MATHEMATICA
Policy Research, Inc.

The Effects of PACE on Medicare and Medicaid Expenditures

Final Report

August 29, 2007

Leslie Foster
Robert Schmitz
Peter Kemper

Programmers:
Amy Zambrowski
Mei-Ling Mason
Matthew Jacobus
Jill Gurvey
Jeffrey Holt

CONTENTS

TABLES

FIGURES

STUDY CONTEXT

Shifting the Balance of Long-Term Care

The Centers for Medicare & Medicaid Services and state governments are increasingly interested in moving states' long-term care systems away from reliance on institutional care and toward the development of more community-based services. Such a shift could allow more seniors and people with disabilities to live in the settings they prefer as they age, and reduce per-capita public expenditures.

The Program of All-Inclusive Care for the Elderly (PACE) attempts to help nursing-home-eligible seniors avoid institutional care by providing them with a rich mix of acute and long-term care services—including adult day care to alleviate caregiver burden—that can be tailored to individual needs and modified as those needs change.

PACE was established as a permanent Medicare benefit by the Balanced Budget Act of 1997. It has several distinctive features:

- PACE is a Medicare managed care program and a Medicaid state plan option. Thus, PACE organizations receive two capitation payments per month for dually eligible participants. In exchange, PACE organizations assume full financial risk for all the health care services participants use.

- PACE services are provided by interdisciplinary teams. Teams assess the needs of each PACE participant, coordinate the delivery of services, and meet frequently to review individual cases. PACE participants agree to receive all their care from a PACE team.

- The locus of PACE activity is the PACE center. PACE center attendance is meant to promote socialization on the part of participants, alleviate caregiver burden, and help the team monitor participants' health and functioning.

Focus of this Report

The Balanced Budget Act of 1997 required an evaluation of the permanent PACE program. Moreover, the current policy interest in rebalancing public expenditures for long-term care makes it important to know how PACE affects Medicare and Medicaid expenditures relative to an alternative source of community-based long-term care.

This analysis develops estimates of the impact of PACE on Medicare and Medicaid expenditures in the first 60 and 24 months, respectively, after beneficiaries entered the PACE program (in 1999 or 2000) relative to the expenditure that would have prevailed had they not enrolled in PACE. Using quasi-experimental methods, we compare actual expenditures for

participants in any of 17 PACE organizations to expenditures predicted from a comparison sample of enrollees entering programs providing home and community-based services (HCBS) under Medicaid waivers in PACE market areas. We follow each sample member in both the treatment and comparison groups regardless of whether they remain in PACE, continue using HCBS, or enter a nursing home.

Other reports prepared for this evaluation assess the effects of PACE on care quality and beneficiary satisfaction, or describe how the permanent PACE program affected program operations.

SAMPLE SELECTION, ANALYTIC METHODS, AND DATA

Sample Selection

Comparison Group. Medicaid eligibility and claims data permit us to identify a comparison sample of dual eligibles who began receiving Medicaid HCBS at about the time PACE sample members entered PACE. HCBS programs are intended to furnish services to community-dwelling beneficiaries who, in the absence of the services, would require care in nursing homes. Thus, HCBS programs serve a clientele similar to that of PACE. Although the PACE and HCBS programs are not otherwise alike, dual eligibles who seek and qualify for HCBS probably resemble those who enter PACE more closely than any other group that can be identified with administrative data. Thus, in this analysis, HCBS users in PACE market areas provide the basis for predicted Medicare and Medicaid expenditures.

Study States and Samples. The study is set in ZIP-code-defined market areas of 17 PACE organizations operating in nine states in 1999. The states (California, Colorado, Maryland, Massachusetts, Michigan, Ohio, South Carolina, Texas, and Wisconsin) were selected for two reasons. First, they offered PACE and Medicaid HCBS to elderly nursing home-eligibles when the study began. Second, they submitted reliable Medicaid claims data to the Medicaid Statistical Information System (MSIS)—an important source of data for this analysis.

The sampling frame for PACE participants included Medicare beneficiaries who enrolled in any of the PACE study sites in 1999 or 2000 and were also enrolled in Medicaid. Because we would go on to create propensity scores for all sample members using data from prior Medicare claims, we further restricted the PACE sample to beneficiaries for whom a year's worth of pre-entry claims were available. Across the nine study states, a total of 1,503 PACE participants met the sample selection criteria.

After the PACE sample was selected, the sampling frame for the comparison group consisted of the remaining dually eligible beneficiaries who were new HCBS users (as determined by recent claims history) and met the other selection criteria used for the PACE sample. Across the nine study states, 7,035 HCBS users met the sampling frame criteria.

Selecting Comparison Group Beneficiaries. Using Medicare administrative data on characteristics known or believed to affect health care expenditures (selected demographics, prior diagnoses, and prior Medicare service use and expenditures), we refined the composition of the comparison group through the method of propensity score matching. The matching process

was conducted at the state level. We estimated the probability that each member of the combined treatment and comparison groups would enroll in PACE using logistic regression and then matched each PACE sample member to the comparison group member whose propensity score was nearest to his or her own.

Using this method, 1,050 comparison group members were matched to the 1,503 PACE sample members. The state-level samples were then pooled for analysis, with California and Massachusetts contributing the greatest share of the sample (44 percent of PACE sample members were in one or the other of those two states).

In the pooled sample, the only statistically significant difference between the PACE group and the matched comparison group was in racial composition. The PACE group had a somewhat larger proportion of white sample members, and a somewhat smaller proportion of black sample members, than the matched comparison group (Table 1).

Analytic Methods

We generated two sets of estimates of the effect of PACE enrollment on Medicare and Medicaid expenditures, relying in both cases on the experience of the comparison group as a counterfactual. The first set of estimates was produced by contrasting mean per-person per-month expenditures for the PACE group over successive six-month intervals with those for the comparison group. We assessed the statistical significance of the differences in sample means with t-tests.

A second set of estimates was produced by comparing *actual* per-person per-month expenditures for the PACE group with expenditures *predicted* on the basis of the experience of the comparison group. Predictions were generated by (1) estimating a least-squares model of expenditure for the comparison group using pre-enrollment characteristics as covariates, and (2) inserting the mean characteristics of PACE sample members into the regression equation. This method improves the accuracy of estimates of expenditures, but also generates large standard errors and, thus, wide confidence intervals for assessing statistical significance.

The covariates used in the regression models were (1) the set of variables used to construct propensity scores (age group; race; and Medicare service use, expenditures, and diagnoses in the 12 months before program entry); (2) whether the sample member died during the six-month interval being modeled; and (3) state of residence.

The dependent variables in the regression models were specified as Medicare or Medicaid expenditures in a given six-month interval divided by the number of months the sample member was alive during the interval. Observations in the matched comparison group were weighted by the number of PACE sample members each comparison sample member matched to during the propensity-score matching process, multiplied by the sample member's share of the sample's months alive during the interval. Observations in the PACE group were weighted by the sample member's share of the sample's months alive during the interval. The difference between actual expenditures and predicted expenditures represents the estimated effect of PACE on Medicare and Medicaid expenditures.

TABLE 1

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP
(Percentages, Unless Otherwise Indicated)

Characteristic	PACE Group	Comparison Group
Age in Years		
66 to 74	26.8	28.1
75 to 84	42.1	39.4
85 or older	31.4	32.5
Race/Ethnicity		**
White	37.1	44.4
Black	33.5	27.2
Hispanic	11.1	11.0
Other	18.2	17.4
Diagnoses in Past 12 Months		
Stroke	29.4	25.6
Dementia	21.4	22.7
Chronic illness[a]	69.9	68.7
Service Use in Past 12 Months		
Any inpatient services	50.2	47.6
Any skilled nursing facility services	19.7	18.4
Any home health care services	43.5	42.7
Any inpatient stay in past 30 days	5.4	4.5
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	11,783	10,464
Total Part B	5,094	5,226
Weighted Sample Size[b]	**1,503**	**1,503**

Source: Data are from Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: The variables in this table were used to calculate propensity scores, by state.

[a]Includes diabetes, rheumatoid arthritis and osteoarthrosis, hip fractures, chronic obstructive pulmonary disease, and asthma.

[b]Observations in the comparison group are weighted by the number of PACE sample members they matched to. The unweighted sample size was 1,050.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

Data

Data for drawing the sample frames, calculating propensity scores, and analyzing the effects of PACE on expenditures came from Medicare enrollment and demographic data, Medicare claims data, Medicare county rate books for managed care plans, and state-specific Medicaid Analytic eXtract (MAX) files.

RESULTS

Mortality During Follow-Up

Mortality rates were similar in the PACE and matched comparison groups throughout the 60-month follow-up period. Over this time, about 54 percent of both the treatment and comparison groups died. This finding suggests the matched comparison group was a reasonable counterfactual for beneficiaries who enrolled in PACE in 1999 or 2000.

Estimated Effects of PACE on Per-Person Per-Month Expenditures

Monthly Medicare expenditures were similar for the PACE group and the matched comparison group (that is, differences between the groups were not statistically significant) in 9 out of 10 six-month intervals (Table 2). In contrast, monthly Medicaid expenditures for the PACE group exceeded those for the matched comparison group in all 4 six-month intervals. The estimated effects on Medicaid were large and highly significant, but they diminished from $926 to $536 from the first to fourth intervals.

Differences between actual and predicted expenditures were consistent with differences between the unadjusted sample means (not shown). Thus, the regression-adjusted results also suggest that PACE affected Medicaid expenditures much more than Medicare expenditures, although the effect on Medicaid did diminish over time.

Sensitivity Tests

Several sensitivity tests suggested themselves, for reasons having to do with (1) the effects of mortality on fee-for-service (FFS) health care expenditures, (2) expenditures following disenrollment from PACE, or (3) our having to select study states based on the availability of Medicaid data.

Mortality. In fee-for-service payment systems, health care expenditures typically increase dramatically near the time of death. Because Medicare capitation payments do not increase as utilization increases, total Medicare expenditures in the last months of life are likely to be lower under capitation plans such as PACE than they would be under FFS. Although mortality rates were similar in the PACE and matched comparison groups, we conducted a subgroup analysis to assess the sensitivity of our main results to the important difference in the way end-of-life costs are paid for under capitation and FFS systems. In the subgroup of decedents, per-person per-month Medicare expenditures were, as expected, much lower for the PACE group than for the

TABLE 2

UNADJUSTED MEAN PER-PERSON PER-MONTH EXPENDITURES, BY GROUP
(Dollars)

Months from Entry	PACE Group	Comparison Group	Difference
Medicare			
1 to 6	1,445	1,474	-28
7 to 12	1,453	1,273	180*
13 to 18	1,435	1,277	157
19 to 24	1,471	1,434	37
25 to 30	1,533	1,430	103
31 to 36	1,571	1,360	211
37 to 42	1,600	1,519	81
43 to 48	1,684	1,565	119
49 to 54	1,663	1,874	-210
55 to 60	1,662	1,687	-25
Medicaid			
1 to 6	2,072	1,146	926***
7 to 12	2,180	1,419	761***
13 to 18	2,292	1,558	734***
19 to 24	2,328	1,792	536***
Medicare and Medicaid Combined			
1 to 6	3,517	2,620	897***
7 to 12	3,633	2,692	941***
13 to 18	3,727	2,835	892***
19 to 24	3,799	3,226	573***

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Per-month expenditures are the sum of expenditures in the interval divided by the number of months alive. Sample members have a weight equal to their matching weight times their share of the sample's months alive, where share of the months alive is calculated separately for the PACE and matched comparison groups. The significance of the difference between the samples was determined through t-tests.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

matched comparison group. In the subgroup of survivors, however, per-person per-month Medicare expenditures were somewhat higher for the PACE group than for the matched comparison group in all but one six-month interval (by $99 to $386 per month).

Disenrollment. Most disenrollment from PACE occurred during the first six months after program entry; about 7 percent of PACE members disenrolled during this time. About 12 percent disenrolled by the end of month 30, with little disenrollment beyond this point. Medicare and Medicaid expenditures could be quite different for PACE participants who decide to leave the program, depending on whether such beneficiaries remain in the community or enter nursing homes. Moreover, PACE organizations have no control over expenditures after beneficiaries leave the program. As a sensitivity test, we calculated actual and predicted expenditures for the PACE sample, excluding disenrollees, to see how the estimated effects changed.

The most noteworthy finding was that health care expenditures decreased after PACE participants left the PACE program. As result, the estimated effects of PACE on Medicaid were somewhat larger (that is, less favorable for Medicaid) when disenrollees were excluded from the sample. This finding seems to reflect the fact that most disenrollees in our sample left the PACE program after a relatively short period; thus, they may have been beneficiaries who had decided PACE was not the right type of community-based care for them, and they disenrolled to remain in the community, rather than enter a nursing home (which we would expect to be more costly than PACE).

