1984 dollars)							
Cost Component	Government Budget					Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a	Total Government		
A. OBSERVED COSTS							
Channeling Case Management Services	0	0	1,182	0	1,182	0	1,182
Formal Community-Based Services	-1,109	-219	4,307	-287	2,692	-191	2,502
Community Room and Board	0	0	0	54	54	-44	10
Alternative Case Management ^c	0	0	0	-240	-240	0	-240
Nursing Home	16	-5	0	-3	8	-130	-122
Hospital	18	-28	0	0	-10	42	32
Other Covered Medical Services ^d	1	13	0	0	14	-13	1
Social Security ^e	0	0	0	76	76	-76	0
SSI and Food Stamps	0	0	0	5	5	-5	0
Cost for the Observation Period	-1,074	-239	5,489	-396	3,780	-418	3,363
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Net Cost After the Observation Period	---	---	---	---	---	---	---
C. OBSERVED LIFE-QUALITY OUTCOMES^g							
<u>Clients</u>							
Mortality was unaffected by channeling. For survivors, channeling had a small (between 5 and 11 percent) impact on the percent of clients who were "pretty or completely satisfied" with life. The average number of reported unmet needs was significantly lower among clients, and the number of persons with more than 3 unmet needs was between 12 and 47 percent lower among clients. Satisfaction with service arrangements was generally higher among clients, by as much as 35 percent. ADL functioning was reported to be poorer by treatments (relative to controls); it is unclear whether this represents an effect of channeling or a measurement artifact. Average income was unaffected.							
<u>Caregivers</u>							
There was no evidence that primary caregivers tended to substitute formal for informal care. There was, however, a modest reduction in caregiving among visiting caregivers and friends and neighbors who provided informal care. There was no apparent impact of the amount of informal financial assistance. The life quality of primary caregivers increased according to some measures: overall life satisfaction rose, caregiver satisfaction with service arrangements increased, and caregiver worry about obtaining help was reduced somewhat. There were no evident impacts on reports of perceived caregiver financial, emotional, or physical strain.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare and Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

III. OBSERVED OUTCOMES

In this chapter we consider the expectations regarding channeling's impact on the 11 outcomes presented in Table II.2, Table II.3, Table II.4 and Table II.5, as well as the data used to make the estimates and the relative magnitudes of the estimates. We also discuss the values placed on the outcomes and the relative certainty we feel can be placed in those values.

In reviewing these outcome areas, we emphasize the total discounted values of costs for the 18 months after randomization. These discounted values are obtained by converting the streams of observed costs into their equivalent value at the time of enrollment.¹⁹ Focusing on these totals rather than on the various sets of impacts over time makes it easier to judge the relative magnitudes of the different impacts. We will discuss those trends that did appear in the data when they have important implications for the benefit-cost analysis. The technical reports cited in the text contain complete discussions of the trends observed in the data, and we have reproduced the undiscounted estimates for each six-month period (along with the associated t-statistics for the impact estimates) in Appendix E.

We have postponed until Chapter V our discussion of the distribution of costs across the various perspectives (Medicare, Medicaid, channeling, other public, clients, and society as a whole). That discussion will draw on our assessments in this chapter of the impacts in all eleven outcome areas. Changes in the distribution of costs across these perspectives are important for judging the effectiveness of the intervention and for assessing the incentives that various groups and government agencies might have to participate in channeling. In particular, we are interested in assessing the extent to which channeling affected the distribution of costs between the government and the clients.

Our examination of the eleven outcome areas begins with a brief analysis of the statistical uncertainty in the benefit-cost analysis. This uncertainty is inherent in the estimation of program impacts. It is determined by the properties of the population under study and the methods used to estimate the impacts. Uncertainty also stems from the procedures used to value the diverse outcomes and to aggregate the resulting values. It reflects both the difficulty in assigning dollar values to the outcomes of social programs and the inherent limitation of the data sets used. We discuss this valuation uncertainty along with the various net cost components.

¹⁹ The concept and method of discounting are discussed in Appendix D. We have used a 5 percent real annual discount rate in our calculations, a rate that is generally consistent with current long-term interest rates and with accepted practice in benefit-cost analysis. Because our observation period is only 18 months, discounting does not greatly affect the value of costs. For example, a cost of \$100 in each six-month period would have a discounted value of \$289 (using a 5 percent real annual discount rate) compared with an undiscounted total of \$300.

A. STATISTICAL UNCERTAINTY IN BENEFIT-COST ANALYSIS

In general, the precision of impact estimates is determined by the interaction of three factors: estimation techniques, sample size, and population variance. Given an estimating procedure, the estimates are more accurate the larger the sample of persons used in the analysis is and the less variation the population has in the behavior and characteristics of interest. The properties and statistical power of the estimating procedures themselves also contribute to the accuracy of the impact estimates.

As Brown (1986) discusses, the plan adopted in the evaluation produced unbiased estimates of modelwide impacts. The sample was large; data are available for up to 6,300 individuals depending on the specific outcome analyzed. It also was relatively homogeneous (when compared with the general population) with respect to health status and other factors determining service use and institutionalization. Furthermore, a variety of methodological studies that examined potential problems due to attrition, the use of proxy respondents for some sample members, and regression specification suggest that the impact estimates are valid and robust.

There is still uncertainty in all the estimates. As noted in Chapter II, the 95 percent confidence intervals surrounding some impact estimates were wide enough that they include values that are proportionally very different from the impact estimate. The benefit-cost analysis deals with this uncertainty by assessing the extent to which its overall conclusions would be altered by using alternative estimates in the confidence interval around the specific impact estimate. In most cases, we found that, even when these alternative estimates were proportionally much larger than the impact estimates, the impact estimates were relatively small so that the absolute value of the implied change was not great. Furthermore, as seen in Chapter II, the costs involved were substantial (channeling case management alone cost approximately \$1,200 per client), and small changes in the absolute value of estimated savings or costs will not affect the overall benefit-cost conclusions.

B. CHANNELING CASE MANAGEMENT COSTS

Channeling case management, the first outcome area listed in the accounting framework, includes the seven core functions described in Chapter I. For purposes of analyzing costs we have grouped these functions into those one-time-only functions associated with enrolling clients (outreach, screening, initial needs assessment, and initial care plan development) and the ongoing functions of service arrangement, ongoing monitoring, and assessment.²⁰ These functions are described in Carcagno et al. (1986), and their costs were estimated by Thornton, Will, and Davies (1986).

²⁰ The costs of initial service arrangement are included with all other service arrangement costs. Our data did not enable us to separate this part of the initial services.

In estimating the costs of these functions we have included the direct case management costs along with the projects' administrative costs (which included costs for clerical services and ongoing relations with service providers as well as those for managing the projects). In the financial control projects, administrative costs also included most of the costs of operating the financial control data system that enabled projects to monitor costs and ensure that the expenditure caps were not exceeded. These project administration costs varied across models and projects. The basic projects spent from 37 to 47 percent of their salary expenditures on administration; the financial control model projects spent 49 to 62 percent on these functions.

For the benefit-cost analysis we used estimates of the channeling case management costs for the demonstration's steady-state phase, the period of relatively stable operations that occurred after the demonstration projects had attained their full sample size.²¹ This phase was chosen because it was the period during which demonstration activities most closely resembled those of an ongoing program. The steady-state phase emphasized delivering services to a constant caseload rather than building caseloads, which was the focus of earlier phases. As a result, outreach and enrollment activities were much more modest during the steady-state phase. Projects were able to replace clients who had died or left channeling by recruiting from waiting lists. They no longer needed the extensive outreach efforts that characterized early operations when it was important to increase project size and to recruit and screen persons who were assigned to the control group. Furthermore, project-level research activities were minimal during this phase, accounting for less than 1 percent of total project-level case management costs.

During the steady-state phase, the basic case management model projects spent an average of \$330 per client enrolled on the initial functions.²² Once a person had signed his or her care plan (or had begun to receive services if that was earlier), these projects spent an average of \$92 per casemonth to provide ongoing services. The financial control projects spent an average of \$346 per client enrolled, with ongoing costs averaging \$86 per ongoing casemonth. Costs per client for the earlier phases were substantially higher, reflecting the smaller size of the projects, the extra costs associated with program startup, and the higher research costs due to efforts to find and screen persons assigned to the control group.

We estimated the average channeling case management cost per client over the observation period by multiplying the ongoing cost estimates by the average number of ongoing casemonths per client during that period, and then adding in the average initial

²¹ The steady-state phase was defined as the nine months from October 1983 to June 1984. The demonstration projects had all been in operation for at least fifteen months by this time.

²² As discussed earlier, we have defined clients to include all persons offered channeling services, regardless of whether they actually received such services. In calculating initial costs per client, we have included all outreach, recruitment, and screening costs, as well as all assessment and care planning costs. Thus, the initial cost per client figures include the costs of pre-enrollment activities for persons who were subsequently determined ineligible, as well as the initial costs incurred for persons who subsequently dropped out of channeling. Thornton, Will, and Davies (1986) provide further information about the estimation of these costs.

cost per client. We also added in the costs of central administration. As part of the demonstration, the states and federal government both monitored the projects. Since an ongoing program would probably not involve the extensive monitoring done in the demonstration, the costs incurred by the states and federal government probably exceed those that would be observed for an ongoing program. For this reason we did not use observed central administration costs, but rather used an estimate of 5 percent of project-level costs. This somewhat arbitrary assumption was used because it reflects a level of resources consistent with the central monitoring efforts observed for similar programs.²³

The resulting values, which are presented in Table II.4 and Table II.5, indicate that channeling spent approximately \$1,200 per client for case management services during the 18 months following randomization. There is little variation across models, since the average costs are quite similar, and there was little difference in the average length of participation.²⁴

These estimates of average costs per client are quite accurate for the demonstration projects as fielded. The cost estimates are based on data from project accounting systems and are generally consistent with the process observations.²⁵ Furthermore, the cost estimates are consistent with those observed for other community care demonstrations.²⁶ Of course, since all these estimates are based on the actual costs of the demonstration projects, they may still misrepresent the costs of an ongoing program. The observed costs may be too high because the demonstration imposed special costs on the projects and because the projects had not yet resolved all of the start-up problems even by the steady-state phase. Also, the demonstration projects may have had higher administrative costs per client because of their relatively small scale. Alternatively, observed costs may also understate the costs of an ongoing program to the extent the projects benefited from the special attention and enthusiasm given the demonstration.

²³ During the steady-state phase, state-level costs were 4 percent of total project-level costs (including direct service expenditures) in the financial control model projects. In the basic model projects, where direct service expenditures by projects were much smaller, the state-level costs were 13 percent of total project-level expenditures. These state costs reflect their long term care planning and research activities, in addition to their project monitoring. Estimates of federal-level monitoring costs were unavailable. For comparison, the state and federal administration costs for the Medicaid program are approximately 6 percent of total Medicaid vendor payments.

²⁴ Participation in the two models is discussed in Chapter VIII of Carcagno et al. (1986). We have presented the estimated average number of ongoing casemonths for each model and each six-month time period in Appendix E. Recall that we have included all persons who were eligible for channeling services in the client group. Since not all clients actually received services, the costs per participant would be greater than the costs per client as defined here.

²⁵ The data for estimating costs came from monthly cost reports submitted to MPR by the demonstration projects. The projects also had their staff complete time sheets, which were used to allocate costs to initial and ongoing functions. These data sources, along with a comparison of channeling case management costs with similar costs for previous community care demonstration, are discussed by Thornton, Will, and Davies (1986).

²⁶ Thornton, Will, and Davies (1986, Chapter VI) compare the estimated channeling case management costs with those reported by Berkeley Planning Associates (1984) for five other demonstrations. Channeling was found to have case management costs approximately equal to the average cost of the five other demonstrations.

While the precise effects of these various factors are unknown, their implications for the benefit-cost analysis appear modest, particularly when viewed in the context of estimated net costs. For the basic model, aggregate net costs for the observation period were a little over \$1,300, of which channeling case management costs for that period were less than \$1,200. Thus, even relatively large changes in the average cost of channeling case management would not alter our basic conclusion that channeling increased aggregate costs. This situation also holds for the financial control model, where channeling case management costs were about the same as for the basic model, and the aggregate net cost was about \$3,400. We return to this issue in Chapter V, when we consider the overall conclusions and the potential for reducing net costs in future channeling-type programs.

C. FORMAL COMMUNITY SERVICES

The primary means by which channeling case management sought to rationalize the delivery of long term care services was through its impact on community services. Most of the central channeling mechanisms described in Chapter I--problem identification, information/advocacy, support, and service price reduction--worked to increase the use of community services, although the fifth channeling mechanism, financial control, worked to limit any increase in expenditures for formal community services. This increased use of community services was an essential part of the channeling intervention and was intended to substitute for the use of institutional services, particularly nursing homes, and enable clients to remain in the community.

These efforts were expected to increase the use of both formal and informal community services. Formal services are those provided by persons who are either employed privately or working through an agency or organization as part of their paid or volunteer work. Informal community services are those provided by spouses, children, friends, and neighbors on an unpaid basis. This section examines formal community services; informal services are examined in Section K.

The formal community services provided to clients included a broad range of long term care and medical assistance services. Many were in-home services such as nursing, therapy, home health aide services, homemaking, personal care, housekeeping, and companion and chore services. They also included services delivered outside the home: delivered or congregate meals, transportation, adult day care, and adult foster care. Finally, these services included such special and emergency assistance as emergency transportation, supplies and equipment, medical social services, respite care, and emergency lodging.

Corson et al. (1986) estimated that expenditures for these types of formal community services would have been substantial even in the absence of channeling. Table II.2 indicated that control group members in the basic case management sites used formal community services worth over \$2,800 per client during the 18 months covered by our data. In the financial control sites, control group members used \$3,500

worth of services per client (Table II.3). In-home services provided by visiting caregivers --housework, laundry or shopping, personal care, and meal preparation--were the most commonly used formal services.

Channeling increased the use of these community services. Data collected in the interviews showed that channeling led to an increased use of formal community services under both models and that the increases in use were much larger under the financial control model (Corson et al., 1986, Chapter III).

Data on expenditures followed the same general pattern as those on use but were influenced to a greater extent than were the use estimates by the existence of a few high-use individuals in the research sample. Interview data indicated a sprinkling of high-use persons in both treatment and control groups, for both models, and for all time periods. However, in the control group in the first six-month period in the basic sites there was a disproportionately high number of high-use cases, which was magnified in the 20 percent provider records subsample.

Obviously, there are at least some high-use individuals in the populations. Liu, Manton, and Liu (1985) found that such persons constitute a potentially important (though small) subgroup of the noninstitutionalized, impaired elderly population. If channeling could reduce the expenditures of this high-use group, it might be able to achieve at least some of the cost savings necessary to pay for the additional services provided to other clients.

The inclusion or exclusion of the high-use persons with respect to the provider records data makes a substantial difference to the observed distribution of expenditures, since their expenditures were enormous compared with those of the vast majority of sample members. The provider records data indicate, for example, that the few high-use individuals used as much as \$20,000 per client worth of formal community services in the six months following randomization. If they are excluded, the average formal community service expenditure per client would be less than 15 percent of that figure. In Appendix C we consider four alternative estimates of the net impact of channeling on formal community service expenditures. These estimates differ with respect to the data set used and whether we include the high-use individuals in our sample. These four estimated impacts over the 18-month observation period for the basic model range from an increase of \$555 per client to a reduction of \$784 per client.

Corson et al. (1986) made the judgment that the distribution of high-use individuals observed for the provider records sample (used to estimate provider and other public expenditures) in the first six months was unlikely, rendering inappropriate the conclusion that channeling was the operative mechanism leading to their absence in the treatment group. To be consistent, the high-use cases were excluded throughout the analysis of community services. They paid most of their services privately. With this exclusion, the basic model of channeling led to an increase of \$175 per client over the 18-month period. This estimate reflects the average experience of the vast majority of sample members.

In assessing the implications of this decision, it is essential to keep in mind that the uncertainty affects only the basic model during the first six months and pertains only to private expenditures for formal community services.

The presence of these few high-use individuals in the control group for the basic model creates an important uncertainty for the benefit-cost analysis.

The financial control model results are not subject to this uncertainty. This model clearly increased the use of and expenditures for formal community services. Corson et al. (1986) estimated that average expenditures for these services rose by approximately \$2,500 per client during our observation period. This is a 70 percent increase in expenditures for formal community services.

D. COMMUNITY ROOM AND BOARD

Channeling was expected to increase expenditures for community room and board by enabling clients to remain in the community. As can be seen in Table II.2 and Table II.3, the costs of room and board for clients in the community can be large: Corson et al. (1986) estimated that, in the absence of channeling, over \$4,000 per person would have been spent during the observation period for housing, food, clothing, utilities, and the other costs of living in the community.²⁷

Housing accounts for over half of these costs. The housing cost estimates include the costs for private residences, public housing, and the homes of friends, relatives, and others with whom the clients live rent-free. They also include the costs of residences such as supportive housing and personal care homes (and the services provided by these facilities). In all cases, Corson et al. attempted to estimate actual resource costs, not just expenditures. Thus, the estimates do not necessarily represent out-of-pocket expenditures for housing, but rather the amount of housing resources used by clients. These estimates were derived by multiplying estimates of use for each housing type (based on interview data) by the estimated cost of each type of housing (based on interviews, provider records, and published unit-cost information).²⁸

The bulk of the other costs of living in the community are for food, but they also include estimated expenditures for clothing, transportation, and a small amount of personal consumption. These costs are estimated from the lower budget estimates developed by the Bureau of Labor Statistics (1982) for an elderly couple living in an

²⁷ These costs are all estimated on a per-person basis. When more than one person was in the household, housing and other costs were divided proportionally across all household members.

²⁸ These procedures are described in Corson et al. (1986), Chapter V.

urban area.²⁹ For those persons who lived in supportive housing or personal care homes, we did not include an additional estimate of the costs of food.³⁰

The impact estimates presented in Table II.4 and Table II.5 indicate that channeling had almost no effect on expenditures for community room and board. This is not surprising since channeling did not have any noticeable effect on mortality or community residence, the two primary mechanisms that would have led to an increase in costs for community room and board. Thus, we conclude that these costs play almost no role in the assessment of the benefits and costs of channeling, despite their importance in total living, medical, and long term care costs for controls.

E. ALTERNATIVE CASE MANAGEMENT

Channeling was fielded in communities that already provided a range of long term care services, including case management. This is clear from the estimates of formal community service use by control group members. It is also evident in the data on the use of separate case management (Brown and Phillips, 1986). These data show that as many as 62 percent of the control group members in the basic sites and 74 percent of control group members in the financial control sites received some sort of case management service; much of it, however, related to the delivery of direct services and was much less comprehensive than channeling's.

Channeling substituted (at least partially) for these alternative sources of case management. Therefore, reductions in the use of such services are treated as benefits (offsets to costs) in the benefit-cost analysis. As noted in Chapter II, we are evaluating the net cost of offering channeling services in addition to those already available in the community.

The estimates of formal community services undoubtedly include some costs for case management. Much of the case management in the existing system is provided, and paid for, in conjunction with the delivery of direct services. Home health aides, nurses, and staff from other formal service providers offer a range of assessment and care planning services. In addition, hospital discharge planners provide case management assistance. The costs of such services are included in the costs of formal community and hospital care. Thus, our estimates of expenditures for formal community care and hospital expenditures capture (at least conceptually) all the costs of alternative case management except for those of agencies which provide case management as a separate service. Data used in the other parts of the analysis have excluded case

²⁹ The BLS budgets also include expenditures for housing and medical services. Because we estimated these components directly, we excluded these components of the BLS budget. To estimate per-person costs we divided the BLS budget for a couple in half.

³⁰ There may have been some double counting of food expenditures to the extent that sample members received meals as part of their use of formal community services. We feel that such errors are small, and are unlikely to influence the estimates of channeling impacts.

management costs when they were identified separately from the other service costs. We analyze all such separate case management costs in this section.

The control group members did not use a substantial amount of separately identifiable case management services. We estimate that in the basic case management sites, expenditures for such services were worth about \$200 per client over the 18-month observation period. Expenditures on such services in the financial control sites were somewhat more, approximately \$240 per client. These relatively low values primarily reflect the low rate of use of separate case management services. When such services were received, we estimate that they could have been substantial (see Appendix A).

These estimates are relatively uncertain. As described in Appendix A, our data on case management provided as a separate service indicate only whether a person received these services. Thus, we do not have data on the actual amount of case management services received. As a result, we had to estimate expenditures for these services by multiplying an estimate of the fraction of controls receiving case management as a separate service by an estimate of the average cost per recipient of such services.³¹ The estimates of use were obtained from provider records data; the cost estimates were based on several assumptions about the intensity and duration of the case management services.

There is some uncertainty in our estimates of use because they are based on the relatively small provider records sample. This data set contained only about 20 percent of the observations included in the sample of individuals who completed followup interviews, but it did accurately identify case management provided as a separate service. Interview data were available for a much larger sample, but they indicate only whether a sample member received services from at least one of a list of comprehensive case management agencies. Thus, the advantages of the larger sample are offset to some extent by the greater imprecision in the data. In any event, both the provider records and interview data indicate the same general level of use (Appendix A presents, for both data sets, estimates of the fraction of control group members receiving alternative case management services). Therefore, we feel that the uncertainty over the incidence of alternative case management is less important than that due to our lack of data on the intensity and duration of those services.

To assess the implications of our lack of data on service intensity and duration, we used several alternative methods for estimating the costs of this case management. At one extreme, we assumed that all separate case management was just as intensive

³¹ We were able to identify alternative case management agencies that provided comprehensive services and those that provided more limited services. We used separate estimates of use and cost for these two general types of agencies (see Appendix A) in deriving the cost estimate.

and continuous as the basic model of channeling.³² Given the comprehensive and intensive nature of channeling, this assumption is likely to yield an upper bound on the costs of alternative case management (provided as a separate service). At the other extreme, we assumed that the alternative case management was just a single care planning visit, with a cost of \$150 per person served. These two unit-cost estimates imply a range of estimated savings due to foregone alternative case management (as a separate service) of \$53 to \$284 per client in the basic model and \$68 to \$355 per client in the financial control model. In either of these cases, the change from our impact estimate is not large enough to alter our basic conclusion about the benefits and costs of channeling.

F. NURSING HOME USE

One of the key hypotheses underlying the demonstration was that channeling would reduce nursing home use and expenditures and, to a lesser degree, hospital use and expenditures by the appropriate substitution of community-based services. As Wooldridge and Schore (1986) point out, the primary impact was expected to be a reduction in the proportion of clients entering a nursing home as a permanent place of residence through the provision of community care services that would either eliminate the need for or delay nursing home entry. In addition, channeling was expected to reduce short-term convalescent stays in nursing homes (and hospitals) by arranging for community care that was less costly. Some increased nursing home use was expected to occur for individuals who would be more appropriately cared for in a nursing home than in a hospital or in the community. Overall, however, channeling was expected to reduce nursing home use and, hence, expenditures.

The nursing home analysis was restricted to settings in which medical care was provided--namely, intermediate care facilities (ICFs) and skilled nursing facilities (SNFs).³³ The data collection strategy for nursing home data was predicated on the assumption that Medicaid and private sources would be the primary payors (Medicare covers only skilled nursing stays).

Expenditures were estimated for each six-month period after randomization. In the first two periods Medicaid and Medicare records were used to estimate the expenditures for persons covered by Medicaid throughout the period. For other persons, expenditures were estimated using data collected from their nursing homes (through the

³² Specifically, we assumed that the cost would equal the initial cost of channeling (\$330 per client in the basic model) plus five months of ongoing case management (at \$92 per month in the basic model). These assumptions yield an estimate of \$790 for each six-month period in which a respondent said he or she received case management as a separate service.

³³ A very few stays in chronic care hospitals were included with nursing home stays. The effects of channeling on other types of supportive housing arrangements, such as boarding homes and community care homes, were examined above in the section on community housing.

provider records extract data collection effort) and from Medicare records.³⁴ In the third six-month period, only Medicaid and Medicare data were available; provider records data were not collected. As a result, there were only the limited cost data for Medicare (which cover only specific types of nursing home stays) available to estimate costs for persons not covered by Medicaid.

In order to ensure that we included all nursing home costs for the third six-month period week, we had to use an alternative, two-step estimation strategy (described fully in Appendix E). This alternative began by calculating, for the second six-month period, the ratio of nursing home expenditures (estimated from all data sources) to nursing home days reported in the interviews. This average expenditure per reported home day was then multiplied by the average number of nursing home reported in the interviews for the third six-month period. This alternative should produce a reasonably accurate estimate of nursing home expenditures per client in the third period, but is subject to greater uncertainty than the estimates for earlier periods that were based entirely on records data.

As Wooldridge and Schore (1986) report, although the demonstration intended to enroll a sample at high risk of institutionalization, the control group's institutionalization rate was only slightly higher than that of the general population of this age profile and frailty. Nevertheless, treatment group members did have lower average nursing home use and expenditures than control group members, although few of the estimated impacts were statistically significant. As was indicated in Table II.2 and Table II.3, over the 18-month observation period the control group's average total nursing home expenditures were worth roughly \$2,400 in both models. Wooldridge and Schore estimated that channeling led to average per-person savings over that 18-month period worth roughly \$280 in the basic case management model and \$120 in the financial control model (see Table II.4 and Table II.5)--savings that accounted only for about 10 to 23 percent of the costs of providing the channeling case management services. This result is counter to the expectation that reductions in nursing home expenditures would be the principal savings generated by channeling.

A number of sensitivity tests were performed in order to examine the robustness of these estimates. They included an examination of monthly impact estimates, alternative regression models, and different functional forms of the outcome variable. These tests yielded estimated impacts on expenditures that were similar to those presented here.³⁵ Thus, we are confident about the nursing home findings we have, presented.

³⁴ Note that this analysis measured expenditures, not costs. These expenditures do not include, for example, some Medicaid and Medicare administrative costs and may fail to capture possible cross-subsidization by private payors.

³⁵ See Wooldridge and Schore (1986) for a full discussion of these methodological issues.

