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8 Payment Source and Episodes of Institutionalization

Alan M. Garber and Thomas E. MaCurdy

In this paper, we explore the relation between the duration of nursing home admissions and the source of payment for nursing home care. This subject has assumed critical importance as a growing number of private insurers begin to offer long-term care insurance, millions of middle-aged and elderly Americans plan for future long-term care needs, and policymakers debate the role that government should play in financing, delivering, and regulating long-term care.

Both private and public initiatives for financing long-term care need accurate projections of utilization, but few studies have examined the effects of insurance on utilization. The size of the insurance subsidy effect on utilization, or moral hazard, is not readily inferred from observed price variation. It is notoriously difficult to gauge the price of nursing home care faced by consumers of this service, in part because price variation reflects differences in the characteristics of nursing homes (e.g., the quality of nursing services, meals, and housing amenities). In the absence of comprehensive, reliable price data or of direct measures of the effects of alternate financing mechanisms on long-term care utilization, studies of the relation between payment source and utilization provide important clues to the likely consequences of changing long-term care insurance benefits.

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The measure of utilization that we examine is the length of each nursing home admission. While information about the duration of spells is a key component, additional information is needed to complete any comprehensive picture of nursing home utilization. Comprehensive measures of utilization (or cumulative duration) also require information about both the likelihood that a spell will occur at all and the frequency of readmission. In the long-term care literature, recidivism is recognized as a frequent event (Lewis, Cretin, and Kane 1985). The length of an individual spell has an entirely different interpretation if it is only one of a series of admissions rather than a unique occurrence.

Nursing home utilization also depends on the mode of exit, which in most duration analyses is of little concern. In other medical contexts, the nature of exit may have minimal significance because there is only one way a spell (of an illness, e.g.) may terminate (in death); in economic contexts, even if there is more than one way to end a spell (of unemployment, e.g.), the nature of the exit may be of secondary interest. The type of exit from nursing homes, in contrast, has substantive economic and welfare implications. Nursing home admissions terminate in return to the community, transfer to a hospital, or death. Although the type of discharge clearly matters to the patient, it also affects future long-term care utilization and overall health expenditures. Transfer to a hospital, for example, is often a costly interruption in a lengthy nursing home stay, while discharge to the community may signal resumption of independent living. The length of a nursing home spell, if it terminates in hospital admission, may be short in relation to overall utilization. To accommodate these phenomena, we complement the analysis of duration distributions with an investigation of the association between the probabilities of alternate modes of exit and several other factors, including personal characteristics, payment source, and length of the nursing home admission.

We investigate these issues by analyzing data on a sample of frail, disabled, and otherwise vulnerable elderly men and women who were believed to be likely to enter a nursing home. They were enrolled in the National Long-Term Care (Channeling) Demonstration, a randomized controlled trial of case management as a deterrent to institutionalization. While this sample is not representative of elderly Americans generally, it represents a group of particular interest: persons who are expected to consume a disproportionate share of long-term care and who are likely to be excluded from the purchase of private long-term care insurance. If associations between payment source and duration patterns are significant in this sample, the relation in the general population might be stronger, particularly if the demand for nursing home care among Channeling participants is inelastic.

In the following section, we describe the current environment for financing nursing home care. After discussing the challenges facing the development of private long-term care insurance, we review salient characteristics of government programs that pay for long-term care. The second section of the paper

describes the data used in the empirical analysis. The third section describes the empirical model used to analyze the duration of nursing home spells and how it accommodates the duration dependence that some forms of health insurance promote. Results of the empirical analysis of nursing home duration and exit type are presented in the fourth section. We conclude with a discussion of the implications of this analysis for the design of long-term care insurance.

8.1 How Nursing Home Care Is Financed

Three payment sources accounted for nearly all nursing home expenditures in 1986: Medicaid (41.4 percent), Medicare (1.6 percent), and direct private payment (51.0 percent). Private health insurance paid for 0.8 percent, and miscellaneous government sources were responsible for the remainder (U.S. Department of Health and Human Services 1988, 161). Much of the current interest in long-term care policies is a response to perceived shortcomings of existing financing arrangements.

Perhaps the most notable feature of long-term care financing in the United States is the minor role played by private long-term care insurance. In contrast to the ubiquitous presence of both privately and publicly funded insurance for other forms of health care, long-term care insurance has paid for a small proportion of total long-term care expenditures in this country. The failure to develop a thriving market for private insurance reflects, in part, insurers' vulnerability to adverse selection and moral hazard. Insurers fear that adverse selection is likely because potential purchasers of insurance are better able to know whether they have an unusually high risk of needing long-term care than the insurer. Although there are several ways to deter adverse selection—such as restrictive benefits or a premium structure that encourages enrollment years before the need for long-term care is likely to arise—adverse selection is less problematic for government insurers than for private firms.

Like private insurers, government programs are also subject to moral hazard. In routine health insurance, moral hazard refers to the "overuse" of covered services. The effective subsidy for covered services can be so large that the price facing the patient or consumer is negligible. Even though moderate copayments may not be sufficient to curtail the demand for covered services, at least one important characteristic of conventional health services limits their utilization: utility derives not from the consumption of the service itself but from the improvement in health that it produces. The marginal benefit of most health interventions eventually becomes negative; the prospect of minimal or no health benefit from uncomfortable medical procedures deters gross overuse.

In contrast, long-term care includes housing, food services, and personal services as well as specialized nursing care. Because these services are potentially valuable to any elderly person, not only to the severely disabled or men-

tally impaired persons who are the intended recipients, long-term care is particularly likely to be subject to moral hazard. Insurers often implicitly ration care by setting medical criteria for reimbursement. However, if they hope to limit the effect of moral hazard by requiring interviews and physical examinations as a condition for reimbursement, they may be stymied by the primitive state of measurement of the "need" for long-term care. These measurements consist of functional and health status indicators, along with characterizations of the availability of social supports. The need for long-term care is determined in large part by self-reported disabilities or reports of family members, who may have an incentive to misrepresent the severity of the impairment when seeking to obtain coverage for desired services. In the absence of reliable objective indicators of disability, it is not surprising that measures of the need for long-term care are rarely as reproducible and credible as the laboratory tests and physical signs of illness that are used to evaluate the need for acute medical services. Consequently, non-price rationing is not a fully satisfactory response to moral hazard.

Although they usually lack private long-term care insurance, nearly all older Americans participate in Medicare. If they are admitted to nursing homes and meet several criteria, Medicare will reimburse part of the cost. The Medicare Catastrophic Act, which was repealed before its full implementation, would have extended the duration of benefits and eased reimbursement requirements but would not have altered the Medicare nursing home benefit substantially. Medicare contributes to the payments for a stay in a nursing home only if the nursing home is a certified skilled nursing facility. This eliminates most custodial care, which does not require the high level of skilled nursing care and rehabilitation services that characterize certified skilled nursing facilities. In addition, five conditions must be met before a patient's stay in a skilled nursing facility could generate any reimbursement: (1) a patient must have been in a hospital at least three consecutive days prior to transfer to the skilled nursing facility; (2) admission to the skilled nursing facility must occur within thirty days after hospital discharge; (3) admission to the skilled nursing facility must be for the treatment of the same condition as was treated in the hospital; (4) the admission must be certified by a physician; and (5) the stay must not be disapproved by a utilization review committee. If all five conditions are met, Medicare will contribute for up to one hundred days of care in each benefit period. Medicare pays the full charges for covered services during the first twenty days in a skilled nursing facility. However, the copayments during the twenty-first through hundredth days are substantial; in 1986, Medicare paid for all but $61.50 each day of the covered charges for days 21–100.