State Selection. Our selection of study states was largely determined by the availability of Medicaid data for the period of observation called for in our study design. Our estimates of the effects of PACE on expenditures might have been different had other states comprised the sample. Although we have no way to know how exclusions may have affected the results, we did assess the sensitivity of our results to two key inclusions: California and Massachusetts, both of which have above-average Medicare FFS reimbursement rates.

The estimated impact of PACE on expenditure was less favorable to Medicare when California was excluded from the analysis. This was because Medicare expenditures for the matched comparison group were above average in California, relative to other study states, but Medicare expenditures for members of the PACE group were about average. Excluding Massachusetts from the analysis did not change the main results substantially.

A Nursing Home Comparison Group for PACE

Some proponents of PACE have argued that not all PACE participants could be maintained in the community by the services that HCBS programs provide. Therefore, some beneficiaries entering PACE would, in its absence, enter nursing homes. While some proportion of PACE entrants might have otherwise entered nursing homes, no firm evidence exists to suggest what that proportion might be.

To explore the consequences of assuming that some PACE entrants might otherwise have been admitted to a nursing home, but without *a priori* knowledge of the proportion of PACE enrollees who might have done so *at the outset*, we constructed (1) a matched comparison group

of beneficiaries who entered nursing homes around the time other beneficiaries entered PACE, and (2) repeated the entire analysis. We found that:

- After program entry, members of the matched comparison group of nursing home entrants died much more quickly than members of the PACE group. In most six-month intervals, the difference was about 20 percentage points.

- Combined Medicare and Medicaid expenditures for members of the PACE group were lower than those for members of the matched comparison group.

The great difference in the groups' mortality rates, even after propensity-score matching, suggests that nursing home entrants are not a suitable comparison group for new PACE participants. It is implausible that members of the PACE group would have experienced a mortality trajectory like the comparison group's had PACE been unavailable. Thus, while some nursing home placements may be averted by PACE, it is also implausible that Medicare and Medicaid expenditures for the group of nursing home entrants are an accurate representation, on average, of what PACE participants would have experienced in the absence of PACE.

DISCUSSION

This nine-state study of beneficiaries who entered PACE in 1999 or 2000 found little effect on Medicare expenditure relative to expenditure that would have prevailed in the absence of PACE. However, estimates suggest that PACE was associated with increased Medicaid expenditure of several hundred dollars per person per month.

The findings about expenditures are generally consistent with previous research about the effects of PACE on public expenditures. The evaluation of the PACE demonstration, conducted by Abt Associates, Inc. in the late 1990s, found that Medicare capitation payments to PACE organizations were somewhat lower than projected fee-for-service expenditures for a comparison group of decliners in the follow-up year, and that Medicaid capitation payments were much higher than projected expenditures. A Washington Department of Health study of the Seattle PACE program found that Medicaid expenditures for PACE enrollees were much higher than for HCBS users. However, the gap between expenditures for PACE participants and those for HCBS users narrowed over time, as our results also suggested. (The Washington study did not assess *Medicare* expenditures.)

The comparability of the PACE group to the matched comparison group is perhaps the greatest open question of this study. While the selected comparison group was chosen to be similar to PACE enrollees in terms of measures that are available from administrative data sources, there is no guarantee that the two groups are equivalent in terms of other factors such as functional and cognitive limitations, extent of home support, and motivation to remain the community. To the extent that beneficiaries who enter PACE rather than HCBS differ in ways that cannot be easily measured and are related to future Medicare or Medicaid expenditure, estimates of PACE impacts reported here could be biased in either direction.

As noted earlier, we selected HCBS participants as a comparison group because they, like PACE enrollees, are living in the community though eligible for a nursing-home level of care in their state of residence. Nonetheless we used expenditure data for a matched group of nursing home entrants to identify the required proportion of PACE participants for whom enrollment in PACE would have averted immediate nursing-home admission—and exhibited the mortality trajectory we observed in the nursing home comparison group—necessary for PACE to produce a net saving for Medicare and Medicaid combined. In the first six-month interval, when expenditures for the PACE group were much less than those for the nursing home group, and the losses relative to HCBS were more, PACE would have produced a net saving only if at least 27 percent of participants would have immediately entered a nursing home rather than an HCBS program in the absence of PACE. No firm evidence exists to confirm the plausibility of this scenario.

Any assessment of the effects of PACE on public expenditures must be considered in light of what is known about the relative quality of care PACE and its alternatives provide. In a companion report to this analysis, Schimmel et al. (forthcoming) used survey data collected one to three years after program entry to assess the effects of PACE on care quality, relative to HCBS. The authors found that PACE seems to favorably affect several important health care utilization and care management outcomes. States must consider whether these favorable effects are worth the additional per capita monthly Medicaid expenditures observed in this analysis.

I. INTRODUCTION

A. CONTEXT OF THE ANALYSIS

The Centers for Medicare & Medicaid Services (CMS) and state governments are increasingly interested in moving states' long-term care systems away from reliance on institutional care toward the development of more community-based services. Such a shift could allow more seniors and people with disabilities to live in the settings they prefer as they age, and reduce per-capita public expenditures.

The Program of All-Inclusive Care for the Elderly (PACE) attempts to help nursing home-eligible seniors avoid institutional care by providing them with a rich mix of acute and long-term care services—including adult day care to alleviate caregiver burden—that are tailored to individual needs and modified as those needs change. PACE was established as a permanent Medicare benefit by the Balanced Budget Act (BBA) of 1997. The program's goal, which is to serve more frail seniors in the community for as long as possible, is consistent with that of such recent CMS programs as Money Follows the Person and Rebalancing Long-Term Care. PACE's integration of acute and long-term care shares elements with older CMS programs such as the Social HMO demonstration. However, PACE has some distinctive features:

- PACE is a Medicare managed care program and a Medicaid state plan option. Thus, PACE organizations receive two capitated payments per month for participants who are dually eligible for Medicare and Medicaid. (Nearly all participants are dually eligible.) In exchange, PACE organizations assume full financial risk for all the health care services participants use.

- PACE organizations must deliver "all services participants need rather than be limited to those reimbursable under the Medicare and Medicaid fee-for-service systems" (Centers for Medicare & Medicaid Services 1998). At a minimum, PACE services include: interdisciplinary assessment and treatment planning; primary physician and nursing services; adult day care; social work; restorative therapies; personal care and supportive services; nutritional counseling; recreational therapy; transportation; meals; medical specialty services; laboratory tests, X-rays, and other diagnostic

procedures; drugs and biologicals; prosthetics and durable medical equipment, corrective vision services, hearing aids, and dentures; acute inpatient care, ambulance, and emergency room services; and nursing home care.

- PACE services are provided by interdisciplinary teams. Teams assess the needs of each PACE participant, coordinate the delivery of services, and meet frequently to review individual cases. PACE participants agree to receive all their care from a PACE team.

- The locus of PACE activity is the PACE center. PACE teams provide some services in the home and in inpatient settings. However, adult day care, physician and nursing services, therapies, nutritional counseling, supportive services, and meals all must be available in the PACE center. PACE center attendance is meant to promote socialization on the part of participants, alleviate caregiver burden, and help the team monitor participants' health and functioning.

The BBA of 1997 required an evaluation of PACE as a permanent program. In addition, the current policy interest in rebalancing public expenditures for long-term care makes it important to know how PACE affects Medicare and Medicaid expenditures relative to alternative sources of community-based long-term care. In many states where PACE operates, Medicaid home- and community-based services (HCBS), provided under Section 1915© waivers, are the primary community-based alternative to PACE for nursing home-eligible seniors. Nationwide, however, far fewer seniors receive community-based long-term care through PACE than through HCBS.[1,2]

B. FOCUS OF THIS REPORT

This report estimates the effects of PACE on Medicare and Medicaid expenditures in the first 60 and 24 months, respectively, after beneficiaries enter the PACE program (in 1999 or

---

[1]About 10,000 seniors used PACE services in 2004 (Gross et al. 2004). About 487,877 seniors and people with disabilities used HCBS in 2002 (Kaiser Family Foundation 2005).

[2]Several factors contribute to the relatively low PACE enrollment: (1) Federal regulations for permanent PACE and provisions for risk-adjusted Medicare payments both took several years to establish. The delays deterred potential providers from opening new PACE sites. (2) The financial costs of opening a new PACE center or expanding an existing one are great. (3) Some beneficiaries reject PACE because it requires them to give up their primary care physician. (4) Many states impose PACE enrollment caps. (See Gross et al. 2004.)

2000). Using quasi-experimental methods, we compare actual expenditures for participants in 17

PACE organizations with predicted expenditures, had PACE been unavailable.

Because interested beneficiaries are not randomly assigned to PACE or to an alternative

program or care setting, we needed to identify a comparison group to predict what expenditures

would have been for PACE participants in the absence of PACE. As a practical matter,

moreover, we needed to identify a comparable group of eligible nonparticipants whose similarity

to PACE sample members could be established *using available administrative data*.

Medicaid data allowed us to identify a comparison sample of dual eligibles who began using

Medicaid HCBS at about the time PACE sample members entered PACE. HCBS programs are

intended to furnish services to community-dwelling beneficiaries who, in the absence of the

services, would require care in nursing homes—the same target population served by PACE.

Although the PACE and HCBS programs are not otherwise alike, as we will describe below,

dual eligibles who seek and qualify for HCBS can be expected to resemble those who enter

PACE. Thus, in this analysis, HCBS users in PACE market areas provide a sound basis for

estimating what Medicare and Medicaid expenditures would have been in the absence of PACE.

As we describe in Chapter II, we used propensity-score matching methods to define a

comparison group of HCBS users.

C. HOW PACE PROGRAMS ARE PAID

PACE organizations are required by federal regulations to accept monthly capitation

payments from Medicare, Medicaid, and private sources. Capitated financing is intended to

allow providers the flexibility required to meet all the health care-related needs of participants.

1. Medicare

Through most of the period covered in this analysis, the Medicare capitation rate for each PACE organization was the Medicare Advantage (formerly Medicare + Choice) county rate multiplied by a frailty adjuster. The frailty adjuster was 2.39 for all participants except those with end-stage renal disease (ESRD) (Department of Health and Human Services 1999). Thus, PACE organizations received the same capitation payment for nearly all Medicare-eligible PACE participants in the county or counties they served (National PACE Association 2007).[3]

Since 2004, the Medicare capitation rate has been a blend of two formulas: (1) the Medicare Advantage county rate multiplied by the uniform PACE frailty adjuster, and (2) a risk-adjusted payment methodology. The blend will transition to a 100 percent risk adjustment in 2008.

2. Medicaid

The Medicaid monthly capitation rate is negotiated between the PACE organization and the state Medicaid agency and is contractually specified. Each state that includes PACE as a Medicaid state plan option develops a capitation rate based on the cost of comparable services for nursing-home eligible Medicaid beneficiaries in the state. Generally, according to CMS, the rates are based on a blend of the cost of institutional and community-based care for frail elders (Department of Health and Human Services 1999).

D. EXPECTATIONS ABOUT EFFECTS ON EXPENDITURES

1. Capitation Versus Fee-for-Service Payment

The analyses reported here compare mean per-person per-month expenditures under PACE with expenditures for a matched comparison group of HCBS users, most of whom receive health

---

[3]A larger adjuster was used for participants with end-stage renal disease.

care in fee-for-service (FFS) environments.[4] Monthly Medicare and Medicaid expenditures for PACE participants should thus be far more predictable than those for the comparison group. Whether the overall level of expenditures for PACE participants will be greater or less than those for the comparison group is more difficult to predict, however, and depends on how capitation rates are set.

In contrast to PACE, HCBS programs provide a much more limited set of long-term care services. These typically include personal care, chore services, caregiver respite, transportation to medical appointments, and coordination by a case manager. HCBS users receive all other services from other Medicare and Medicaid providers, who may have little incentive to control costs. On the one hand, Medicare and Medicaid expenditures for PACE participants (in the form of capitated payments) may be greater than expenditures for HCBS users because of (1) the sizable Medicare frailty adjuster, and (2) state rate-setting methods that may be calibrated more closely to an institutionalized population than to a community-based one. HCBS users also may be less likely than PACE participants to know how to access all the services they qualify for, a task that PACE teams routinely manage for participants. On the other hand, total health care expenditures for HCBS users could exceed those for PACE participants if, for example, the fragmented nature of FFS medical care resulted in poorer quality care overall and costly complications.

2. Previous Research

The most recent multisite evaluation of the effects of PACE on Medicare and Medicaid expenditures was conducted by Abt Associates, Inc. in the late 1990s (White et al. 2000). That

---

[4]Beneficiaries who used managed care in the follow-up period are included in our analysis, but they comprise only a small proportion of sample members.

evaluation compared the expected expenditures of PACE demonstration participants to the actual expenditures, in the form of capitation payments, in the first year of PACE enrollment. The comparison group was eligible nonparticipants—beneficiaries who underwent the PACE application-screening process but decided not to enroll. The PACE group and the comparison group enrolled or decided not to enroll in PACE between 1995 and 1997. The study included 11 PACE sites.