G. HOSPITAL SERVICE USE

Channeling was also expected to reduce hospital use and, consequently, hospital expenditures. In addition to arranging for community-based convalescent care (or nursing home care) in lieu of similar care provided in hospitals, channeling was expected to reduce hospital use by improving both access to health-related services and monitoring of clients' health in order to identify health problems before they became more serious. Alternatively, this monitoring of clients' health could lead to increased hospital use, if serious health problems were more readily identified. In addition, a decrease in nursing home use, as hypothesized above, might lead to an increase in the use of hospitals for the treatment of ailments that would otherwise be handled routinely by nursing homes. On balance, however, channeling was expected to reduce hospital use.

Channeling enrolled a sample with levels of hospital use and expenditures that were remarkably higher than those of the general aging population, and indeed were consistent with samples of persons in their last year of life (Wooldridge and Schore, 1986). Over the 18 months following randomization, the average total hospital expenditures from all sources for control group members were worth approximately \$6,600 in the basic model and \$9,300 in the financial control model (see Table II.2 and Table II.3).³⁶

Under both the basic and financial control models, Wooldridge and Schore concluded that there was a very small (and not statistically significant) increase in average hospital expenditures for clients. This increase was estimated to be worth approximately \$200 per client (a 3 percent increase) under the basic case management model and \$30 per client (less than a 1 percent increase) under the financial control model. Given the overall level of expenditures observed for clients, changes of this magnitude are relatively unimportant.

H. OTHER COVERED MEDICAL SERVICES

Other covered medical services include the following services when covered by Medicare and Medicaid: services provided by physicians and other independent practitioners; outpatient, clinic, and HMO services; and laboratory, X-ray, pharmacy, and other miscellaneous services not received while in a hospital or nursing home. The hypotheses surrounding the impact of channeling on the consumption of these medical services are strongly tied to those presented above for hospital use. If channeling was instrumental in reducing hospital use, then we would expect an increase in the use of outpatient and other ambulatory services. In addition, if channeling case managers identified health problems early and encouraged preventative physician visits, we would

³⁶ Note that this analysis also measured expenditures, not costs. The dollar amounts presented do not include some administrative (e.g., claims file processing) costs. A few sample members were covered by the Diagnosis (DRG) system of billing based on diagnosis rather than on actual costs per patient. For these individuals, the expenditure data may not reflect true costs.

expect an increase in physician use. On the other hand, the amount of physician attention while in the hospital would decline if hospital admissions and days were reduced; thus, a reduction in physician use could result as an indirect effect of reduced hospital use. On balance, however, the expectation was that if channeling increased the percent of people in the community, the use of and expenditures for other medical services would also increase.

Control group means presented in Table II.2 and Table II.3 indicate that, in the absence of channeling, treatment group members in the basic and financial control models would have used, on average, approximately \$2,000 and \$2,900, respectively, worth of other medical services over the 18-month period following randomization.

Note that these dollar amounts understate the total costs for other medical services. Because Medicare and Medicaid claims records were the sole sources of data for this analysis, only services that were covered by these programs were included in the analysis. Thus, our expenditure estimates underrepresent personal and family expenditures for uncovered services and for services for which the physician did not accept assignment of benefits, billing the patient for the excess beyond the Medicare payment.

The exact magnitude of our underestimate is unknown. We did capture some private costs, since we included deductibles and copayments payable by clients who were not Medicaid covered. However, data from the National Health Care Expenditures Study suggest that total payments from sources other than Medicare and Medicaid may account for the majority of the physician and other medical service expenditures when such services are provided in an ambulatory setting. Berk and Schur (1985) found that in 1977 Medicare and Medicaid paid for only 32 percent of the expenditures for ambulatory nonphysician services incurred by persons age 65 and older who had such expenditures. Similarly, Wilensky and Bernstein (1983) found that the corresponding fraction for physician services was 42 percent. However, these rates probably overstate the amount of error for our sample, since a large part of physician expenditures for the channeling sample were probably for inpatient care where assignment rates are higher than for office visits (Burney and Schieber, 1985). Thus, we have probably captured between 40 and 60 percent of the total costs for all (covered and uncovered) other medical services.

This potential error means that our estimates of total control group expenditures (Table II.2 and Table II.3) are too low. The estimates of net cost, however, are probably not seriously affected, since Wooldridge and Schore concluded that treatment group members did not consume significantly more of these services over the 18-month period after randomization than they would have in the absence of channeling. They found virtually no effect under the financial control model. Under the basic model, they found an increase in average total expenditures per client over the 18-month period worth approximately \$140 (see Table II.4). Thus, even if we captured only half of the total other medical service costs, the total increase in costs for such medical services

would probably constitute a small portion of the total increase in living, medical, and long term care costs.

I. SOCIAL SECURITY AND TRANSFER PAYMENTS

Social Security (specifically, the Old Age, Survivors, and Disability Insurance Program, OASDI) was the major source of income for the channeling clients. At baseline, these benefits accounted for 85 percent of total income. Over the 18 months following randomization, these benefits were worth over \$5,700 per client. While channeling was not expected to affect these benefits, it is useful to examine them in the context of judging clients' ability to pay for the needed medical, living, and long term care services. The same argument holds for Veterans pensions, although they account for a much smaller fraction of income.

In contrast, channeling was expected to increase transfer payments from Supplemental Security Income (SSI) and food stamps, which together were worth approximately \$575 per client during our observation period. First, these transfer payments are generally contingent on the recipient's living in the community. Thus, they could be increased if channeling reduced nursing home use and increased community residence. Second, channeling case managers could inform clients about and assist them in applying for these transfer programs. Finally, transfer payments would also increase if clients lived longer, thereby increasing the time during which they could receive transfers.³⁷ A channeling-induced increase in public transfers would be paid for by the government, and would represent an increase in income available to clients and their families.

The evaluation found virtually no impacts on mortality and community residence. As we might expect, then, there was virtually no observed differences between average transfer payments received by treatment group members and those received by the control group.³⁸ The specific point estimates (see Table II.4 and Table II.5) were increases of approximately 1 percent over the amount of transfers received by control group members. Thus, the impact of channeling on transfer payments does not play a major role in our assessment of the costs and benefits of channeling.³⁹

J. CLIENT LIFE-QUALITY

One of the major premises of the demonstration was that the expansion of community-based long term care alternatives would result in a better life for the

³⁷ This type of a mortality effect could also lead to a change in average Social Security and Veterans benefits per client.

³⁸ See Appendix C for a full discussion of the impacts of channeling on transfer payments.

³⁹ The small increase in transfer payments would not be expected to affect the total cost of administering transfer programs, although such costs have been important for evaluating other social programs.

channeling clients. Although there have been numerous studies of well-being, it remains a difficult concept to measure. After surveying the literature, the evaluation adopted a broad measurement approach that examined several indicators of life quality. The approach assumes that impacts on life quality are captured indirectly through their effects on these indicators. This approach is organized around four dimensions: (1) longevity; (2) service and environmental conditions facing clients in the community; (3) social and psychological well-being; and (4) functioning.⁴⁰

In general, estimates of the various life quality indicators suggest that channeling did improve service and environmental conditions (reducing unmet needs and improving satisfaction with service and housing conditions) and global life satisfaction, a measure included in the social/psychological well-being dimension. Significant impacts were generally small to moderate in magnitude but, on average, represented proportionally large improvements in quality of life when compared with that reported by control group members. In the financial control model, there was also an unexpected and contrary effect: treatment group members reported being more disabled on the ADL tasks. Channeling impacts across all these dimensions of client life quality are described below; the control group means and estimated impacts for many of these measures are presented in Appendix E.

In assessing the performance of the two channeling models it is important to note that there were no substantial differences by model in longevity, unmet needs, general social/psychological well-being, satisfaction with service arrangements, or confidence about receiving needed services. As a result, it seems that the higher net costs of the financial control model did not produce a measured difference in client well-being.

1. Longevity

Mortality is a central element in quality of life. It also affects all the other elements in the benefit-cost analysis through its indirect effects on service use. In the evaluation, mortality was measured using death rates and survival days.

Wooldridge and Schore (1986) found that channeling had little effect on mortality. This is not surprising given that channeling did not affect nursing home use or the use of health-related services, the principal mechanisms by which channeling might affect mortality. This conclusion is the same regardless of whether mortality is measured using death rates or survival days. Given the size of the sample and the variety of procedures used in this analysis, we feel quite confident of this conclusion.

2. Unmet Needs, Satisfaction with Care, and Physical Environment

The measures of unmet needs used in this analysis were based on whether the respondent reported needing help with any of eight major tasks of daily living with which

⁴⁰ For a full discussion of longevity, see Wooldridge and Schore (1986). For a full discussion of satisfaction with service/environment conditions, social/psychological well-being, and functioning, see Applebaum and Harrigan (1986).

a channeling-eligible individual could be expected to need assistance on a regular basis: transfer, dressing, toileting, bathing, meal preparation, housekeeping, transportation, and medical treatments. Under both models the treatment group reported significantly fewer unmet needs than did the control group.⁴¹ For example, at 12 months after randomization, total scores on the 8-item measure under both models were approximately 20 percent lower for the treatment group (a difference of about one-third of one unmet need). This reduction in unmet needs relative to the control group also existed at 18 months, although it was no longer statistically significant.⁴²

Followup respondents were also asked about their satisfaction with service arrangements for four services (housework, meals, laundry, and shopping).⁴³ On average, treatment group members were significantly more satisfied, despite the fact that control group members reported a high level of satisfaction with service arrangements (only between 7 and 13 percent of the control group reported being dissatisfied).⁴⁴ These treatment/control differences were relatively small in size, although in certain categories (such as those reporting to be dissatisfied) impacts represented large proportional differences (30-50 percent reductions) in those dissatisfied with service arrangements.

A checklist of six key environmental problems observed by the interviewer in the respondent's house was used as the measure of physical hazards in the client's community residence.⁴⁵ Under the basic model, treatment group members were found to have significantly fewer hazards than control group members at 12 months. This small difference (0.11 hazards) represents a 41 percent reduction in the number of observed hazards compared with basic model control group members. No significant differences were observed between treatment and control group members in the financial control model sites.

3. Social/Psychological Well-Being

The investigation of social/psychological well-being indicated that channeling had small effects on client satisfaction--greater confidence in receiving needed services, more satisfaction with service arrangements for housecleaning, meals, laundry, and shopping, and more satisfaction with their life generally.

⁴¹ These outcomes were measured for one-week periods at 6, 12, and 18 months after randomization. The impact estimates are presented in Appendix E.

⁴² This lack of significance at 18 months may be due to the smaller sample size and resulting lower precision of estimates for this period. It could also be due to different impacts for those who were enrolled in the program during the first half of the randomization period (those eligible to be included in the 18-month sample) from impacts for the full sample. See Applebaum and Harrigan (1986).

⁴³ In addition, sample member confidence that the necessary care was being received was also measured. The pattern of impacts for the confidence measure is similar to that reported here for satisfaction.

⁴⁴ Impacts on these measures in both models were similar across the weeks at 6 and 12 months after randomization (see Appendix E).

⁴⁵ Interviewers did not conduct a systematic evaluation of the home but rather recorded hazards observed during the normal interview process.

There were generally no impacts on other reported measures of social/psychological well-being: reported happiness, attitudes toward loneliness, social contacts, self-perceived health, concern about health, and contentment. There were, however, two exceptions to this general result under the basic model. Both were indications of improved social/psychological well-being at 12 months; at that time, treatment group members reported more positive attitudes toward aging and less loneliness than did control group members (differences that were statistically significant).

4. Functioning

There were essentially no impacts on functioning for the basic model (with the exception of an impact on bathing at 12 months). In the financial control model, there were no impacts on IADL or restricted days. There was, however, a statistically significant impact on the ADL measure under the financial control model: on average, treatment group members reported being more disabled than control group members at 6 and 12 months. There are two possible explanations for this result, both related to service use but with very different substantive implications. The first is the possibility that increased formal service use induced to some degree the kind of atrophy effect on functioning which has been reported to occur as a result of institutionalization. The second is that the result is an artifact of the way we asked the question about ADL functioning of sample members ("do you?" rather than "can you?"), which led to more "no" answers by those sample members who received more formal services, without any real differences in functional ability. We cannot distinguish between these two possibilities based on our impact data.

K. INFORMAL CARE

Channeling expected to affect the behavior and well-being of informal caregivers --those persons who provided care to clients on an informal, unpaid basis. The case managers were expected to help these caregivers maintain their efforts by arranging for needed services, including respite care for the caregivers. These services were expected to add to those already provided by informal caregivers and to reinforce the informal support network. Thus, there might be some substitution of formal for informal services, but it was hoped that this would enable informal caregivers to continue providing care for a longer time.

Christianson (1986) found a great deal of informal care provided to sample members. During the 18-month observation period, approximately 85 percent of control group members living in the community received informal care, with the average caregiving network having about two members. Most of these control group members received help with housework, laundry, or shopping (76 to 81 percent) and with meal preparation (65 to 71 percent). Informal help with therapy and medical treatments was reported the least frequently (less than 5 percent). Sample members received about

three visits a week, on average, from visiting caregivers, who spent about six to nine hours a week in providing care.⁴⁶

In analyzing the efforts of these caregivers, we distinguished between the individuals identified by the sample members as being the primary informal caregiver (typically spouses and daughters) and all other informal caregivers (typically neighbors and friends). Data about all services provided informally were collected directly from the sample members (or proxy respondents). In addition, detailed data about the caregiving services and financial assistance provided by the primary caregiver were obtained in interviews with those caregivers. Thus, we have a broad overall picture of the informal services received by sample members and a narrower, but more detailed, picture of the primary persons providing this care.

It is important to note that providing care, on an informal basis, can generate both benefits and costs to the caregiver. The costs are quite clear. Over the 18-month observation period, Christianson (1986) found that, on days that they helped, primary caregivers devoted two to three hours a day to caregiving activities and an additional two hours to socializing with the sample member.⁴⁷ About 30 to 40 percent of the primary caregivers to non-spouse control group members also provided financial assistance, averaging about \$190 a month per caregiver providing the assistance (not including in-kind assistance, such as gifts of food or clothing, which were probably substantial). In addition, slightly more than half of the primary caregivers to control group members living in the community reported limitations in their social lives due to caregiving (very few reported any limitations with respect to employment), and roughly one-quarter reported that they experienced severe emotional stress. Approximately one-third of these primary caregivers also reported dissatisfaction with their lives.

The benefits from caregiving are less tangible. They pertain to satisfaction from caring for a loved one or close friend and a desire to fulfill a social obligation to provide such care.

The benefit-cost analysis focuses on the net change in these benefits and costs as indicated by the change in the reported well-being of primary caregivers. We also considered the changes in time spent and the extent to which formal services were substituted for informal ones. However, we have not assigned a dollar value to this substitution due to a lack of data on secondary caregivers and the difficulty in valuing such volunteer time.

In general, the inability to value the substitution is not a serious drawback, since there is very little evidence that channeling resulted in any substitution of formal services for informal care provided by primary caregivers. Specifically, there was no evidence that channeling had any effect on the overall provision of care by primary

⁴⁶ Visits and hours data were collected only for visiting caregivers, even though questions about the types of care received dealt with all types of caregivers.

⁴⁷ Informal care includes only care provided to sample members while they were in the community.

caregivers.⁴⁸ The results do suggest that channeling led to some concentration of care into certain care areas, such as the arrangement of services or benefits and help with eating and certain other personal care tasks. A possible explanation for this is that the increased provision of formal services allowed primary caregivers more time for tasks not readily performed by formal providers.

There also was no evidence that channeling under the basic case management model led to a substitution of formal services for care provided by visiting caregivers (friends and neighbors), although channeling under the financial control model did lead to minor reductions in certain services provided by friends and neighbors (who, it should be noted, provided a small amount of total informal care in any case).

There did appear to be impacts on the reported well-being of the primary informal caregivers. As with the life quality of the clients, the evaluation measured impacts on caregiver well-being by examining changes in a number of variables thought to be good indicators of well-being. These indicators included reductions in stress-producing factors such as: personal and employment limitations, objectionable behavior by the sample member (for example, yelling at the caregiver or refusing to cooperate), sleep interruptions due to caregiving, worry about obtaining sufficient care for the sample member, satisfaction with service arrangements, and general emotional, physical, and financial strain.

Christianson (1986) found that channeling improved the well-being of primary caregivers according to some of these indicators (estimates are presented in Appendix E). Under both models, the percent of primary caregivers reporting serious privacy and social limitations declined. Both channeling models also increased caregiver satisfaction with care arrangements. Finally, it appeared to increase the overall life satisfaction expressed by primary caregivers. There was, however, no indication that channeling reduced caregiver perceptions of emotional, physical, or financial strain or perceptions of the prevalence of serious objectionable behavior exhibited by sample members.

In many instances, there were sizable changes in the indicators of well-being. For example, under the basic case management model at 6 months, there was a 50 percent reduction in the percent of caregivers reporting that restrictions on privacy imposed by caregiving were a serious problem (5.7 percent of the treatment group caregivers compared with 11 percent of the control group caregivers reported a serious problem). Similarly, 22 percent of control group caregivers in the basic case management sites at 6 months reported limits on social life to be a serious problem, compared with 16 percent of treatment group caregivers (a reduction of 27 percent).⁴⁹ Impacts at 12 months were generally in the same direction but were not significant,

⁴⁸ This conclusion is the same across several measures of care provision, including: whether or not care was provided, the frequency of care provided, the hours of care provided, and financial assistance.

⁴⁹ Treatment group caregivers also reported significantly fewer personal limitations (including limits on time with family, restricted privacy, limits on social life, constant attention to sample member required, and negative effects of caregiving on other relationships).

possibly indicating that channeling had a strong early effect on caregiver perceptions which diminished over time.

Channeling also increased caregiver satisfaction with both formal and informal care arrangements. At both 6 and 12 months under the financial control model the percent of treatment group caregivers reporting they were very satisfied with care arrangements was significantly larger than that for control group caregivers. For example, at 6 months, roughly 37 percent of caregivers to control group members reported being very satisfied with care arrangements, compared with 51 percent of treatment group caregivers; this difference of 14 percentage points represents a 38 percent increase in the percent reporting themselves very satisfied.⁵⁰

Finally, under the financial control model at 12 months, 76 percent more treatment group caregivers than control group caregivers reported being completely satisfied with their lives (17.4 percent of caregivers to treatment group members reported being completely satisfied, compared with 9.9 percent of control group caregivers). Also under this model at 12 months, there was an accompanying decrease in caregivers reporting that their lives were not very satisfying.

While estimated impacts on some indicators of well-being suggest that channeling did improve caregiver well-being under both models, there is some uncertainty about the strength of this conclusion to the extent that the concept and indicators of well-being are difficult to define and measure. Other indicators of well-being included in the analysis (such as emotional strain due to giving care), which we might expect to be correlated with those that were affected by channeling, did not appear to change as a result of the intervention. However, none of the measures indicated that channeling significantly reduced caregiver well-being. Thus, although life quality remains a concept that is difficult to measure, it seems clear that the channeling intervention did improve caregiver well-being.

⁵⁰ There were also corresponding, and statistically significant, reductions in the percent of caregivers reporting that they were dissatisfied with care arrangements or had no present care arrangements.

IV. NET COSTS AFTER THE OBSERVATION PERIOD

Thus far, we have examined only the outcomes observed during the 18 months following randomization. As the accounting framework indicates, such a time-limited analysis is incomplete since it ignores the outcomes that occur after the observation period. In order to obtain a comprehensive picture of the net costs of channeling, we now turn to these longer range outcomes. This analysis, with its focus on future net costs, indicates the magnitude of the net financial commitment that would be made to persons enrolled in an ongoing channeling program.

Future costs will be determined by the types of services that clients use and the costs of those services. We can expect both the pattern of use and cost to change over time. Use will change depending on the mortality rate and decisions about using nursing home, hospital, and community services. Such changes in the pattern of use will affect average costs, and, in addition, channeling may directly affect the costs of some services by negotiating more favorable rates with service providers.

The analysis of these factors is made difficult because these future trends are unobserved. We can assess their magnitude only by extrapolating the trends observed during the first 18 months, a process that is obviously much less certain than the analysis of the observed outcomes discussed earlier.

The 18-month observation period provides only a limited basis for estimating future expenditures and service use. In some cases, the data set contained only three observations over the 18 months. Given all the factors that influenced sample members' expenditures and service use over this period, three observations are insufficient for projecting long-range patterns of use.

As a result, we have confined our analysis to an assessment of the potential magnitude of future costs and the implications of changes in key parameters. Rather than make specific point estimates of future costs, we have estimated them under a variety of alternative assumptions about mortality, rates of use for hospital and nursing homes, and the effects of channeling on average expenditures. While none of these estimates has any special validity as a point estimate of future costs, together they indicate how these various factors interact to determine future costs and the general magnitude of those costs.

There are four general conclusions from this analysis.

1. The value of future social costs (i.e., costs excluding Social Security, SSI, and food stamp payments) under both models of channeling is likely to be large. However, the value of net future social costs due to channeling is probably of the same general magnitude as net social costs observed during the first 18 months.

Thus, in the basic case management model, total net costs of channeling are likely to be around \$2,350 per client (compared with \$1,300 for the first 18 months), while in the financial control model they are likely to be around \$8,200 per client (compared with \$3,400 for the first 18 months).

2. Estimates of the distribution of future net costs between the government and clients are more uncertain than those of aggregate social net costs. Nevertheless, if the patterns observed for the first 18 months persist, clients would save some additional expenses (primarily for formal community services), and future net costs to the government would be somewhat greater than the total social costs summarized above.
3. Impacts on mortality and the use of nursing home, hospital, and community services must be considered simultaneously. These factors interact over time, with savings in one area often implying costs in another.
4. Even if channeling had a delayed effect that reduced the use of nursing homes, it is extremely unlikely that such an effect would be large enough to offset the net costs incurred during the first 18 months.

Thus, our analysis of future costs suggests that the basic conclusions from the 18-month observation period would probably not be changed by the inclusion of future outcomes. However, these future costs are likely to be quite important for budgeting channeling-like programs.

We begin our analysis by examining the average cost of providing care to persons in nursing homes, hospitals, and the community, and the effect of channeling on these expenditures during the observation period. These estimates provide the basis for the analysis of future costs, and provide a useful perspective on the impacts of channeling during the observation period. We then turn to the alternative assumptions about future patterns of use and the resulting estimates of future average expenditures.

A. DAILY COSTS FOR NURSING HOMES, HOSPITALS, AND THE COMMUNITY

We estimated average daily costs per client in two parts. The first included the direct costs for nursing home, hospital, and community services, as these services were defined in Chapter III. The second part included the costs of the associated covered physician services and other covered medical goods and services. This second part was necessary in order to allocate the costs of the other covered services between hospital, nursing home, and community service costs.

The average direct cost per client per day of being in a nursing home was estimated by Wooldridge and Schore (1986, Chapter IV). They used expenditure and use data from Medicare, Medicaid, and provider records data to estimate these costs.

During months 7 to 12, the last period for which we have complete expenditure records data, the sample members in nursing homes incurred average costs of approximately \$50 per day in the basic case management model sites, and \$54 per day in the financial control model sites.⁵¹

Similarly, Wooldridge and Schore estimated the average direct cost of a day in the hospital. These costs were found to be just over \$300 in both models.⁵² There was no evidence that these costs were affected by channeling.

The costs of a day in the community include several factors: formal community services, community room and board, and case management provided by channeling or other agencies.⁵³ The average costs per client for these community services were discussed in Chapter III. In order to estimate the average cost per client per day in the community, we divided the estimated average community-service costs per client by the average number of days clients spent in the community.⁵⁴ These costs clearly were affected by channeling. Case management and formal community services, in particular, are much greater under channeling. Thus, we made two estimates of the average daily costs for community residence: one corresponding to channeling and the other pertaining to costs in the absence of channeling. These procedures are described in Appendix D.

In addition to these direct costs of nursing home, hospital, and community services, we added the costs for covered physician and other medical services. These other costs were estimated by Wooldridge and Schore (Chapter VI). We allocated these costs among community, nursing home, and hospital costs by assuming that all nonphysician other medical costs (for example, costs for podiatrist, pharmacy, and outpatient services) were incurred by persons in the community and that the physician costs should be allocated according to the distribution of Medicare service expenditures.⁵⁵ These allocations are also described in Appendix D.

⁵¹ As mentioned in Chapter III, the evaluation had complete records data on nursing home expenditures only for the first twelve months of the observation period. In this analysis, we used the estimate from the last six-month period for which we had complete data, since we are interested in extrapolating into the future.

⁵² Again, we used the last six-month period for which we had complete data--in this case, months 13 to 18. Analysis of variation in the average daily costs of hospitals for our sample indicated that average daily hospital costs did not differ by more than 5 percent between months 7 to 12 and months 13 to 18.

⁵³ Here, we focus on aggregate social costs, and so we exclude payments from Social Security, SSI, and food stamps. We return to these costs at the end of the chapter when we discuss future government costs.

⁵⁴ As mentioned earlier, we use the term "client" to refer to all persons offered channeling services, regardless of the extent to which they actually received such services.

⁵⁵ Approximately two-thirds of the Medicare expenditures were for hospital services, so this procedure allocates that fraction of covered physician services to our estimate of the average daily cost of hospitals. Services provided in the community accounted for another 30 percent of Medicare expenditures. Services provided in hospitals accounted for the remaining 4 percent. Of course, as we mentioned in Chapter III, these estimates exclude uncovered physician and other medical costs, which could equal the value of the costs included in the analysis. However, channeling did not appear to affect these types of costs. Thus, the total cost estimates understate true costs, but the estimates of changes due to channeling are probably accurate, despite this omission.