Thus, despite near universal participation, Medicare pays for relatively little nursing home care because its coverage rules are so restrictive. Eligibility for Medicaid is much more limited, yet Medicaid pays for a substantial fraction of U.S. nursing home care. To be eligible for Medicaid benefits, an

individual must meet income and asset tests or have health expenses that are large in relation to income. Because Medicaid is a combined federal and state program, eligibility criteria and benefit structure vary from one state to another (U.S. Department of Health and Human Services 1985). In most states, Medicaid does not limit the duration of benefit, nor are nursing home benefits restricted to stays in skilled nursing facilities.

Although Medicaid typically requires no copayments, its reimbursement levels can be well below private pay charges for nursing home care. Consequently, there are usually delays before a Medicaid patient can be admitted to a nursing home. Furthermore, Medicaid patients who are transferred to hospitals risk losing their place in the nursing home if the hospital stay is not brief.

There would be narrower interest in Medicaid if it covered only the nursing home stays of impoverished older persons. However, Medicaid often serves as a long-term care insurer for middle-class elderly. This is a consequence of the "medically needy" category of Medicaid eligibility.

Besides standard income-based criteria for Medicaid enrollment, most states have a provision that enables individuals who "spend down" to qualify for Medicaid, even if they do not meet other Medicaid eligibility requirements. Persons can obtain Medicaid benefits if their health expenses are so large that their remaining income is only one-third higher than the poverty level. Institutionalization is the most common reason for such large expenditures, at least in part because the average monthly charges for nursing homes in 1985 were $1,456. This figure includes "no-charge" residents along with paying residents (U.S. Department of Health and Human Services 1988, 163). The specific rules for each state are described elsewhere (U.S. Department of Health and Human Services 1985). Although Medicaid rules are stringent, loopholes and uneven enforcement enable many elderly Medicaid recipients to conserve assets (Kidwell 1988).

Private pay patients would ordinarily pay full charges for nursing home care, but as they approach "medically indigent" health expenditures they may face a complex price schedule. For persons expecting to "spend down" to Medicaid eligibility, the price of a day in a nursing home will eventually fall to zero. The implicit deductible is a function of the patient's assets and income and varies across states. The "spend-down" is important only for long stays, but it is so frequent that it explains much of Medicaid's large expenditures for nursing home care. In 1986, the 14.0 percent of Medicaid recipients aged 65 and over accounted for 36.9 percent of Medicaid payments (U.S. Department of Health and Human Services 1988, 177); 36.3 percent of Medicaid's total expenditures were for nursing home care (U.S. Department of Health and Human Services 1988, 174).

If only because nursing home patients face different price schedules under each arrangement, the duration of nursing home admissions may differ according to payment source. The price the patient pays for nursing home care

increases at twenty and one hundred days if covered by Medicare. Consequently, there may be jumps in the discharge rates near days 20 and 100. Patients covered by Medicaid pay nothing, but because the nursing home receives less money for Medicaid patients than for private pay patients, the providers may influence discharge rates. The time pattern of discharge rates would be less clear, but because Medicare patients are primarily admitted for posthospital care, and because Medicaid patients are not paying for their nursing home care, we would expect Medicaid admissions to be longer. For other payers, the patient usually bears the full cost until approaching "spend-down." The private pay patients may be a very heterogeneous group. They may include some people who are extremely disabled and would be expected to stay in a nursing home for a long time but whose financial resources exceed the Medicaid levels. They may also include individuals who are expected to have short stays in a nursing home but whose admissions do not qualify for Medicare reimbursement. The duration of nursing home stays for this group would seem likely to be intermediate between Medicare and Medicaid stays.

Because Medicare finances posthospitalization nursing home care, we would expect frequent hospital readmissions, particularly after the implementation of Medicare's Prospective Payment System. Prospective payment for hospital care gave hospitals an incentive to discharge patients early, and there have been widespread complaints that Medicare patients were being discharged "quicker and sicker." In addition, the Prospective Payment System encouraged substitution of outpatient services for inpatient care. Thus, the average Medicare patient admitted to a hospital after implementation of the new system was sicker than before since healthy Medicare recipients received more of their care as outpatients. Although these changes imply that more Medicare patients would be discharged from hospitals to nursing homes than before, there was not a surge in total Medicare nursing home expenditures. Inasmuch as Medicare inpatients were sicker and discharged earlier, we expect patients transferred from the hospital to nursing homes to be readmitted to hospitals at a high rate.

8.2 Data for the Analysis of Nursing Home Spells

Our data were obtained as part of the Channeling Demonstration, a large-scale randomized controlled trial that was organized in 1980 by the Department of Health and Human Services in order to test an intervention called "case management." This intervention gave professional personnel the responsibility for arranging and coordinating services for impaired elderly "clients." According to its advocates, case management would decrease nursing home utilization and improve the long-term care of the elderly. The Channeling Demonstration tested this hypothesis by enrolling high-risk elderly participants at ten sites around the country. The intervention did not significantly reduce nursing home utilization or improve functional status or objective mea-

sures of health, so our analyses do not incorporate estimates of the effect of case management. We have described the data elsewhere (Garber and MaCurdy 1990); the entire April 1988 issue of *Health Services Research* is devoted to the evaluation of the Channeling Demonstration.

To participate in the study, an individual had to be at least 65 years old, suffer limitations in several basic activities of daily living or instrumental activities of daily living, and have unmet needs, meaning that because of functional impairments he or she required help with at least two categories of service for six months. Because this was primarily a study of disabled elderly people living in the community, persons who were in nursing homes at the time of enrollment were included only if discharge was likely within three months. The sample meeting these criteria was relatively old (mean age 80), poorly educated, poor, and disabled.

Extensive baseline data were collected from 5,626 individuals between September 1982 and July 1983. Follow-up interviews were conducted at six, twelve, and eighteen months following the enrollment period.

Severe disability and the presence of multiple chronic illnesses were reflected in very high mortality rates. In the first year of study, 26 percent of all Channeling participants died, and about 16 percent entered nursing homes. Hospitalization was frequent and sometimes prolonged. In the first six months of the study, hospital use averaged thirteen days, and approximately 45 percent of the participants were admitted to a hospital at least once (Wooldridge and Schore 1988, 119). Monthly health care costs varied among sites and between intervention and control groups, ranging from about $1,330 to $1,879.

A large percentage of participants were admitted to nursing homes, often for repeated stays. Nearly a thousand participants had at least one admission, 292 had at least two spells, ninety-three had at least three, and twenty had four or more admissions. Medicare paid for at least part of the costs for 43 percent of the first spells, Medicaid paid for 26 percent, and other (private) payers were responsible for 31 percent. The proportion covered by Medicare or others fell steadily with admission number; Medicaid was the payer for 50 percent of third and 60 percent of fourth admissions.