The evaluation found that, in the first year after enrollment, the projected counterfactual Medicare and Medicaid expenditures ($3,010 per month) were about 10 percent lower than the actual capitation payments combined. However, the Medicare portion of the capitation payment was 42 percent less than projected expenditures, while the Medicaid portion of the capitation payment was 86 percent greater than projected expenditures. The primary limitations of the evaluation were (1) the short follow-up period, and (2) the use of a comparison group whose comparability to PACE participants was questionable because its members expressed interest in PACE but later declined to enroll. If PACE participants differed systematically from nonparticipants in ways that were not controlled for in the analysis but that affected expenditures, the evaluation may have overstated the effects of PACE.

A more recent study of the effects of PACE on expenditures, among other outcomes, was conducted by the Washington State Department of Health and Human Services (Mancuso et al. 2005). That study used quasi-experimental methods to compare Medicaid expenditures for clients of the Providence ElderPlace PACE site, in Seattle, with those of HCBS users and nursing home residents in the same market area. Expenditures were observed for up to four follow-up years. The authors concluded that "PACE clients are much more expensive [to the state Medicaid program] than clients receiving HCBS," and "about as expensive [to the state] as clients receiving nursing home services." Per-person per-month Medicaid expenditures for

PACE participants exceeded those for HCBS users by $1,442, on average (the difference between $2,791 and $1,349) in the first follow-up year. By the fourth follow-up year, the gap narrowed to $1,018 (the difference between $2,958 and $1,940). The gap narrowed primarily because of rising nursing home costs for the HCBS group. In the comparison with nursing home residents, Medicaid expenditures were significantly higher for PACE participants than nursing home residents in the first follow-up year ($2,791 versus $2,602), but not in subsequent years.

E. CHAPTERS IN THIS REPORT

The rest of this report consists of three chapters. Chapter II describes sample selection, analytic methods, and data sources used in the analysis. Chapter III presents results on the estimated effects of PACE on public expenditures relative to the comparison group. Chapter IV is a summary and discussion.

II. SAMPLE SELECTION, ANALYTIC METHODS, AND DATA

A. SAMPLE SELECTION

1. Study Setting

The study included all states that both:

- Offered PACE *and* HCBS to elderly nursing-home-eligible Medicare beneficiaries in 1999; and

- Submitted reliable Medicaid claims data to the Medicaid Statistical Information System (MSIS)—an important source of data for this analysis—in 1999.

By beginning the study in 1999, we were able to observe sample members' Medicare claims for as many as 60 follow-up months and their Medicaid claims for as many as follow-up 24 months. The states that met our two criteria were California, Colorado, Maryland, Massachusetts, Michigan, Ohio, South Carolina, Texas, and Wisconsin.[5] Seventeen PACE organizations operated in those nine states in 1999; thus, their ZIP-code-defined market areas comprised the study setting.

2. Samples

Medicare and Medicaid enrollment and claims data provided the sampling frames for the analysis. (Data sources are described in detail later in this chapter.)

---

[5]New York, despite having a relatively large population of PACE participants, is not included in this analysis of costs because its HCBS program served mostly clients with mental retardation/developmental disabilities when this study began. We concluded there were too few elderly HCBS clients in PACE market areas in New York to draw a sufficient sample. We did visit New York PACE sites (among several others) earlier in the study, to learn about sites' transition from demonstration to permanent status.

a. The PACE Group

The sampling frame for PACE participants included Medicare beneficiaries who enrolled in PACE in any of the nine study states in 1999 or 2000 and were dually eligible for Medicaid at the time of (or within 30 days of) enrollment. Because we would go on to create propensity scores for all sample members using data from prior Medicare claims, we further restricted the PACE sample to beneficiaries for whom a year's worth of pre-entry claims were available. That is, sample members were at least 66 years old at the time of PACE entry; they were enrolled in fee-for-service Medicare for at least one year prior to entry; and data on Part A and Part B expenditures in the year prior to entry were available. Across the nine study states, a total of 1,503 PACE participants met the sample selection criteria.

b. The Comparison Group

After the PACE sample was selected, the sampling frame for the comparison group consisted of the remaining dually eligible beneficiaries who were new HCBS users in PACE market areas and met the other selection criteria used for the PACE sample. To identify new users of HCBS, we searched beneficiaries' claims for the first HCBS claim between April 1999 and December 2000, and then looked back at the three preceding months. If there were no HCBS claims in those three months, we considered the beneficiary to be a "new" user of HCBS as of the date of the first claim. This pseudo-entry date served as the starting point for the follow-up period. Across the nine study states, 7,035 HCBS users met the sampling frame criteria.

c. Propensity Score Matching

We selected the comparison group from the larger sample of dual-eligible Medicare beneficiaries who entered Medicaid HCBS waiver programs in 1999 and 2000 using the method

of propensity-score matching. Matching variables, drawn from the Medicare Enrollment Database and from Medicare claims in the 12 months prior to entry into PACE or HCBS, included:

- Demographic characteristics (age group at enrollment, race)
- Diagnosis (stroke, dementia, and chronic conditions including diabetes, arthritis, chronic obstructive pulmonary disease, and hip fracture)[6]
- Service utilization (inpatient, skilled nursing facility, home health care)
- Total Medicare expenditure (Part A and Part B)

Separate logistic regression models were estimated for each of the nine states. Each PACE participant was matched to the HCBS participant with the propensity score closest to his or her own score. Because matching was carried out with replacement, the comparison group was smaller than the PACE group in each state. In total, the 1,503 PACE participants were matched to 1,050 beneficiaries entering HCBS waiver programs. Table II.1 shows the composition of the sample by state.

The PACE group and the matched comparison group were similar in nearly all characteristics, though the racial composition of the PACE group differed somewhat from that of the comparison group (Table II.2). Medicare Part A expenditures in the 12 months prior to program entry were about 12 percent higher, and Medicare Part B expenditures were about 3 percent lower, for the PACE group relative to the comparison group though these differences were not statistically significant.

---

[6] The diagnoses are based on inpatient, outpatient, skilled nursing facility, home health, physician, or hospice claims with the following ICD-9 codes: stroke (433xxd-436xx), dementia (290.0x, 290.2x, 290.3x, 290.9x, 331.0x), and chronic conditions (250xx, 714xx-715xx, 490xx-496xx, 820.01, 820.02, 820.03, 820.09, 820.20, 820.22, 820.8). These ICD-9 codes may understate the true prevalence of each of these conditions, particularly dementia, which is often not coded on Medicare claims.

TABLE II.1

SAMPLE DISTRIBUTION, BY STATE AND GROUP

State	PACE Group	Comparison Group
California	382	246
Colorado	69	62
Massachusetts	275	205
Maryland	115	15
Michigan	84	70
Ohio	158	118
South Carolina	108	71
Texas	178	161
Wisconsin	134	102
Unweighted Sample Size	**1,503**	**1,050**

Source: Medicare Group Health Plan file and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE II.2

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP
(Percentages, Unless Otherwise Noted)

Characteristic	PACE Group	Comparison Group
Age in Years		
66 to 74	26.8	28.1
75 to 84	42.1	39.4
85 or older	31.4	32.5
Race/Ethnicity		**
White	37.1	44.4
Black	33.5	27.2
Hispanic	11.1	11.0
Other	18.2	17.4
Diagnoses in Past 12 Months		
Stroke	29.4	25.6
Dementia	21.4	22.7
Chronic illness[a]	69.9	68.7
Service Use in Past 12 Months		
Any inpatient services	50.2	47.6
Any skilled nursing facility services	19.7	18.4
Any home health care services	43.5	42.7
Any inpatient stay in past 30 days	5.4	4.5
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	11,783	10,464
Total Part B	5,094	5,226
Weighted Sample Size[b]	**1,503**	**1,503**

Source: Data are from Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: The variables in this table were used to calculate propensity scores, by state.

[a]Includes diabetes, rheumatoid arthritis and osteoarthrosis, hip fractures, chronic obstructive pulmonary disease, and asthma.

[b]Observations in the comparison group are weighted by the number of PACE sample members they matched to. The unweighted sample size is 1,050.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

The distribution of propensity scores for the PACE and comparison group samples is shown in Figure II.1. Details of the matching results are provided in Appendix A.

B. METHODS FOR ESTIMATING PACE EFFECTS

1. Calculating Actual Expenditures for PACE Sample Members

For each month of PACE enrollment, we obtained Medicaid PACE capitation payments from MSIS-derived Medicaid Analytic eXtract (MAX) records. We computed Medicare PACE capitation payments, which cannot be observed in administrative records, according to specifications in the county rate books used for Medicare managed care plans. The payments equaled the annual county rates for Medicare Parts A and B times the appropriate frailty factor:

$$(\text{Part A county rate} + \text{Part B county rate}) * (2.39) = \text{Monthly Medicare payment}$$
$$\text{for all but ESRD patients}$$

$$(\text{Part A ESRD county rate})*(1.46) + (\text{Part B ESRD county rate})*(1.36) = \text{Monthly Medicare}$$
$$\text{payment for ESRD patients}$$

Sample members who disenrolled from PACE in the follow-up period remained in our analysis. Depending on whether they reverted to fee-for-service care or began managed care, we obtained expenditures for their care from Medicare and Medicaid claims, or calculated them from the county rate books for managed care plans.

In Chapter III, we present mean per-person per-month expenditures for the PACE sample. These were calculated as the sample member's total expenditures in a given six-month interval divided by the number of months alive during that interval, with each sample member having a weight equal to his or her share of the sample's months alive during the interval.

FIGURE II.1

FREQUENCY DISTRIBUTION OF PROPENSITY SCORES: PACE AND HCBS
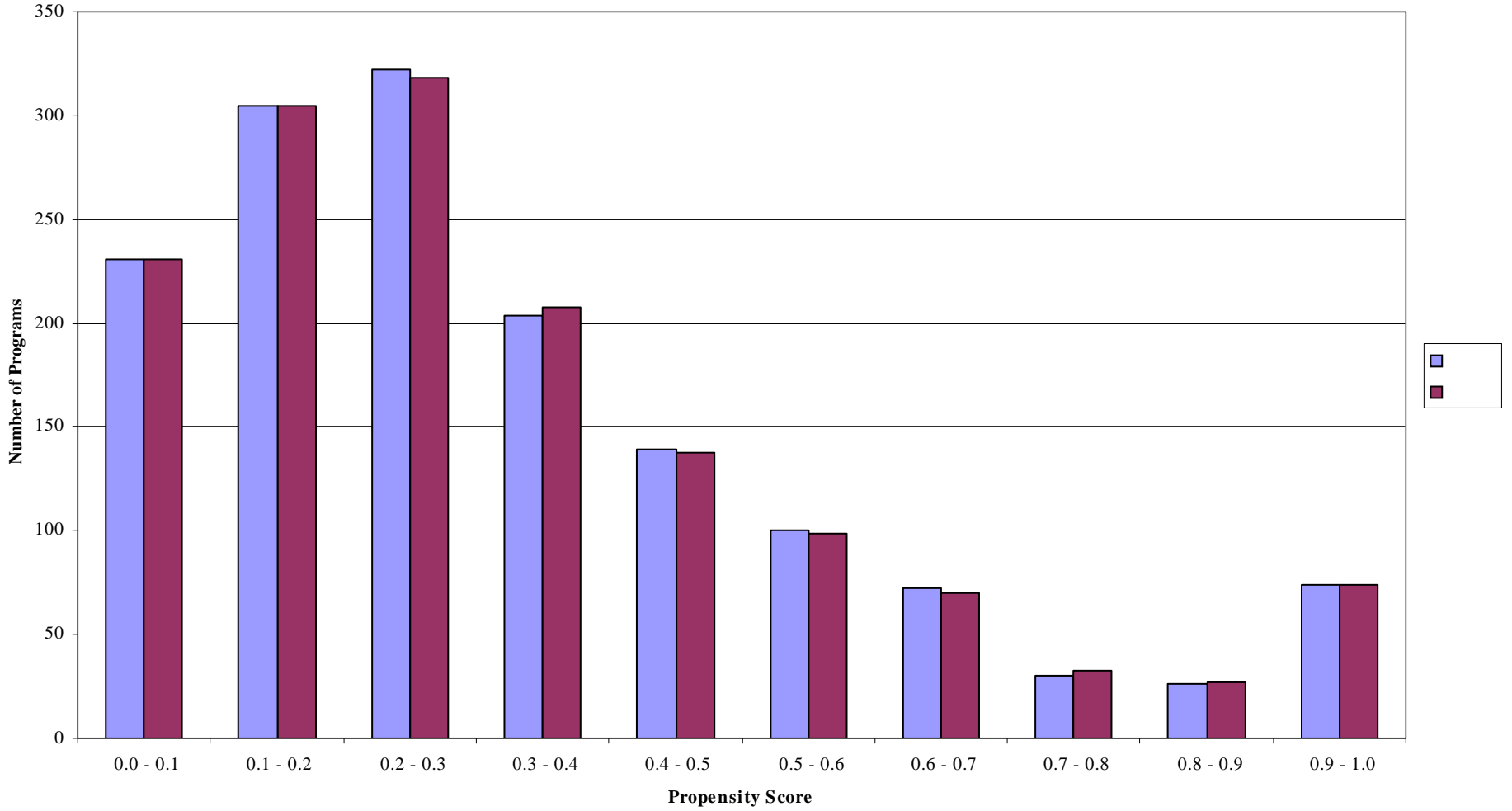
2. Predicting Expenditures in the Absence of PACE