The resulting estimated daily rates are shown in Table IV.1 (Appendix Table D.2 provides a disaggregation of these estimates into their components). The estimates reflect the general pattern of impacts already discussed in Chapter II and Chapter III. They indicate that, under the basic case management model, channeling appeared to increase average daily costs for persons in the community by \$3 (11 percent), to approximately \$27. Under the financial control model, with its higher expenditures for formal community services, the average daily cost for channeling clients in the community was over \$37. This represents an increase of more than \$11 (approximately 43 percent) over the daily costs in the absence of channeling. Most of this difference is due to differences in the expenditures for formal community services: average daily expenditures for these services in the financial control model were almost twice those in the basic case management model. Estimated average expenditures for housing and food were about the same under the two models, approximately \$12 to \$13 per day, and they accounted for a substantial fraction of total community expenditures: 48 percent under the basic case management model and 39 percent under the financial control model.

The cost estimates in Table IV.1 also indicate that the average daily cost of serving persons who live in the community is substantially below the cost of serving persons who live in nursing homes. This is true even with the extra services provided by channeling. Under the basic case management model, the average daily cost of serving the persons living in the community was just slightly more than half that of serving the persons who were in nursing homes. Under the financial control model, the higher costs of serving persons in the community made the difference smaller, but costs for persons in the community were still only 68 percent of those for persons in nursing homes.

TABLE IV.1: Average Expenditures Per Day in Community, Nursing Home, and Hospital (1984 dollars)						
	Basic Case Management Model			Financial Control Model		
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
Cost Per Day in the Community	26.51	23.90	2.61	37.50	26.25	11.25
Cost Per Nursing Home Day	51.45	50.87	0.58	55.47	54.59	0.88
Cost Per Hospital Day	366.29	366.30	-0.01	372.89	354.41	18.48
NOTE: Expenditures on other medical services were distributed across each of the three statuses: community, nursing home, hospital. See Appendix D for a full discussion of these estimates.						

These differences reflect the different costs of providing services in institutional and community settings, as well as the potentially different service needs of persons in

these two settings.⁵⁶ The estimates presented here indicate the overall difference in average expenditures potentially due to both these reasons. This implies that efforts to substitute community services for those provided by nursing homes are unlikely to achieve savings equal to the full difference in these daily rates. We return to this issue in Chapter V.

In estimating future expenditures, we have assumed that channeling did not affect the average daily rates for hospital and nursing homes. This reflects the findings of Wooldridge and Schore. It also helps to simplify the estimation process and clarify the effects of changes in the key parameters determining future expenditures (i.e., differences in future costs can be attributed to factors other than small differences in the average expenditures for hospital and nursing home days).

B. ESTIMATES OF AVERAGE FUTURE EXPENDITURES

The method for estimating future costs begins by estimating the expected number of days that sample members will spend, on average, in nursing homes, hospitals, and the community. Future costs are then estimated by multiplying the number of days estimates by their appropriate daily cost estimate and then summing the results. In this way, shifts in the use of these broad service types can be taken into account, although the method fails to capture some changes in the mix of services that clients use while in a hospital, nursing home, or the community.⁵⁷ Appendix D documents these procedures in more detail.

In all these calculations, we have used a ten-year time horizon. This period was chosen because it reflects the general life expectancy of sample members and is also a common planning horizon. Under our assumptions about mortality, which are described below, virtually all of the sample members would be expected to have died by the end of this period (11.5 years after randomization). We feel that this time horizon will yield estimates that indicate the general magnitude of future costs and the interactions of the underlying factors, although we recognize that the choice of a time horizon is somewhat arbitrary.

⁵⁶ For example, persons in nursing homes might be expected to have higher service needs and therefore higher service expenditures. In comparing channeling clients (80 percent of whom were in the community) with a 1977 nursing home population, Carcagno et al. (1986) indicated that, although the two groups appeared to be similar overall on measures of functioning, nursing home residents were older and slightly more disabled in eating, dressing, and bathing tasks; channeling sample members were more disabled in toileting, continence, and mobility.

⁵⁷ This approach was chosen over a simpler procedure that would have multiplied an estimate of the expected average number of survival days per client by the observed average cost per survival day. Such an approach would err to the extent that the mix of services used by survivors changed over time. We observed surviving sample members to have an increasing rate of institutionalization over the first 18 months. Since nursing home expenditures generally exceed those for care in the community, further shifts of this type would tend to increase the average cost per survival day. The proposed procedure that treats nursing home, hospital, and community services separately eliminates this specific problem. For reference purposes we have included estimates of the average costs per survival day in Appendix D.

The calculations also discount all dollar values back to the time of enrollment in channeling using a 5 percent real annual discount rate. In addition, all dollar values in these calculations are expressed in 1984 dollars. These procedures assure that the value of future costs can be directly compared with the estimates of costs for the observation period.⁵⁸

In general, the available data are insufficient for us to make precise estimates of future trends in the use of community, nursing home, and hospital services (an uncertain process even with a wealth of data). As a result, we have made several sets of assumptions that reflect the general experience of the demonstration. By considering these alternatives we can assess the impact of changing specific assumptions about the average expenditures for the different types of services or about mortality, nursing home, and hospitalization rates. As mentioned at the outset, these estimates are illustrative, and should be interpreted as reasonable ranges rather than as valid point estimates of actual future costs.

In all, we consider five sets of alternative assumptions. The first set of assumptions examines the general magnitude of the future costs that would be incurred in the absence of channeling. This set of assumptions is used as a benchmark for assessing the implications of alternative assumptions about channeling's future impacts. We estimated the future pattern of use by first estimating the expected average number of survival days for each six-month period after the end of the observation period. We then estimated how these survival days would be allocated between nursing homes, hospitals, and the community.

The starting point for these extrapolations was the distribution of the sample members across statuses (nursing home, hospital, community, or dead) that was observed at the end of the observation period. We used the distribution of the entire sample, rather than separate estimates for treatment and control group members, to reflect the conclusions of Wooldridge and Schore (1986), who found no evidence that channeling had an effect on mortality or place of residence. The extrapolation assumptions are described in more detail in Appendix D and are summarized in Table D.3 and Table D.4.

We also had to make assumptions about the rates at which the probabilities of clients being in nursing homes, in hospitals, or dead would change over time.⁵⁹ In making these assumptions, we drew on the trends observed during the first 18 months and on published data about general trends in use. Our intent was to develop a plausible set of assumptions that would serve to approximate the future trends that would occur in the research sample.

In all cases, we started with the rate of change observed for the last six months of the observation period (months 13 to 18). We then made several assumptions about

⁵⁸ The procedures used to discount values and to convert estimates to 1984 dollars are presented in Appendix D.

⁵⁹ Assumptions about these three determine the residual status (community).

how those rates would change. The death rate was assumed to increase over time at the same rate of increase observed for death rates in the U.S population between 85 and 95 years old. This rate is approximately 0.7 percentage points every six months (American Council of Life Insurance, 1983).

The rate at which survivors used nursing homes was assumed to continue the trend toward increasing nursing home use observed during the first 18 months following randomization but a slower rate of increase. However, it appeared unlikely that the rapid growth in this rate over the observation period would continue (the number of nursing home days per 100 survival days increased over 175 percent in both models during that period). Thus, we assumed that the rate of increase would begin to decline over the extrapolation period.⁶⁰

TABLE IV.2: Alternative Estimates of Social Costs After the 18-Month Observation Period: Basic Case Management Model				
	Nursing Home Costs	Hospital Costs	Community Costs	Total Social Costs
No channeling	7,221	9,860	9,386	26,467
Channeling affects only the average daily cost of community care	7,221 (0)	9,860 (0)	10,411 (1,025)	27,492 (1,025)
Channeling affects the average daily cost of community care <u>and</u> decreases the future rate of change in nursing home use by 25 percent	6,599 (-622)	9,860 (0)	10,735 (1,349)	27,194 (727)
Channeling affects the average daily cost of community care <u>and</u> decreases future hospital use by 1 percentage point	7,221 (0)	7,806 (-2,054)	10,560 (1,174)	25,587 (-880)
Channeling affects the average daily cost of community care <u>and</u> decreases the rate of change in the death rate by 25 percent	7,668 (447)	10,355 (495)	10,889 (1,503)	28,912 (2,445)
NOTE: The figures in parentheses indicate the difference between the estimated value of future costs under given assumptions and the value of those costs in the absence of channeling (i.e., they are analogous to treatment/control differences). All dollar values are expressed in 1984 dollars and discounted to the time of enrollment using a 5 percent real discount rate. Costs for the observation period (months 1-18) in the basic model are presented in Table II.2 and Table II.4. Social costs exclude Social Security, SSI, and Food Stamp payments.				

Finally, the rate of hospital use appeared to decline among survivors during the first 18 months. We have assumed that this decline does not continue, but rather that

⁶⁰ As described in Appendix D, we assumed that the rate of nursing home use among survivors would increase with the logarithm of time.

hospital use continues at the same level observed at the end of the observation period, between 5 and 7 percent of survival days depending on the model.

Table IV.2 and Table IV.3 summarize the five alternative extrapolation scenarios. Under the first set of assumptions, we calculated the average expenditures per client over the 10 years following the observation period in the absence of channeling. In the absence of channeling, these expenditures would have been over \$26,000 (over the 10-year extrapolation period) per client enrolled in the basic case management sites. In the financial control sites, they would have been approximately \$34,000. The difference in these estimates reflects the differences in the pattern of service use in the two sets of sites. The average daily expenditures for persons in the community and in nursing homes were higher for persons living in the financial control sites. Partially counteracting this expenditure difference was a tendency for clients in the basic case management sites to be more likely to be in a nursing home.

TABLE IV.3: Alternative Estimates of Social Costs After the 18-Month Observation Period: Financial Control Model				
	Nursing Home Costs	Hospital Costs	Community Costs	Total Social Costs
No channeling	7,863	14,907	11,280	34,050
Channeling affects only the average daily cost of community care	7,863 (0)	14,907 (0)	16,114 (4,834)	38,884 (4,834)
Channeling affects the average daily cost of community care <u>and</u> decreases the future rate of change in nursing home use by 25 percent	7,162 (-701)	14,907 (0)	16,592 (5,312)	38,661 (4,611)
Channeling affects the average daily cost of community care <u>and</u> decreases future hospital use by 1 percentage point	7,863 (0)	12,662 (-2,245)	16,344 (5,064)	36,869 (2,819)
Channeling affects the average daily cost of community care <u>and</u> decreases the rate of change in the death rate by 25 percent	8,386 (523)	15,710 (803)	16,914 (5,634)	41,010 (6,960)
NOTE: The figures in parentheses indicate the difference between the estimated value of future costs under given assumptions and the value of those costs in the absence of channeling (i.e., they are analogous to treatment/control differences). All dollar values are expressed in 1984 dollars and discounted to the time of enrollment using a 5 percent real discount rate. Costs for the observation period (months 1-18) in the financial control model are presented in Table II.3 and Table II.5. Social costs exclude Social Security, SSI, and Food Stamp payments.				

Channeling can be expected to affect this situation in a number of ways. It will raise the costs of serving persons in the community and may alter the pattern of the use of community and institutional services (although the available evidence shows changes

only in the pattern of community services). To see how future costs would be affected by channeling's impact on average expenditures for community services, we recalculated the 10-year costs under a second set of assumptions. This set maintained all of the initial assumptions, and in addition assumed that channeling increased average expenditures per day for persons in the community, as indicated in Table IV.1.

Under this set of assumptions, channeling would increase the costs (relative to the costs in the absence of channeling) over our 10-year extrapolation period only by 4 percent (about \$1,000 per client over the ten-year extrapolation period) under the basic case management model. Costs would be increased by more under the financial control model: approximately 14 percent (about \$4,800 per client).

In many ways this second set of assumptions is our best indication of the magnitude of the future social costs of channeling as it was fielded in the demonstration. It incorporates channeling's impact on average expenditures for community services, but assumes no effect on mortality or on the use of nursing homes or hospitals. In this case, future costs would be substantial, but future net costs (over the 10-year extrapolation period) under the basic case management model could be expected to be just 77 percent of those observed over the first 18 months. Thus, total net costs over the remaining lifetime of clients would be on the order of \$2,350 per client (which is 77 percent more than the \$1,328 per client observed for the first 18 months). Future net costs under the financial control model would be larger than those observed in the first 18 months. The \$4,800 per client in estimated extra future costs would raise the total net cost of this model over the remaining lifetimes of clients to approximately \$8,200 per client.

If channeling had a delayed effect that limited the rate at which future nursing home use increased, it could create additional savings. While we have no evidence that channeling would produce such an effect, we used a third set of assumptions to assess the implications of such an occurrence. This calculation indicates how changes in future nursing home use change future costs. Our specific assumption was that channeling had the effect of decreasing the rate of change in nursing home use by 25 percent (we maintained all the other assumptions of the first and second sets).

Under this third set of assumptions, channeling reduces future nursing home costs but increases future community costs relative to their expected values in the absence of channeling. Under both models, the estimated nursing home savings under this third scenario are relatively small when compared with the increased community costs. As a result, future net costs are not very different under this alternative than they were under the second alternative, which assumed that channeling did not affect nursing home use--suggesting that very large (and implausible) delayed effects on nursing home use would be required just to offset the future net increase in community costs.⁶¹

⁶¹ We return to this issue in Chapter V, where we assess the size of the effects on nursing home required for channeling to break even.

Channeling might also reduce future hospital use by enabling persons to move more quickly into the community. We assessed the implications of such a delayed impact by using a fourth set of assumptions. Specifically, we assumed that channeling would enable clients to decrease their use of hospitals over time by one percentage point (by approximately 20 percent). We maintained all the other assumptions of the first two sets.

If channeling decreased future hospital use, as indicated in the fourth alternative, it could generate substantial savings. These savings would be nearly \$2,000 per client under either model. Under the basic model, these savings would more than offset the costs of future increases in community services due to channeling, leaving a total net cost of only \$450 per client for the combined observation and extrapolation periods. Under the financial control model, the hospital savings would be insufficient to offset even the future increases in community costs. Of course, we have no evidence of such a delayed effect on hospitals under either model. This analysis simply indicates that even modest reductions in the use of these high-cost services could produce substantial savings.

Finally, we can examine the implications of a delayed channeling impact on longevity. Changes in longevity will lead to an increased use of all services, and so will increase the net cost due to channeling. At the same time, we would expect greater longevity to produce additional benefits in life quality. The potential future costs of such a delayed effect can be assessed with the fifth alternative, which assumed that channeling decreased (by 25 percent) the extent to which the death rate would increase in the future (all other assumptions of the first and second alternatives were maintained).

So far, our examination of future net costs has focused on social costs--that is, aggregate resource costs regardless of who pays for them. We are also interested in net costs to the government, particularly to the extent that channeling leads to any substitution of public for private expenditures. Such information is crucial for efforts to budget any channeling-like programs.

Table II.2, Table II.3, Table II.4 and Table II.5 indicated the estimated distribution of living, medical, and long term care costs between the government and clients. They showed that, for the 18-month observation period, the government paid for the majority of these services for clients: approximately two-thirds of these costs for controls in the basic sites and approximately 72 percent of them in the financial control sites. In addition, most of the extra costs associated with channeling were paid for by the government. Thus, the general pattern of future government costs, including both total and net costs, is likely to follow closely the patterns estimated for social costs. Furthermore, if the general cost distribution persists, future government total and net costs will probably be somewhat larger than the corresponding future social costs.

This conclusion reflects two general observations. First, in addition to all of the costs considered so far, the government must pay the costs of Social Security, SSI, and

food stamp benefits. Channeling did not appear to affect these payments, so they will not enter into future net costs. However, they represent a large component of future total costs. We estimate that the average cost per survival day of Social Security benefits would be approximately \$14, while the average cost per day in the community for SSI and food stamps would be roughly \$2. Under the first set of extrapolation assumptions described earlier, this implies total future costs to the government for these programs of over \$8,000 per client under either channeling model.

The second observation is that channeling appeared to reduce client costs slightly during the observation period while increasing government costs. The client savings were in the costs for nursing homes and formal community services and appeared in both models. This pattern, if it persisted, would tend to increase government costs above social costs. We will return to this issue in the next chapter.⁶²

⁶² While the small client savings for formal community services are likely to continue, those for nursing homes may become government savings. This could occur if the observed nursing home savings were concentrated among persons who would have been spending down their assets to pay for nursing home services in the absence of channeling. In this case, some of these persons would have eventually become eligible for Medicaid benefits. At that time, savings due to channeling efforts to keep these persons in the community would accrue to Medicaid. Thus, there could be some future government savings, although they would be small compared with the costs of channeling case management and the extra formal community service arranged by channeling.

V. INTERPRETATION AND CONCLUSION

In Chapter III and Chapter IV we have presented the background necessary for interpreting the overall benefit-cost results first presented in Chapter II. In particular, by examining the underlying impact estimates and valuation procedures, we have highlighted the uncertainty inherent in any single estimate of net costs. Moreover, in assessing the impact of channeling on the quality of the lives of clients and their informal caregivers, we have underscored the difficulty of capturing such impacts in the benefit-cost analysis. Nevertheless, this background has not altered the essential conclusion presented in Chapter II--that channeling appeared to increase net costs as it led to small increases in the quality of the lives of both clients and their informal caregivers.

In this concluding chapter, we begin by reviewing the overall net cost findings, focusing explicitly on the distribution of costs and benefits between the public and private sectors. We then discuss some of the implications of these estimates; specifically, we analyze the break-even point for channeling--that is, the magnitude of the impacts that would be necessary to create net savings--and the approximate level of government funding required to operate channeling on an ongoing basis. We conclude this chapter by comparing our results with those from other community care demonstrations.

A. THE BENEFITS AND COSTS OF CHANNELING

The channeling demonstration led to an increase in the living, medical, and long term care costs per client. The absolute and relative size of this increase differed substantially by the two models. The basic case management model appeared to increase these costs by about \$1,300 per client during the 18-month observation period, which represents an increase of approximately 7 percent over the roughly \$18,500 in costs we estimate that clients would have incurred in the absence of channeling.

The financial control model, by devoting greater expenditures to community services, increased costs by much more: by approximately \$3,400 per client during the observation period. We estimate that, during this period, clients would have incurred average costs of almost \$23,000 in the absence of channeling. Thus, the financial control model of channeling increased costs by roughly 15 percent.

Channeling will continue to generate additional net costs beyond this observation period. While we cannot, of course, estimate the precise magnitude of such costs, it appears that including them would not alter the basic benefit-cost findings from the observation period. Under the basic model, future social net costs could add another \$1,000 per client to the observed net costs, under plausible assumptions about future longevity and service use. Under the financial control model, the higher costs for serving

persons in the community could lead to greater future net costs of almost \$5,000 per client under the same extrapolation assumptions.

Under both models, the government pays for virtually all of the living, medical, and long term care services used by clients. In the absence of channeling, Medicare and Medicaid would have paid approximately 94 percent of the hospital costs of clients, 85 percent of their other covered medical service costs (primarily physician and outpatient services), and 55 percent of their nursing home costs (see Table II.2 and Table II.3). In addition, Medicare and Medicaid would have paid for approximately 60 percent of clients' formal community service costs in the basic model sites and for approximately 82 percent of these costs in the more service-rich financial control model sites. Moreover, the government provided most of the income for clients through payments from Social Security, Supplemental Security Income, and the food stamp program. Thus, these government expenditures for direct services and income maintenance in the absence of channeling roughly equal the total expenditures that clients would have incurred for living, medical, and long term care services: \$18,500 per client in the basic model sites and \$23,000 per client in the financial control sites.

In addition to these expenditures, the demonstration indicated that both channeling models would raise government expenditures further by increasing the use of services--primarily channeling case management and additional formal community services. Under the basic model, government costs would rise by 10 percent (approximately \$1,750 per client) over the 18-month observation period. Under the financial control model, government costs would rise by 16 percent (\$3,800 per client) over this period.

In the demonstration, the channeling projects incurred most of these additional government costs. They paid for all of the channeling case management, as well as for additional formal community services. Moreover, under the financial control model, the projects paid for many community services that would have been paid by Medicare or Medicaid in the absence of the demonstration. Thus, the pattern of demonstration funding generated savings to Medicaid and other public agencies under both channeling models and substantial savings to Medicare under the financial control model (see Table II.4 and Table II.5).

These savings to specific government programs should be considered an artifact of our accounting system. The savings reflect a redistribution of government costs due to the pooling of Medicare, Medicaid, and some other government funds under channeling. The specific redistribution of costs observed in the demonstration is only one possible way to finance channeling. Other financing arrangements (for example, funding channeling as part of Medicare) would produce different distributions of government costs. The essential conclusion is that channeling increased the total costs to the government for clients; these costs could be distributed across existing or new government agencies in almost any way the government desired.

Under both models, it appears that the increased costs of case management and formal community services generated benefits for clients. For instance, the indications are that both models significantly reduced the proportion of clients who had severe (that is, more than three) unmet needs, and increased the proportion of clients who reported that they were more confident about receiving the necessary services and more satisfied with their service arrangements for house cleaning, meal preparation, and laundry and shopping. Moreover, channeling seemed to increase clients' reported satisfaction with their lives.

Some indicators of the quality of clients' lives were not enhanced by channeling. For instance, longevity and average income were unaffected. In addition, measured declines occurred in the average functioning level of clients under the financial control model (functioning was unaffected under the basic model). In part, these results show simply that channeling will not affect all aspects of clients' lives. (The means by which it could bring about changes in such outcomes as longevity or income are tenuous at best.) The results also highlight the difficulty of measuring intangible outcomes: we used several indicators of the underlying outcomes (i.e., life quality, functioning, and satisfaction with services), and these indicators respond differentially to changes in those underlying outcomes. Moreover, with respect to functioning, it is unclear whether an actual decline occurred or whether it was only the manner in which the questions on functioning were asked in the interviews that generated the observed decline.⁶³

Despite these uncertainties, it appears that, when all these indicators are considered together, channeling enhanced the quality of clients' lives. However, it is difficult to assess the precise magnitude of this enhancement, since the psychometric properties of our indicators are not well understood, and not all of them were apparently affected. It is this uncertainty about the magnitude of these generally intangible benefits that makes it difficult to draw overall benefit-cost conclusions.

Primary informal caregivers also seemed to derive benefits from channeling: they reported more satisfaction both with their lives and with the care arrangements for clients. The evidence suggests that primary caregivers did not reduce their efforts due to channeling under either model. The only reduction in effort observed was a slight reduction for visiting caregivers (who were generally less closely associated with clients) under the financial control model.⁶⁴

In addition to these apparent benefits in terms of enhancing the quality of the lives of both clients and their informal caregivers, we estimated that clients experienced some savings under the channeling models. These savings are small, approximately

⁶³ As discussed in Chapter III, functioning was measured as the number of ADL impairments. These impairments were determined by asking respondents whether they received assistance with the five activities of daily living. Because of channeling services, some clients might have reported a limitation (i.e., receiving help), even though they could perform the activity independently. Applebaum (1986) examines this issue in detail.

⁶⁴ Evidence indicated that some substitution of formal for informal care occurred under the financial control model. However, this effect seemed to be concentrated among friends and neighbors, and not the primary caregivers, who were more likely to be spouses or daughters.

\$400, and are somewhat uncertain. They stem from savings in private expenditures for formal community services and nursing homes.

The uncertainty surrounding these private expenditures is due to the presence of a few individuals (all of whom were control group members in the basic model) who had very high private expenditures for formal community services. This evidence suggested the possibility that channeling produced potentially large private savings. However, because of the rarity of these individuals, we cannot be sure whether they are represented in the correct proportion in our sample. Furthermore, we cannot be certain whether channeling was the operative mechanism that led to the observed treatment/control differences in private expenditures for formal community services. In this case, we have chosen to exclude this handful of high-use individuals and to report the results that are applicable to the vast majority of clients in the basic model: a small savings in private expenditures for formal community services, and a slight overall increase in total public expenditures for these services.⁶⁵

Overall, we place a high degree of confidence in the general picture that emerges from our net-cost and life-quality estimates. The evaluation findings are based on the experience of a large sample of individuals and on an extensive data base. Furthermore, we generally found consistent results when we estimated the outcomes with different data sources. For example, the estimated patterns of use based on interview data are generally similar to the estimated patterns of expenditures based on records data. Finally, the key outcomes--nursing home expenditures and the costs of channeling case management--are based on comprehensive records data. The quality of the data and the consistency of the results, as well as the extensive methodological investigations conducted as part of the evaluation, generate a high level of confidence in the overall findings.

Of course, residual uncertainty remains. Even with the samples used in this evaluation, there is a chance that some estimated treatment/control differences are due to chance rather than to the operative mechanisms of channeling. The statistical confidence intervals surrounding our estimates include a relatively wide range of values. Thus, while the orders of magnitudes suggested by the expenditure estimates are reliable, some caution should be exercised when using the specific dollar estimates.

In summary, the general weight of the findings is that channeling, as it was fielded in the demonstration, led to higher overall expenditures, due to the expansion of channeling case management and formal community services. These extra expenditures were incurred in addition to the substantial expenditures that would have been incurred even in the absence of channeling. Thus, based on our estimates, the net increase in social expenditures for channeling clients was about 7 percent under the

⁶⁵ This uncertainty also surrounds the financial control model. In that model, we did not observe persons who had extremely high expenditures for formal community services, but, again, we could have a problem in terms of our not representing rare individuals. As in the basic model, our estimates of the impacts on expenditures in the financial control model are consistent with the evidence from the large interview sample: private expenditures for formal community services declined slightly.

basic case management model and 15 percent under the financial control model. These increased expenditures enhanced the quality of the lives of both clients and their primary caregivers. Whether these increases in life quality are large enough to justify the extra costs is a policy judgment that must be answered in a broader context.

This overall conclusion holds for both of the channeling models that were fielded in the demonstration, although the two models did differ in terms of the magnitude of their net costs. These differences are generally due to the greater expenditures devoted to formal community services under the financial control model. However, the differences also reflect the more service-rich environment of the financial control model sites. These site differences were noted by Carcagno et al. (1986), and are evident in the higher control-group expenditures for formal community services under the financial control model sites.