A subset of the many personal characteristics recorded as part of the Channeling study appears as the explanatory variables in our analyses. We described the association between several characteristics and cumulative utilization in a previous paper (Garber and MaCurdy 1990); we found that the presence of a severe impairment in an activity of daily living (ADL) and Medicaid coverage were closely associated with increased risk of entering a nursing home. Medicaid patients who were admitted to nursing homes were less likely to terminate an admission by death. Gender was also important; men were much more likely than women to end a nursing home admission by dying. These previous estimates were based only on data on cumulative nursing home utilization and did not provide direct information about spell length.

The estimates we report here are based on additional data that include the dates of admission to and discharge from nursing homes, allowing a richer empirical specification and a more precise characterization of the roles of payer source and duration effects. The explanatory variables we use include the payment source at entry to the nursing home, the source of the admission (hospital or community), gender, age, and the presence of severe impairment in at least one ADL. Summary statistics for key variables, for the entire sample of nursing home admissions and by payer type, appear in table 8.1. The variables include ENTRY, which takes the value of zero if an individual enters a nursing home from the community and a value of one if the subject

Table 8.1 **Summary Statistics**

Variable	Mean	SD
Entire sample of spells ($N = 1,396$)		
ENTRY	.706	.46
AGE	80.594	7.54
AGE^2	6,552.200	1,213.80
SEX	.250	.43
SVADL	.760	.43
MEDICARE	.389	
MEDICAID	.306	
OTHER	.305	
SPELL LENGTH (days)	99.225	107.85
RIGHT CENSORED SPELLS	.220	.41
Medicare subsample ($N = 543$)		
ENTRY	.924	.29
AGE	80.039	7.50
AGE^2	6,462.500	1,203.70
SEX	.267	.44
SVADL	.759	.43
SPELL LENGTH (days)	55.692	74.23
RIGHT CENSORED SPELLS	.908	.29
Medicaid subsample of spells ($N = 427$)		
ENTRY	.639	.49
AGE	80.958	7.59
AGE^2	6,611.800	1,228.90
SEX	.194	.40
SVADL	.785	.41
SPELL LENGTH (days)	133.620	127.13
RIGHT CENSORED SPELLS	.611	.49
Other payment source ($N = 426$)		
ENTRY	.493	.50
AGE	80.937	7.49
AGE^2	6,606.800	1,204.70
SEX	.284	.45
SVADL	.737	.44
SPELL LENGTH (days)	120.230	104.18
RIGHT CENSORED SPELLS	.786	.41

enters from a hospital; AGE and AGE^2 the age and square of age at admission; SEX, which is set to one for men and zero for women; and SVADL, which equals one if a severe ADL limitation is present and zero otherwise.

8.3 An Empirical Framework

To address the issues raised in the introduction, we propose two sets of empirical specifications: one that describes how the length of stay in nursing homes varies by payment source and a second that describes the link between financing sources and the mode of exit from nursing home stays. In the subsequent formulations, we envision a person as residing in any one of four states at a given time: community residence (state c); hospitalization (state h); nursing home occupancy (state n); and death (state d). The number of days composing a spell in state n represents the length of a nursing home stay. On termination of a spell, an individual exits to state c, h, or d. Thus, our empirical requirements translate into introducing specifications that capture the relation between payment source and spell length in state n and the connection between payment source and the probability of moving to state c, h, or d when an exit from state n occurs.

8.3.1 Duration Distributions, Survivor Functions, and Hazard Rates

A duration distribution characterizes the likelihood that an individual experiences a given number of days of continuous residence in a nursing home given admission into the institution. A formulation for such a distribution is given by

$$f(\tau) = S(\tau - 1)\,[1 - P(X, \tau)], \tag{1}$$

with

$$S(\tau - 1) = \prod_{t=1}^{\tau-1} P(X, t), \tag{2}$$

where $P(X, t)$ represents a probability that conditions on the variables X and t. The function $f(\tau)$ specifies the probability that duration in a status will last exactly τ days for individuals falling into a category characterized by attributes X who are known to have entered the status at some time. The quantity $S(\tau - 1)$, the survivor function, represents the probability that individuals in this category will experience at least $\tau - 1$ days in the status. For the problem of concern in this analysis, τ corresponds to the duration of a nursing home spell, and the covariates X include factors influencing the length of spells, such as financing sources.

In the specification of the probabilities $P(X, t)$, the variables X are set at the time of entry into the status, and the variable t represents the level of duration accumulated up to the point of evaluation. The literature terms the influence

of t on P "duration dependence." If $P(X, t)$ increases (decreases) as a function of t, then positive (negative) duration dependence is said to exist.

Proposing a specification for f and S requires the acquisition of some basic information concerning the appropriate functional form of the probabilities $P(X, t)$. Two aspects of this functional form are critical to specification. The first involves the nature of duration dependence applicable for the data under investigation, which primarily determines how P varies with t. The second concerns the possibility that central features of duration dependence change as the values of X change. To account for this possibility, the specification of P must allow interaction between X and t to capture the underlying nature of the relation.

Plotting hazard rates is a popular mode for presenting information about the character of duration dependence. A hazard rate is defined as follows:

$$H(\tau) = \frac{f(\tau)}{S(\tau - 1)} = 1 - P(X, \tau). \tag{3}$$

Formally, the hazard rate $H(\tau)$ represents the probability that a spell terminates on day τ given that this spell has already lasted $\tau - 1$ days. Consequently, it shows the fraction of the institutional population who, having been in the nursing home for $\tau - 1$ days will leave on the τth day of their spell. Plotting $H(\tau)$ against τ indicates how $P(X, \tau)$ varies as a function of τ.

8.3.2 An Empirical Specification for Spell Lengths in Nursing Homes

Graphs of hazard rates reveal that empirical specifications of the probabilities $P(X, t)$ must admit nonmonotonic duration dependence and allow the form of this dependence to vary according to the attributes X. Accounting for such features rules out "proportional hazards," one of the most popular choices in the duration literature, as a specification for P. We require a formulation for P that admits flexibility both in the functional form for duration dependence and in the way in which this dependence varies for different values of the covariates X.

The following specification for the probability $P(X, t)$ has these properties:

$$P(X, t) = \frac{1}{1 + e^{X_1\beta + g(t, X_2, \alpha)}}, \tag{4}$$

where X_1 and X_2 are vectors of variables made up of the covariates X, β is a parameter vector,

$$g(t, X_2, \alpha) = \sum_{j=1}^{K} [\Phi_j(t) - \Phi_{j-1}(t)][\alpha_{0j}X_2 + t \cdot \alpha_{1j} + t^2\alpha_{2j}], \tag{5}$$

$\Phi_j(t)$ denotes the cumulative distribution function of a normal random variable possessing mean μ_j and variance σ_j^2, and the α_{ij}'s in (5) represent parameter vectors. Specification (4) models P as a logit function.