To predict what the monthly Medicare and Medicaid expenditures for PACE sample members would have been in the absence of PACE, we estimated linear regression models using the matched comparison group of beneficiaries who started using HCBS around the time the PACE participants in our sample entered PACE. Members of the matched comparison group remained in our analysis regardless of the services they used and regardless of whether they remained in the community in the follow-up period.

a. Independent Variables in the Expenditure Models

The independent variables in the regression models were those used to construct sample members' propensity scores. The models also included a binary indicator of whether the sample member died during the interval in question. Thus, we assumed that (1) the timing of death is exogenous to the use of PACE services or HCBS; and (2) expenditures during the last months of life are not typical of expenditures in other months. Finally, the models included a variable indicating sample members' state of residence. California was used as the reference state for interpreting coefficients on these variables, so its variable was omitted from the models.

b. Dependent Variables

The dependent variables in the regression models were specified as Medicare or Medicaid expenditures in a given six-month interval divided by the number of months the sample member was alive during the interval. All members of the matched comparison group were assigned a weight equal to the number of PACE sample members they matched to during the propensity-score matching process multiplied by their share of the sample's months alive. Because we could follow sample members' Medicare expenditures for 60 months after program entry or until death, whichever came first, we estimated 10 regression models, one for each 6-month interval

of Medicare claims.   Similarly, because we could follow sample members' Medicaid expenditures for 24 months after program entry or until death, we estimated 4 regression models, one for each interval of Medicaid claims. We also estimated 4 models in which the dependent variable was the sum of Medicare and Medicaid expenditures in the interval divided by months alive in the interval.[7]

d. Predicted Expenditures

We used the regression results for the matched comparison group (described in Chapter III) to predict what the mean monthly expenditures for PACE sample members would have been had they begun using HCBS, instead of PACE services, when their follow-up period began. For each six-month interval of Medicare or Medicaid expenditures, we inserted the mean baseline characteristics of PACE sample members who were alive when the interval began into the regression equation that was estimated for the members of the matched comparison group who were alive when the interval began. The difference between actual expenditures and predicted expenditures represents the estimated effect of PACE on Medicare and Medicaid expenditures.

e. Confidence in the Estimates of PACE Effects

Standard errors and *t* statistics for the comparison of expenditures for the PACE group to those for the matched comparison group are computed in the typical manner, assuming that such expenditures are (at least in the limit) normally distributed. Standard errors for the regression-

---

[7]Because Medicare provides lifelong benefits, "number of months alive" is the appropriate denominator for calculating average Medicare expenditures. Medicaid eligibility, in contrast, is state specific and means tested. Beneficiaries lose eligibility if they move out of state or have a disqualifying change in income and assets. Strictly speaking, "number of months eligible" is the appropriate denominator for calculating average Medicaid expenditures. We compared average Medicaid expenditures per months alive and per months eligible and found that expenditures were 1 to 3 percent lower when calculated over months alive, a pattern that held for the PACE and matched comparison group. Having determined that calculating Medicaid expenditures per months alive would not materially change our overall findings, we proceeded with that approach.

adjusted comparisons were more complicated to compute, because they involve a comparison of mean expenditure for PACE participants ($\bar{E}$) and a regression-based prediction of mean expenditure that PACE participants would have incurred had they started using HCBS instead of PACE ($\bar{\hat{y}}$). There are two sources of error in this latter quantity: (1) ordinary sampling error which represents variation in outcomes for this particular sample among the much larger conceptual population of beneficiaries who might have entered PACE, and (2) errors in estimation of counterfactual expenditure. The estimated variance of $\bar{\hat{y}}$ is given by

$$h^2 \equiv EstVar\left(\bar{\hat{y}}\right) = s^2 \left[\bar{x}_0' \left(\sum_i x_i x_i' \right)^{-1} \bar{x}_0 + 1/n \right]$$

where x_i represents covariate values for beneficiary i, $\bar{x}_0$ is the mean of these same covariate values, n is the size of the sample used to create the prediction of expenditures for PACE participants, and s^2 is the estimated error variance.[8] (See, for example, Greene (1990), chapter 6 for a derivation.) If the estimated variance of observed monthly expenditure for PACE participants is given by g^2, then the t-statistic for the comparison of actual to predicted PACE expenditure can be written as:

$$t = \frac{\bar{E} - \bar{\hat{y}}}{\left(n^{-1}g^2 + h^2\right)^{1/2}}$$

C. DATA

Data for drawing the sample frame, calculating propensity scores, and analyzing the effects of PACE on expenditures came from Medicare enrollment and demographic data, Medicare claims data, Medicare county rate books for managed care plans, and MAX. The files we used

---

[8]The covariates referred to here are the same as those used to create the propensity scores described in Section A.2 of this chapter.

are described below. The sequence and purposes for which we used them in sample selection are

shown in Figures II.2 and II.3.

- **Medicare Group Health Plan (GHP) Master File.** This file contains data on periods of managed care enrollment for all beneficiaries who were ever enrolled in a Medicare managed care plan, including PACE. We used the file to draw the PACE sampling frame and to track PACE enrollment and disenrollment in the follow-up period. We also used the GHP to identify months of Medicare managed care enrollment for members of the matched comparison group in the follow-up period.

- **Medicare Enrollment Database (EDB).** This file includes current and historical data on anyone ever enrolled in Medicare Parts A or B, with the most recently available demographic information and details on the periods of, and reasons for, Medicare entitlement. We drew EDB data on age, race/ethnicity, and original reason for Medicare entitlement for all members of the PACE and comparison group sampling frames. We also used the file to identify date of death in the follow-up period and county of residence for all sample members.

- **Standard Analytic Files (SAFs).** These files contain details about services covered by Medicare, including dates of service, descriptions of services, diagnoses, provider types, and reimbursement amounts for Medicare beneficiaries receiving care on a fee-for-service (FFS) basis. SAFs are built from "final action, fully adjusted" claims suitable for research. We used data from the SAFs to construct the diagnosis, service use, and expenditure variables for propensity-score matching. We also used the files to measure Medicare expenditures for members of the matched comparison group in the follow-up period.

  SAFs do not contain information about Medicare expenditures for Medicare managed care enrollees. If PACE sample members disenrolled from PACE and reverted to FFS care, however, we used the SAFs to measure those post-disenrollment expenditures.

- **Medicare County Rate Books.** The Medicare county rate books for managed care plans contain the county-level payment amounts on which Medicare PACE payments, and other managed care payments, are based. We used the county rate books to calculate Medicare expenditures for PACE sample members for every month of PACE enrollment in the follow-up period. We also used them to calculate Medicare managed care payments for the small proportion of sample members who enrolled in Medicare managed care plans during followup.[9]

---

[9]Medicare began transitioning managed care plans from its AAPCC payment system, in which payments to plans were adjusted for enrollees' demographic factors, to its PIP-DCG risk-adjusted system in 2000. Thus, we calculated AAPCC rates for payments in 1999, and blended AAPCC and risk-adjusted rates for payments in 2000 to 2005. We did not have data on sample members' PIP-DCG scores—one component of the overall risk-adjustment factor—so we estimated lower-bound payments (assuming all enrollees had the lowest PIP-DCG score) and upper-bound payments (assuming all enrollees had the highest score). Because total Medicare payments reflected only 10 percent of the risk-adjusted portion of the payment in 2000, 2001, 2002, and 2003, using upper- and lower-bound payments had very little effect on overall sample means. Having established this, we decided to assume all Medicare managed care enrollees had the middle PIP-DCG score. The results we report reflect this decision.

FIGURE II.2

DATA SOURCES USED TO SELECT PACE SAMPLE MEMBERS

MEDICARE GHP FILE	MEDICARE EDB	MAX PERSONAL FILES, 1999 and 2000	PACE SAMPLE
Identify Medicare beneficiaries entering PACE between 1/99 and 12/00 in any of 9 study states	Obtain HICs Keep in sample if: – >=66 at PACE entry FFS Medicare in prior year – Non-missing prior-year expenditures for Medicare Parts A and B	Keep in sample if: – Was Medicaid-eligible before or within one month of PACE entry – Appears in MAX file of only one state – MAX state matches PACE state	Calculate propensity score

HIC = Health Insurance Claim number

FIGURE II.3

DATA SOURCES USED TO SELECT THE COMPARISON GROUP

MAX PERSONAL RECORD FILES	MAX ENROLLMENT FILES	MEDICARE EDB	POTENTIAL COMPARISON GROUP SAMPLE
Identify Medicaid beneficiaries using HCBS for "first" time between 4/99 and 12/00 Keep in sample if: – ZIP code of residence is in PACE market area	Obtain HICs, SSNs, and DOBs (match on 2 of 3 DOB elements)	Keep in sample if: - Medicare-eligible	Calculate propensity score Retain best matches
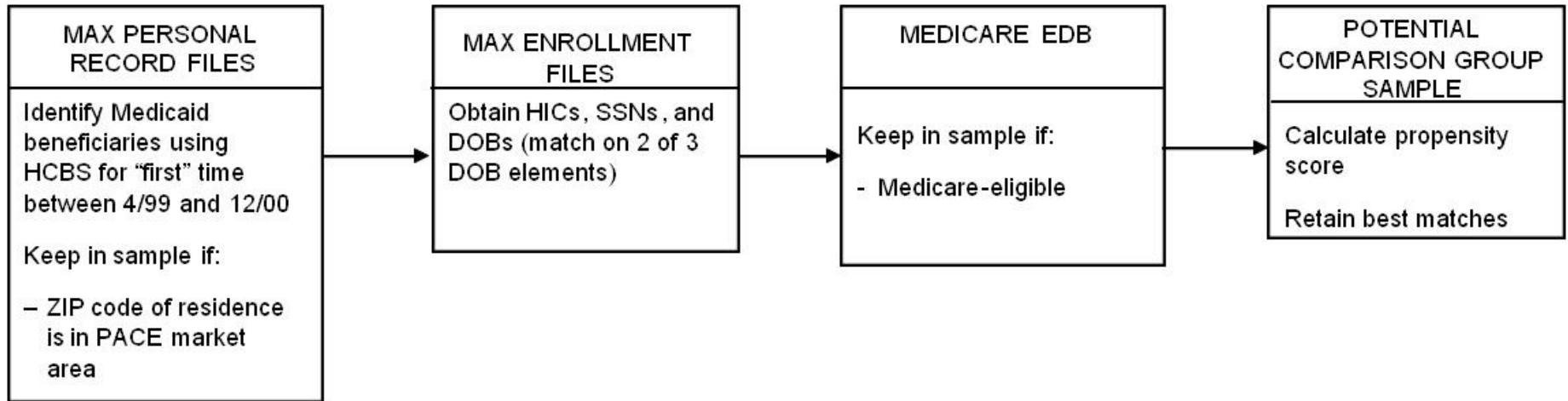
HIC = Health Insurance Claim number
SSN = Social Security Number
DOB = date of birth
HCBS = Home- and Community-Based Services

- **MAX Files.** MAX files are derived from MSIS and are intended for analytic use. These state-specific files contain information on Medicaid-covered services beginning in 1999. MAX consists of the following five files:

  - *Person Summary (PS) File.* This file contains eligibility, address, and other identifying information. We used PS data to identify members of the PACE sampling frame who were dually eligible for Medicare and Medicaid, and to draw sampling frames of dually eligible beneficiaries in ZIP-code-defined PACE market areas who were new users of HCBS in 1999 or 2000.

  - *Inpatient (IP) File.* This file contains inpatient claims for services billed by a hospital. We used the file to measure Medicaid expenditures for inpatient costs not covered by Medicare, such as coinsurance and deductibles (so-called cross-over claims) for all sample members in the follow-up period.

  - *Long-Term Care File.* This file contains institutional service claims for care billed by nursing facilities, intermediate care facilities for the mentally retarded or developmentally delayed, and psychiatric hospitals. We used the file to measure these Medicaid expenditures for all sample members in the follow-up period.

  - *Prescription Drug (RX) File.* This file contains claims for all prescription drugs covered by the state's Medicaid program. We used the file to measure Medicaid prescription drug expenditures for all sample members in the follow-up period.