Further, the differences among the sites in which the two channeling models were fielded create some uncertainty about the extent to which observed model differences can be generalized to a broader content. The results generally indicate that the basic model was more cost-effective. It produced approximately the same increase in measures of life quality as did the financial control model, but its net cost was about one-third that of the financial control model. However, the differences in the availability of services in the sites clouds this issue, since it is unclear whether the financial control model would have generated these greater increases in life quality had it been fielded in the less service-rich environment of the basic model sites. Nevertheless, our available evidence indicates that the basic case management model is the more cost-effective of the two.

B. IMPACTS NECESSARY TO GENERATE NET SAVINGS

Another way to consider the benefit-cost estimates is to examine the size of the impacts necessary to generate a net savings, given the observed magnitude of the costs of channeling case management. These necessary impacts are influenced by two factors over and above the costs of services. First, most of the cost savings were expected to stem from reductions in the use of nursing homes. Second, it is difficult to predict who will enter a nursing home. Consequently, expanded community services are inevitably provided to some persons who would have remained in the community even in the absence of such services. The expectation of channeling was that the savings generated from reductions in nursing home expenditures would outweigh the costs of providing additional services to community residents.

To estimate the potential savings from the reduction in nursing home days, we used estimates of the average cost per day both in the community and in nursing homes. These cost estimates were presented in Chapter IV, and reflect the patterns of use observed for treatment and control group members over the period from 13 to 18 months after randomization. Under the basic model, these estimates indicate that channeling case management increased the average cost per day in the community by

11 percent, to approximately \$27 per day. At the same time, the average cost of a nursing home day in these sites was \$51. The difference in these average costs suggests that it would be possible to save an average of almost \$25 for every day a person remained in the community rather than placed in a nursing home, although it would cost an extra \$3 per day in the community to provide additional services to community residents who would not have entered a nursing home. Thus, if the proportion of clients who are at risk of institutionalization remains high, it appears that the basic model could generate savings.

Of course, this possibility assumes that those individuals for whom channeling prevented or delayed institutionalization would have the same average service needs as persons in the community. Specifically, this simple comparison assumes that the average cost per day in the community would be unaffected by changes in the composition of the community residents. This is a strong assumption. It may be true for small changes in which the number of nursing home residents served in the community is small relative to the number of community residents who receive services. However, in a more narrowly focused and smaller program, the switch from nursing home to community care could increase the average cost of community care. In that case, the savings would be less than those implied by the observed difference in the daily costs of community and nursing home care.⁶⁶

Despite the limitations of this type of comparison, it can provide a lower bound for the impacts necessary to generate a net savings. Wooldridge and Shore (1986) found that, in the absence of channeling, clients in the basic sites would have spent an average of 49 days in a nursing home, 23 days in a hospital, and 349 days in the community during the 18-month observation period.⁶⁷ These figures imply that channeling would have to reduce nursing home days by about 75 percent (37 days) in order to break even.⁶⁸ Such a reduction would generate savings in nursing home expenditures of over \$900 per client over the 18 months and would increase the costs of providing services to these and other persons in the community by approximately the same amount. In fact, the observed reduction was only 5 days, less than 20 percent of the required amount.

The higher costs of the financial control model imply that even larger reductions in nursing home use would be required in order to break even. The case management and formal community services provided by the financial control projects increased the

⁶⁶ It is also possible that the nursing home service needs and costs of persons for whom nursing home days are reduced would fall below the average. Thus, the savings from keeping these persons out of nursing homes would be less than indicated here. Alternatively, if channeling affected those persons who had such extreme needs that community service costs could exceed nursing home costs, then preventing or delaying nursing home admission would generate net costs rather than savings.

⁶⁷ The remainder of the days during the 18-month period (127 days) were accounted for by deaths.

⁶⁸ This implication assumes that virtually all of the savings would be generated by reductions in nursing home days. The estimates of the cost per day in the community incorporate the observed reductions in the use of alternative case management services. However, the calculations do assume that hospital and other medical expenditures are unaffected by the hypothesized shift from nursing homes to the community. The required reduction in nursing home days would be smaller if savings in other areas could be generated.

average cost per day in the community by over \$11, to approximately \$38 per day. Nursing home expenditures in these sites averaged \$55 per day. The difference between these numbers implies potential savings of approximately \$18 for every nursing home day avoided (again, this implication assumes that average prices do not change as a result of serving more persons in the community).

For these financial control model sites, Wooldridge and Schore (1986) found that, in the absence of channeling, clients would have spent an average of 46 days in nursing homes, 32 days in hospitals, and 362 days in the community during the 18-month observation period.⁶⁹ Even if channeling had been able to eliminate all nursing home use for these clients, this model would not have generated sufficient savings from reductions in nursing home use to pay for the costs of the increased community service. If all clients in these projects had remained in the community (and no other savings accrued over and above those incorporated in the estimated cost per day in the community), the savings from reductions in nursing home use would have been approximately \$800 per client over the 18 months, compared with an increase in community costs of approximately \$4,100 per client.

These estimates illustrate the challenge that faces channeling-type programs. In order to generate net savings, these programs must enroll persons who would be very likely to enter a nursing home if they could not obtain appropriate community care. Channeling and all other community care demonstrations have made extensive efforts to enroll such persons, but these efforts have generally been unsuccessful. Thus, it seems unlikely that these types of programs can target services in a manner whereby they generate net savings when operated at a large scale. Of course, it remains possible to find individual cases for whom savings could be generated.

C. ESTIMATED ANNUAL NET COST TO THE GOVERNMENT OF AN ONGOING PROGRAM

While it is unlikely that a channeling-type program will generate savings for the government, such a program will still be desired if its intangible benefits (i.e., increases in the quality of the lives of clients and their caregivers) are judged to be important enough to justify its net costs. If a permanent program is deemed desirable, estimates of the annual level of funding necessary to operate it would be essential for appropriation, budgetary, and expenditure planning purposes.

Thus far, we have only indirectly addressed such estimates of the annual cost of serving an active channeling caseload. Rather, we have focused on net costs per client. For several reasons, these per-client estimates, which indicate the net financial implication of the decision to offer channeling services to an eligible person, are inadequate for developing an annual budget. First, our estimates generally aggregate expenditures that occurred over the entire 18-month observation period, and they

⁶⁹ Again, the remaining days in the 18-month period were accounted for by deaths.

include the entire research sample (including persons who died or entered a nursing home), rather than only active program participants. Consequently, our estimates of the net costs per client for the observation period will be lower than the actual costs of serving an active caseload for the same length of time.

A second inadequacy is due to the fact that the costs of an ongoing channeling program will differ from those observed under the demonstration, even if the ongoing program is designed to be exactly the same as the demonstration programs. In particular, the dynamics of enrollments and terminations will change the mix of new and ongoing clients over time. Since the costs of serving these two types of clients differ, this change in caseload mix will affect the average cost of operating the ongoing program. Further, a permanent program might differ from the demonstration in terms of the specific program model, the average project and case-manager caseload sizes, the types of covered services, cost-sharing arrangements, and service environments. While it is uncertain how such structural changes would affect the benefits generated by channeling, it is certain that they, too, would affect the costs of operating the program.

In this section, we consider the net cost to the government of operating a permanent channeling program. These costs include the direct operating expenditures of the channeling projects plus the net costs or savings generated by channeling for other government programs. Thus, the estimates encompass the Medicare, Medicaid, channeling, and other public program perspectives. Furthermore, the estimates include expenditures for medical and long term care services, as well as those for Social Security, Supplemental Security Income, and other social insurance programs (total social insurance payments account for approximately 30 percent of total government costs for clients).

In examining these costs, we provide several alternative estimates of the cost to the government budget per case month--that is, the net cost to the government of providing channeling services to a client for a month. Each of these estimates illustrates the implications of specific assumptions. No single estimate can be regarded as best. The most appropriate estimate for budgeting a future program will depend on a host of decisions about who would be served and what services would be provided. However, the estimates provided herein indicate the likely magnitude of the change in the aggregate government budget that is necessary to implement channeling, as well as how decisions about operating the program will affect those net costs.

Our discussion is based strictly on the results of the basic and financial control models that were fielded in the demonstration. As we noted, the costs of future programs will differ from the costs of these demonstration program models for many reasons. Here, we can only note these potential differences, and we caution budgeters to take into account how future programmatic or environmental changes might alter the present benefit and cost findings of channeling.

1. Estimation Process: Implications of Client Mix

As the first step in determining the costs of implementing the basic and financial control models, we estimated the mix of new and ongoing clients that would be observed in an ongoing program. We then used these proportions to calculate the appropriately weighted average of the estimated cost per case months for these two types of clients. As indicated below and in Appendix D, the key assumptions in this process are the long-term survival rates of clients and the costs of serving ongoing clients.

The data from the demonstration suggest that clients who receive case management services can be divided into two groups in terms of their net costs. The first group constitutes new clients. These clients receive the one-time-only initial case management services of screening, assessment, and initial care planning. They also tend to have high medical expenditures, which (as we found in the demonstration) are often due to acute health problems that prompted them to seek channeling services. The other group constitutes ongoing clients. They receive only ongoing case management services, and the acute health problems they had experienced at enrollment have often been resolved.

The net costs of these two groups differ. If we define (somewhat arbitrarily) new clients as those who have received case management services for less than six months, their total government cost per survival month would be \$1,600 under the basic model and \$2,200 under the financial control model. For on-going clients--that is, those who survive and continue to receive services beyond six months after randomization--we estimate that the total government cost would be only \$1,400 under the basic model and \$1,900 under the financial control model. These figures for ongoing clients represent reductions of, respectively, 12 and 15 percent from the figures for new clients.⁷⁰

As we suggested earlier, this reduction is due partially to differences in the costs of channeling case management (initial costs are incurred only for new clients) and partially to declining medical expenses (for instance, medical expenditures per survival month for controls declined after the first six months following randomization).

To make budget calculations easier, we converted these estimates of the costs per survival month (units that are difficult to measure outside of a demonstration) into costs per active case month. To do so, we multiplied the costs per survival month by the ratio of survival months to case months (case months are less than survival months because of survivors who were terminated from channeling). These calculations are presented in Appendix D. Table V.1 presents the resulting estimates. They show that it costs the government just over \$2,500 for every month in which a new client

⁷⁰ Appendix D presents the estimated cost per survival month for the periods from 1 to 6, 7 to 12, and 13 to 18 months after randomization. We have used costs per survival month for the period 13 to 18 months after randomization as our estimate for ongoing-client costs. Estimates are provided separately for the treatment and control groups. Thornton, Will, and Davies (1986) present the initial and ongoing costs of channeling.

participates in the basic model of channeling. Under the financial control model, the government's cost is almost \$2,500 per case month. For ongoing clients, the costs are slightly under \$2,500 per case month under the basic model, and \$3,000 per case month under the financial control model.

The average cost per case month for a permanent program will be determined by the costs of serving these two types of clients and the mix of these clients. The demonstration cost estimates for the two types provide a reasonable basis for making budgetary calculations (although they should be modified to reflect any anticipated changes in the models or the environment). The mix of new and ongoing clients that was observed in the demonstration is inappropriate; in the long run, a channeling program will consist of proportionately more ongoing clients.

TABLE V.1: Estimated Net Government Costs Per Casemonth for an Ongoing Channeling Program			
Client Type^a	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
Basic Case Management Model			
New Clients	2,522	2,313	209
Ongoing Clients	2,492	2,274	218
All Clients	2,498	2,282	216
Financial Control Model			
New Clients	3,291	2,890	401
Ongoing Clients	3,028	2,495	533
All Clients	3,081	2,574	507
NOTE: Cost per casemonth for the control group was estimated as the cost per survival month for the control group multiplied by the ratio of survival months for the control group to casemonths for the treatment group. Government costs include that for medical and long term care services, as well as payments from Social Security, Supplemental Security Income, and other social insurance programs. See Appendix D for a full discussion of these estimates.			
a. New clients are those persons who are enrolled for six or fewer months. Ongoing clients are those who survive and remain enrolled beyond six months.			

The change in client mix is due to the long-term nature of channeling. Many clients will continue to receive services long after their enrollment. Thus, as clients continue to be enrolled, the program's stock of ongoing clients will continue to rise. That is, each year, the program must serve the surviving ongoing clients from previous years, as well as those former new clients who have become on-going clients because they continued to participate in channeling. Ultimately, attrition among the long-term clients due to death, institutionalization, and individual decisions to decline further services should balance the inflow of new clients, and the projects should reach a stable caseload size and mix.

We estimated the mix of new and ongoing clients in a permanent program based on the estimated length of time that clients remained enrolled in channeling. Because we observed our sample only for 18 months at most (and thus cannot be certain what the average length of participation would be in the long run), we have used the extrapolations presented in Chapter IV (and derived in Appendix D) to draw estimates

which indicate that, in the long run, 20 percent of the caseload will constitute new clients (persons who have been in the program for six months or less), and the remaining 80 percent will constitute ongoing clients.

Using these fractions, we estimate that the average cost per case month in a ongoing program would be approximately \$2,500 under the basic model and \$3,100 under the financial control model. Annual-budget costs would be derived by multiplying these cost-per-case-month estimates by 12 to yield costs per case year and then multiplying that product by the expected caseload size. Thus, a program based on the basic case management model that expected to have an annual active caseload of 1,000 persons would cost the government approximately \$30 million per year, including both direct operating costs and the net cost of channeling to other government programs. In the absence of such a channeling program, the government would have spent approximately \$27.6 million on the persons included in this caseload (based on the experience of demonstration controls). Thus, adding the channeling basic model would raise government costs by 8.7 percent (recall that the average costs to the government per client who is offered basic-model channeling services rose by approximately 9.5 percent). Under the financial control model, annual government costs would rise by almost 20 percent.

2. *Implications of Different Caseload Definitions*

To budget an ongoing program, one uses the average cost per case month (weighted for the appropriate mix of new and ongoing clients) multiplied by the expected average size of the ongoing program. This exercise depends crucially on the definition of clients that is used. It is essential that the same definition be used to estimate caseload size as is used to calculate annual costs per case month.

In particular, it should be noted that our estimates reflect the caseload definitions used in the demonstration. Thus, only persons actively receiving case management services were included in the caseload. All individuals who entered a nursing home, declined services, moved out of the catchment area, died, or were otherwise judged inappropriate for services were terminated from the program.

If a program used a different estimate of caseload, then it would be necessary to use different estimates of cost per case month for assessing its impact on the government budget. For example, a program might use a broader definition that kept some persons who entered a nursing home or declined services on the caseload. Such a definition would be consistent with desires to serve those persons if they subsequently decided to return to the community or ask for services. Our estimates of cost per case month would be inappropriate for a program using this definition of caseload; their use would overstate net government costs since the broader definition of caseload includes persons who receive essentially no program services. In such cases, it would be necessary to recompute the cost per case month estimates to reflect this change in the definition of caseload.

3. *Implications of Alternative Estimates of the Costs of Channeling Case Management*

The third critical element in estimating the annual net cost of operating channeling as an ongoing program is to assess the consequent changes in the average costs of case management. To do so, one must extrapolate beyond the demonstration data, thus adding considerable uncertainty to the estimates. Nevertheless, we can assess the sensitivity of the net cost per case month estimates to changes in the costs of delivering channeling case management.

Thornton, Will, and Davies (1986) estimated that during the steady-state phase of the demonstration approximately 40 percent of the initial costs and over 50 percent of the ongoing case management costs (excluding direct service costs) were attributable to project administration, clerical, and provider relations activities. A larger-scale program may provide more opportunities for improving the efficiency of these administrative and support efforts. If we assume, for example, that these costs could be reduced by 25 percent (a percentage change that is smaller than the change reported by Thornton, Will, and Davies between the buildup and steady-state phases of the demonstration), then the costs of case management would decline by at least 10 percent: initial costs would fall by less than \$35 per client enrolled (from approximately \$340), while ongoing case management costs would fall by \$9 per case month (from \$90).

Such reductions in the average costs of channeling case management would reduce net costs per case month by less than 1 percent (since case management costs are less than 10 percent of total government costs). However, this change would reduce the net amount that channeling adds to the system by 5 percent (\$216 to \$205 per case month) under the basic model and by 2 percent (\$507 to \$496 per case month) under the financial control model.

4. *Estimates of Net Cost Per Case Month*

The three factors discussed herein--caseload mix, caseload definitions, and case management costs--are only a few of the dimensions along which the net costs of an ongoing program might differ from those of the demonstration. Yet they indicate the general range that one might observe for an ongoing program.

Examining costs per case month does not change the central conclusion that living, medical, and long term care costs would be higher under channeling. We estimate that net government expenditures per case month, including costs for Social Security and transfers, would rise by approximately 10 percent (\$216 per case month) under the basic model and by approximately 20 (\$507 per case month) percent under the financial control model. These numbers reflect the average costs observed during the steady-state phase of the demonstration, assume that 20 percent of the future caseload will consist of new clients, and are based on the demonstration definition of clients.

These net annual cost estimates indicate larger net cost increases than did the social cost per client estimates presented in Chapter II, since the savings that accrued to clients are excluded for the government perspective presented here. Those costs that do accrue to the government will be spread across several government agencies. The specific distribution will depend on how channeling services are financed.

D. COMPARISON WITH OTHER COMMUNITY CARE DEMONSTRATIONS

Comparisons between the benefit-cost findings for channeling and those for other community care demonstrations are difficult because of differences in analytical methodologies, data sources, and the populations served. Differences in the types of cost data collected are particularly limiting. Given the many providers and sources of reimbursement and funding, the cost data, by their nature, are distributed throughout the system. Thus, cost analyses must adopt broad data collection strategies, such as those used in the channeling evaluation, or must limit the focus of their analysis.

Most other community-based care demonstration efforts have chosen to limit their analytical focus. They have obtained cost data from the demonstration projects (for demonstration-funded costs) or from Medicare or Medicaid claims files. These sources typically lack information on private and other public costs. Such missing data can be particularly problematic with respect to assessing the impacts of formal community services and separate case management services. The varying coverage of the cost data used to evaluate the other demonstrations makes it difficult to make comparisons with them.

Nonetheless, the overall findings for channeling can be compared in general terms with those for the other community care demonstrations that have been implemented and evaluated over the past 15 years:

- Massachusetts' Worcester Home Care Project (Commonwealth of Massachusetts, 1976)
- National Center for Health Service Research's (NCHSR) 222 Six-Site Study (Weissert, Wan, and Livieratos, 1980)
- Georgia's Alternative Health Services Project (Skellie, Favor, Tudor, and Strauss, 1982)
- Wisconsin's Community Care Organization (Seidl, Applebaum, Austin, and Mahoney, 1983)
- California's Project OPEN (Mount Zion Hospital and Medical Center, 1983)

- South Carolina's Community Long Term Care Project (Blackman, Brown, and Learner, 1984)
- Florida's Pentastar Project (Florida Department of Health and Rehabilitative Services, 1984)
- North San Diego County's Long Term Care Demonstration Project (Allied Home Health Association, 1984)
- Connecticut's Triangle Project (Shealy, Hicks, and Quinn, 1979)
- San Francisco's On-Lok Project (Zawadski, Shin, Yorki, and Chin-Hansen, 1984)
- California's Multipurpose Senior Services Project (MSSP) (Miller, Clark, and Clark, 1984)
- New York City's Home Care Project (Sainer, 1984)
- New York State's Nursing Homes Without Walls (Birnbaum, Gaumer, Pratter, and Burke, 1984)

The impacts of these demonstrations on the use of nursing homes and other services are discussed in the references cited herein and in the various demonstration technical reports. Here, we focus only on their general cost findings, which are summarized in Table V.2.

In general, the overall findings for channeling are consistent with the findings from these previous demonstrations. Higher costs were reported in 9 of the 12-earlier demonstrations that used individual data and examined costs outside those that were spent by the demonstration project itself.⁷¹ Among the other three demonstrations, one reported essentially no difference (a 2.6 percent reduction), one had mixed results (a reduction in one site and an increase in another), and one reported a substantial reduction. This last result, the substantial reduction reported for the On-Lok Project, is based on a comparison group methodology that exhibited documented noncomparabilities between the treatment and control groups.

⁷¹ Fourteen demonstrations are listed in Table V.2. The ACCESS demonstration, which did not use individual data, and the Worcester Home Care project, which examined only project costs, are excluded from our discussion.

TABLE V.2: Direct Service Costs Per Month for Community Care Demonstrations

Demonstration	Time Period	Funding Sources	Nursing Home		Hospital		Community ^a		Physician and Other Medical		Total	
			Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
Randomized Design												
Worcester Home Care (1973-1975)	26 months	Project	0	0	0	0	54	0	0	0	54	0
NCHSR Day Care/Homemaker Experiment (1975-1977)												
Day Care	12 months	Project	0	0	0	0	281	0	0	0	281	0
		Medicare	---	---	---	---	---	---	---	---	533	534
		Total	---	---	---	---	281	---	---	---	813	534
Homemaker	12 months	Project	0	0	0	0	232	0	0	0	232	0
		Medicare	---	---	---	---	---	---	---	---	864	786
		Total	---	---	---	---	232	---	---	---	1095	786
Combined	12 months	Project	0	0	0	0	---	0	0	0	---	0
		Medicare	---	---	---	---	---	---	---	---	---	847
		Total	---	---	---	---	---	---	---	---	1243	847
Georgia AHS (1976-1980)	12 months	Project	0	0	0	0	152	0	0	0	152	0
		Medicaid	50	64	40	23	6	6	38	43	284	135
		Medicare	0	0	95	75	1	1	28	27	126	104
		Total	50	64	135	98	159	7	67	70	410	235
Wisconsin CCO (1977-1980)	14 months	Project	0	0	0	0	188	0	0	0	188	0
		Medicaid	70	97	58	158	84	133	92	119	307	507
		Total	70	88	58	158	271	133	92	119	494	507
Project OPEN ^b (1979-1983)	35 months	Project	0	0	0	0	342	0	0	0	342	0
		Medicare	2	16	489	628	43	53	0	0	534	697
		Total	2	16	489	628	385	53	0	0	876	697
South Carolina LTC (1980-1984)	36 months	Project	0	0	0	0	77	0	0	0	77	0
		Medicaid	164	253	10	6	5	2	21	13	200	274
		Medicare	4	6	101	83	13	10	25	21	143	119
		Total	168	259	111	89	95	12	46	34	420	393
Florida Pentastar ^c (1981-1983)	12 months	Project	0	0	0	0	202	19	0	0	202	19
		Food Stamps	0	0	0	0	43	42	0	0	43	42
		Housing assistance	0	0	0	0	27	28	0	0	27	28
		Medicare/Medicaid	---	---	---	---	---	---	---	---	207	199
		Other Public (other than Medicaid/Medicare)	0	0	0	0	18	21	0	0	18	21
		Total	---	---	---	---	290	110	---	---	497	312
San Diego LTC (1981-1984)	12 months	Project	0	0	0	0	478	0	0	0	478	0
		Medicare	5	8	444	473	13	63	---	---	462	543
		Medicaid	---	---	---	---	---	---	---	---	75	129
		Total	5	8	444	473	491	63	---	---	1019	672

TABLE V.2 (continued)

Demonstration	Time Period	Funding Sources	Nursing Home		Hospital		Community ^a		Physician and Other Medical		Total	
			Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
Channeling (1982-1985)												
Basic Case Management Model	18 months	Project	0	0	0	0	108	0	0	0	108	0
		Medicare	11	15	440	426	128	113	116	108	695	661
		Medicaid	67	62	17	23	27	30	13	16	124	131
		Other Public Clients and Families	0	1	0	0	63	79	0	0	63	80
		Total	45	68	29	28	324	341	24	22	422	459
			123	145	486	477	650	563	153	145	1412	1330
Financial Control Model	18 months	Project	0	0	0	0	408	0	0	0	408	0
		Medicare	17	15	597	575	101	181	162	157	877	928
		Medicaid	60	59	35	36	14	30	17	15	125	140
		Other Public Clients and Families	1	1	0	0	33	67	0	0	34	68
		Total	54	66	43	39	308	322	29	29	434	456
			132	141	675	650	864	600	208	201	1878	1592
Nonrandomized Design												
ACCESS (1975-1979)	---	---	---	---	---	---	---	---	---	---	---	---
Triage (1977-1979)	12 month	Diary accounting of costs (Total)	35	2	213	124	71	16	76	28	394	170
On Lok (1979-1983)	12 months	Project	0	0	0	0	98	0	0	0	98	0
		Diary accounting of costs	143	679	469	1145	326	263	421	110	1420	2198
		Total	143	679	469	1145	423	263	421	110	1518	2198
MSSP (1979-1983)	12 months	Medicaid	---	---	---	---	---	---	---	---	248	164
		Medicare	---	---	---	---	---	---	---	---	906	362
		Total	---	---	---	---	---	---	---	---	1154	606
Nursing Home Without Walls (1978-1983)												
Upstate project	12 months	Medicare	---	---	---	---	---	---	---	---	299	224
		Medicaid	---	---	---	---	---	---	---	---	533	894
		Total	---	---	---	---	---	---	---	---	825	1117
New York City project	12 months	Medicare	---	---	---	---	---	---	---	---	518	528
		Medicaid	---	---	---	---	---	---	---	---	1143	539
		Total	---	---	---	---	---	---	---	---	1633	1159

TABLE V.2 (continued)

Demonstration	Time Period	Funding Sources	Nursing Home		Hospital		Community ^a		Physician and Other Medical		Total	
			Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
New York City home care ^b (1980-1984)	8 months	Project	---	---	---	---	551	0	---	---	551	0
		Medicare	3	10	554	527	47	50	---	---	603	598
		Medicaid	---	---	---	---	---	---	---	---	60	124
		Total	3	10	554	527	598	50	---	---	1215	713

NOTE: Costs per months were calculated by dividing costs reported for the time period by the number of months in the time period. All dollar amounts are converted to constant dollars for the first quarter of 1984, using the GNP implicit price deflator.

- a. Includes case management and formal community services, wherever available. In the case of channeling, this column also includes room and board in the community.
- b. Data for this project come from the final report of Berkeley Planning Associates, 1985. The data from Project OPEN's final report (Sklar and Weiss, 1983) show treatments to have lower total costs, however.
- c. The Pentastar project report the costs of the initial assessment for the control group members as project services for controls.