The function $g(t, X_2, \alpha)$ determines the duration properties of nursing home admissions. The presence of X_2 in g allows duration dependence to vary according to all the attributes included in X_2. To describe the characteristics of g, suppose for the moment that X_2 consists only of an intercept, j, so

$$\alpha_{0j}X_2 + t\alpha_{1j} + t^2\alpha_{2j} = \alpha_{0j} + \alpha_{1j}t + \alpha_{2j}t^2.$$

The presence of the cumulative density functions in (5) permits us to incorporate spline features in g so that the quadratic polynomial $\alpha_{0j} + \alpha_{1j}t + \alpha_{2j}t^2$ represents g over only a prespecified range of t. In particular, suppose that we wish to set $g = \alpha_{01} + \alpha_{11}t + \alpha_{21}t^2$ for values of t between zero and t^* and to set $g = \alpha_{02} + \alpha_{12}t + \alpha_{22}t^2$ for values of t between t^* and some upper bound $\bar{t}$. To create a specification of g that satisfies the property, assign $K = 2$ in (5); fix the three means determining the cumulative density functions as $\mu_0 = 0$, $\mu_1 = t^*$, $\mu_2 = \bar{t}$; and pick very small values for the three standard deviations σ_0, σ_1, and σ_2. These choices for the μ's and the σ's imply that the quantity $\Phi_1(t) - \Phi_0(t)$ equals one over the range $(0, t^*)$ and zero elsewhere and that the quantity $\Phi_2(t) - \Phi_1(t)$ equals one over the range $(t^*, \bar{t})$ and zero elsewhere. Accordingly, g possesses the desired property. Further, $g(t, X_2, \alpha)$ is differentiable in t. With the values of the μ_i and the σ_i set in advance of estimation, $g(t, X_2, \alpha)$ is strictly linear in the parameters α and in known functions of t and X_2. One can control where each spline or polynomial begins and ends by adjusting the values of the μ's. Also, one can control how quickly each spline cuts in and out by adjusting the values of the σ's, with higher values providing for a more gradual and smoother transition from one polynomial to the next.

In the subsequent estimation dealing with nursing home spells, we pick a specification of $g(t, X_2, \alpha)$ by setting $K = 3$ in (5), with $\mu_0 = -1.0$, $\sigma_0 = .5$, $\mu_i = 15$, $\sigma_1 = 5$, $\mu_2 = 50$, $\sigma_2 = 5$, and μ_3 equal to a numerical value that exceeds the highest spell length. Thus, the polynomial $\alpha_{01}X_2 + t\alpha_{11} + t^2\alpha_{21}$ determines g from zero to about fifteen days. After fifteen days, g switches to the polynomial $\alpha_{02}X_2 + t\alpha_{12} + t^2\alpha_{22}$, which determines its value until about fifty days. Over the interval from day 40 to day 60, g again switches to become the polynomial $\alpha_{03}X_2 + t\alpha_{13} + t^2\alpha_{23}$, where it remains for the highest values of duration. The empirical analysis estimates the α coefficients. The following empirical analysis considers several specifications of the explanatory variables incorporated in X_1 and X_2.

8.3.3 Empirical Specifications for Exit Probabilities

A second aspect of our empirical analysis characterizes the routes by which individuals exit from nursing home spells. We seek to identify the connection between payment sources and the likelihood of following various exit alternatives. On the termination of a spell in a nursing home or, equivalently, in state n, an individual either dies, enters the community, or transfers to a hos-

pital, which we designate as states d, c, and h, respectively. Define the probabilities

$$\Pr(n \to i) \equiv \Pr(n \to i \mid \tau, X), \quad i = c, h, d, \tag{6}$$

for the probability of exit from state n to state i after experiencing a spell of τ days in state n. Formally, the quantity $\Pr(n \to i)$ represents the probability that an individual moves from state n to residency in state i conditional on ending a spell of τ days in state n and on the covariates X. By incorporating indicators of payment sources in X, one can relate the circumstances under which a nursing home stay ends to the financing sources used to fund this stay.

We parameterize these probabilities using a multinomial logit specification. Subsequent empirical formulations take the form

$$\Pr(n \to i) = \frac{e^{Z\beta_i}}{\sum_{j=c,h,d} e^{Z\beta_j}}, \quad i = c, h, d. \tag{7}$$

The vector Z contains polynomials and interactions involving the duration variable τ and the elements of the covariates X.

8.4 Empirical Results

In this section, we describe the empirical relation linking the length of nursing home stays, the circumstances under which spells end, and the financing sources used to (partially) fund the spells. The analysis initially describes the estimation of duration distributions $f(\tau)$, with covariates incorporated to control for demographic characteristics and health conditions. After discussing the implications of the empirical findings for spell lengths, we consider the mode of exit from institutions.

8.4.1 Estimation Results for Duration Distributions

To estimate the distribution $f(\tau)$, we apply conventional maximum likelihood methods of the sort found in duration analysis to compute values for the coefficients β and α appearing in specification (4). Our sample consists of observations on nursing home spell lengths. Our procedure accounts for right censoring when spells are interrupted.

We estimate distinct models for three types of payment sources: (1) spells financed by Medicare at admission; (2) spells financed by Medicaid at admission; and (3) spells financed by private funds at admission. If Medicare paid any part of the nursing home costs, it was considered to be the payer. If Medicaid, but not Medicare, paid any of the costs of the admission at the time of entry, Medicaid was considered the payer. "Other payer" was considered to be the payment source if neither Medicare nor Medicaid contributed to the nursing home payments at the time of admission. An individual who "spent down"

to Medicaid eligibility *during* a nursing home admission would not be considered a Medicaid patient during that admission since Medicaid was not the payer at the outset.

Table 8.2 presents coefficient estimates and standard errors for $f(\tau)$ associated with the three payment sources. The results reported correspond to a specification of $P(X, t)$ given by (4) in which $X_2 = 1$ and X_1 includes ENTRY, SEX, AGE, AGE^2, and SVADL. Before reaching this specification, we explored a number of formulations. Likelihood ratio tests at conventional levels of significance indicate acceptance of the restriction that the variables ENTRY, SEX, and SVADL can be excluded individually and jointly as components of X_2. From our examination of a variety of candidates for inclusion in X_2, no other variables appear to alter the form of duration dependence after accounting for payment source.

For Medicare spells, none of the coefficients of the covariates in X_1 reaches conventional levels of statistical significance. For Medicaid spells, AGE is statistically significant, and SEX is of borderline significance. For payment from other sources, SEX is statistically significant, and SVADL is of borderline sig-

Table 8.2 **Parameter Estimates from Duration Analyses (standard errors in parentheses)**

Variable	MEDICARE	MEDICAID	OTHER
ENTRY	.17083	.06436	.03396
	(.17971)	(.13300)	(.11121)
AGE	.07680	−.11256	.01195
	(.10991)	(.01600)	(.15604)
AGE^2	−.00058	.00070	−.00004
	(.00069)	(.00013)	(.00098)
SEX	.08427	.28961	.36174
	(.10677)	(.15471)	(.13246)
SVADL	.08176	.07688	.19968
	(.10631)	(.16030)	(.12979)
α_{01}	−7.02882	−.94959	−6.82207
	(4.35469)	(.55863)	(6.1759)
α_{11}	.12874	.01401	.21060
	(.09200)	(.05454)	(.20456)
α_{21}	−.00678	.00000	−.00606
	(.00607)	(.00048)	(.01180)
α_{02}	−5.66112	.00000	−5.71846
	(4.34942)	(.04839)	(6.23813)
α_{12}	−.02220	−.01990	−.00784
	(.01354)	(.01720)	(.01995)
α_{22}	.00000	.00000	.00000
	(.00000)	(.00000)	(.00000)
α_{03}	−6.65183	−.77403	−6.11224
	(4.35140)	(.57684)	(6.18819)
α_{13}	−.00379	−.00280	.00049
	(.00131)	(.00091)	(.00080)

nificance. More of the information pertinent to the duration of the spell appears to be embedded in payment source than in these covariates.