  - *Other (OT) File.* This file includes information on all claims that are not in the previous files, including claims for physician, clinic, and outpatient hospital services; laboratory and X-ray services; transportation; HCBS, personal care, and adult day care; and capitated payments to Medicaid managed care plans, including PACE. We used the file to measure Medicaid expenditures for the services listed here for all sample members in the follow-up period.[10]

---

[10] Some states do not pay for case management services on an FFS basis, and thus will have no claims data to cover this service, even though Medicaid does pay for it. Our estimates of Medicaid expenditures exclude case management costs that were not observable through claims.

III. RESULTS

A. MORTALITY IN THE FOLLOW-UP PERIOD

Throughout the 60-month follow-up period, mortality rates were similar for the groups of beneficiaries who (1) entered PACE in 1999 or 2000, or (2) began using HCBS, along with other health care services, around the same time. Six months after program entry, roughly 5 percent of each group's members were deceased (Table III.1). At the end of month 24, roughly one quarter was deceased. By the end of the follow-up period, more than half the sample members (54 percent) were deceased. The similarity in the groups' mortality rates suggests that the matched comparison group is a reasonable counterfactual for beneficiaries who enrolled in PACE in 1999 or 2000.

B. UNADJUSTED DIFFERENCES IN EXPENDITURES

In the first stage of our analysis, we compared average monthly expenditures for the PACE group with those for the matched comparison group without adjusting for any between-group differences in baseline characteristics that remained after matching.

Monthly Medicare expenditures for the two groups were similar (Table III.2). The only statistically significant difference in expenditures for the two groups was seen in the second interval, in which average monthly Medicare expenditures for the PACE group were $180 greater than expenditures for the matched comparison group. Monthly Medicaid expenditures for the PACE group, however, exceeded those for the matched comparison group in all four six-month intervals. The differences were large (between $536 and $926 per month) and highly significant.

TABLE III.1

TIME FROM PROGRAM ENTRY TO DEATH, BY GROUP
(Cumulative Percentages)

Deceased By End of:	PACE Group	Comparison Group
Month 6	5.8	4.7
Month 12	12.8	11.4
Month 18	18.6	17.1
Month 24	24.4	22.6
Month 30	30.5	31.6
Month 36	36.4	38.1
Month 42	40.2	41.9
Month 48	45.3	46.3
Month 54	50.6	51.2
Month 60	54.8	54.2
Weighted Sample Size[a]	**1,503**	**1,503**

Source: Medicare EDB for beneficiaries entering PACE or HCBS in 1999 or 2000.

[a]Observations in the comparison group are weighted by the number of PACE sample members they matched to. The unweighted sample size is 1,050.

TABLE III.2

UNADJUSTED MEAN PER-PERSON PER-MONTH EXPENDITURES, BY GROUP
(Dollars)

Months from Entry	PACE Group	Comparison Group	Difference
Medicare			
1 to 6	1,445	1,474	-29
7 to 12	1,453	1,273	180*
13 to 18	1,435	1,277	157
19 to 24	1,471	1,434	37
25 to 30	1,533	1,430	103
31 to 36	1,571	1,360	211
37 to 42	1,600	1,519	81
43 to 48	1,684	1,565	119
49 to 54	1,663	1,874	-210
55 to 60	1,662	1,687	-25
Medicaid			
1 to 6	2,072	1,146	926***
7 to 12	2,180	1,419	761***
13 to 18	2,292	1,558	734***
19 to 24	2,328	1,792	536***
Medicare and Medicaid Combined			
1 to 6	3,517	2,620	897***
7 to 12	3,633	2,692	941***
13 to 18	3,727	2,835	892***
19 to 24	3,799	3,226	573***

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Per-month expenditures are the sum of expenditures in the interval divided by the number of months alive. Sample members have a weight equal to their matching weight times their share of the sample's months alive, where share of the months alive is calculated separately for the PACE and comparison groups. The significance of the difference between the groups was determined through t-tests.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

C. CHARACTERISTICS THAT HELP EXPLAIN EXPENDITURES IN THE FOLLOW-UP PERIOD

1. In the Medicare Models

After comparing the unadjusted mean expenditures for the PACE and matched comparison groups, we estimated regression-adjusted models of predicted expenditures. The estimated coefficients from the models used to predict Medicare expenditure for the comparison group showed that mortality, state of residence, and prior Part B expenditures were strong predictors of Medicare expenditure in this group (data not shown).[11] Most other factors had little apparent effect (at the .05 significance level). The explanatory power of the models for Medicare expenditures in the matched comparison (HCBS) group decreased from an R^2 value of 0.25 in the first interval to an R^2 of 0.16 in the tenth. That is, the models predicted expenditures less accurately as the time from program entry increased. This result is, of course, expected because all covariates are measured for the period prior to program entry. The explanatory power of these covariates naturally tends to decay over time.

The coefficients on the mortality variable, which indicates whether a sample member died during the six-month interval covered by the model, were large, positive, and highly significant in each of the 10 intervals. Compared to sample members who survived a given interval, sample members who died had Medicare expenditures that were several thousand dollars higher per interval month, other factors being equal. Medicare Part B expenditures in the 12 months prior to first HCBS use were positively associated with Medicare expenditures in the first six follow-up intervals, but not thereafter.

---

[11]We do not present the coefficients in the report because of the sheer number of them. Including Medicare, Medicaid, and combined expenditures, we estimated 18 regressions for the matched comparison group.

The coefficients on the state variables were statistically significant for several states in 6 out of 10 intervals. Furthermore, those coefficients were consistently negative, indicating that fee-for-service Medicare expenditures for the matched comparison were higher in California (the reference state) than in the other study states.

With the exception of one interval, coefficients on other variables were neither as consistently significant nor as important in explaining expenditures. The exception is for the seventh interval, in which four indicators of diagnoses and service use (dementia, other chronic conditions, use of inpatient services, and use of skilled nursing facility services) were all positively associated with Medicare expenditures.

2. In the Medicaid Models

In the models of Medicaid expenditures, a dementia diagnosis and prior use of skilled nursing facility (SNF) services were associated with higher Medicaid expenditures in all four follow-up intervals. Mortality was not a strong predictor of Medicaid expenditures, which may be because Medicaid covers long-term care services more than the acute services often used in the final months of life. Coefficients on the variables for Michigan and South Carolina showed that Medicaid expenditures were lower in those states than in California, all else equal. There was no pattern among the other states. The R^2 values on the Medicaid models ranged from 0.11 in the first interval to 0.20 in the fourth.

D. DIFFERENCES IN EXPENDITURES AFTER ADJUSTING FOR SAMPLE CHARACTERISTICS

In regression-adjusted analyses, actual Medicare expenditures for PACE sample members were similar to expenditures that would be predicted had these same beneficiaries begun using HCBS and other health care services instead of enrolling in PACE. In contrast, actual Medicaid expenditures for PACE sample members exceeded predicted expenditures throughout the follow-

up period. Because of the large standard errors associated with the predictions (see Chapter II),

none of the differences were statistically significant. Importantly, however, the differences were

similar in magnitude to the unadjusted differences reported earlier in this chapter and followed

similar patterns across intervals. The similarities between the unadjusted (PACE versus HCBS)

and regression-adjusted results suggest differences in expenditures for the PACE group and the

matched comparison group are, at least in part, a true PACE effect and not the result of chance.

1. Medicare Expenditures

During the 60-month followup period for Medicare expenditures, actual per-person per-

month expenditures for the PACE group increased from a mean of $1,445 during the first six-

month interval to $1,662 during the tenth interval (Table III.3 and Figure III.1). Mean predicted

expenditures, based on models for the matched comparison group, increased somewhat more

quickly, from a monthly mean of $1,545 in the first interval to $1,875 in the tenth. Actual mean

expenditures were slightly lower than predicted expenditures in most intervals and slightly

higher in the others.

What factors contributed to the increasing expenditures for the matched comparison group?

Over the five-year period of observation, the increase in Medicare expenditures for the matched

comparison group was accounted for primarily by increasing expenditure for SNF services,

outpatient services, managed care capitation payments, and home health services (Figure III.2).[12]

Somewhat surprisingly, expenditures for hospital services did *not* increase during this time,

although this continued to be the largest component. This finding seems to suggest that after

elderly beneficiaries enter the post-acute care system (because of the onset of a major, acute

---

[12]Members of the comparison group can incur capitation expenses if they enter managed-care programs *after* their enrollment in HCBS. Comparison-group members were required to be in FFS Medicare only during the one-year period prior to enrollment.

TABLE III.3

ESTIMATED EFFECT OF PACE ON PER-PERSON PER-MONTH EXPENDITURES
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]	N[b]
Medicare				
1 to 6	1,445	1,545	-100	1,503
7 to 12	1,453	1,405	48	1,416
13 to 18	1,435	1,417	18	1,310
19 to 24	1,471	1,566	-95	1,224
25 to 30	1,533	1,554	-21	1,136
31 to 36	1,571	1,554	17	1,044
37 to 42	1,600	1,702	-102	956
43 to 48	1,684	1,675	9	899
49 to 54	1,663	2,088	-425	822
55 to 60	1,662	1,875	-213	742
Medicaid				
1 to 6	2,072	1,155	917	1,503
7 to 12	2,180	1,428	752	1,416
13 to 18	2,292	1,563	729	1,310
19 to 24	2,328	1,803	525	1,224
Medicare and Medicaid Combined				
1 to 6	3,517	2,701	816	1,503
7 to 12	3,633	2,833	800	1,416
13 to 18	3,727	2,980	747	1,310
19 to 24	3,799	3,368	431	1,224

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

[b]The number of PACE sample members alive when the interval began.

FIGURE III.1

ACTUAL AND PREDICTED PER-PERSON PER-MONTH MEDICARE EXPENDITURES

FIGURE III.2

MEAN PER-PERSON PER-MONTH MEDICARE EXPENDITURES FOR THE MATCHED COMPARISON GROUP,
BY SERVICE TYPE

31
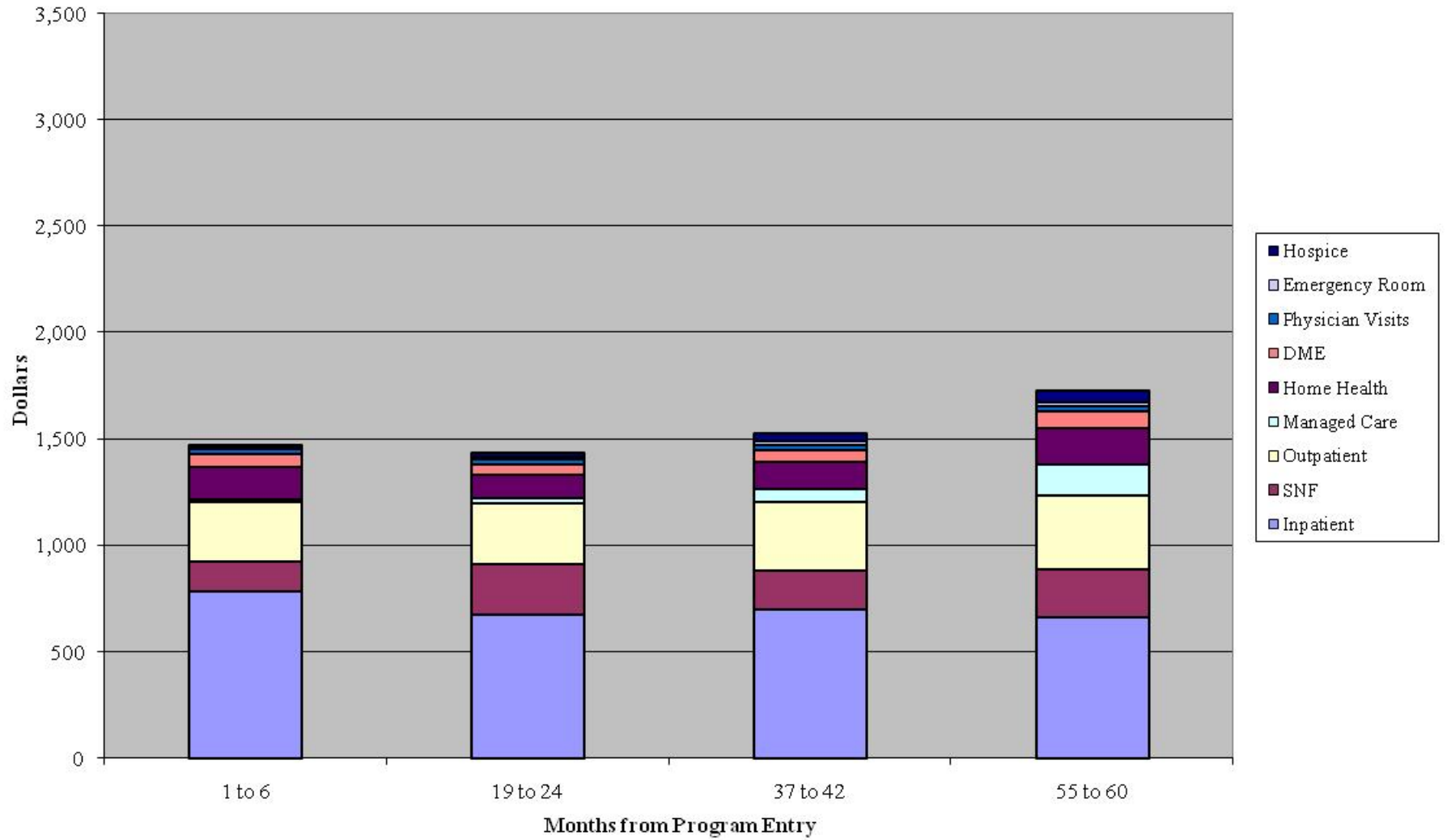
illness or other precipitating event, for example) they go on to use more and more post-acute and other support services, on average, but do not use increasingly greater levels of hospital services.