An additional comparison can be made across several of the demonstrations in terms of the costs of the case management services (that is, project costs excluding those for formal community services and other direct services). Berkeley Planning Associates (1984) estimated these costs on a consistent basis for five earlier demonstrations. Thornton, Will, and Davies (1986) compared the case management costs incurred by the basic and financial control model projects in the demonstration with these earlier cost estimates. The results indicated that channeling costs were about in the middle of the range of the case management costs for the five earlier demonstrations.

The evidence from these previous evaluations, combined with the findings from channeling, yields two general conclusions about the benefits and costs of channeling-type programs. The first is that these efforts will tend to raise overall costs. Community-care programs have largely been unsuccessful in delivering services only to those clients who would enter a nursing home in the absence of community services. This has limited their ability to generate system savings. At the same time, they have increased the general level of services provided to community residents, thereby increasing overall costs.

The second conclusion is that these extra services to community residents have apparently increased the quality of the lives of the elderly clients and their informal caregivers. In the demonstration, we found that channeling reduced the average number of unmet needs, and increased clients' satisfaction with services, their confidence that they would receive the necessary services, and their global life satisfaction. Channeling was also found to increase the quality of the lives of primary caregivers and their satisfaction with service arrangements. Furthermore, the formal services provided by channeling did not appear to cause primary caregivers to reduce their efforts.

These two conclusions must be considered together in order to make the final assessment of channeling. The net costs of this intervention are now well documented, both in this report and in previous studies. Benefits in the form of increases in life quality have been more difficult to document, but they do appear to exist. The issue for consideration is whether the largely intangible benefits are worth the net costs of producing them.

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APPENDIX A. ALTERNATIVE CASE MANAGEMENT

Case management services vary substantially. They are provided by a range of organizations, including ones similar to the channeling projects as well as home health agencies, hospital discharge planners, and other care providers. The services also may vary in their comprehensiveness, duration, and intensity.

The challenge facing the benefit-cost analysis is to capture the costs of all the various case management services. We have approached this task by dividing all case management provided to sample members into three categories. The first category contains all the costs of providing channeling case management to treatment group members. These costs were estimated by Thornton, Will, and Davies (1986), who used demonstration accounting records. The second category includes all case management that was provided as part of other formal services--for example, case management provided by hospital discharge planners or home health aides. These costs are captured along with the other service costs incurred by these agencies and are included in the estimates of formal community service costs and hospital costs.

The third category includes case management that was provided as a separate service. These services were generally provided by case management agencies operated by the states or private non-profit organizations. These costs were estimated as part of the benefit-cost analysis using the data collected for the analysis of the receipt of case management (Brown and Phillips, 1986).

This appendix presents our procedures for estimating this third component of case management costs. These costs for case management provided as a separate service were estimated in two steps. The first step was to determine how many persons received such services in each six-month period. The second step was to estimate how much case management service those persons received and its cost. This second step involved several assumptions about the intensity and duration of these case management services. These steps are described in the following two sections; the resulting estimates were presented and discussed in Chapter III. When interpreting these estimates, it is important to remember that they include only a portion of the total cost for case management provided to sample members.

A. ESTIMATING RECEIPT OF CASE MANAGEMENT AS A SEPARATE SERVICE

We had two basic measures of the fraction of controls receiving case management as a separate service: data from provider records and interview data collected in the followup surveys. Both data sources have strengths and weaknesses, but they both indicate the same general level of use.

The provider records data accurately identified case management provided as a separate service, and, therefore, minimize the problem of double-counting the costs of such case management (that is, they avoid the problem of including here the costs of case management already captured by the analysis of formal community services). In contrast, the interview data indicate whether a sample member received case management from at least one of a list of agencies providing relatively comprehensive case management. In some cases, these agencies could have provided services other than case management, or persons could have received case management as a separate service from another agency omitted from the list. Thus, in this regard, the provider records data appear to be more accurate for benefit-cost purposes.⁷²

However, the interview data contain many more observations. Interview data about case management were available over for 1,400 control group members. Provider records data were available only for 297 control group members for the first six-month period and only for 140 control group members for the second six-month period, and they were not collected for the last six-month period. This smaller size for the provider records data increases the uncertainty inherent in estimates using those data. Thus, in this regard, the interview data appear to be more accurate.

We chose to use the provider records data in the benefit-cost calculations. We then tested the sensitivity of the benefit-cost findings to our use of these data by making an alternative estimate using the interview data. Because both data sets indicate similar levels of the receipt of alternative case management, there is not much difference in the two sets of estimates. Table A.1 presents both sets of estimates.

The estimates presented in Table A.1 are derived from the findings of Carcagno et al. (1986). The derivation included two steps. The first was required because both the provider records and interview estimates correspond to the survivor sample (only persons living to the end of a six-month period received an interview, which was also the basis for collecting provider records). All estimates used in the benefit-cost analysis reflect the entire research sample, in that they include persons who died during our observation period. Thus, we needed to adjust the estimates for survivors to reflect the death rates. This was done for each six-month period by multiplying the estimates for survivors by the associated percent of the sample which survived to the end of that period (estimates of the survival rate were obtained from Wooldridge and Schore, 1986).⁷³

The second step in the derivation was to estimate the percent of the sample receiving separate case management in the period 13 to 18 months after randomization (the third, and last, six-month period observed). Provider records and interview data on

⁷² In their analysis of the effects of case management, Brown and Phillips (1986) examined the quality of a variety of measures of case management services and the purpose to which each is suited.

⁷³ This process will fail to capture use by persons who died prior to completing one of the followup interviews. This may have been a particular problem during the first six months when the factors that influenced persons to seek channeling services were strong. However, we feel the estimates used here indicate the correct order of magnitude, particularly when considered along with the estimates generated in the sensitivity tests (see Table A.2).

comprehensive case management data were not available for this period. In the absence of other data, we assumed that the receipt of alternative case management among survivors remained the same as it was in the previous six-month period, 7 to 12 months after randomization.

TABLE A.1: Alternative Estimates of the Receipt of Case Management as a Separate Service, Control Group Means			
Data Source	Months 1-6	Months 7-12	Months 13-18^a
Basic Case Management Model			
Provider records data	14.3	12.3	10.7
Interview data ^b	16.9	10.4	9.0
Financial Control Model			
Provider records data	20.8	13.3	12.3
Interview data ^b	22.0	13.8	12.8
<p>NOTE: Estimates were derived from Brown and Phillips (1986), who provided estimates for the followup sample. Here, we have multiplied those estimates by the fraction of persons alive at the end of each six-month period in order to convert to a per-client-enrolled basis. This correction is an approximation and will exclude use by persons who died prior to completing a followup interview.</p> <p>a. The estimates for this period are not based on observed data. Instead, they assume that the fraction of survivors who use case management as a separate service remains the same as for the previous period, months 7 to 12. The differences between the estimates for months 7 to 12 and those for months 13 to 18 reflect the different fractions of the sample that died by the end of these periods (data on deaths were obtained from Wooldridge and Schore, 1986).</p> <p>b. The interview data indicate that a sample member reported receiving services from an agency that provided separate case management services. In general, agencies that provide comprehensive case management services do so as a separate service. Thus, these interview data approximate the receipt of separate case management services, but they are not as precise in this regard as the provider records data.</p>			

B. ESTIMATING THE AMOUNT OF CASE MANAGEMENT RECEIVED

It proved to be difficult to estimate the amount and cost of the separate case management received by controls who reported that they had received such services. Most case management agencies that were interviewed for the provider records data collection effort did not maintain records about the amount of services provided or the cost per client of providing these services. In many cases this reflected the fact that such services were provided at no charge because the agency or program was supported by general grants rather than by fees for service. Thus, we were unable to obtain an accurate estimate of the average cost per person of these case management services.

Faced with this problem, we attempted to make a rough estimate of costs per person that was consistent with our general observations about the case management services provided to controls in the demonstration sites. Because such estimates involve uncertainty we tested the sensitivity of the benefit-cost findings to changes in the

estimate of average cost by recalculating net costs using alternative estimates of average cost.

All together, we made four estimates of the costs of case management provided as a separate service. These estimates differ in the assumptions they make about the fraction of controls receiving case management as a separate service and about the cost of that service. As noted above, there were two alternative estimates about the fraction of controls receiving these services--one based on provider records data, and the other based on interview data. We also used three cost estimates based loosely on the costs observed for channeling. These three cost estimates include: (1) a "high" estimate which assumes that other case management was as comprehensive and intensive as channeling, (2) a "middle" cost estimate, which we have used as our primary estimate in calculating the net cost of channeling (that is, 75 percent of the cost observed for channeling), and (3) a "low" estimate which assumes that the other case management service costs equaled the average initial costs incurred by channeling projects with the channeling outreach and screening costs excluded.

The channeling projects incurred \$646 in costs per treatment group member over the first six months after random assignment. This cost includes \$330 in initial costs and 3.4 months of ongoing services at \$92 per month. Because some treatment group members dropped out prior to receiving services (see Carcagno et al., 1986, Table VIII.8) this cost estimate understates the cost for those treatment-group members who actually received services. To correct this underestimate, we divided the cost per treatment group member by the fraction of treatment group members who received some channeling services. This fraction varied across sites, but was approximately 91 percent overall. The resulting estimate was \$710 per person who received at least some case management during the first six months.

This estimate was used as our high cost estimate. The middle estimate was simply 75 percent of this figure, \$533 per six months. This fraction is arbitrary, but reflects the general conclusion of Carcagno et al., that, while many of the agencies that provided case management as a separate service provided comprehensive case management, it was, in general, less comprehensive and intensive than those provided by channeling.

The low cost estimate was \$230. This estimate equals the average initial costs of the channeling projects, with the costs for outreach and screening excluded.⁷⁴ While separate case management services may have provided followup as well as assessment and care planning services, we have assumed that their total cost per client equals these initial channeling costs.

For comparison purposes it is useful to consider the costs of an agency that maintained an average caseload of 100 clients per case manager. This client to case

⁷⁴ Thornton, Will, and Davies (1986) estimate that initial channeling costs per client were \$330 in the basic model. They also indicate that approximately 30 percent of these costs were due to outreach and screening. Thus, the initial costs without these functions would be approximately \$230.

manager ratio is high for many agencies, but we did observe some programs with this staffing pattern. In this case, a case manager would be able to spend about 10 hours per client every six months.⁷⁵ Our provider records data suggest that case management costs about \$30 per hour, implying a six-month cost of \$300 every six months. This figure is between our low and middle estimates.

Table A.2 presents our primary estimate (which is based on provider records data and assumes a cost of \$533 per six months) and the three alternative estimates. These estimates all indicate the same general level of use. The choice of provider records or interview data appears to make little difference: for the 18-month period, the two sets of estimates are within 5 percent of each other. The high cost estimate which assumes that alternative case management was as expensive as channeling is likely to be an upper bound, since channeling appeared to be more costly than most other case management agencies. None of these estimates indicates a level of use that would alter our overall benefit-cost conclusions. In particular, they do not suggest that savings from the reduced use of separate case management by clients would offset more than a fraction of the costs of channeling case management and the costs of the additional formal community services arranged through channeling.

TABLE A.2: Alternative Estimates of the Cost Per Person for Case Management Provided as a Separate Service, Control Group Means						
Estimating Assumptions^a	Basic Case Management Model			Financial Control Model		
	Months 1-6	Months 7-12	Months 13-18	Months 1-6	Months 7-12	Months 13-18
Use PRE data and cost per 6 months is \$533	76	66	57	111	71	66
Use PRE data and cost per 6 months is \$230	33	28	25	48	31	28
Use PRE data and cost per 6 months is \$710	102	87	76	148	94	87
Use interview data and cost per 6 months is \$533	90	55	48	117	74	68
a. These alternative assumptions are explained in the text; PRE indicates the data are from the provider records extracts.						

⁷⁵ This calculation assumes that the average work year for a case manager includes 2,080 hours. A person with a caseload of 100 clients could then spend 10.4 hours per client in a six-month period. As noted, some agencies providing separate case management services were observed to have average caseloads in this range, although the most comprehensive of these agencies tended to have smaller average caseloads.

APPENDIX B. SOCIAL SECURITY AND TRANSFER PROGRAMS

This appendix examines client receipt of payments from the Social Security Old Age, Survivors, and Disability Insurance (OASDI) program as well as payments from Veterans Administration cash-benefit programs, Supplemental Security-Income (SSI), and food stamps.⁷⁶ This Appendix begins with an overview of the mechanisms by which channeling might affect payments from these programs and the data sources used in the analysis. The second section presents the estimated effects.

A. OVERVIEW

Social Security, Veterans benefits, and transfer payments accounted for a substantial fraction of client income. As a result, they played an important role in clients' financial ability to live in the community and in their general well-being. Channeling could have affected these payments by (1) assisting clients to apply for income-conditioned transfers (such as SSI and food stamps), (2) helping clients to live in the community and thereby make them eligible for SSI and food stamp benefits that are paid only to persons in the community,⁷⁷ or (3) reducing client mortality, which would increase the time during which clients could receive all types of cash benefits. Such changes in payments would affect both the clients (and their families) and government expenditures.

At baseline, these payments accounted for almost 90 percent of the approximately \$560 in average monthly income reported by sample members. The bulk of these benefits (accounting for 85 percent of average income) were OASDI payments. Almost all sample members reported receiving OASDI baseline, and they reported an average payment of \$470 per month. There was less participation in SSI--only 17 percent of the sample members reported receiving it at baseline--and SSI payments were generally lower (\$221 per month for a person receiving SSI). Food stamps were received by 17 percent of the sample (these benefits were worth an average of \$46 per month for persons receiving them), and Veterans benefits were received by only 5 percent of the sample (the average value was \$242 per month for recipients).

Information about these payments came from self-reported data collected in the baseline and three followup interviews. These interview data correspond to the total amount received by a sample member plus his or her spouse (when applicable) and pertain to the month prior to the interview. In order to obtain estimates of the total cash benefits received during the 18-month observation period, we had to interpolate

⁷⁶ Impacts on participation in Medicaid are examined in Wooldridge and Schore (1986).

⁷⁷ Food stamp benefits are paid only to persons who reside in the community. SSI payments are limited to \$25 per month for persons in institutions where part of their care is paid by Medicaid.

between the observations. This process generally averaged the payment amounts reported by an individual at two consecutive interviews and multiplied the result by six to estimate the amount received for the six-month period defined by those two interviews.

Occasionally, some of the data need to interpolate were missing. Some sample members failed to report the dollar amount of their benefits even though they reported receiving payments from specific programs. Other sample members died during the observation period, and so no information was obtained about their transfer payment receipt between their last interview and their death.

When data were missing, we attempted to use the available information to impute the appropriate dollar amount. For sample members who reported a dollar amount at one interview but reported only that they received the benefit at a contiguous interview, we multiplied the reported amount by six to obtain a value for the period defined by the two interviews. For sample members who reported in two consecutive interviews that they received transfer payments (but gave no amounts), we imputed using average payments for that program. (The estimation sources for the imputations for each transfer program are listed in Table B.1.) For sample members who reported receiving transfers at one interview but died prior to completing their subsequent interview, we assumed that they continued to receive the reported benefits up to the time of their death.⁷⁸ If they were married, we assumed that benefits to surviving spouses were paid for the remainder of the period defined by the interviews preceding and following death. After that period, all payments for that sample member were assumed to be zero.⁷⁹

We estimated the effect of channeling on these payments using, with only a minor exception, the standard regression model and control variables used throughout the evaluation (see Brown, 1986, for details). The exception was to include an extra control variable representing OASDI receipt by the sample member and spouse at baseline. This extra variable was needed to control for a baseline difference in OASDI receipts between treatment and control group members.

⁷⁸ For those individuals receiving OASDI, we also added in the value of their OASDI death benefits.

⁷⁹ The treatment of payments to spouses is complicated. Our data include such payments for married sample members. If the sample member dies, OASDI pays benefits to his or her surviving spouse and (in some cases) dependents. SSI benefits are essentially determined on an individual basis, so if both members of a couple receive SSI the surviving member will continue to receive SSI benefits at the individual rate. Thus, payments under both these programs would continue until both individuals die or become ineligible. Because we do not have information about surviving spouses, we arbitrarily assumed that the surviving spouse benefits would continue only until the time of the next scheduled interview. We estimated impacts under the alternative assumption that the surviving spouse's benefits continued beyond that time; the impact estimates were essentially unaltered.

TABLE B.1: Average Monthly Payments for Cash Benefit Programs: Estimates and Sources		
Program	Average Payment Per Month (dollars)	Data Source for Estimate
OASDI		
Single recipient	402	Social Security Bulletin, Annual Statistical Supplement (1983), Table 99
Married couple	699	
SSI		
Single recipient	165	Mean monthly SSI payment for sample members reporting an SSI payment
Two recipients in the same household	256	
Veterans Cash Benefits		
Single recipient	177	Mean monthly Veterans benefit payment for sample members reporting a Veterans benefit payment
Married couple	268	
Food Stamps	46	Mean monthly benefit received by sample members who reported receiving food stamps.

B. ESTIMATED IMPACTS

The evaluation found that none of the three hypothesized mechanisms that could have affected the payments actually operated so as to change the average level of payments to clients. The process analysis (Carcagno et al., 1986) found that, while there were instances where case managers aid help needy persons apply for income-conditioned transfers, there was no evidence of a systematic effort to enroll clients in such transfer programs. Similarly, the impact analysis indicates that channeling had only trivial effects on mortality and community residence (Wooldridge and Schore, 1986). As a result, it is not surprising that we find virtually no difference between average payments made to treatment and control group members.

Table B.2 presents the specific estimates of the impacts on payments. The figures indicate the effect on average payments for persons in the followup plus deceased sample.⁸⁰ They indicate that there is virtually no difference between the average payments received by treatment group members and those received by the control group. None of the estimated treatment/control differences is statistically significant. Furthermore, the point estimates for the two groups are remarkably close. In all cases, we estimate that the treatment/control difference in average payments is less than 8 dollars per month. Thus, it appears that there was essentially no impact on average cash benefit payments.⁸¹

⁸⁰ This and the other analysis samples are described in Brown (1986). Because the followup-plus-deceased sample includes persons who have died, the estimates of average payments over a six-month period presented in Table B.2 are less than for persons who actually received the payments or who continued to live in the community.

⁸¹ This same conclusion is reached if we examine months of receipt of cash benefits rather than the dollar value of such benefits.

TABLE B.2: Estimated Impacts on Public Transfer Payments During 6-Month Periods: Followup Plus Deceased Sample

	Months 1-6				Months 7-12				Months 13-18			
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference		Treatment Group Mean	Control Group Mean	Treatment/Control Difference		Treatment Group Mean	Control Group Mean	Treatment/Control Difference	
BASIC CASE MANAGEMENT												
Earned-Entitlement Programs			(•)				(•)				(•)	
OASDI	2271	2271	0	(0.02)	1853	1840	13	(0.24)	1535	1511	24	(0.28)
Veterans	98	91	7	(0.48)	126	112	14	(0.85)	94	95	-1	(-0.07)
Income-Conditioned Programs			(•)				(•)				(•)	
SSI	175	176	-1	(-0.05)	173	181	-8	(-0.51)	116	109	7	(0.31)
Food Stamps	47	52	-5	(-0.97)	42	46	-4	(-0.82)	33	32	1	(0.15)
Total	2589	2590	1	(0.03)	2192	2177	15	(0.25)	1777	1747	30	(0.33)
Sample Size	1365	950	2315		1301	897	2198		650	476	1126	
FINANCIAL CONTROL MODEL												
Earned-Entitlement Programs			(•)				(•)				(•)	
OASDI	2534	2490	44	(1.85)	2041	2017	24	(0.44)	1671	1608	63	(0.71)
Veterans	51	62	-11	(-0.77)	51	61	-10	(-0.59)	26	57	-31	(-1.44)
Income-Conditioned Programs			(•)				(•)				(•)	
SSI	182	163	19	(1.31)	162	166	-4	(-0.24)	163	174	-11	(-0.51)
Food Stamps	42	43	-1	(0.22)	35	33	2	(0.49)	30	31	-1	(-0.19)
Total	2808	2758	50	(1.67)	9	2276	13	(0.22)	1890	1871	19	(0.20)
Sample Size	1605	879	2484		1546	823	2369		745	389	1134	
<p>NOTE: Treatment/control differences are estimated using multiple regression to control for site and individual baseline characteristics. T-statistics on the treatment/control differences are in parentheses. The total sample size is in the treatment/control difference. Details may not sum to totals because of rounding.</p> <p># Treatment/control differences differ statistically from each other across models at the 5 percent significance level.</p> <p>†/• Indicates whether (†) or not (•) all of the impact estimates in the group under the heading differ from zero statistically at the 5 percent significance level when tested jointly.</p> <p>* Different from zero statistically at the 5 percent significance level, using a two-tailed test.</p> <p>** Different from zero statistically at the 1 percent significance level, using a two-tailed test.</p>												

APPENDIX C. ESTIMATING IMPACTS ON FORMAL COMMUNITY-BASED SERVICE EXPENDITURES

The analysis of channeling impacts on formal community-based service expenditures employed data from Medicare, Medicaid, the channeling financial control system, channeling project cost records, the client tracking system, and provider records extracts. The Medicare, Medicaid, and channeling data accurately indicate expenditures from these three sources.⁸² However, expenditures by other public organizations (e.g., the Veterans Administration, social service block grants, or Title III funds) and by clients (and their friends and private insurance) are not captured as accurately. These expenditures are estimated using provider records data that are more limited in their coverage and accuracy.

This appendix outlines the limitations of these provider records data and describes the methods used in generating the benchmark estimates presented in Table II.2, Table II.3, Table II.4, and Table II.5. In addition, three sensitivity tests based on alternative estimation strategies are described.

As mentioned above, we were limited in our ability to estimate channeling impacts on other public and private expenditures. Provider records were the only available sources of data on expenditures by private payors and public programs other than Medicare, Medicaid, and channeling. Moreover, the sample of persons with such data was small for a number of reasons. First, provider records extracts were prompted only for a 20 percent subsample. Second, a relatively small fraction of these sample members received services paid for privately or by other public funds. Finally, not all providers supplied the information. In addition, for the 7- through 12-month period, provider records extracts were prompted only for those individuals in the 20 percent subsample who were randomized in the earlier months of the program; for the period from 13 to 18 months, there were no provider records prompts.⁸³

Impact estimates for the first two time periods (months 0-6 and 7-12) were estimated via ordinary least-squares. The resulting coefficients were inflated for the underreporting of public and private expenditures (due to the underreporting of service

⁸² Although Medicare and Medicaid records provided a complete picture of expenditures for those services which were covered, sample attrition may have contributed to an underestimate of total Medicaid expenditures. Due to resource constraints, Medicaid claims were prompted only for sample members who reported Medicaid coverage at the time of the sample member interviews. As a result, sample members who became Medicaid-covered after the baseline interview but died prior to the 6-month followup interview were included in the analysis sample and were coded as incurring no Medicaid expenditures (despite the fact that they may have had claims prior to death). For this group, however, the problem is probably minor, since Medicaid eligibility that was established subsequent to the baseline interview most likely would have been in connection with nursing home admission. It is likely, in this case, that Medicaid coverage was used for nursing home rather than community services.

⁸³ The available analysis sample for months 7 to 12 was only about half as large as that available for months 1 to 6.

use by both sample members and providers).⁸⁴ In addition, since no provider records data were collected for the 13- through 18-month period, Corson et al. (1986) estimated public and private expenditures for formal community services provided during this last period as a function of the 7- to 12-month expenditure estimates. This extrapolation adjusted for changes in the average time spent in the community because of deaths or changes in institutionalization rates, and assumed that average expenditures and percentage impacts were the same in these two time periods as they were for those in the community.

In addition to the general limitations of the provider records data outlined above, the distribution of expenditures was highly skewed, due to a small number of high-use individuals in the basic case management model sites.⁸⁵ Provider records for two control group members in basic case management model sites indicated that they each received over \$20,000 worth of formal community services in the first 6 months after randomization (they reported receiving round-the-clock care from multiple visiting caregivers). Eighty percent of these expenditures were from private sources, while 20 percent were paid by public funds other than Medicare and Medicaid. Indeed, the private expenditures of these two persons plus one other high-use control-group member accounted for approximately 70 percent of the private expenditures for all control-group members in the basic case management model. Because the provider records sample was quite small (only 130 basic model controls had valid data on private expenditures in months 1 to 6), these outliers had a very strong effect on estimates of average private expenditures for the control group and the mean differences between the treatment group and the control group.

Alternative estimates of impacts on formal community-based services were computed by Corson et al. (1986). One set included the full provider records sample, and one set eliminated those individuals with private expenditures over \$10,000--namely, the two cases described above and a few others.⁸⁶ Corson et al., concluded that the estimates made by eliminating the very high service users from the sample were more reasonable than were those for individuals in the sample, because the treatment/control distribution of high users was concentrated only in the control group in one time period. The situation was accentuated in using the provider records data, since the few high users in the treatment group (as documented in the interview data) were, by chance, not selected for the 20% provider records sample. In this report, we have followed Corson et al., in using as our benchmark set of estimates the estimated average expenditures, excluding the high-use cases. In addition to the formal community service expenditure estimates based on records data, Corson et al., also present two additional sets of estimates based on interview data. Like the estimates

⁸⁴ Corson et al. (1986) estimated the extent to which provider records understated expenditures by comparing Medicare expenditures for specific services reported in provider records with measures of expenditures from Medicare records for the same services. They found evidence of substantial underreporting.

⁸⁵ Note that the high users were concentrated in the control group in the 1- to 6-month period.