8.4.2 Implications of the Findings for Duration

To summarize the influence of various explanatory variables on the duration of nursing home admissions, tables 8.3A–8.3C report percentiles associated with the survivor functions for alternate values of the five basic characteristics used as covariates in the model, by payment source. In each of these specifications, payment source is fully interacted with the covariates. Listed in the first row of each set of results, the baseline case is a man, age 75, who has no severe impairment in basic activities of daily living and who was transferred from a hospital to the nursing home. Subsequent rows of each table show the

Table 8.3 **Quantiles of Nursing Home Duration**

A. Days in Nursing Home, for Admissions Covered Initially by Medicare

	Percentile				
Specification	10th	25th	50th	75th	90th
Baseline[a]	7	15	32	79	167
Entry source = hospital	6	13	27	62	129
Age = 85	8	17	38	101	220
Gender = female	7	16	35	89	191
Severe ADL limitation = present	6	14	30	70	147

B. Days in Nursing Home, for Admissions Covered Initially by Medicaid

	Percentile				
Specification	10th	25th	50th	75th	90th
Baseline[a]	16	38	114	298	> 549
Entry source = hospital	15	36	105	270	> 549
Age = 85	16	39	116	305	> 549
Gender = female	20	55	166	514	> 549
Severe ADL limitation = present	15	35	103	264	> 549

C. Days in Nursing Home, for Admissions Covered Initially by Other Payment Sources

	Percentile				
Specification	10th	25th	50th	75th	90th
Baseline[a]	12	33	97	203	336
Entry source = hospital	12	32	94	196	325
Age = 85	12	31	92	193	320
Gender = female	16	53	144	291	471
Severe ADL limitation = present	11	26	77	166	277

[a]Baseline characteristics are as follows: entered nursing home from community; age 75; male; no severe impairment in activities of daily living.

predicted quantiles associated with a change in the value of one covariate at a time. To compare the baseline cases for the three forms of financing, figure 8.1 presents plots of the survivor functions associated with the three cases. The results in table 8.3 and figure 8.1 demonstrate that there are striking differences in duration by payer source, with Medicaid admissions having the greatest length and Medicare the shortest. Table 8.3 indicates that women have longer nursing home stays than men, especially if Medicaid or "other source" initially finances the stay. Age is associated with an increased length of stay for Medicare admissions, but not for the other payment sources.

Just as the parameter estimates indicate that the presence of a severe ADL impairment and the source of admission could be excluded from the model, table 8.3 shows that the predicted duration varies little with changes in these variables. Severe ADL impairment was of borderline significance in the duration analyses for other payment source, and table 8.3C shows that duration is shorter for persons with a severe ADL impairment than for the baseline case, if payment comes from "other source." The overall lack of explanatory power for ADL impairment may be somewhat surprising, but is consistent with our earlier finding that severe ADL impairment was a statistically significant predictor of mortality and of the probability of admission to a nursing home but not of the probability of discharge from a nursing home (Garber and MaCurdy 1990). As we will see in the next section, the current analysis confirms that, while the presence of a severe ADL impairment has little effect on duration, it is associated with the probability that a spell will terminate in death.

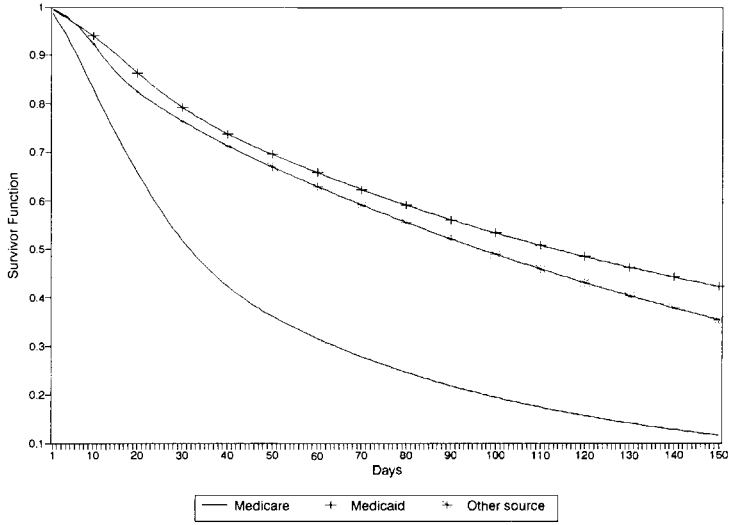

Fig. 8.1 Survivor functions by payment source

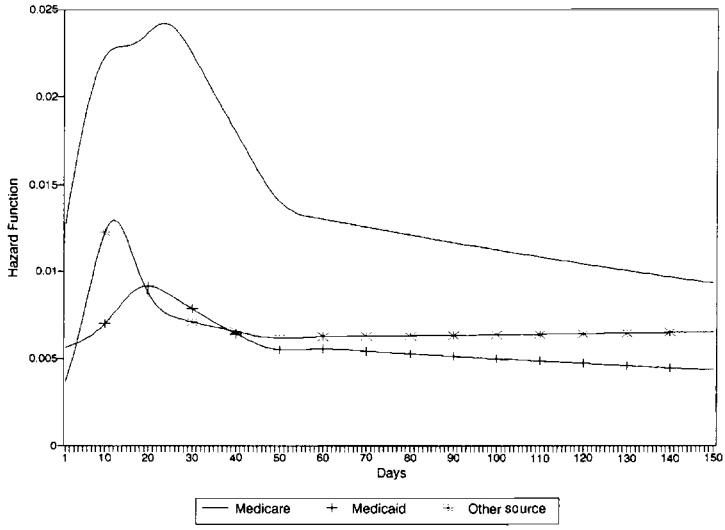

Fig. 8.2 Hazard functions by payment source

The hazard functions for each payer type, plotted in figure 8.2, demonstrate the nature of duration dependence. Medicare nursing home spells, but not the others, would be expected to show fluctuations in the value of the hazard because of the changes in the effective price induced by the Medicare rules. Private pay patients would not be expected to experience changes in price during a nursing home admission unless they were approaching the spend-down to Medicaid eligibility. Medicaid patients face zero price, so rapid changes in hazard rates are not expected.[1]

Although the hazard functions are qualitatively similar for persons with different characteristics, the magnitude of the rate is variable. Furthermore, there are striking differences in hazards according to payer type. At baseline characteristics there is a broad peak in the hazard rate between days 10 and 40. As table 8.3 reveals, this early peak in the hazard corresponds to a relatively short length of stay. Half the Medicare admissions have ended by thirty-two days, and three-fourths have ended by seventy-nine days.

1. Particularly for Medicaid patients, transfer to a hospital or discharge to the community is not simply a demand phenomenon, so other factors may be responsible for fluctuations in the hazard rate. Nursing homes can influence discharges and may have special incentives for doing so when Medicaid is the payer. Gertler (1989) has argued that, while private pay patients can be charged more than Medicaid reimburses, Medicaid patients are admitted because regulations prevent nursing homes from discriminating on the basis of payment source. There is typically excess demand for Medicaid-financed beds. One implication of Gertler's argument is that nursing homes have an incentive to discharge or transfer Medicaid patients whenever there is an increase in demand among private payers or when health deterioration increases the cost of caring for a Medicaid patient.