2. Medicaid Expenditures

During the 24 months we followed Medicaid expenditures, actual expenditures for PACE sample members consistently exceeded the expenditures that would be predicted in the absence of PACE (Table III.3 and Figure III.3). The differences were large but they diminished over time. For example, actual per-person per-month expenditures for PACE sample members were $2,072, on average, in the first interval, and average predicted expenditures were $1,155. The $917 difference is 79 percent of the predicted mean. By the fourth interval, actual per-person per-month expenditures for PACE sample members were $2,328, on average, and average predicted expenditures were $1,803. The $525 difference is 29 percent of the predicted mean. The diminishing gap was largely due to increasing Medicaid expenditures for nursing home care for members of the matched comparison group over time (Figure III.4). The mean number of nursing home days for the matched comparison group rose from 0.6 days per month in the first interval to 3.5 days per month in the fourth (data not shown).

To see whether the difference between actual and predicted Medicaid expenditures continued to diminish, we analyzed an additional year of data that were available for sample members who entered PACE or began using HCBS in 1999 (slightly more than half the overall sample). In this cohort, as in the overall sample, the estimated effect of PACE on Medicaid expenditures decreased steadily between the first and fourth intervals, from $880 to $494 (Table III.4). By the end of the sixth interval, the estimated effect had decreased to $219 (after a slight increase to $564 in the fifth interval). For members of this cohort, mean per-person per-month expenditures for nursing home care continued to rise slightly from the fourth interval to the fifth, but then leveled off between the fifth and sixth intervals (Figure III.5).

FIGURE III.3

ACTUAL AND PREDICTED PER-PERSON PER-MONTH MEDICAID EXPENDITURES

33
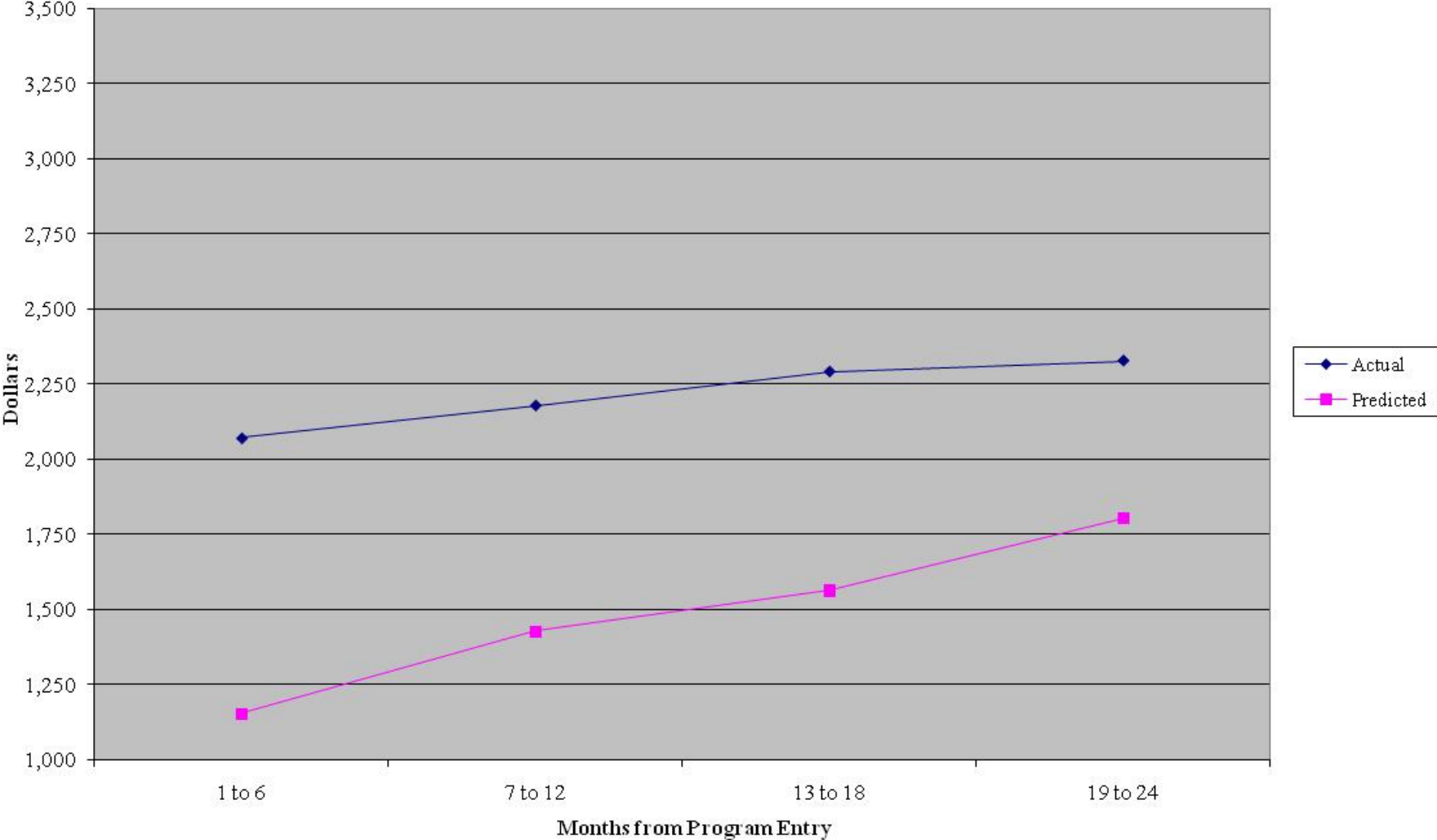
FIGURE III.4

MEAN PER-PERSON PER-MONTH MEDICAID EXPENDITURES FOR THE MATCHED COMPARISON GROUP,
BY SERVICE TYPE

34
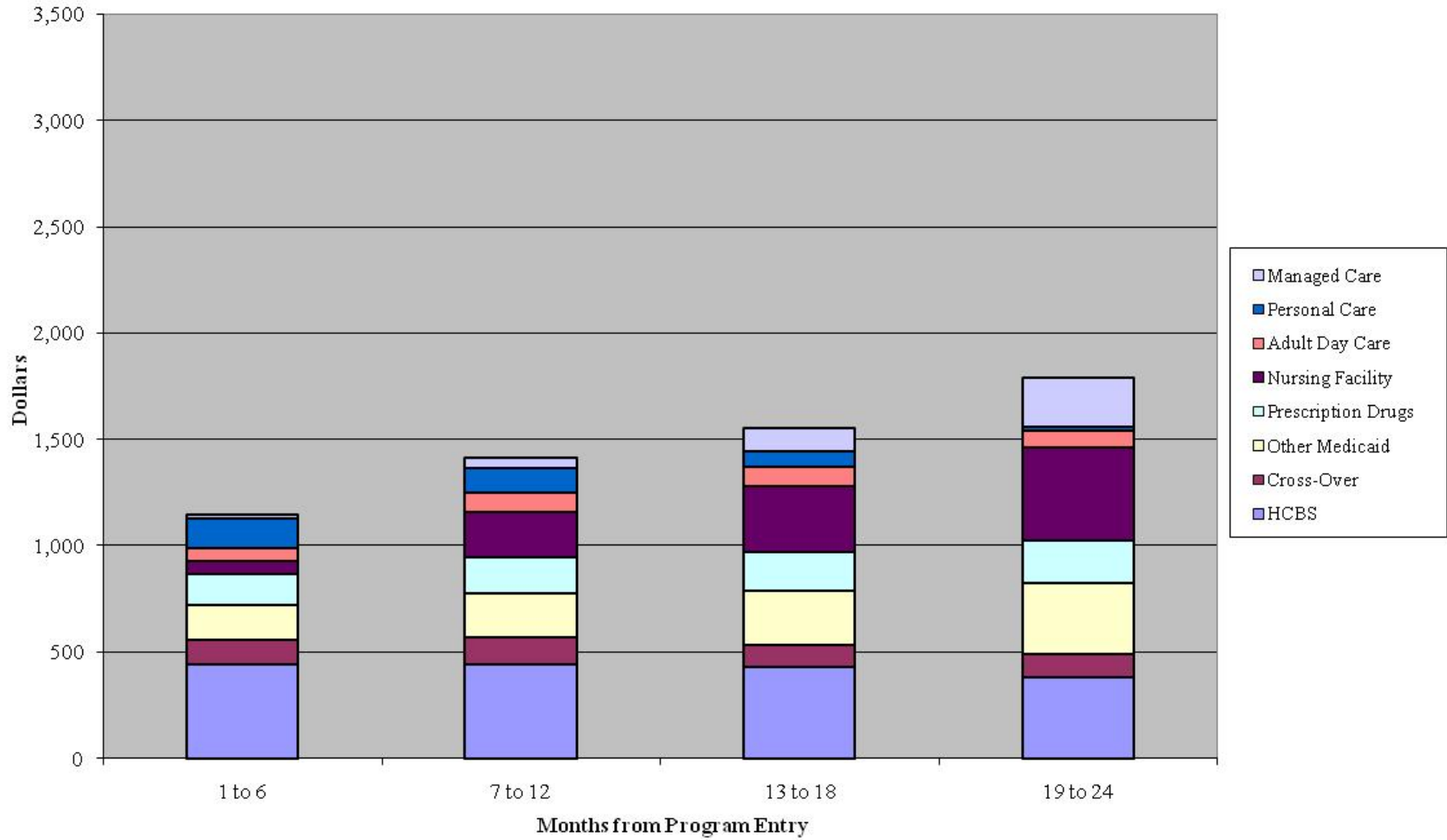
TABLE III.4

ESTIMATED EFFECT OF PACE ON PER-PERSON PER-MONTH MEDICAID EXPENDITURES,
1999 COHORT
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]	N[b]
1 to 6	2,004	1,124	880	786
7 to 12	2,107	1,299	808	736
13 to 18	2,167	1,440	727	675
19 to 24	2,197	1,703	494	633
25 to 30	2,363	1,799	564	591
31 to 36	2,404	2,185	219	541

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

[b]The number of PACE sample members alive when the interval began.