⁸⁶ Note that, in order to be consistent, Corson et al. (1986) eliminated these cases from the samples used to estimate impacts on expenditures incurred by each payment source (including Medicare and Medicaid). This restriction had only a very small impact on the estimates for payment sources other than private (and other public).

presented above, one set includes high-use cases, while the other set excludes them. Both estimates were calculated by multiplying use data from the interviews by unit prices for services and, then, mean weeks in the community. This procedure assumes that expenditures in the snapshot week at the end of each period are representative of average expenditures per week in the community over the entire six-month period. Because of the number of assumptions involved both in generating an estimate of total expenditures according to this method and in breaking that total down by payment source, Corson et al. (1986) concluded that the benchmark estimates discussed above are probably more accurate. All four sets of estimates of total formal community service expenditures are presented in Table C.1.

As indicated above, the benchmark estimates of the total net cost of channeling presented in Table II.4 and Table II.5 used the formal community service estimates based on records data, excluding the high-use cases. To investigate the sensitivity of these benchmark estimates, we reestimated the net cost of channeling using the three alternative sets of estimates. Table C.2 summarizes the results of these sensitivity tests.

For the basic case management model, the four estimates of total net cost over the 18-month observation period range from \$369 to \$1,708, indicating that the benchmark estimates appear to be sensitive in that model to the data set used and to whether or not we include the high-use cases. Table C.3 presents the lowest estimate, representing a net cost of \$369 per client over 18 months, broken down by cost component and funding source. (The benchmark estimates are presented in Table II.4 and Table II.5.) As Corson et al., point out, it is possible that the large reduction in formal community service private expenditures (which drives the lower net cost estimate) is a true effect of channeling--that is, that channeling found more cost-effective alternatives to round-the-clock care for the few clients who would have been high users in the absence of the program. However, as noted above, we feel that the high service users are overrepresented in the control group in the first six-month observation period, so that estimates made by eliminating them from the sample (such as the benchmark estimates) are more likely to represent the true impact of channeling.

For the financial control model, the situation is more clear-cut. This model clearly increased the use and expenditures for formal community services, leading to a total net cost of channeling within a range of \$3,124 to \$3,396 per client over the 18-month observation period. Total net cost, as well as the distribution across payment sources, did not appear to vary substantially among alternative estimates of formal community service expenditures.

TABLE C.1: Alternative Estimates for Formal Community Case Expenditures									
	1-6 Months			7-12 Months			13-18 Months		
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
BASIC CASE MANAGEMENT MODEL									
Excluding High Service Users									
Interview-Based Estimates	1957.61	1723.66	233.95	1611.32	1341.21	270.11	1186.52	1118.14	68.38
Records-Based Estimates	1353.19	1393.01	-39.82	1084.62	974.92	109.70	929.18	813.02	116.16
Excluding High Service Users									
Interview-Based Estimates	2068.22	2108.15	-39.93	1747.75	1582.65	165.10	1172.47	1169.39	3.08
Records-Based Estimates	1241.89	1748.12	-506.23	1071.75	1246.20	-174.45	923.40	1045.62	-122.22
FINANCIAL CONTROL MODEL									
Excluding High Service Users									
Interview-Based Estimates	2820.04	1728.01	1092.03	2195.16	1526.79	668.37	1864.01	1140.40	723.16
Records-Based Estimates	2410.09	1761.89	648.20	2073.08	1008.66	1064.42	1750.77	859.05	891.72
Excluding High Service Users									
Interview-Based Estimates	2802.84	1728.01	1074.83	2182.19	1526.79	655.40	1876.07	1268.84	607.23
Records-Based Estimates	2358.58	1773.41	585.17	2130.34	1011.40	1118.94	1794.94	859.06	935.88
SOURCE: Corson et al., 1986.									

TABLE C.2: Alternative Estimates of the Social Net Costs of Channeling Per Client During Months 1-18		
	Basic Case Management Model	Financial Control Model
Records-Based Estimates		
Excluding high service users (benchmark)	1,328	3,363
Including high service users	369	3,396
Interview-Based Estimates		
Excluding high service users	1,708	3,264
Including high service users	1,275	3,124

**TABLE C.3: Estimated Net Costs and Benefits of Channeling Per Client During Months 1-18, by Analytical Perspective; Formal Community-Based Service Estimates Based on Full Records
Sample: Basic Case Management Model
(1984 dollars)**

Cost Component	Government Budget					Clients and Families ^b	Society As a Whole
	Medicare	Medicaid	Channeling	Other Public ^a	Total Government		
A. OBSERVED NET COSTS							
Channeling Case Management Services	0	0	1,170	0	1,170	0	1,170
Formal Community-Based Services	242	-30	298	-45	465	-1249	-784
Community Room and Board	0	0	0	33	33	83	116
Alternative Case Management ^c	0	0	0	-192	-192	0	-192
Nursing Home	-40	16	0	-3	-27	-258	-284
Hospital	252	-76	0	0	177	20	197
Other Medical Services ^d	137	-32	0	0	106	41	147
Social Security ^e	0	0	0	55	55	-55	0
SSI and Food Stamps	0	0	0	-10	-10	10	0
Net Cost for the Observation Period	592	-122	1,468	-163	1,775	-1,407	369
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. OBSERVED LIFE-QUALITY OUTCOMES^g							
<u>Clients</u> Mortality was unaffected by channeling. For survivors, channeling had a small (between 2 and 10 percent) impact on the percent of clients who were "pretty or completely satisfied" with life. The average number of reported unmet needs was generally lower among clients (by as much as 10 percent), and the number of persons with more than 3 unmet needs was between 22 and 34 percent lower among clients. Satisfaction with service arrangements was generally higher among clients, by as much as 48 percent. There were essentially no impacts on ADL functioning level. Average income was also unaffected.							
<u>Caregivers</u> There was no evidence of substitution of formal for informal care. There was no apparent impact on the amount of informal financial assistance. The life quality of primary caregivers increased according to some measures: overall life satisfaction rose, caregiver satisfaction with service arrangements increased, and caregiver worry about obtaining help was reduced somewhat. There were no evident impacts on reports of perceived caregiver financial, emotional, or physical strain.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare or Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

APPENDIX D. INFLATION, DISCOUNTING, EXTRAPOLATION, AND BUDGETING AN ONGOING PROGRAM

Channeling services are provided over time. As a result, there is a continuous stream of costs to provide the channeling case management and a similar stream of effects as that case management helps shape the services used by clients. To analyze this pattern of services, we had to account explicitly for the time period over which services were provided and the effects produced. This required that we address the issues of inflation, discounting, and extrapolation beyond the 18-month observation period. These issues are relevant for interpreting the evidence from the demonstration and estimating the magnitude of the net change in government expenditures required to fund channeling on an ongoing basis.

A. INFLATION

Channeling was fielded from early 1982 through 1984.⁸⁷ While inflation during this period was lower than in earlier years, it was still high enough to affect comparisons of dollars from different years. Using a broad-based inflation index, such as the implicit price deflator for the gross national product (GNP), the general price level rose by just over 10 percent during the period covered by the evaluation (first quarter of 1982 through the second quarter of 1984).⁸⁸ General price increases in the goods and services purchased by state and local governments and in medical services rose even faster. The prices of state and local government purchases rose by approximately 13 percent during the period of the evaluation, and medical service prices (measured by the change in the consumer price index for medical services) rose by 22 percent.

This type of change in the price level will distort treatment/control comparisons if channeling affects the time pattern of use. In particular, there would be a problem if channeling delayed nursing home admissions, but did not reduce overall use during the observation period. In this case, inflation would increase the nominal cost of nursing homes for treatment group members relative to that for control group members, an effect that would reduce the overall treatment/control difference in nominal expenditures for nursing homes.

Because of the possibility of such effects, the benefit-cost analysis (as well as most other components of the evaluation) attempted to control for the effects of inflation.

⁸⁷ This is the period of the demonstration. The channeling projects in most sites continued on after this period using other funding.

⁸⁸ The implicit price deflator for gross national product and the consumer price index are reported on a quarterly basis by the Council of Economic Advisors (1985).

In most cases, we collected dollar-denominated data on the outcomes of interest (for example, reported expenditures for nursing homes or hospitals). These nominal values were expressed in 1984 dollars by multiplying them by the ratio of the GNP implicit price deflator for the month of the observation to the deflator for the first quarter of 1984.⁸⁹ The first quarter of 1984 was chosen as the base period because it corresponded to the middle of the demonstration steady-state period: the time from the fourth quarter of 1983 through the second quarter of 1984 when the demonstration operations most closely resembled an ongoing program (see Carcagno et al., 1986, for a discussion of the demonstration phases). Because the data on channeling case management costs used in the benefit-cost analysis correspond to this steady-state period, the use of that period as a base period enabled us to use the cost estimates without adjustment. In those cases where outcome data were not already expressed in dollars (for example, use of owner-occupied homes), we valued the outcomes using shadow prices expressed in 1984 dollars.⁹⁰

B. DISCOUNTING

When summing benefits and costs that occur in different years, there is a problem that a benefit or cost (measured as a given amount of dollars) achieved this year is worth more than one achieved, say, ten years from now, even after inflation has been taken into account. Consider a result that reduced nursing home costs. The savings, if they occurred this year, could be reinvested and earn a rate of return over the next ten years. Thus, over a ten-year period, the value of this savings would equal the costs saved this year plus the return on investment over the next ten years. This value will clearly exceed the value of the same savings if they occurred ten years from now.

To reflect this, all benefits and costs must be calculated in equivalent values by discounting those that occur in the future by a factor that reflects the return that could have been earned in the interim. The resulting discounted values are termed "present values."⁹¹ For convenience, values are discounted to the point of randomization into the program.

The appropriate discount rate to use when evaluating social programs is always somewhat controversial. While the choice of a discount rate is very important for the

⁸⁹ Use of a single index has expositional and computational advantages. Also, the use of a broad-based index like the implicit price deflator for GNP more accurately captures changes in the general price level than do more narrowly focused measures like the consumer price index.

⁹⁰ Shadow prices are used to value changes in resource use where we did not collect data on dollar expenditures. In the case of owner-occupied housing, we imputed a dollar value from the reported number of rooms in the dwelling and its geographic location. The values used in this imputation procedure were all expressed in 1984 dollars.

⁹¹ Suppose a \$1,000 benefit occurs 10 years from now. What present value invested at a 5 percent return per annum would yield \$1,000 ten years from now? Call that value PV. PV invested today would earn 5 percent a year for 10 years or $(1 + 0.05)^{10}$. So its value 10 years from now is $PV(1 + 0.05)^{10} = \$1,000$. The present value is therefore equal to $1000 / (1 + 0.05)^{10} = \614 . This is the present value of a \$1,000 benefit occurring 10 years from now.

evaluation and is well established theoretically, there has never been a completely satisfactory way to estimate discount rates.⁹² Imperfections in the markets for capital, the existence of risk, uncertainty and inflation, and the fact that many tax-incidence questions are still unresolved have made it impossible to determine a single discount rate that is appropriate for evaluating social programs. As a result, the choice of a discount rate is typically done arbitrarily. Most studies of social programs have used rates between 3 and 10 percent a year. We use a middle value, 5 percent, and then test the sensitivity of the findings to this assumption by recomputing the values using 3 and 10 percent discount rates.⁹³ Under neither of these alternative discount rates does the estimated net cost for channeling change by more than 4 percent (for example, under the basic model, increasing the discount rate from 5 to 10 percent lowers the present value of net costs from \$1,338 per client to \$1,272 per client).

C. EXTRAPOLATION

The assessment of benefits and costs is limited by the demonstration observation period. In general, we have data on sample members only for the 18 months following randomization. Thus, we do not observe the long-term effects of channeling. However, we can assess the potential magnitude of those long-run effects and get a better understanding of the factors that will determine them by extrapolating trends observed during the 18-month observation period.

The process of extrapolating outcomes into the future is an uncertain one at best. In the case of the channeling evaluation, the process is particularly constrained because the 18-month observation period provides only a limited basis for assessing trends. Because of this uncertainty we are limited to a rough assessment of potential future net costs. We make a number of assumptions that reflect plausible future scenarios for key outcomes, and then calculate future costs under those assumptions. This exercise provides a means for assessing the potential magnitude of future net costs and an illustration of how key factors interact to generate those future net costs. Throughout this discussion, it should be remembered that only the rough order of the magnitude of costs and the general pattern of effects are important; specific values have little meaning in themselves.

⁹² Baumol (1968) provides a theoretical foundation for measuring the social discount rate. He suggests that it should measure the rate of return that the resources used for the public investment would have earned otherwise in the private sector. Bradford (1975) suggests the use of the rate at which consumers trade off future for current consumption (the social rate-of-time preference). These approaches lead to the same rate if all markets are competitive. In the presence of markets characterized by monopoly power, inflation, taxes, and uncertainty, however, the approaches lead to quite different results and are difficult to implement empirically in a correct manner.

⁹³ The 10 percent rate is mandated by the Office of Management and Budget (1972) for evaluating government investments. These rates are all expressed as real annual rates--that is, as annual rates net of the effect of inflation. Real rates are appropriate because inflation was taken into account by the procedures outlined in the previous section.

The procedure used to examine future costs had two components. The first was to estimate the average cost per day of serving persons in the community, nursing homes, and hospitals. The second was to extrapolate into the future the trends observed for months 1 to 18. These price and future-use estimates were then combined to derive an estimate of total future costs. In this section, we first discuss the estimation of average costs per day. We then turn to the extrapolation procedures. The resulting estimates of future costs are presented and discussed in Chapter IV. In the following calculations, we made separate estimates for treatment and control group members, except where explicitly noted.

1. *Estimating Average Daily Costs*

In estimating the average daily costs of serving persons in nursing homes, hospitals, and the community, we used data from the last six-month observation period for which complete data were available. In most cases, this was the last six months of the observation period, months 13 to 18. For nursing homes, we used the period from months 7 to 12, since this was the last period for which there were complete Medicaid-, Medicare, and provider records data on nursing home costs.

The use of the last period often required that we use a smaller sample than that available for earlier periods. However, despite this limitation, we felt that the last period was preferable, since it was closest to the periods to which we were extrapolating. Furthermore, there was a greater chance that any specific, acute problems clients had when they enrolled in channeling had been resolved by this last period, and so the last period would more accurately reflect the long-run costs of serving clients in the future.

The first step in estimating the average cost per day for services provided to persons in the community, nursing homes, and hospitals was to allocate the other covered medical services to these three statuses. The estimates of these other covered medical services are presented in Wooldridge and Schore (1986). We allocated these expenditures to the community, nursing home, and hospital statuses on the basis of general information about their composition.⁹⁴

⁹⁴ As mentioned in Chapter III, the estimates of other covered medical services include only expenditures reported in the Medicare and Medicaid records. We do not know the fraction of total expenditures for other medical services that are reported in these sources, but data from the National Health Care Expenditures Survey (Wilensky and Bernstein, 1983, and Berk and Schur, 1985) indicate that our estimates may exclude up to half the total other medical expenditures. These potentially missing costs mean that the estimates presented here should be interpreted with caution. As shown in Table D.2, the other medical service cost allocations account for no more than 18 percent of community costs, 16 percent of hospital costs, and 2 percent of nursing home costs. As a result, the missing components of other medical services (i.e., uncovered physician and other medical services and supplies) are not likely to have a substantial effect on the analysis.

The allocations are presented in Table D.1.⁹⁵ We began by assuming that all nonphysician services (which include, for example, podiatrist, pharmacy, and outpatient services) were provided to persons in the community. This assumption is plausible since nonphysician services provided to persons in hospitals and nursing homes are generally billed as part of the overall costs of those facilities. Physician services were allocated according to the distribution of Medicare service expenditures observed in our sample. This allocation places 66 percent of the physician expenditures that were included in the other covered medical estimates with the hospital costs. It places 30 percent of these expenditures with community costs, and the remaining 4 percent were allocated to nursing home costs. This assignment process is somewhat arbitrary, but should provide a reasonable approximation of the actual allocation. Moreover, other medical costs generally account for a small share of the total costs (see Table D.2), and so errors in the allocation will have a relatively small effect on the analysis.

TABLE D.1: Distribution of Other Covered Medical Services Expenditures Across Community, Nursing Home, and Hospital Statuses (Expenditures in Months 13 through 18; 1984 Dollars)				
Type of Service	Basic Case Management Model		Financial Control Model	
	Treatment Group Mean	Control Group Mean	Treatment Group Mean	Control Group Mean
Physician Services^a				
Community	109	89	150	165
Nursing Home	19	15	15	17
Hospital	248	203	335	369
Total	376	308	500	550
Nonphysician Services^b				
Total	180	200	288	270
Total	556	508	788	820

NOTE: Numbers may not sum to total due to rounding.

a. Total covered physician services were distributed across the three statuses according to the distribution of Medicare expenditures for formal community service expenditures, nursing home expenditures, and hospital expenditures. This distribution was 0.30, 0.04, and 0.66 in both models for community, nursing home, and hospital expenditures, respectively.

b. Since most nonphysician services incurred in a nursing home or hospital would have been captured directly by nursing home and hospital claims, all other nonphysician services expenditures were allocated here to the community status.

The second step of the process for estimating average daily expenditures was to combine the allocations of other covered medical services with the estimates of community, nursing home, and hospital costs. Estimates of the average costs per day of serving persons in hospitals and nursing homes were obtained from Wooldridge and Schore (1986). Table D.2 presents these daily costs, along with the allocated other covered medical service costs.

⁹⁵ The other covered medical services allocated to each status (community, nursing home, and hospital) were divided by the average number of days clients were in each of those statuses in order to estimate the average daily costs. These estimates correspond to the period 13 to 18 months after randomization (that is, the last six months of the observation period).

The average cost per day of serving persons in the community (exclusive of the other physician and medical services) was estimated by summing all the components of average community costs per person and then dividing by the average number of days in the community. The average cost included the costs of formal community services, housing, food and other living expenses, and case management services (including channeling for persons in the treatment group). The estimates of days in the community were derived from the estimates presented in Corson et al. (1986, Table III.3). Again, Table D.2 presents the estimated average daily costs.

TABLE D.2: Average Expenditures Per Day in Community, Nursing Home, and Hospital, by Type of Expenditure (1984 dollars)						
	Basic Case Management Model			Financial Control Model		
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
Cost Per Day in the Community						
Channeling	2.32	0.00	2.32	2.48	0.00	2.48
Housing and Living Expenses	12.19	12.24	-0.05	12.93	12.78	0.15
Formal Community-Based Services	9.03	7.84	1.19	17.36	8.22	9.14
Alternative Case Management	0.00	0.63	-0.63	0.00	0.69	-0.69
Other Medical Services	2.97	3.19	-0.22	4.73	4.56	0.17
Total	26.51	23.90	2.61	37.50	26.25	11.25
Cost Per Nursing Home Day						
Direct Expenditures	50.48	50.15	0.33	54.70	53.73	0.97
Other Medical Services	0.97	0.72	0.25	0.77	0.86	-0.09
Total	51.45	50.87	0.58	55.47	54.59	0.88
Cost Per Hospital Day						
Direct Expenditures	318.60	319.63	-1.03	324.27	299.09	25.18
Other Medical Services	47.69	46.67	1.02	48.62	55.32	-6.70
Total	366.29	266.30	-0.01	372.89	354.41	18.48

In these estimates of the average daily costs of serving persons in the community, we have excluded the expenditures for Social Security, SSI, and food stamps. These expenditures can be important costs to the government, as seen in Table II.2 and Table II.3. However, they are not social costs. That is, they do not represent the use of resources, but instead are a transfer of resources between groups in society. Furthermore, while these expenditures are substantial, channeling did not appear to have an effect on them. Thus, they are of limited interest in the analysis.

2. Extrapolating Observed Trends

The extrapolation of the trends observed during the 18 months following randomization was problematic. As mentioned in Chapter IV, we chose to make a series of calculations that indicated the general order of the magnitude of future trends in service use rather than make specific point estimates of future use. In making these

calculations, we have attempted to follow the basic pattern of effects observed in the data and to incorporate general data on service use.

The general extrapolation procedure began by estimating the expected number of survival days per client in each six-month period for the ten years following the observation period. These survival days were then allocated to the community, nursing homes, and hospitals.

A ten-year time horizon was used because it reflects the general life expectancy of the evaluation sample. Most sample members will die during this period, although some can be expected to live beyond it.⁹⁶ However, ten years represents a useful planning horizon since any effects beyond that time would carry relatively little weight in decisions about channeling as a program.⁹⁷

Future survival days were estimated by extrapolating the death rates observed in the demonstration. There was no evidence of a channeling effect on mortality, so we used the average rates observed for the entire sample. These rates are presented in Wooldridge and Schore (1986). In general, the death rate for the period from months 7 to 18 was fairly constant. We began our extrapolation with the death rates observed for months 13 to 18, which were approximately 23 percent a year in the basic model sites and 21 percent a year in the financial control sites.

It is expected that mortality rates would increase as the sample ages. This pattern is observed in most mortality tables for persons more than 65 years old (see, for example, American Council of Life Insurance, 1983). Such an increase might not immediately appear for the demonstration sample because survivors might be healthier as a group than the persons who die early in the demonstration. This could result because persons who had acute medical problems that led them to enroll in channeling could have had those problems resolved and then be relatively healthy. Thus, the death rate might fall for a while until the general effects of an aging population began to predominate. This is, in fact, what appeared to happen during the first six months of the observation period. However, the death rate then seemed to stabilize as indicated above.

In the extrapolations, we have assumed that death rates will increase at the same rate observed for the general U.S population between 85 and 95 years old. The death rate for this group ranges from 13 to 26 percent, with an average increase of

⁹⁶ Given the death rate assumptions discussed later, over 98 percent of the sample in both models would be expected to have died by the end of the ten-year extrapolation period.

⁹⁷ This small weight reflects many factors, but three are particularly important. First, the present value of dollars more than ten years after the end of the observation period (11.5 years after enrollment) would be less than 60 percent of the same dollars at enrollment (assuming a 5 percent annual discount rate). Thus, effects after this ten-year point would have to be much larger than any of those observed, before their discounted value would be sufficiently large to change the qualitative conclusions of the benefit-cost analysis. Second, given the level of uncertainty inherent in the analysis of social programs, outcomes assumed to occur more than ten years after the observation period must be considered very skeptically. Finally, after ten years, so few clients are likely to be alive that their will be virtually no costs after that period.

approximately 1.4 percentage points per year (assuming that the trends are linear over this range). This is the rate at which we have assumed that the death rate for sample members will increase.

The distribution of survival days between the community, nursing homes, and hospitals is examined by Wooldridge and Schore (1986). They find that the fraction of survival days spent in nursing homes increased substantially over the 18 months following randomization. In the basic model, the number of nursing home days per 100 survival days increased by 185 percent between the first six months and the period 13 to 18 months after randomization. In the financial control model, the increase was 200 percent.

It is unclear whether these rapid rates of increase will continue. For our extrapolation exercise, we assumed that the rate of nursing home use among survivors would continue to rise, but at a slower rate. Specifically, we assumed that the rate would increase with the logarithm of time. This rate of increase was estimated by fitting a logarithmic function to the observed data on nursing home use per survival day (these data were obtained from Wooldridge and Schore, 1986, Tables IV.3A and IV.3B). This functional form implies that the rate will increase by 14 percent during the first six months following the observation period and by less than that amount in subsequent periods. This implies that the nursing home rate for survivors will rise from approximately 17 percent to 35 percent over the ten-year extrapolation period.

Hospital use per survival day declined over the observation period (Wooldridge and Schore, 1986, Table V.1). It ranged from 8 to 12 days per 100 survival days for the first six months to 4 to 7 days per 100 survival days for the period 13 to 18 months.⁹⁸ In large part, this decline appears to be due to the resolution of acute medical problems facing clients at the time of enrollment. It is unclear whether this decline will continue or if it will begin to reverse itself as the population ages. As a result, we assumed that there would be no further change: surviving sample members would continue to use the same general level of hospital services (5 percent of survival days in the basic model and 7 percent in the financial control model sites).

Once we estimated the fraction of survival days spent in nursing homes and hospitals, the rest of the survival days were allocated to the community.

These assumptions are summarized in Table D.3 and Table D.4. These tables also summarize the alternative assumptions used in Chapter IV to assess the implications of changing individual assumptions about mortality rates and the allocation of survival days between statuses. The estimates of total social costs are also provided for reference.

⁹⁸ In the basic model, the number of hospital days per 100 survival days fell from 8.3 in the first six months to 4.8 in the last six months. In the financial control model, the fall was from 11.5 to 6.6 hospital days per 100 survival days. These rates are presented in Wooldridge and Schore (1986, Table V.1).

3. Costs per Survival Day

Another perspective on the net costs during the observation period can be obtained by examining the cost per survival month. The numerators for these estimates are the same as for the estimates of the average daily costs of serving persons in nursing homes, hospitals, or the community. The denominators, average survival months per client, were obtained from Wooldridge and Schore (1986). Table D.5, Table D.6, Table D.7 and Table D.8 present these estimates.

D. NET GOVERNMENT COSTS OF AN ONGOING CHANNELING PROGRAM

In this section, we consider the net cost to the government of operating a permanent channeling program. In doing so, we take a comprehensive view of government costs. We include the costs for providing the case management services, as well as the impacts of case management on other government costs. Thus, in addition to the costs of channeling case management, we examine the costs and savings that accrue to Medicare, Medicaid, channeling projects, and other public agencies. Our view encompasses costs for formal community services, nursing homes, hospitals, and physician and other medical services. Our view also encompasses the effects of channeling on social insurance programs--specifically, the Old Age, Survivors, and Disability Insurance (OASDI) program of Social Security, the Supplemental Security Income (SSI) program, food stamps, and Veterans Benefit programs.

Our view is also comprehensive in the sense that we examine the impacts on the costs incurred by all eligible persons who were offered channeling services. We include both active case management clients and those eligible persons who were terminated from the program or who declined services.⁹⁹

This comprehensive view enables us to include in our analysis all of the direct and indirect impacts that channeling had on the government budget. For expositional and planning purposes, we have expressed these impacts on a per-case-month basis, despite the inclusion of costs and impacts that accrue outside the channeling project budgets. These cost-per-case-month estimates can easily be used to estimate the net annual cost to the government of operating channeling. All that is required is to multiply the cost per case month by 12 to derive costs per case year and then to multiply that product by the expected average caseload size of the permanent program.