Medicaid hazard rates are lower than Medicare hazards, corresponding to the much longer average length of stay for a Medicaid admission. Medicaid hazards have an attenuated peak at about twenty days (possibly reflecting dual coverage). As the Medicaid survivor function shows, the probability of remaining in the nursing home declines slowly and smoothly with time. Even after a hundred days, more than half the Medicaid admissions remain in the nursing home; the seventy-fifth percentile for Medicaid is 298 days at baseline characteristics and exceeds a year for women.

Hazard rates for admissions reimbursed by private funds exhibit an early peak, at about two weeks, but the peak is not nearly as high as for the Medicare admissions. At later times, the hazard rate remains higher than for Medicaid patients (but lower than for Medicare). For example, at the baseline values of the variables, the hazard rate under "other insurance" is .0065 at one hundred days, but only .005 for Medicaid. The Medicare hazard rate, in contrast, is about .012 at one hundred days.

Despite the somewhat higher hazard rates, spells paid by "other payer" are only slightly shorter than Medicaid spells, as the survivor functions (fig. 8.2) suggest.

8.4.3 Estimation Results for Exit Probabilities

To estimate the probabilities $\Pr(n \rightarrow i)$ defined by (5), we apply standard maximum likelihood procedures in a multinomial logit framework to compute values for the parameters β appearing in specification (7). Our sample consists of observations on the residency status of an individual immediately following the termination of a nursing home spell. The values of the variables Z are fixed at the time of entry into the spell. As an arbitrary normalization, the coefficients in the transition to death are set equal to zero, so reported coefficient estimates measure $\Pr(n \rightarrow h)$ and $\Pr(n \rightarrow c)$ relative to $\Pr(n \rightarrow d)$.

Table 8.4 presents parameter estimates and standard errors associated with the exit probabilities. The variables incorporated in Z include polynomials in the spell-length quantity τ and many of the same variables introduced in the duration analysis presented above. The intercepts and the polynomial terms τ, τ^2, and τ^3 are fully interacted with the three dummy variables MEDICAID, MEDICARE, and OTHER, which identify payment source at the time of admission into the institution. Such a parameterization allows patterns for the relation between spell lengths and exit probabilities to vary by payment source. Interactions between SVADL and the three financing dummies also permit separate influences for severe ADL limitations. The inclusion of the variables AGE, AGE^2, and SEX control for demographic characteristics. Likelihood ratio tests at conventional levels of significance imply acceptance of the restriction that the associations of demographic characteristics with exit probabilities do not vary by payment source. Additional hypothesis tests indicate that the ENTRY variable, which describes residency status prior to institutionalization, is not a statistically significant determinant of exit outcomes.

Table 8.4 **Parameter Estimates of the Exit Probabilities (standard errors in parentheses)**

Variable	$\Pr(n \to c)/\Pr(n \to d)$	$\Pr(n \to h)/\Pr(n \to d)$
CONSTANT × MEDICARE	.516020	−1.445786
	(9.643600)	(9.659844)
SPELL LENGTH × MEDICARE	.032360	.009396
	(.010600)	(.011443)
SPELL LENGTH^2 × MEDICARE	−.000242	−.000059
	(.000085)	(.000100)
SPELL LENGTH^3 × MEDICARE	.000000	.000000
	(.000000)	(.000000)
CONSTANT × MEDICAID	.316500	−.711479
	(9.655840)	(9.676097)
SPELL LENGTH × MEDICAID	.009850	.009584
	(.019530)	(.018069)
SPELL LENGTH^2 × MEDICAID	−.000127	−.000120
	(.000162)	(.000152)
SPELL LENGTH^3 × MEDICAID	.000000	.000000
	(.000000)	(.000000)
CONSTANT × OTHER	1.487810	−1.469308
	(9.805370)	(9.821161)
SPELL LENGTH × OTHER	.019757	.028884
	(.030393)	(.030842)
SPELL LENGTH^2 × OTHER	−.000097	−.000168
	(.000291)	(.000293)
SPELL LENGTH^3 × OTHER	.000000	.000000
	(.000001)	(.000001)
SVADL × MEDICARE	−.640180	−.238538
	(.334980)	(.347173)
SVADL × MEDICAID	.049353	.513870
	(.524721)	(.473625)
SVADL × OTHER	.342004	.629457
	(.621751)	(.651149)
AGE	.033890	.068363
	(.241234)	(.241742)
AGE^2	−.000356	−.000516
	(.001493)	(.001497)
SEX	−.592309	−.402908
	(.219186)	(.221017)

8.4.4 Implications of the Findings for Exits

To develop the implications of the empirical results given above for the relation between financing sources and the circumstances under which a nursing home spell ends, table 8.5 reports predictions for the exit probabilities for different values of the covariates. The results in table 8.5 imply that, for 75-year-old men, the presence of severe impairment in at least one activity of daily living raises the probability that a Medicare-paid nursing home admission will terminate in death. The association between severe impairment and death is not present when Medicaid or other sources finance the admission.

Table 8.5 Exit Probabilities, by Duration, Characteristics, and Payment Source

A. From Hospital, Age 75, Male, No Severe ADL Impairment

SPELL	MEDICARE			MEDICAID			OTHER SOURCE		
LENGTH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH
5	.4239	.3482	.2279	.2461	.5736	.1802	.6369	.2256	.1375
10	.4530	.3362	.2108	.2480	.5775	.1745	.6387	.2355	.1258
15	.4798	.3246	.1956	.2495	.5808	.1697	.6397	.2448	.1155
25	.5265	.3033	.1702	.2517	.5857	.1625	.6403	.2613	.0984
50	.6038	.2656	.1306	.2530	.5906	.1564	.6386	.2907	.0707
75	.6348	.2505	.1147	.2499	.5872	.1630	.6395	.3047	.0559
100	.6315	.2542	.1143	.2437	.5769	.1794	.6457	.3061	.0482

B. From Hospital, Age 85, Male, No Severe ADL Impairment

SPELL	MEDICARE			MEDICAID			OTHER SOURCE		
LENGTH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH
5	.3885	.3487	.2628	.2238	.5700	.2063	.6029	.2333	.1638
10	.4172	.3384	.2444	.2257	.5744	.1999	.6057	.2441	.1502
15	.4440	.3282	.2278	.2273	.5782	.1945	.6077	.2542	.1381
25	.4911	.3091	.1998	.2296	.5838	.1866	.6099	.2720	.1180
50	.5705	.2742	.1553	.2310	.5893	.1797	.6110	.3039	.0851
75	.6029	.2600	.1371	.2278	.5851	.1871	.6132	.3193	.0675
100	.5996	.2637	.1366	.2215	.5732	.2053	.6203	.3213	.0583

C. From Hospital, Age 75, Female, No Severe ADL Impairment

SPELL	MEDICARE			MEDICAID			OTHER SOURCE		
LENGTH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH
5	.5058	.3438	.1504	.3000	.5785	.1215	.7080	.2075	.0845
10	.5343	.3281	.1375	.3016	.5811	.1173	.7072	.2158	.0770
15	.5602	.3135	.1263	.3029	.5833	.1139	.7060	.2235	.0705
25	.6041	.2879	.1080	.3046	.5866	.1088	.7029	.2374	.0598
50	.6741	.2453	.0806	.3055	.5901	.1044	.6955	.2620	.0426
75	.7010	.2289	.0700	.3025	.5883	.1091	.6932	.2733	.0335
100	.6978	.2324	.0699	.2971	.5820	.1210	.6976	.2736	.0288

D. From Hospital, Age 75, Male, With Severe ADL Impairment

SPELL	MEDICARE			MEDICAID			OTHER SOURCE		
LENGTH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH	COMMUNITY	HOSPITAL	DEATH
5	.3080	.3780	.3140	.2480	.5792	.1729	.6152	.2904	.0943
10	.3343	.3707	.2951	.2498	.5829	.1673	.6129	.3013	.0857
15	.3592	.3631	.2777	.2513	.5861	.1626	.6104	.3114	.0783
25	.4042	.3479	.2478	.2534	.5909	.1557	.6049	.3291	.0661
50	.4837	.3179	.1984	.2546	.5956	.1498	.5933	.3600	.0466
75	.5175	.3052	.1773	.2515	.5923	.1562	.5892	.3742	.0366
100	.5142	.3092	.1766	.2455	.5824	.1721	.5935	.3750	.0315

However, for people whose nursing home stays are not financed by either government program, the presence of a severe impairment in an activity of daily living is associated with a decreased likelihood of return to the community.