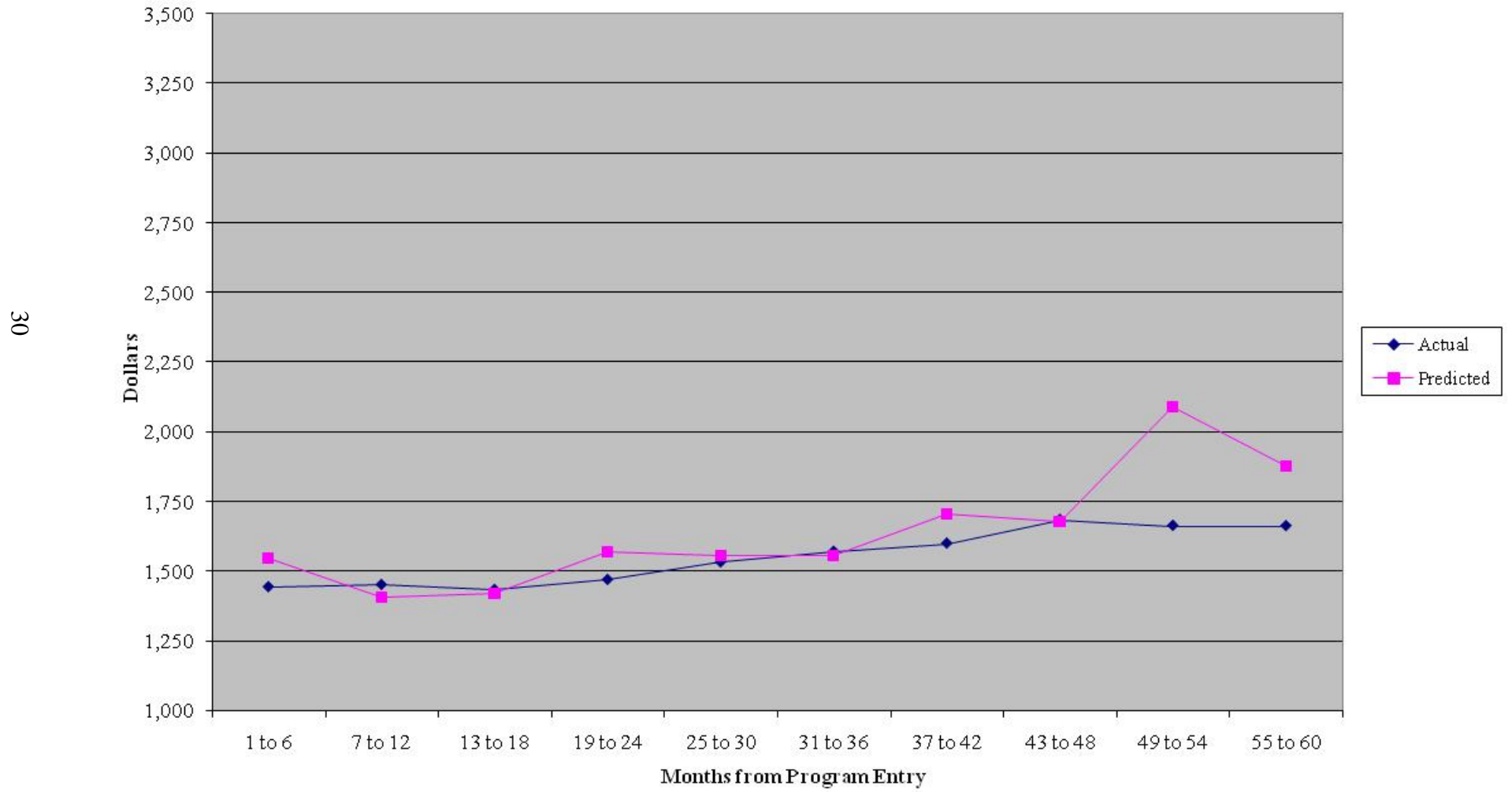FIGURE III.5

MEAN PER-PERSON PER-MONTH MEDICAID EXPENDITURES FOR THE MATCHED COMPARISON GROUP,
BY SERVICE TYPE: 1999 COHORT

36
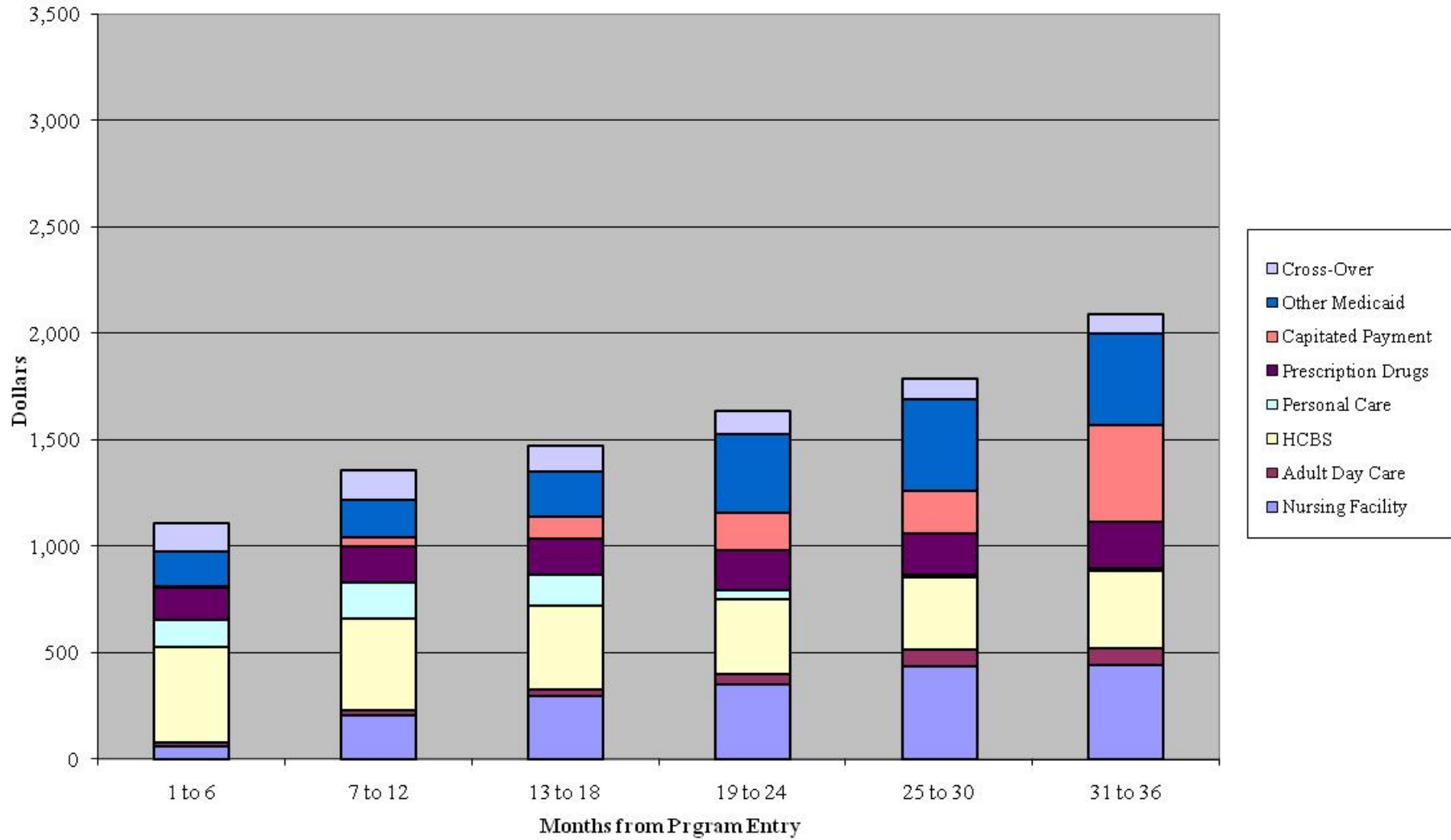
E. SENSITIVITY TESTS

In considering factors that might have driven the overall results, several sensitivity tests suggested themselves, for reasons having to do with (1) the effects of mortality on fee-for-service health care expenditures, (2) expenditures following disenrollment from PACE, or (3) our having to select study states based on the availability of Medicaid data. The rationale for and results of each test are described below.

1. Mortality

In FFS payment systems, health care expenditures typically increase dramatically near the time of death. Because Medicare capitation payments do not increase as utilization increases, total Medicare expenditure in the last months of life is likely to be lower under capitation plans like PACE than it would be under FFS. Although mortality rates were similar in the PACE and matched comparison groups, we conducted a subgroup analysis to assess the sensitivity of our main results to the important difference in the way end-of-life costs are paid for under capitation and FFS systems. The results for the subgroup decedents were as expected. The results for the subgroup of survivors suggested PACE increased expenditures somewhat.

Medicare. The results for Medicare expenditures illustrate that, in any given interval, Medicare spent somewhat more (generally $100 to $400 more) per-person per-month for survivors in PACE than it would have spent on the same survivors in the absence of PACE (Table III.5). In contrast, Medicare spent several thousand dollars less per-person per-month for PACE decedents than it would have spent on the same decedents in the absence of PACE, reflecting the absence of association between utilization and payment under capitation.

Medicaid. In any given six-month interval, the effects of PACE on per-person per-month Medicaid expenditures are much smaller for decedents than for survivors (Table III.5). As expected because of capitation, actual expenditures for PACE sample members are roughly the

TABLE III.5

PREDICTED AND ACTUAL PER-PERSON PER-MONTH EXPENDITURES, BY MORTALITY STATUS
(Dollars)

Months from Entry	Survived the Entire Interval			Died During the Interval		
	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect	Actual Mean for PACE Sample	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]
Medicare						
1 to 6	1,437	1,326	111	1,672	6,328	-4,656
7 to 12	1,418	1,100	318	2,158	6,342	-4,184
13 to 18	1,407	1,129	278	2,072	7,686	-5,614
19 to 24	1,454	1,266	188	1,876	5,544	-3,668
25 to 30	1,497	1,314	183	2,257	5,779	-3,522
31 to 36	1,526	1,140	386	2,411	6,378	-3,967
37 to 42	1,555	1,392	163	2,844	6,335	-3,491
43 to 48	1,633	1,395	238	2,574	3,911	-1,337
49 to 54	1,532	1,589	-57	3,878	7,707	-3,829
55 to 60	1,599	1,500	99	2,875	4,799	-1,924
Medicaid						
1 to 6	2,070	1,139	931	2,130	2,048	82
7 to 12	2,179	1,388	791	2,200	1,671	529
13 to 18	2,292	1,547	745	2,305	1,853	452
19 to 24	2,330	1,767	563	2,287	2,216	71
Medicare and Medicaid Combined						
1 to 6	3,507	2,465	1,042	3,803	8,376	-4,573
7 to 12	3,597	2,488	1,109	4,358	8,013	-3,655
13 to 18	3,698	2,676	1,022	4,376	9,539	-5,163
19 to 24	3,784	3,034	750	4,163	7,760	-3,597

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Notes: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores and state. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

same, regardless of mortality. Predicted expenditures, however, are considerably greater for decedents than for survivors, resulting in a smaller estimated effect on expenditures for decedents than for survivors. Actual Medicaid expenditures for personal care services and so-called crossover claims (Medicaid reimbursement of coinsurance and copayments for Medicare services provided to dual-eligibles) were more than twice as high for decedents than for survivors (data not shown).

2. Disenrollment from PACE

Disenrollment from PACE is nearly always initiated by participants, not by PACE organizations. Anecdotal evidence from PACE organizations suggests that some participants disenroll from PACE quite quickly because aspects of the program—such as having to give up one's regular primary care physician and all other providers—do not appeal to them. Later disenrollments are said to occur because participants decide to enter a nursing facility that does not have a contract with the PACE organization. In our sample, most disenrollment from PACE occurred during the first six-month interval (7 percent) (Table III.6). The proportion of living disenrollees increased to 12 percent by month 30 and then stayed at about that level.

Medicare and Medicaid expenditures could be quite different for PACE sample members after disenrollment, depending on whether beneficiaries remain in the community or enter nursing homes. Moreover, PACE organizations have no control over expenditures after a beneficiary leaves the program. We calculated actual and predicted expenditures for the PACE group, excluding disenrollees, to see how the estimated effects of PACE changed. In our main analysis (Table III.3), the actual expenditures reported for PACE group members included any that may have been incurred following disenrollment from PACE.

Excluding disenrollees from the sample did not materially affect estimates for Medicare expenditures. In contrast, we found that PACE disenrollees cost Medicaid *less* out of PACE than

TABLE III.6

STATUS OF THE PACE SAMPLE OVER TIME

Snapshot at the End of:[a]	Percentage
Month 6	
Enrolled in PACE	87.5
Disenrolled from PACE	6.7
Deceased	5.8
Month 12	
Enrolled in PACE	78.5
Disenrolled from PACE	8.7
Deceased	12.8
Month 18	
Enrolled in PACE	70.9
Disenrolled from PACE	10.6
Deceased	18.6
Month 24	
Enrolled in PACE	63.7
Disenrolled from PACE	11.8
Deceased	24.4
Month 30	
Enrolled in PACE	57.4
Disenrolled from PACE	12.0
Deceased	30.5
Month 36	
Enrolled in PACE	51.1
Disenrolled from PACE	12.5
Deceased	36.4
Month 42	
Enrolled in PACE	46.8
Disenrolled from PACE	13.0
Deceased	40.2
Month 48	
Enrolled in PACE	41.4
Disenrolled from PACE	13.3
Deceased	45.3
Month 54	
Enrolled in PACE	37.4
Disenrolled from PACE	12.0
Deceased	50.6
Month 60	
Enrolled in PACE	33.5
Disenrolled from PACE	11.7
Deceased	54.8
Sample Size	**1,503**

Source: Medicare EDB and GHP for beneficiaries entering PACE in 1999 or 2000.

[a]Sample members are categorized by their enrolled, disenrolled, or deceased status at the time of the "snapshot." Thus, sample members who are disenrolled from PACE at the end of one six-month interval, but are deceased by the end of a latter interval, will be categorized as deceased, not as disenrolled, in the latter interval.

in PACE. As a result, the estimated effects of PACE on Medicaid expenditures were somewhat larger (less favorable for Medicaid) when disenrollees were excluded from the sample (Table III.7). For example, in the first interval actual per-person per-month Medicaid expenditures for the overall PACE sample were $2,072, on average, compared to $2,115 without disenrollees (compare Tables III.3 and III.7). The estimated effect of PACE went from $917 to $958 per-person per-month, a 4 percent increase. In the fourth interval, the estimated effect of PACE increased 27 percent (from $525 to $666) without disenrollees. The finding that Medicaid expenditures were lower for disenrollees than for enrollees probably reflects the fact that most disenrollees in our sample left the PACE program after a relatively short period; thus, they may have been beneficiaries who decided PACE was not right for them, and they disenrolled to remain in the community, rather than enter a nursing home.