⁹⁹ Of course, this view is comprehensive only in terms of government costs. We have excluded the costs and savings to clients and the effects on the quality of the lives of both clients and their informal caregivers.

TABLE D.3: Alternative Estimates of Social Costs After the 18-Month Observation Period: Basic Case Management Model							
Extrapolation Assumption	Death Rate ^a		Nursing Home Rate ^b		Hospital Rate ^b		Estimated Future Social Expenditures ^c (1984 dollars)
	Base Rate	Annual Change	Base Rate	Annual Change ^d	Base Rate	Annual Change	
No channeling	23	1.4/yr	17	9.9/t	5	no change	26,467
Channeling affects only the average daily cost of community care	same		same		same		27,492 (1,025)
Channeling affects the average daily cost of community care <u>and</u> decreases the future rate of change in nursing home use by 25 percent	same		17	7.4/t	same		27,194 (727)
Channeling affects the average daily cost of community care <u>and</u> decreases future hospital use by 1 percentage point	same		same		4	no change	25,587 (-880)
Channeling affects the average daily cost of community care <u>and</u> decreases the rate of change in the death rate by 25 percent	23	1.0/yr	same		same		28,912 (2,445)
<p>NOTE: Costs for the observation period (months 1-18) in the basic model are presented in Table II.2 and Table II.4. Social costs exclude Social Security, SSI, and Food Stamp payments.</p> <p>a. The death rate is the percent of the sample expected to die in the next year. The annual change is the number of percentage points by which this rate increases each year.</p> <p>b. Nursing home and hospital rates indicate the percent of survival days spent in each type of facility.</p> <p>c. Daily expenditure estimates used to make this estimate are presented in Table IV.1. All dollar values are expressed in 1984 dollars and discounted to the time of enrollment using a 5 percent real discount rate. The figures in parentheses indicate the difference between the estimated value of future costs under given assumptions and the value of those costs in the absence of channeling (i.e., they are analogous to treatment/control differences).</p> <p>d. Nursing home rates are assumed to increase with the logarithm of time. The specific formula in this case without channeling is $[5.6 + 9.9(1/n t)]$ where t is the six-month period after randomization (for example, the period 19 to 24 months after randomization is period 4). This formula implies that the rate will rise by $9.9/4$ each year (i.e., by $9.9/4$, or 2.5 percentage points, in the fourth six-month period). Under the alternative formula, the increase is 25 percent less.</p>							

TABLE D.4: Alternative Estimates of Social Costs After the 18-Month Observation Period: Financial Control Model							
Extrapolation Assumption	Death Rate ^a		Nursing Home Rate ^b		Hospital Rate ^b		Estimated Future Social Expenditures ^c (1984 dollars)
	Base Rate	Annual Change	Base Rate	Annual Change ^d	Base Rate	Annual Change	
No channeling	21	1.4/yr	15	9.3/t	7	no change	34,050
Channeling affects only the average daily cost of community care	same		same		same		38,884 (4,834)
Channeling affects the average daily cost of community care <u>and</u> decreases the future rate of change in nursing home use by 25 percent	same		15	7.0/t	same		38,661 (4,611)
Channeling affects the average daily cost of community care <u>and</u> decreases future hospital use by 1 percentage point	same		same		6	no change	36,869 (2,819)
Channeling affects the average daily cost of community care <u>and</u> decreases the rate of change in the death rate by 25 percent	21	1.0/yr	same		same		41,010 (6,960)
<p>NOTE: Costs for the observation period (months 1-18) in the financial control model are presented in Table II.3 and Table II.5. Social costs excluded Social Security, SSI, and Food Stamp payments.</p> <p>e. The death rate is the percent of the sample expected to die in the next year. The annual change is the number of percentage points by which this rate increases each year.</p> <p>f. Nursing home and hospital rates indicate the percent of survival days spent in each type of facility.</p> <p>g. Daily expenditure estimates used to make this estimate are presented in Table IV.1. All dollar values are expressed in 1984 dollars and discounted to the time of enrollment using a 5 percent real discount rate. The figures in parentheses indicate the difference between the estimated value of future costs under given assumptions and the value of those costs in the absence of channeling (i.e., they are analogous to treatment/control differences).</p> <p>h. Nursing home rates are assumed to increase with the logarithm of time. The specific formula in this case without channeling is $[4.8 + 9.3(1/n t)]$ where t is the six-month period after randomization (for example, the period 19 to 24 months after randomization is period 4). This formula implies that the rate will rise by $9.3/t$ each year (i.e., by $9.3/4$, or 2.33 percentage points, in the fourth six-month period). Under the alternative formula, the increase is 25 percent less.</p>							

TABLE D.5A: Estimated Living, Medical, and Long Term Care Costs Per Survival Month During Months 1-18, Control Group Means, Basic Case Management Model (1984 dollars per month)

Cost Component	Government Budget				Total Government	Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a			
A. OBSERVED COSTS							
Channeling Case Management Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Formal Community-Based Services	112.48	30.40	0.00	50.46	193.34	40.74	234.08
Community Room and Board	0.00	0.00	0.00	13.68	13.68	300.35	314.03
Alternative Case Management ^c	0.00	0.00	0.00	14.59	14.59	0.00	14.59
Nursing Home	14.59	61.71	0.00	0.61	76.91	68.40	145.31
Hospital	425.90	22.80	0.00	0.00	448.70	27.97	476.67
Other Covered Medical Services ^d	107.62	15.81	0.00	0.00	123.43	21.58	145.01
Social Security ^e	0.00	0.00	0.00	435.02	435.02	-435.02	0.00
SSI and Food Stamps	0.00	0.00	0.00	43.78	43.78	-43.78	0.00
Cost for the Observation Period	660.59	130.72	0.00	558.14	1349.45	-19.76	1329.69
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. QUALITY OF LIFE^g							
Clients							
At baseline, clients had an average age of 79 years, and 56 percent had very severe or extremely severe ADL impairments. 43 percent of the clients reported more than 3 unmet needs at baseline, and 13 percent were dissatisfied with their service arrangements. The average monthly income at baseline was \$538, and 60 percent reported being "pretty or completely satisfied" with life. After 18 months, 12 percent were in a nursing home and 39 percent had died.							
Informal caregivers							
83 percent of the clients had an informal caregiver at baseline, with the average person having 1.8 caregivers. Clients received an average of 4.2 visits per week from caregivers who lived outside their home, and these visiting caregivers spent an average of 11.2 hours per week providing care. For primary caregivers, 34 percent were "not too" satisfied with the formal service arrangements or had no such service arrangements. The primary caregivers typically provided 4.5 hours of care and 1.9 hours of socializing on days they provided care. 67 percent of the primary caregivers were "pretty or completely satisfied" with life.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare or Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

TABLE D.5B: Estimated Net Costs and Benefits of Channeling Per Survival Month During Months 1-18, by Analytical Perspective, Basic Case Management Model (1984 dollars per month)

Cost Component	Government Budget				Total Government	Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a			
A. OBSERVED NET COSTS							
Channeling Case Management Services	0.00	0.00	85.42	0.00	85.42	0.00	85.42
Formal Community-Based Services	15.50	-3.34	22.50	-3.64	31.02	-20.37	10.65
Community Room and Board	0.00	0.00	0.00	2.13	2.13	3.35	5.48
Alternative Case Management ^c	0.00	0.00	0.00	-14.59	-14.59	0.00	-14.59
Nursing Home	-3.65	5.17	0.00	-0.31	1.21	-23.10	-21.89
Hospital	14.29	-5.78	0.00	0.00	8.51	1.21	9.72
Other Medical Services ^d	8.51	-2.43	0.00	0.00	6.08	2.74	8.82
Social Security ^e	0.00	0.00	0.00	-0.30	-0.30	0.30	0.00
SSI and Food Stamps	0.00	0.00	0.00	-1.22	-1.22	1.22	0.00
Net Cost for the Observation Period	34.65	-6.38	107.92	-17.93	118.26	-34.65	83.61
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. OBSERVED LIFE-QUALITY OUTCOMES^g							
<u>Clients</u>							
Mortality was unaffected by channeling. For survivors, channeling had a small (between 2 and 10 percent) impact on the percent of clients who were “pretty or completely satisfied” with life. The average number of reported unmet needs was generally lower among clients (by as much as 20 percent), and the number of persons with more than 3 unmet needs was between 22 and 34 percent lower among clients. Satisfaction with service arrangements was generally higher among clients, by as much as 48 percent. There were essentially no impacts on ADL functioning level. Average income was also unaffected.							
<u>Caregivers</u>							
There was no evidence of substitution of formal for informal care. There was no apparent impact on the amount of informal financial assistance. The life quality of primary caregivers increased according to some measures: overall life satisfaction rose, caregiver satisfaction with service arrangements increased, and caregiver worry about obtaining help was reduced somewhat. There were no evident impacts on reports of perceived caregiver financial, emotional, or physical strain.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare or Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

TABLE D.6A: Estimated Living, Medical, and Long Term Care Costs Per Survival Month During Months 1-18, Control Group Means, Financial Control Model (1984 dollars per month)

Cost Component	Government Budget				Total Government	Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a			
A. OBSERVED COSTS							
Channeling Case Management Services	0.000.00	0.00	0.00	0.00	0.00	0.00	0.00
Formal Community-Based Services	181.49	29.79	0.00	29.49	240.77	18.54	259.31
Community Room and Board	0.00	0.00	0.00	20.06	20.06	303.70	323.76
Alternative Case Management ^c	0.00	0.00	0.00	17.63	17.63	0.00	17.63
Nursing Home	15.20	58.98	0.00	1.22	75.40	65.66	141.06
Hospital	574.86	35.87	0.00	0.00	610.73	38.91	649.64
Other Covered Medical Services ^d	156.86	15.20	0.00	0.00	172.06	28.88	200.94
Social Security ^e	0.00	0.00	0.00	449.92	449.92	-499.92	0.00
SSI and Food Stamps	0.00	0.00	0.00	43.47	43.47	-43.47	0.00
Cost for the Observation Period	928.41	139.84	0.00	561.79	1630.04	-37.70	1592.34
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. QUALITY OF LIFE^g							
<u>Clients</u> At baseline, clients had an average age of 80 years, and 60 percent had very severe or extremely severe ADL impairments. 53 percent of the clients reported more than 3 unmet needs at baseline, and 11 percent were dissatisfied with their service arrangements. The average monthly income at baseline was \$547, and 52 percent reported being "pretty or completely satisfied" with life. After 18 months, 13 percent were in a nursing home and 33 percent had died.							
<u>Informal caregivers</u> 78 percent of the clients had an informal caregiver at baseline, with the average person having 1.7 caregivers. Clients received an average of 3.8 visits per week from caregivers who lived outside their home, and these visiting caregivers spent an average of 10.5 hours per week providing care. For primary caregivers, 35 percent were "not too" satisfied with the formal service arrangements or had no such service arrangements. The primary caregivers typically provided 4.5 hours of care and 2.1 hours of socializing on days they provided care. 59 percent of the primary caregivers were "pretty or completely satisfied" with life.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients' private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare or Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

TABLE D.6B: Estimated Net Costs and Benefits of Channeling Per Survival Month During Months 1-18, by Analytical Perspective, Financial Control Model (1984 dollars per month)

Cost Component	Government Budget				Total Government	Clients and Families ^b	Society as a Whole
	Medicare	Medicaid	Channeling	Other Public ^a			
A. OBSERVED NET COSTS							
Channeling Case Management Services	0.00	0.00	85.42	0.00	85.42	0.00	85.42
Formal Community-Based Services	-80.26	-16.11	322.85	-20.98	205.50	-14.28	191.22
Community Room and Board	0.00	0.00	0.00	4.26	4.26	0.00	4.26
Alternative Case Management ^c	0.00	0.00	0.00	-17.63	-17.63	0.00	-17.63
Nursing Home	1.82	0.60	0.00	0.00	2.42	-11.55	-9.13
Hospital	21.89	-0.91	0.00	0.00	20.98	4.56	25.54
Other Covered Medical Services ^d	5.48	1.52	0.00	0.00	7.00	0.00	7.00
Social Security ^e	0.00	0.00	0.00	10.94	10.94	-10.94	0.00
SSI and Food Stamps	0.00	0.00	0.00	0.91	0.91	-0.91	0.00
Net Cost for the Observation Period	-51.07	-14.90	408.27	-22.50	319.80	-33.12	286.68
B. UNOBSERVED COSTS							
Unmeasured Resource Costs ^f	---	---	---	---	---	---	---
Cost After the Observation Period	---	---	---	---	---	---	---
C. OBSERVED LIFE-QUALITY OUTCOMES^g							
<u>Clients</u>							
Mortality was unaffected by channeling. For survivors, channeling had a small (between 5 and 11 percent) impact on the percent of clients who were “pretty or completely satisfied” with life. The average number of reported unmet needs was significantly lower among clients, and the number of persons with more than 3 unmet needs was between 12 and 47 percent lower among clients. Satisfaction with service arrangements was generally higher among clients, by as much as 35 percent. ADL functioning was reported to be poorer by treatments (relative to controls); it is unclear whether this represents an effect of channeling or a measurement artifact. Average income was unaffected.							
<u>Caregivers</u>							
There was no evidence that primary caregivers tended to substitute formal for informal care. There was, however, a modest reduction in caregiving among visiting caregivers and friends and neighbors who provided informal care. There was no apparent impact on the amount of informal financial assistance. The life quality of primary caregivers increased according to some measures: overall life satisfaction rose, caregiver satisfaction with service arrangements increased, and caregiver worry about obtaining help was reduced somewhat. There were no evident impacts on reports of perceived caregiver financial, emotional, or physical strain.							
NOTE: The observation period is the eighteen months after enrollment covered by the interview and records data. All dollar denominated benefits and costs are discounted to the time of enrollment using a 5 percent real annual discount rate. All dollars have also been expressed in 1984 dollars to control for the effects of inflation. Details do not sum to the totals because of rounding.							
<ul style="list-style-type: none"> a. This perspective also includes private charities. In general, our evidence indicates that costs to these charities were small. b. This perspective also includes clients’ private insurance and friends. c. Includes only case management provided as a separate service. The costs of the case management activities of home health agencies and other direct service providers are included in the estimated costs of their direct services. d. This component includes costs for physician, outpatient, pharmacy, and other medical services and products when they were covered by Medicare or Medicaid. We did not estimate the value of other medical services that were <u>not</u> covered by Medicare or Medicaid. e. Includes payments from Veterans pension programs as well. f. The major unmeasured resource costs are: medical services not covered by Medicare or Medicaid and the value of time spent by informal caregivers. g. The specific estimates underlying this summary are presented in Applebaum and Harrigan (1986) and Christianson (1986). 							

**TABLE D.7: Total Social (Excluding Transfer Programs) Per Survival Month During Months 1-18, by Service and Time Period
(1984 dollars per month)**

Service	Months 1-6			Months 7-12			Months 13-18		
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
BASIC CASE MANAGEMENT MODEL									
Channeling Case Management	126.46	0.00	126.46	64.14	0.00	64.14	55.33	0.00	55.33
Formal Community Services ^a	248.67	268.13	-19.46	234.38	228.30	6.08	252.32	244.72	7.60
Community Housing and Living Expenses	317.07	317.68	-0.61	319.20	310.99	8.21	323.15	311.60	11.55
Nursing Homes	86.34	114.91	-28.57	172.67	185.14	-12.47	272.08	309.47	-37.39
Hospitals	590.37	616.51	-26.14	445.97	425.60	20.37	393.98	344.74	49.24
Other Covered Medical Services	169.33	167.81	1.52	155.34	133.76	21.58	131.94	126.16	5.78
Total	1538.24	1485.04	53.20	1391.70	1283.79	107.91	1428.80	1336.69	92.11
FINANCIAL CONTROL MODEL									
Channeling Case Management	126.46	0.00	126.46	64.14	0.00	64.14	55.33	0.00	55.33
Formal Community Services ^a	442.02	340.48	101.54	452.96	231.95	221.01	460.26	241.07	219.19
Community Housing and Living Expenses	333.18	328.32	4.86	331.97	322.85	9.12	316.16	317.98	-1.82
Nursing Homes	96.37	98.19	-1.82	177.54	195.78	-18.24	287.58	278.16	9.42
Hospitals	880.08	880.38	-0.30	546.29	561.79	-15.50	549.33	453.26	96.07
Other Covered Medical Services	237.12	227.39	9.73	188.48	183.62	4.86	190.91	186.05	4.86
Total	2115.23	1874.76	240.47	1761.38	1495.99	265.39	1859.57	1476.52	383.05
a. Includes case management provided as a separate service.									

**TABLE D.8: Total Costs Per Survival Month for Services Other Than Transfer Programs by Funding Source and Time Period
(1984 dollars per month)**

Funding Source	Months 1-6			Months 7-12			Months 13-18		
	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
BASIC CASE MANAGEMENT MODEL									
Government Budget									
Medicare	836.30	833.26	3.04	633.84	584.29	49.55	587.63	519.84	67.79
Medicaid	99.41	115.82	-16.41	154.13	146.83	7.30	203.07	234.99	-31.92
Channeling	148.66	0.00	148.66	87.25	0.00	87.25	77.22	0.00	77.22
Other public	51.68	70.22	-18.54	71.74	86.94	-15.20	69.31	85.42	-16.11
Total government	1136.05	1019.30	116.75	946.96	818.06	128.90	937.23	840.25	96.98
Clients and Families	402.19	465.73	-63.54	444.75	465.73	-20.98	491.57	496.43	-4.86
Society as a Whole	1538.24	1485.03	53.21	1391.71	1283.79	107.92	1428.80	1336.68	92.12
FINANCIAL CONTROL MODEL									
Government Budget									
Medicare	1123.58	1210.53	-86.95	725.34	800.74	-75.40	723.22	710.45	12.77
Medicaid	112.48	123.42	-10.94	141.66	169.02	-27.36	204.59	207.33	-2.74
Channeling	406.45	0.00	406.45	418.00	0.00	418.00	402.50	0.00	402.50
Other public	27.36	77.52	-50.16	38.30	63.23	-24.93	40.13	63.84	-23.71
Total government	1669.87	1411.47	258.40	1323.30	1032.99	290.31	1370.44	981.62	388.82
Clients and Families	445.36	463.30	-17.94	438.06	462.99	-24.93	489.14	494.91	-5.77
Society as a Whole	2115.23	1874.77	240.46	1761.36	1495.98	265.38	1859.58	1476.53	383.05

In examining the estimates of government costs per case month, we consider five issues:

1. The decision to divide clients into two types--new clients and ongoing clients
2. The estimation of the costs for these two types of clients
3. The estimation of the mix of new and ongoing clients in a permanent program
4. The effect of changing the definition of caseload
5. The effect of reducing case management costs

We have not considered how costs and benefits would be influenced by other potential differences between the demonstration programs and a permanent program. These include differences in terms of the case management approach, the amount of cost-sharing required, the types of services covered, the eligibility criteria, the average caseload size, and the general service environment in which the channeling programs would operate. Future budgeting and planning efforts would need to consider the effects of these potential differences in addition to the specific issues addressed herein.

1. *New and Ongoing Clients*

One of the primary differences between the demonstration projects and a permanent program will pertain to the mix of clients. A permanent program will have proportionally more long-term clients--that is, clients who have completed initial assessments and care planning activities and continue to receive ongoing channeling services. The channeling projects operated only for a little more than two years under the demonstration. In the long run, they would continue to serve not only those clients who continued to want services but also new clients. Under plausible circumstances, this process would lead to an increasingly larger caseload size that includes proportionally more long-term clients. Ultimately, attrition among the long-term clients due to deaths, institutionalization, and individual decisions to decline further services would balance the inflow of new clients, and the projects would reach a stable caseload size and mix.¹⁰⁰

This process must be considered when the costs of a permanent channeling program are estimated. We must examine the extent of any cost differences that exist in serving clients of different tenures and must take those cost differences into account. In theory, we could have divided all clients into any number of groups. We chose a relatively simple approach based on the cost-per-survival-day estimates presented in Table D.7. Those estimates indicated that costs per survival day were substantially higher during the first six months after randomization than they were during any other time in the observation period. These lower costs reflect lower medical costs (probably due to the resolution of some of the acute medical problems that were present at the

¹⁰⁰ It is possible that projects would never reach a stable size, particularly if enrollments or terminations occurred in large, irregularly spaced groups. We have no information that this would be the case. Consequently, we have assumed that clients would be enrolled at an even rate over time, and that the projects would reach a stable caseload size and mix. We return to this issue in subsection 3.

time of enrollment) and the fact that the initial case management costs are incurred only as clients are enrolled.

On the basis of this observation, we divided clients into two groups: new clients and ongoing clients. The new clients were those who had been enrolled for less than six months. The ongoing clients were those who had survived and continued to participate for longer than six months. This two-part categorization is clearly a rough approximation. It is based on the availability of data and the desire to keep the estimation process straightforward. Furthermore, this procedure should provide reasonably accurate estimates for initial planning purposes. If more detailed estimates were needed, a more detailed categorization of clients could be made by using approaches similar to those used to extrapolate results beyond the 18-month observation period.

2. Costs for New and Ongoing Clients

We used the costs per survival month that were observed for the first six months following randomization as an estimate of the net cost impact due to new clients. For ongoing clients, we used the costs per survival day that were observed for the period from 13 to 18 months after randomization.

The decision for new clients is clear; the decision for ongoing clients is less so. Costs for ongoing clients will reflect the costs for all groups of clients who have been enrolled for longer than six months. From 7 to 12 months after randomization, costs per survival day were generally lower than those for the period from 13 to 18 months after randomization. In subsequent periods, the costs per survival day may rise further as more sample members enter nursing homes. The decision to use the costs for the period from 13 to 18 months after randomization thus represents a somewhat arbitrary compromise in the absence of data on costs in the long run. Again, it would be possible to make further categorizations of costs by using the extrapolation procedures, if such an effort were necessary for planning.

Table D.9 presents the estimated net cost per survival month for the two periods: months 1 to 6 and months 13 to 18. Separate estimates are provided for treatment and control groups and for each of the channeling models. These estimates, which include transfer payments as well as service costs, indicate the same patterns observed in Table D.7.

These costs per survival month estimates were converted into costs per case month by multiplying them by the ratio of survival months to case months. Estimates of survival months were obtained from Wooldridge and Schore (1986). The estimates of case months were obtained from the demonstration client tracking system. Table D.9 presents the ratios and the resulting estimates of costs per case month.

TABLE D.9: Estimates of Average Government Cost Per Case Month for an Ongoing Program									
	Treatment Group		Weighted Average^a	Control Group		Weighted Average^a	Treatment/Control Difference		Weighted Average^a
	Months 1-6	Months 13-18		Months 1-6	Months 13-18		Months 1-6	Months 13-18	
BASIC CASE MANAGEMENT MODEL									
Net Cost Per Survival Month ^b	1,613	1,420	1,459	1,492	1,331	1,363	121	89	95
Survival Months Per Case Month ^c	1.56	1.76	1.72	1.55	1.71	1.68	0.01	0.05	0.04
Net Cost Per Case Month	2,522	2,492	2,498	2,313	2,274	2,282	209	218	216
FINANCIAL CONTROL MODEL									
Net Cost Per Survival Month ^b	2,185	1,867	1,931	1,913	1,468	1,557	272	399	374
Survival Months Per Case Month ^c	1.51	1.62	1.60	1.51	1.70	1.66	0.00	-0.08	-0.06
Net Cost Per Case Month	3,291	3,028	3,081	2,890	2,495	2,574	401	533	507
NOTE: Details do not sum to totals because of rounding.									
<p>a. The weighted average reflects the costs of a program in which 20 percent of the caseload constitute new clients (persons who are enrolled less than six months), and 80 percent constitute ongoing clients (persons who are enrolled for more than six months, whose costs are approximated by those observed for sample members who survived to the period from 13 to 18 months after randomization).</p> <p>b. These estimates include all costs show in Table D.7 plus costs for transfer payments.</p> <p>c. Estimates of case months are from the demonstration client tracking system. Estimates of survival months are from Wooldridge and Schore (1986). The observed mean number of case months for treatment group members were also used for the control group members, who, of course, did not actively receive channeling services.</p>									

3. *Estimating the Mix of Clients in a Permanent Program*

As noted, the mix of new and ongoing clients will continue to change over time until the projects reach a stable caseload. We can estimate both when this will occur and the final mix of clients by using the assumptions and procedures that are used to extrapolate the impacts. Those assumptions (presented in the previous section) implied that virtually all clients would die within ten years after our observation period (that is, 11.5 years after randomization). Thus, if projects continue to enroll a constant number of new clients each year, their caseloads will continue to rise for 11.5 years, at which point they will stabilize. The rate of growth over this 11.5-year period will decline as the death and determination rates grow in response to the increasing proportion of ongoing clients.

To estimate this process, we used the results of the extrapolation process. Those calculations produced an estimate of the number of persons who were alive and in the community for each 6-month period in the 11.5 years following randomization. We used those estimates to represent the statuses of a series of client cohorts enrolled at 6-month intervals over an 11.5-year period. When considered in this fashion, this series of estimates indicates the number of persons from each enrollment cohort who are still alive and in the community. We then summed the numbers for all cohorts except the one enrolled for less than six months.¹⁰¹ That sum provided our estimate of the number of ongoing clients in a permanent program. When it was combined with the estimate for the cohort that had been enrolled for fewer than six months (the new clients), we could then estimate the proportions of new and ongoing clients for a permanent program.

This calculation indicated that approximately 80 percent of the clients in a permanent program would be ongoing clients, and that the remaining 20 percent would be new clients. These proportions were virtually identical for both of the channeling models. We used these proportions as the weights to estimate the costs per case month for a permanent channeling program. Table D.9 presents these weighted average estimates, which are discussed in Chapter V.