As the parameter estimates imply, gender differences in exits are significant. Table 8.5C presents results for a woman identical to the baseline case in every way except gender. Although the probability of hospital transfer does not appear to differ by gender, death is much less likely for a woman than for a man, and the probability of discharge to the community is somewhat greater.

The well-described heterogeneity of nursing home admissions (Keeler, Kane, and Solomon 1981) suggests that the probability of each type of exit would not be fixed over time. Nursing home residents who have severe chronic disabilities and cannot live independently in the community are likely to terminate nursing home spells either by death or by transfer to a hospital. Such individuals predominate among the long-stayers. Discharges that occur early in a nursing home admission represent mixtures of people admitted for terminal care or for convalescence; one would expect few hospital transfers among early discharges. Whether death would be more likely for early discharges than for long-stayers depends in large part on the mix of terminal patients and convalescent patients among short-term nursing home stays.

Although there is no relation between duration of the spell and exit probabilities for Medicaid patients, exit probabilities change with time for Medicare and "other source." For Medicare patients, the probability of community discharge increases with duration, while the probability of hospital transfer and death both fall with duration. For admissions paid by other sources, the probability of discharge to the community does not vary with duration of the admission, but the probability of death declines, and the probability of hospital admission rises. Without knowing the subsequent pattern of utilization or the outcomes of hospitalization, it is difficult to ascertain the significance of the time trend of exit probabilities for "other source," but it appears likely that a relatively high percentage of Medicare admissions for terminal care end early.

Even for admissions of the same duration, predicted exit probabilities demonstrate striking variation with payer type. Return to the community is most likely if other sources pay for the nursing home admission. Death is most likely for Medicare patients, although Medicaid patients are also more likely to terminate a nursing home spell in death than are patients whose admissions are financed by other sources. Medicaid patients are the least likely to return to the community. These results and the duration findings together imply that Medicaid patients are likely to enter nursing homes for very long periods that terminate in either death or transfer to a hospital; our analyses do not enable us to say whether the hospital transfers ended in death, transfer back to a nursing home, or return to the community. These results make it seem unlikely that subsequent long-term care utilization by Medicare or "other" patients will be nearly as great as for Medicaid patients.

8.5 Conclusions

As planning for and financing long-term care have achieved new prominence in policy circles, there is an urgent need for reliable estimates of the effect of insurance on long-term care utilization. We have attempted to take a step toward understanding the effect of insurance by measuring the association between payer type and utilization within a high-risk population of older Americans. One might argue that the absence of an association between type of coverage and utilization suggests that the demand for nursing home care is inelastic, an assumption implicit in much of the policy discussion regarding long-term care insurance. Many advocates of broader long-term care insurance coverage believe that widespread adoption of long-term care insurance would not increase the utilization of nursing homes.

Our analysis finds that the distribution of the length of nursing home stays differs substantially among payer types, in ways that may not simply reflect selection. These differences are apparent even in a population of frail elderly individuals who lack social supports and are felt to have "unmet needs." The differences also persist despite the control of the additional covariates incorporated into our model. Although our study was not designed to assess whether the differences in nursing home duration by payer are causal relations, the persistence of strong relations between payer type and duration of nursing home admission despite the selection of the population and the control for additional covariates suggests that the incentive effects of the subsidy of nursing home care may play an important role in nursing home utilization.

The results of the duration analyses reported here suggest that the payment source is strongly associated with the length of nursing home admissions. The covariates have a weak independent association with duration, at least within this population and in the time period studied, but some of them, such as the presence of a severe ADL impairment, are associated with the type of exit. Medicare-financed admissions are much shorter than admissions funded by either Medicaid or "other" payment source, and there is a striking early peak in the hazard rate for Medicare admissions.

The type of exit from the nursing home is also highly associated with the payment source. Exit probabilities reflect the "success" of a nursing home admission, and they also give clues to future utilization of long-term care. Nursing home spells financed by "other," primarily private, payers last nearly as long as Medicaid admissions but are much more likely to end with return to the community. The length of admission and payment source interact, at least for Medicare spells; the longer a Medicare patient is in a nursing home, the more likely is discharge to home. Even long Medicare admissions seem short in comparison to Medicaid admissions and are much more likely to end in return to the community. For the Medicaid admissions, the high rate of discharge to hospitals and the high rate of death are discouraging signs for return to independent living. A study that traced paths of nursing home pa-

tients found that 14 percent of the patients discharged to a hospital died within forty-eight hours. Of the remaining hospital transfers, 11 percent died in the hospital, and about 80 percent returned to a nursing home (Lewis, Cretin, and Kane 1985).

Although the results of this study may be interpreted to imply that the demand for nursing home care is responsive to price, such a broad interpretation is premature. First, the population studied does not readily generalize to all elderly Americans. Channeling participants were selected because they were at high risk of entering a nursing home. The selection rule makes it difficult to generalize to all America's elderly population, particularly since the criteria for "unmet needs" were not explicit. On the other hand, this population is inherently interesting. The Channeling population used nursing homes heavily. Many of them would have been unable to purchase private long-term care insurance because they could not afford the premiums. In addition, many would have been ineligible because of preexisting chronic diseases or because their conditions would not be covered by many nursing home care policies. This is the group that is most likely to benefit from a federal program for long-term care insurance and would account for a disproportionate share of program costs.

Furthermore, while the Channeling population is special, the basic phenomena we describe may occur in similar fashion in the general population. There is some evidence that the outcomes of nursing home spells were *more* favorable in the Channeling population than among all nursing home spells. An analysis of the 1977 National Nursing Home Survey found that 49.7 percent of Medicare admissions ended in discharge to the community, slightly *less* than predicted in our analyses, at the mean duration of fifty-six days. Similarly, "other" payment source and Medicaid admissions had a lower rate of discharge to the community in the 1977 National Nursing Home Survey than predicted in our analysis of Channeling. The analysis did not present the percentage who died, subsequent outcomes, or variation in discharge status with length of stay (Weissert and Scanlon 1985).

A second difficulty arises from the endogeneity of payer source. Medicaid patients are likely to have been chronically debilitated, and they may have been enrolled for substantial periods before entering the Channeling study. Other admissions must meet several requirements before they qualify for Medicare reimbursement. Inasmuch as there is a need for recent hospitalization, a relatively high death rate for Medicare admissions has little to do with causal effects of the payment system and much to do with the selection rules. Nearly all Medicare patients would have had either an acute illness or an acute exacerbation of a chronic illness; the same phenomenon need not have been true for the other payers.

Our results to date should be viewed as suggestive findings, not as definitive answers about insurance effects. As such, they make it clear that a complete understanding of nursing home utilization must be based on an adequate

characterization of paths leading to and from nursing homes and that it must account for multiple admissions.

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Comment Paul J. Gertler

How to finance long-term care is being intensely debated at all levels of government. At issue is whether to promote private insurance alternatives or expand current entitlement programs. Further, there is substantial controversy over how to structure benefits under any alternative. Answers to these questions clearly depend on the properties of the demand for long-term care. Alan M. Garber and Thomas MaCurdy make an important contribution to understanding the determinants of the use of long-term care. In particular, they investigate the likely moral hazard properties of private long-term care insur-

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ance. The authors argue that one possible argument as to why a private long-term care insurance market does not exist is moral hazard.

Garber and MaCurdy also move the empirical modeling of health care demand out of a static framework into dynamic models. While theoretical work has recognized dynamics, few empirical studies have attempted dynamic models. In addition, the empirical work is careful, and the authors go to great lengths to maintain maximum flexibility in their econometric specifications.

The authors' model the duration of a nursing home stay (conditional on the entry decision) and mode of exit (home, hospital, or death). The first stage estimates hazard models separately by payment source (Medicare, Medicaid, and private pay). The major empirical issue is identification of price effects. Nursing home patients can be categorized into three groups based on method of payment: private pay, Medicaid, and Medicare. The biggest source of price variation faced by patients is in the private pay market. However, Garber and MaCurdy argue that one cannot accurately estimate the true prices faced by private pay patients because of hard-to-measure quality differences across nursing homes. For the remaining patients, there is limited cross-sectional price variation. Medicaid patients face zero prices, and all Medicare patients face the same copayments. However, the Medicare copayment changes over time, so Medicare patients face an increase in copayments during their nursing home stay. It is this variation that Garber and MaCurdy exploit to identify price effects.

While Garber and MaCurdy have made an important contribution to identifying price effects, there is some question as to how useful their estimates are. Medicare accounts for a very small percentage of nursing home patient days and expenditures. The question boils down to whether Medicare price effects are representative of the price elasticity of demand by the majority of patients (Medicaid and private pay). Indeed, the three types of patients are very different.

Consider the differences between Medicare and non-Medicare patients. Almost all Medicare patients have entered the nursing home after a hospitalization for some acute morbid event. Their nursing home stay is directly related to their illness, and their reason for being in a nursing home is typically rehabilitative. Therefore, unless these patients die quickly, one would expect them to get better and return to the community. Medicare patients are short-stayers. Medicaid and private pay patients typically enter nursing homes because of a long-term chronic problem that has so incapacitated them that they require help in their activities of daily living. Their purpose for being in a nursing home is typically life-style maintenance, and they are long-stayers. Indeed, the data reported by Garber and MaCurdy support these differences. The majority of Medicare patients enter nursing homes from hospitals, and their average length of stay is only fifty-five days (9 percent of the observations are right censored). On the other hand, the majority of Medicaid and private pay

patients do not enter from a hospital, and their average length of stay is about 125 days (70 percent of the observations are right censored).

Now consider the differences between Medicaid and private pay patients. One must be financially indigent to be eligible for Medicaid. Private pay patients tend to be wealthier and healthier than Medicaid patients. Medicaid status is commonly used as a measure of overall poor health in many studies in medical literature. Thus, one would expect Medicaid patients' health to deteriorate much more quickly. Therefore, their stays are shorter, and they are more likely to exit via hospitalization or death. This is borne out in the data. Medicaid patients exit nursing homes faster than private pay patients: 75 percent of Medicaid patients exit via death or hospitalization, whereas 35 percent of private patients exit via these methods. This is either because the initial state of health is poorer for Medicaid patients or because nursing homes quality discriminate.

What these differences suggest is that there is substantial underlying patient heterogeneity across patients in the three groups. If price elasticities depend on health status, wealth, and other demographic factors, then Garber and MaCurdy's price elasticity estimates have limited usefulness. However, this is not the authors' fault. It is a limitation of the available price variation in nursing home data. Indeed, Garber and MaCurdy should be commended for finding a way to exploit the limited variation to obtain any estimates at all.

A more fundamental problem concerns the extent to which Garber and MaCurdy have estimated complete price elasticities. The paper attempts to measure the effects of financial incentives on the demand for nursing home care by investigating length of stay conditional on the decision to enter a nursing home. While modeling the duration of stay captures an important component of demand, other elements need to be considered to obtain a complete alternative. Most obvious is the decision to enter a nursing home at all. Financial incentives are likely to have a big effect on the initial entry decision. Not incorporating entry is somewhat surprising given Garber and MaCurdy's previous work on entry decisions using the same data. Second, quality as measured by the services nursing homes provide has been shown to respond dramatically to the incentive structure of Medicaid reimbursement rules and the level of private pay demand. Indeed, some nursing homes may respond to alternative financial incentive structures by adjusting quality instead of quanity (length of stay). A complete picture of the demand for nursing home care needs to incorporate the entry decision and quality.

A more complete model is important for examining the policy implications of the price effects. For example, the Rand health insurance experiment demonstrated that hospital entry and length of stay have very different price elasticities. If this is the case for nursing homes, then moral hazard estimates depend crucially on the entry decision. Given their data, they can follow individuals through the complete course of medical treatment, not just begin-

ning with nursing home entry. By looking only at nursing homes, they have a selected sample and therefore cannot examine how policies that affect hospitalization (diagnostic related groups, or DRGs) affect nursing home demand. Moreover, they cannot investigate how policies affect total medical care expenditures. In the end, we are more interested in the total medical care expenditures than in just the nursing home component.

A next step for Garber and MaCurdy would be to use the information on entire episodes of illness (hospitalization, who does not enter a home, and what happens to patients pre– and post–nursing home stay). The could easily expand their dynamic framework to include hospitalization and other forms of care so as to get complete resource use model. In addition, resource use is modeled as an input into a health production function whose dependent variable is length of life. This more complete framework is easier to interpret from a welfare perspective. It would have individuals moving in and out of four states: home, hospital, nursing home, death (absorbing state). Indeed, one could expand this to include living arrangements and get at the question of substitutability of formal and informal care.

Let me turn now to the exit model. A discrete choice model conditional on length of stay is specified. The possible modes of exit are community (get better), hospitalization (health deteriorates), and death (health deteriorates further). This suggests that length of stay is an input into the production of health. However, it seems to matter only for Medicare patients. It does not affect the other types of patients getting better.

How should length of stay be interpreted in the exit model? Are short stops good or bad? The moral hazard story implies that short stays are good if patients return home because fewer resources are used. Alternatively, long stays may be good if nursing home care substitutes for hospital care. If patients exit to death, then long stays (ignoring quality of life) are better. What this again suggests is that the authors need a more complete theoretical model to guide the empirical specification. Initial health conditions are determined by whether and when to enter a nursing home. It would be easier to interpret results if they follow changes in health status over time.

In summary, Garber and MaCurdy have made an important contribution to the understanding of the demand for nursing home care as well as moving the demand for medical care literature into dynamic models. I hope that they continue to expand their work into more complete dynamic models.