4. *The Effects of Changing the Definition of Caseload*

As we noted in Chapter V, it is essential that one use consistent definitions of caseloads and case months when making these calculations. We have followed the definition used by the channeling projects: clients were terminated as active clients if they declined services, entered a nursing home, moved out of the catchment area, or died. Other programs may use different definitions. For example, a person entering a nursing home might still be considered a client by a program that maintained contact

¹⁰¹ In our calculations, we have assumed that the fraction of clients in the community who are active in channeling remains the same after the period from 13 to 18 months after randomization. As Carcagno et al. (1986) discuss, some clients who were in the community did decline channeling services and were terminated. We have no data on how many more clients would decline services after our observation period. We feel that this approximation is reasonable. If additional community residents were terminated from the program, we would expect net costs per case month to be lower than those shown here, although this is not certain.

with such clients in order to provide support at a subsequent date if the client desired to return to the community.

The specifics of the definition are not critical, as long as the same definition is used throughout the calculations. Broader definitions will tend to increase the measured size of the caseload. This will correspondingly tend to reduce the associated average government costs per case month, since the costs and savings for all current and former clients are already included in the cost estimate, and since the larger caseload estimate lowers the estimate of the costs per case month.

This is illustrated in Table D.9. The estimates of net costs per survival month would be consistent with a caseload definition that included all surviving persons who had been offered channeling services.

5. *The Effect of Reducing Case Management Costs*

It is likely that a permanent channeling program would exhibit different costs for providing channeling case management services. Such a program might be able to obtain additional efficiencies in program administration and provider relations activities.¹⁰² It might also have additional administrative functions (for example, more extensive cost-sharing would require additional monitoring and recordkeeping efforts). It is interesting to note how sensitive our estimates of net costs per case month would be to the level of operating costs.

To assess this sensitivity, we reestimated costs per case month under the assumption that channeling case management costs could be cut by an additional 10 percent (if all of this reduction were obtained by cutting the costs of channeling administration and provider relations, those costs would have to be cut by 25 percent). Table D.10 presents these alternative estimates. They show that total government costs per case month would change by less than 1 percent in response to a 10 percent cut in channeling case management costs. However, the additional costs due to channeling--that is, the treatment/control differences--are more sensitive to changes in case management costs. A 10 percent reduction in those costs would reduce this difference by 5 percent under the basic model and by 2 percent under the financial control model.

¹⁰² The extent of such efficiencies is uncertain. Our cost estimates reflect operations during the demonstration steady-state phase, when research costs were at their lowest and the projects had been able to establish themselves in their communities. Thornton, Will, and Davies (1986) found that the costs associated with administration and provider relations for this period were more than 25 percent below those costs earlier in the demonstration. Thus, savings beyond this point are unclear.

TABLE D.10: Estimated net Government Cost Per Casemonth for an Ongoing Channeling Program if Case Management Costs Were Reduced 10 Percent (1984 dollars per month)			
Client Type^a	Treatment Group Mean	Control Group Mean	Treatment/Control Difference
BASIC CASE MANAGEMENT MODEL			
New Clients	2,502	2,313	189
Ongoing Clients	2,483	2,274	209
All Clients	2,487	2,282	205
FINANCIAL CONTROL MODEL			
New Clients	3,271	2,890	381
Ongoing Clients	3,019	2,495	524
All Clients	3,069	2,574	496
<p>NOTE: Cost per casemonth for the control group was estimated as the cost per survival month for the control group multiplied by the ratio of survival months for the control group to casemonths for the treatment group. Government costs include that for medical and long term care services, as well as payments from Social Security, Supplemental Security Income, and other social insurance programs. See Appendix D for a full discussion of these estimates.</p> <p>a. New clients are those persons who are enrolled for six or fewer months. Ongoing clients are those who survive and remain enrolled beyond six months.</p>			

APPENDIX E. CONTROL GROUP MEANS AND IMPACT ESTIMATES, BY TIME PERIOD

The control group means and benchmark impact estimates presented in Table II.2, Table II.3, Table II.4, and Table II.5 represent net outcomes over the full 18-month observation period. These estimates are the discounted sum of the estimates for the three 6-month observation periods. Table E.1 and Table E.2 present the control group means, undiscounted, for each 6-month period for the basic case management and financial control models, respectively. Similarly, the undiscounted impact estimates for each 6-month period are presented in Table E.3 and Table E.4. We have indicated in the right-hand column the reports from which these estimates were obtained. In general, the estimates were obtained from the other evaluation technical reports, with two exceptions: (1) channeling service months and (2) nursing home expenditures during months 13 through 18. Descriptions of the methods used to estimate these two components are included below.

A. AVERAGE ONGOING SERVICE MONTHS PER CLIENT

As stated in Chapter III, the benchmark estimates of ongoing channeling case management costs were derived by multiplying the cost channeling per service month by the average number of ongoing service months per client.¹⁰³ Thornton, Will, and Davies (1986) estimated the average cost per client month of ongoing case management. Ongoing service months are all the months in which a client was enrolled after services had begun or after the initial care plan had been signed, whichever came first. The average number of service months per client in each model was estimated by dividing the total number of ongoing service months provided by the projects (including zero months for treatment group members who never received ongoing case management services) by the total number of clients enrolled. These data were obtained from the demonstration client tracking system.

B. NURSING HOME EXPENDITURES, MONTHS 13 TO 18

Nursing home expenditures during the first two 6-month periods were obtained from Wooldridge and Schore (1986). For these two periods, Medicaid and Medicare records were used to estimate expenditures for persons covered by Medicaid, and extracts from provider records provided information on nursing home expenditures for those individuals who were not covered. For the third 6-month period, however, only Medicaid and Medicare data were available; provider records were not collected. Thus, expenditure data for this time period, months 13 to 18, were incomplete.

¹⁰³ Average initial costs (those for outreach, screening, initial assessment, etc.) were estimated on a per-client basis. Thus, they are not considered to be a function of the length of participation.

We estimated nursing home expenditures for this period using data on the average number of nursing home days and estimates of the average expenditure per nursing home day for treatment and control group members. The procedure began with the ratio of average nursing home expenditures per person to average nursing home days per person. This ratio was calculated for the period from month 7 to month 12 based on records data from Medicare and Medicaid and data extracted from provider records for those who were not covered by Medicaid. We then estimated the average number of nursing home days for the period from month 13 to month 18 based on interview data, which were supplemented by Medicaid and Medicare data for those persons who had incomplete followup data. In this way, interview data were used to substitute for missing PRE data. The final estimate of nursing home expenditures for months 13 to 18 was then computed by multiplying the estimated number of days by the estimated cost per day.

This method for estimating nursing home expenditures during months 13 through 18 relies on several assumptions. First, average nursing home expenditures per day during months 13 through 18 were assumed to be the same as for months 7 through 12. However, Wooldridge and Schore found an 8 percent reduction in daily rates between months 1 through 6 and months 7 through 12. This reduction appeared to reflect the increasing proportion of ICF days relative to SNF days. Thus, our estimates of impacts and mean control group expenditures may overstate the actual average.

Second, in using this method, we assumed that the interview data accurately reflected the same quality of information as was provided by provider records data during the first 12 months. Although interview self-reports of nursing home days may not be as accurate as the PRE data, the two data sources seem consistent. Furthermore, the interview-based estimates for months 13 to 18 continue the trends observed for earlier periods:

- The number of nursing home days increased.
- The percent of individuals in a nursing home increased.
- The average length of stay increased.

Finally, by computing average expenditures for months 13 through 18 based on aggregate-level averages rather than on estimates of total expenditures for each individual, we assumed that the distributions of nursing home expenditures and days across individuals remained the same between months 7 through 12 and months 13 through 18. The absence of noteworthy outliers during the first two periods led us to believe that this assumption was reasonable.

Overall, this alternative approach should have produced reasonably accurate estimates of nursing home expenditures per client during months 13 through 18. However, these estimates are subject to greater uncertainty than the estimates for earlier periods, which were based entirely on records data.

TABLE E.1: Control Group Means Used in the Benefit-Cost Analysis: Basic Case Management Model				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Months in Channeling	0.0	0.0	0.0	Not applicable to control group
Formal Community-Based Service Expenditures	1393	975	813	Corson, Grannemann, Holden, Thornton (1986) Table V.2
Community Housing Costs	895	754	610	Corson, Grannemann, Holden, Thornton (1986) Table VI.3
Alternative Case Management Expenditure	76	66	57	Appendix A, Table A.2
Nursing Home Expenditures	666	819	1051	Wooldridge and Schore (1986) Table IV.4; also see discussion in this appendix
Hospital Expenditures	3412	2015	1389	Wooldridge and Schore (1986) Table C.15
Other Covered Medical Services Reimbursements	928	633	508	Wooldridge and Schore (1986) Table C.18
Transfer Expenditures				Appendix B, Table B.2
OASDI and Veterans	2362	1952	1606	
SSI and Food Stamps	228	227	141	
CLIENT WELL-BEING				
Survival Days (cumulative)	162.18	300.08	431.06	Wooldridge and Schore (1986) Table F.5
Number of Unmet Needs ^a (maximum of 8)	1.83	1.63	1.34	Applebaum and Harrigan (1986) Table III.1
Client Satisfaction with Service Arrangements (percent) ^a				Applebaum and Harrigan (1986) Table III.4
Satisfied	66.5	65.2	67.0	
Pretty Satisfied	20.8	21.6	26.3	
Dissatisfied	12.7	13.2	6.7	
Number of Physical Hazards in Client's Residence ^a (maximum of 6)	0.27	0.27	0.26	Applebaum and Harrigan (1986) Table III.5
Global Life Satisfaction (percent) ^a				Applebaum and Harrigan (1986) Table IV.1
Completely satisfied	14.2	13.6	10.5	
Pretty satisfied	44.4	49.2	51.9	
Not very satisfied	41.4	37.2	37.6	
Number of ADL Impairments ^a (maximum of 5)	2.3	2.2	2.5	Applebaum and Harrigan (1986) Table V.1
CAREGIVER WELL-BEING				
Restricted Privacy Due to Caregiving (percent) ^b				Christianson (1986) Table VI.1
Serious problem	11.0	4.7	n.a.	
A problem, but not serious	12.3	10.9	n.a.	
Not a problem	76.7	77.4	n.a.	
Limits on Social Life ^b (percent)				Christianson (1986) Table VI.1
Serious problem	21.9	15.0	n.a.	
A problem, but not serious	22.3	13.9	n.a.	
Not a problem	55.8	71.2	n.a.	
Caregiver Satisfaction with Service Arrangements (percent) ^b				Christianson (1986) Table VI.10
Very satisfied	39.4	38.9	n.a.	
Somewhat satisfied	33.3	38.9	n.a.	
Not too satisfied	13.3	10.0	n.a.	
No present care arrangements	14.1	12.2	n.a.	
Caregiver Life Satisfaction (percent) ^b				Christianson (1986) Table VI.12
Completely satisfying	21.6	19.5	n.a.	
Pretty satisfying	49.0	53.7	n.a.	
Not very satisfying	29.4	26.8	n.a.	

TABLE E.1 (continued)				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Caregiver Emotional Strain ^{b,c}	2.7	2.2	n.a.	Christianson (1986) Table VI.14
Caregiver Financial Strain ^{b,c}	1.8	1.6	n.a.	Christianson (1986) Table VI.14
Caregiver Physical Strain ^{b,c}	2.2	2.0	n.a.	Christianson (1986) Table VI.14
<p>a. These variables are measured at the end of each period.</p> <p>b. These variables are measured at the end of each period and are available only at six and twelve months after randomization.</p> <p>c. Degree of strain is measured on a five point scale, with 1 being little or no strain and 5 being a great deal of strain. Average scores are presented here.</p>				

TABLE E.2: Control Group Means Used in the Benefit-Cost Analysis: Financial Control Model				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Months in Channeling	0.0	0.0	0.0	Not applicable to control group
Formal Community-Based Service Expenditures	1762	1009	859	Corson, Grannemann, Holden, Thornton (1986) Table V.2
Community Housing Costs	963	834	695	Corson, Grannemann, Holden, Thornton (1986) Table VI.4
Alternative Case Management Expenditure	111	71	66	Appendix A, Table A.2
Nursing Home Expenditures	560	894	1072	Wooldridge and Schore (1986) Table IV.4; also see discussion in this appendix
Hospital Expenditures	4899	2706	1994	Wooldridge and Schore (1986) Table C.15
Other Covered Medical Services Reimbursements	1266	884	820	Wooldridge and Schore (1986) Table C.19
Transfer Expenditures				Appendix B, Table B.2
OASDI and Veterans	2552	2078	1665	
SSI and Food Stamps	206	199	205	
CLIENT WELL-BEING				
Survival Days (cumulative)	165.82	307.92	439.63	Wooldridge and Schore (1986) Table F.5
Number of Unmet Needs ^a (maximum of 8)	1.71	1.54	1.33	Applebaum and Harrigan (1986) Table III.1
Client Satisfaction with Service Arrangements (percent) ^a				Applebaum and Harrigan (1986) Table III.4
Satisfied	70.1	61.9	63.1	
Pretty Satisfied	19.4	25.5	29.3	
Dissatisfied	10.6	12.6	7.6	
Number of Physical Hazards in Client's Residence ^a (maximum of 6)	0.12	0.08	0.05	Applebaum and Harrigan (1986) Table III.5
Global Life Satisfaction (percent) ^a				Applebaum and Harrigan (1986) Table IV.1
Completely satisfied	13.9	12.6	12.8	
Pretty satisfied	41.1	43.7	46.2	
Not very satisfied	45.1	43.7	41.0	
Number of ADL Impairments ^a (maximum of 5)	2.4	2.3	2.7	Applebaum and Harrigan (1986) Table V.1
CAREGIVER WELL-BEING				
Restricted Privacy Due to Caregiving (percent) ^b				Christianson (1986) Table VI.2
Serious problem	10.7	9.4	n.a.	
A problem, but not serious	15.4	12.7	n.a.	
Not a problem	74.0	72.0	n.a.	
Limits on Social Life ^b (percent)				Christianson (1986) Table VI.2
Serious problem	23.4	17.3	n.a.	
A problem, but not serious	22.5	18.6	n.a.	
Not a problem	54.1	64.2	n.a.	
Caregiver Satisfaction with Service Arrangements (percent) ^b				Christianson (1986) Table VI.10
Very satisfied	37.0	37.2	n.a.	
Somewhat satisfied	34.8	36.2	n.a.	
Not too satisfied	19.3	16.0	n.a.	
No present care arrangements	8.9	10.6	n.a.	
Caregiver Life Satisfaction (percent) ^b				Christianson (1986) Table VI.12
Completely satisfying	16.3	9.9	n.a.	
Pretty satisfying	47.8	51.6	n.a.	
Not very satisfying	35.9	38.6	n.a.	

TABLE E.2 (continued)				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Caregiver Emotional Strain ^{b,c}	2.7	2.3	n.a.	Christianson (1986) Table VI.15
Caregiver Financial Strain ^{b,c}	1.6	1.4	n.a.	Christianson (1986) Table VI.15
Caregiver Physical Strain ^{b,c}	2.3	2.0	n.a.	Christianson (1986) Table VI.15
<p>a. These variables are measured at the end of each period.</p> <p>b. These variables are measured at the end of each period and are available only at six and twelve months after randomization.</p> <p>c. Degree of strain is measured on a five point scale, with 1 being little or no strain and 5 being a great deal of strain. Average scores are presented here.</p>				

TABLE E.3: Impact Estimates Used in the Benefit-Cost Analysis: Basic Case Management Model				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Months in Channeling	3.44	3.06	2.33	See discussion in this appendix
Formal Community-Based Service Expenditures	-40	110	116	Corson, Grannemann, Holden, Thornton (1986) Table V.2
Community Housing Costs	-13 (-0.53)	52 (1.70)	45 (1.11)	Corson, Grannemann, Holden, Thornton (1986) Table VI.3
Alternative Case Management Expenditure	-76	-66	-57	Appendix A, Table A.2
Nursing Home Expenditures	165* (-2.15)	-58 (-0.56)	-70	Wooldridge and Schore (1986) Table IV.4; also see discussion in this appendix
Hospital Expenditures	-119 (-0.45)	59 (0.29)	274 (0.94)	Wooldridge and Schore (1986) Table C.15
Other Covered Medical Services Reimbursements	16 (0.23)	89 (1.42)	48 (0.58)	Wooldridge and Schore (1986) Table C.18
Transfer Expenditures			23	Appendix B, Table B.2
OASDI and Veterans	7	27	8	
SSI and Food Stamps	-6	-12		
CLIENT WELL-BEING				
Survival Days (cumulative)	1.33 (0.84)	4.21 (1.08)	7.55 (0.85)	Wooldridge and Schore (1986) Table F.5
Number of Unmet Needs ^a (maximum of 8)	-0.16 (-1.78)	-0.34** (-3.73)	-0.08 (-0.59)	Applebaum and Harrigan (1986) Table III.1
Client Satisfaction with Service Arrangements (percent) ^a				Applebaum and Harrigan (1986) Table III.4
Satisfied	3.0 (1.31)	7.5** (2.80)	4.3 (0.99)	
Pretty Satisfied	1.2 (0.60)	-1.2 (-0.51)	-6.2 (-1.52)	
Dissatisfied	-4.3** (-2.87)	-6.3** (-3.65)	1.9 (0.79)	
Number of Physical Hazards in Client's Residence ^a (maximum of 6)	-0.03 (-1.23)	-0.11** (-3.96)	-0.06 (-1.48)	Applebaum and Harrigan (1986) Table III.5
Global Life Satisfaction (percent) ^a				Applebaum and Harrigan (1986) Table IV.1
Completely satisfied	2.7 (1.69)	0.9 (0.57)	0.4 (0.14)	
Pretty satisfied	2.8 (1.25)	1.2 (0.50)	0.6 (0.15)	
Not very satisfied	-5.6* (-2.56)	-2.2 (-0.92)	-1.0 (-0.26)	
Number of ADL Impairments ^a (maximum of 5)	0.0 (0.63)	0.1 (0.87)	-0.0 (0.22)	Applebaum and Harrigan (1986) Table V.1
CAREGIVER WELL-BEING				
Restricted Privacy Due to Caregiving (percent) ^b				Christianson (1986) Table VI.1
Serious problem	-5.3* (-2.42)	2.0 (0.95)	n.a.	
A problem, but not serious	5.1 (1.79)	-3.2 (-1.26)	n.a.	
Not a problem	0.2 (0.06)	4.2 (1.23)	n.a.	
Limits on Social Life ^b (percent)				Christianson (1986) Table VI.1
Serious problem	-5.9* (-1.99)	0.5 (0.16)	n.a.	
A problem, but not serious	1.5 (0.46)	0.4 (0.13)	n.a.	
Not a problem	4.4 (1.22)	-0.9 (-0.24)	n.a.	
Caregiver Satisfaction with Service Arrangements (percent) ^b				Christianson (1986) Table VI.10
Very satisfied	8.6* (2.03)	8.8 (1.75)	n.a.	
Somewhat satisfied	-3.1 (-0.75)	-1.7 (-0.34)	n.a.	
Not too satisfied	-1.4 (-0.50)	-2.7 (-0.89)	n.a.	
No present care arrangements	-4.0 (-1.79)	-4.4 (-1.71)	n.a.	
Caregiver Life Satisfaction (percent) ^b				Christianson (1986) Table VI.12
Completely satisfying	-0.7 (-0.25)	-0.3 (-0.08)	n.a.	
Pretty satisfying	6.9 (1.78)	5.3 (1.11)	n.a.	
Not very satisfying	-6.2 (-1.81)	-5.0 (-1.19)	n.a.	

TABLE E.3 (continued)				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Caregiver Emotional Strain ^{b,c}	-0.2* (-2.06)	-0.1 (-1.14)	n.a.	Christianson (1986) Table VI.14
Caregiver Financial Strain ^{b,c}	-0.0 (-0.43)	-0.0 (-0.46)	n.a.	Christianson (1986) Table VI.14
Caregiver Physical Strain ^{b,c}	-0.2 (-1.36)	-0.1 (-1.04)	n.a.	Christianson (1986) Table VI.14
<p>NOTE: T-statistics on the treatment/control differences are in parentheses. Indicates whether () or not () all the impact estimates in the group under the heading differ from zero statistically at the 5 percent significance level when tested jointly. * Different from zero statistically at the 5 percent significance level; using a two-tailed test. ** Different from zero statistically at the 1 percent significance level; using a two-tailed test.</p> <p>a. These variables are measured at the end of each period. b. These variables are measured at the end of each period and are available only at six and twelve months after randomization. c. Degree of strain is measured on a five point scale, with 1 being little or no strain and 5 being a great deal of strain. Average scores are presented here.</p>				

TABLE E.4: Impact Estimates Used in the Benefit-Cost Analysis: Financial Control Model				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Months in Channeling	3.61	3.31	2.55	See discussion in this appendix
Formal Community-Based Service Expenditures	648	1064	892	Corson, Grannemann, Holden, Thornton (1986) Table V.2
Community Housing Costs	7 (0.29)	9 (0.28)	-22 (-0.51)	Corson, Grannemann, Holden, Thornton (1986) Table VI.4
Alternative Case Management Expenditure	-111	-71	-66	Appendix A, Table A.2
Nursing Home Expenditures	-8 (-0.11)	-103 (-0.99)	-15.75	Wooldridge and Schore (1986) Table IV.4; also see discussion in this appendix
Hospital Expenditures	-68 (-0.25)	-161 (-0.79)	271 (0.88)	Wooldridge and Schore (1986) Table C.15
Other Covered Medical Services Reimbursements	36 (0.52)	-6 (-0.09)	-32 (-0.37)	Wooldridge and Schore (1986) Table C.19
Transfer Expenditures				Appendix B, Table B.1
OASDI and Veterans	33	14	32	
SSI and Food Stamps	18	-2	-12	
CLIENT WELL-BEING				
Survival Days (cumulative)	-0.56 (-0.36)	-1.76 (-0.45)	-7.77 (-0.84)	Wooldridge and Schore (1986) Table F.5
Number of Unmet Needs ^a (maximum of 8)	-0.26** (-2.91)	-0.31** (-3.39)	-0.14 (-0.95)	Applebaum and Harrigan (1986) Table III.1
Client Satisfaction with Service Arrangements (percent) ^a				Applebaum and Harrigan (forthcoming) Table III.4
Satisfied	3.5 (1.47)	7.7** (2.77)	0.7 (0.16)	
Pretty Satisfied	0.2 (0.07)	-3.6 (-1.42)	0.3 (0.08)	
Dissatisfied	-3.7* (-2.38)	-4.1* (-2.32)	-1.1 (-0.42)	
Number of Physical Hazards in Client's Residence ^a (maximum of 6)	-0.01 (-0.49)	0.01 (0.46)	0.04 (1.02)	Applebaum and Harrigan (1986) Table III.5
Global Life Satisfaction (percent) ^a	†	°	°	Applebaum and Harrigan (1986) Table IV.1
Completely satisfied	1.6 (0.97)	1.2 (0.71)	2.3 (0.86)	
Pretty satisfied	4.3 (1.85)	4.3 (1.70)	0.5 (0.13)	
Not very satisfied	-5.9** (-2.65)	-5.5* (-2.27)	-2.8 (-0.73)	
Number of ADL Impairments ^a (maximum of 5)	0.2** (3.29)	0.2** (2.86)	-0.0 (-0.03)	Applebaum and Harrigan (1986) Table V.1
CAREGIVER WELL-BEING				
Restricted Privacy Due to Caregiving (percent) ^b	°	°		Christianson (1986) Table VI.2
Serious problem	-3.7 (-1.79)	-2.1 (-1.05)	n.a.	
A problem, but not serious	2.8 (1.04)	0.7 (0.30)	n.a.	
Not a problem	0.9 (0.30)	2.3 (0.74)	n.a.	
Limits on Social Life ^b (percent)	°	°		Christianson (1986) Table VI.2
Serious problem	-2.5 (-0.90)	-1.7 (-0.65)	n.a.	
A problem, but not serious	2.2 (0.70)	-0.3 (-0.12)	n.a.	
Not a problem	0.4 (0.10)	2.1 (0.61)	n.a.	
Caregiver Satisfaction with Service Arrangements (percent) ^b	†	†		Christianson (1986) Table VI.10
Very satisfied	14.2** (3.51)	16.2** (3.37)	n.a.	
Somewhat satisfied	6.0 (1.52)	2.3 (0.47)	n.a.	
Not too satisfied	-11.1** (-4.02)	-9.9** (-3.41)	n.a.	
No present care arrangements	-9.1** (-4.20)	-8.6** (-3.53)	n.a.	
Caregiver Life Satisfaction (percent) ^b	°	†		Christianson (1986) Table VI.12
Completely satisfying	1.5 (0.54)	7.5* (2.40)	n.a.	
Pretty satisfying	4.1 (1.12)	-1.4 (-0.31)	n.a.	
Not very satisfying	-5.6 (-1.73)	-6.1 (-1.55)	n.a.	

TABLE E.3 (continued)				
Variable	Time Period			Source
	Months 1-6	Months 7-12	Months 13-18	
Caregiver Emotional Strain ^{b,c}	0.0 (0.16)	-0.1 (-0.99)	n.a.	Christianson (1986) Table VI.15
Caregiver Financial Strain ^{b,c}	0.0 (0.55)	0.0 (0.49)	n.a.	Christianson (1986) Table VI.15
Caregiver Physical Strain ^{b,c}	-0.1 (-0.52)	-0.1 (-1.35)	n.a.	Christianson (1986) Table VI.15

NOTE: T-statistics on the treatment/control differences are in parentheses.
†/° Indicates whether (†) or not (°) all the impact estimates in the group under the heading differ from zero statistically at the 5 percent significance level when tested jointly.
* Different from zero statistically at the 5 percent significance level; using a two-tailed test.
** Different from zero statistically at the 1 percent significance level; using a two-tailed test.

a. These variables are measured at the end of each period.
b. These variables are measured at the end of each period and are available only at six and twelve months after randomization.
c. Degree of strain is measured on a five point scale, with 1 being little or no strain and 5 being a great deal of strain. Average scores are presented here.

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