3. High-Cost States

As explained in Chapter II, our selection of study states was largely determined by the availability of Medicaid data. Availability varies substantially by state, and this was especially true for the period of time for which we needed data. Variation in per-capita Medicare spending also varies substantially by state (Gold 2004). Thus, our estimates of the effects of PACE on expenditures might have been quite different had we conducted the analysis with a different set of states.

Although we have no way of knowing how exclusions might have affected the study, we did assess the sensitivity of our results to key inclusions. Two of the PACE market areas included in this study—southern California and the Boston area—have overall Medicare FFS reimbursement rates that are among the highest in the nation, at about 1.3 to 1.7 times the national average (Wennberg and Cooper 1999). In a 2002 state ranking of per diem Medicare reimbursements for nursing facility care, for example, California and Massachusetts ranked first and twelfth,

TABLE III.7

PREDICTED AND ACTUAL PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING PACE DISENROLLEES
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]	N[b]
Medicare				
1 to 6	1,436	1,548	-112	1,411
7 to 12	1,478	1,427	51	1,295
13 to 18	1,490	1,436	54	1,152
19 to 24	1,496	1,575	-79	1,046
25 to 30	1,557	1,585	-28	954
31 to 36	1,572	1,625	-53	861
37 to 42	1,623	1,777	-154	760
43 to 48	1,647	1,735	-88	700
49 to 54	1,768	2,206	-438	644
55 to 60	1,731	1,977	-246	569
Medicaid				
1 to 6	2,115	1,157		1,411
			958	
7 to 12	2,275	1,435	840	1,295
13 to 18	2,438	1,579	769	1,152
19 to 24	2,494	1,828	666	1,046
Medicare and Medicaid Combined				
1 to 6	3,551	2,705	846	1,411
7 to 12	3,752	2,862	890	1,295
13 to 18	3,928	3,015	913	1,152
19 to 24	3,990	3,403	587	1,046

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

[b]The number of PACE sample members alive when the interval began and enrolled in PACE throughout the interval.

respectively, among the 50 states (Gibson et al. 2004). Among our sample of nine states, these two states ranked first and second for nursing facility reimbursement. To explore the effects of relatively high FFS Medicare expenditures in California and Massachusetts, we ran our analyses (1) without any California sample members (about 25 percent of the overall sample); and (2) without any Massachusetts sample members (about 18 percent of the overall sample).

Medicare. Without California in the analysis, the effects of PACE on Medicare expenditures appeared somewhat less favorable (Table III.8). Medicare expenditures for the matched comparison group were above average in California, relative to the other study states, but Medicare expenditures for the PACE group were about average. Thus, without California in the analysis, predicted expenditures decreased in most intervals (by 10 to 18 percent), actual expenditures stayed about the same in all intervals, and the estimated effect of PACE was to increase Medicare expenditures (compare Tables III.3 and III.8). In the first six-month interval, for example, PACE saved Medicare about $100 per-person per-month in the overall analysis; without California, the program cost $55 more per-person per-month.

Excluding Massachusetts from the analysis did not have much effect on the Medicare results (Table III.9). Medicare expenditures for the matched comparison group were slightly above average in Massachusetts, relative to the other study states, but Medicare expenditures for the PACE group were also above average. Thus, without Massachusetts in the analysis, predicted expenditures decreased slightly in most intervals, actual expenditures also decreased, and the estimated effect of PACE stayed roughly the same (compare Tables III.3 and III.9).

Medicaid. Without California in the analysis, the estimated effects of PACE on Medicaid expenditures were slightly more unfavorable than in the analysis of the overall sample in the first three intervals (comparing Tables III.3 and III.8). As described above, predicted Medicaid means decreased slightly without California in the analysis, while actual means stayed about the

TABLE III.8

ESTIMATED EFFECT OF PACE ON PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING CALIFORNIA
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]	N[b]
Medicare				
1 to 6	1,456	1,401	55	1,121
7 to 12	1,460	1,274	186	1,058
13 to 18	1,447	1,265	182	980
19 to 24	1,501	1,439	62	919
25 to 30	1,564	1,445	119	853
31 to 36	1,611	1,550	61	778
37 to 42	1,645	1,687	-42	710
43 to 48	1,622	1,663	-41	664
49 to 54	1,646	1,732	-86	602
55 to 60	1,701	1,803	-102	545
Medicaid				
1 to 6	2,097	1,054	1,043	1,121
7 to 12	2,161	1,361	800	1,058
13 to 18	2,254	1,468	786	980
19 to 24	2,248	1,766	482	919
Medicare and Medicaid Combined				
1 to 6	3,553	2,445	1,098	1,121
7 to 12	3,621	2,635	986	1,058
13 to 18	3,702	2,733	969	980
19 to 24	3,749	3,205	544	919

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

[b]N is the number of PACE sample members alive when the interval began.

TABLE III.9

ESTIMATED EFFECT OF PACE ON PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING MASSACHUSETTS
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if Enrolled in HCBS	Estimated Effect[a]	N[b]
Medicare				
1 to 6	1,372	1,442	-70	1,228
7 to 12	1,396	1,429	-33	1,158
13 to 18	1,381	1,392	-11	1,070
19 to 24	1,417	1,595	-178	997
25 to 30	1,476	1,464	12	928
31 to 36	1,485	1,473	12	850
37 to 42	1,508	1,472	36	776
43 to 48	1,656	1,516	140	740
49 to 54	1,651	2,145	-494	682
55 to 60	1,606	1,922	-316	616
Medicaid				
1 to 6	2,063	1,207	856	1,228
7 to 12	2,196	1,444	752	1,158
13 to 18	2,300	1,581	719	1,070
19 to 24	2,359	1,834	525	997
Medicare and Medicaid Combined				
1 to 6	3,435	2,649	786	1,228
7 to 12	3,592	2,873	719	1,158
13 to 18	3,682	2,974	708	1,070
19 to 24	3,777	3,429	348	997

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or HCBS in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the comparison group. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Comparison group members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No estimated effects were statistically significant at the .10 level.

[b]The number of PACE sample members alive when the interval began.

same. Without Massachusetts in the analysis, neither the predicted nor the actual means differed much from those for the overall sample, so the estimated effects were about the same in both analyses (compare Tables III.3 and III.9).

4. The New PACE Payment System

Since 2004, Medicare capitation payments to PACE plans have been risk-adjusted using the Medicare Advantage (MA) Hierarchical Condition Code (HCC) scores constructed from diagnoses submitted by the plans through the CMS Risk Adjustment Processing System (RAPS). After transition to full risk adjustment in 2008, the Medicare capitation payment for a PACE participant will be computed as the product of a base rate and a risk-adjustment score. The risk-adjustment score, in turn, is equal to the sum of the participant's individual HCC score and a plan-specific score based on the number of limitations in activities of daily living (ADL) of all the plan's participants.[13]

This approach to rate setting differs from the method in effect over the period of the study. As we have already described, prior to 2004 monthly Medicare capitation payments for PACE participants were set equal to a base payment, determined from the Medicare + Choice (M+C) county ratebook, multiplied by a frailty factor of 2.39. The change in payment methodology raises the possibility that the results presented here may not apply to the period after 2004. In principle, we could investigate whether this were true simply by recomputing Medicare PACE payments from 1999 to 2002 using the new rate-setting scheme and comparing the results to Medicare expenditures for the two comparison groups. This strategy is not available, however, because the necessary data on diagnoses (to compute HCC scores) and ADL limitations (to

---

[13]The PACE payment is thus identical to the payment that would be received by an MA plan except for the addition of the plan-specific frailty score.

compute the plan-level frailty adjustment) are not available for PACE participants in the 1999 to 2002 period.

We have therefore investigated a somewhat different question: How much would Medicare PACE payments for beneficiaries enrolled in 2004 and 2005 differ if they were based on the pre-2004 methodology than if they were based on the post-2008 methodology? To address this question, we computed the ratio of the two payment amounts, both reported to in the Medicare Advantage Prescription Drug (MARx) system payment files during the period of transition between the M+C and MA payment systems. Results for each PACE plan in the study appear in Table III.10. As the table shows, full risk adjustment appears to be associated with a slight decline in payments to PACE organizations. The overall weighted mean of the ratio of risk-adjusted (MA) to demographic-adjusted (M+C) payments is about 0.97. Hence it is unlikely that the transition to full MA risk adjustment will substantially affect the results presented here. To establish upper and lower bounds on the effect of the transition, we also assessed the effect on PACE payment of selecting the highest (1.17) and lowest (0.76) ratios in the sample of PACE plans.

When the actual mean of Medicare expenditures in Table III.3 is adjusted for MA risk adjustment at the mean (by multiplying the mean by 0.97), the estimated Medicare PACE effect shows consistent saving over the first 24 months after PACE enrollment. Only in the second interval (months 7 to 12) does the point estimate of mean PACE expenditure exceed the predicted mean for PACE participants under HCBS; furthermore, the estimated effect is only $4. On average, MA risk adjustment appeared to increase Medicare PACE saving by $40 to $50 per month. When the ratio of MA to M+C payments is set to its highest sample value, 1.17, monthly Medicare PACE payments exceeded estimated Medicare payments under HCBS by $150 to $300 over months 1 to 24. When the same ratio is set to its lowest value, 0.76, monthly Medicare

TABLE III.10

RATIO OF RISK-ADJUSTED TO DEMOGRAPHIC PAYMENT COMPONENTS OF PACE CLAIMS,
2004-2005

State and Plan Number	PACE Organization	Mean	1st Quartile	Median	3rd Quartile	N
CA						
H0542	AltaMed Health, Los Angeles	0.89	0.63	0.78	1.00	1,787
H5403	On Lok, San Francisco	1.01	0.71	0.92	1.22	7,931
H5405	Center for Elder Independence, Oakland	0.87	0.61	0.77	1.01	2,545
H5406	Sutter Senior Care, Sacramento	1.01	0.70	0.93	1.23	1,688
CO						
H0613	Total Long-Term Care, Denver	0.95	0.61	0.80	1.15	7,469
MA						
H2218	Harbor Health Services, Dorchester	1.00	0.65	0.90	1.19	1,501
H2219	Fallon Community Health Plan, Worcester	1.07	0.72	0.95	1.30	1,414
H2220	Elder Service Plan of Mutual Health Center, Dorchester	1.02	0.59	0.83	1.30	899
H2221	Cambridge Hospital, Cambridge	1.00	0.62	0.90	1.22	902
H2223	Elder Service Plan of East Boston NHC, East Boston	1.03	0.67	0.92	1.23	2,448
MD						
2109	Hopkins Elder Plus, Baltimore	1.05	0.72	0.92	1.25	1,118
MI						
H2318	Center for Senior Independence, Detroit	0.78	0.54	0.64	0.93	1,455
OH						
H3613	Concordia Care, Cleveland Heights	0.76	0.54	0.64	0.80	1,822
H3614	Tri Health Senior Link, Cincinnati	0.85	0.54	0.69	0.94	2,151
SC						
H4203	Palmetto Senior Care, Columbia	1.17	0.71	1.00	1.45	2,466
TX						
H4518	Bienvivir Senior Health Services, El Paso	1.05	0.72	0.92	1.23	5,706
WA						
H5007	Providence Elder Place, Seattle	1.09	0.72	0.98	1.32	1,607
WI						
H5212	Community Care for the Elderly, Milwaukee	0.86	0.59	0.74	1.03	3,432

Source: CMS Health Plan Management System, Medicare Advantage payment files, 2004 and 2005.

payments are estimated to be $300 to $450 lower than estimated payments under HCBS over the same period—an average saving of about 30 percent. Even this substantial level of Medicare saving, however, is not sufficient to overturn the overall result, which is that combined Medicare and Medicaid expenditure for PACE participants exceeds the amount that would have been spent had these beneficiaries begun using HCBS instead of PACE.

F. A NURSING HOME COMPARISON GROUP FOR PACE

Beneficiaries entering HCBS programs, like those entering PACE, qualify for nursing home care in their state and are attempting to remain in the community by using a more varied mix of services than Medicare or Medicaid would otherwise provide to community residents. They resemble PACE entrants more closely than any other group that can be identified using available administrative data and, therefore, form a natural comparison group for PACE participants. Some proponents of PACE have nonetheless argued that not all PACE participants could be maintained in the community by the services that HCBS programs provide. Therefore, the proponents claim, some beneficiaries entering PACE would, in its absence, enter nursing homes. While some proportion of PACE entrants might have otherwise entered nursing homes, no firm evidence exists to suggest what that proportion might be. Short of random assignment to PACE or an alternative, we consider the matched comparison group we used to be the best indicator of what might have happened to our sample of PACE entrants in the absence of PACE.

To explore the consequences of assuming that some PACE entrants might otherwise have been admitted to a nursing home, but without *a priori* knowledge of the proportion of beneficiaries that PACE might divert from nursing homes *at the outset*, we constructed (1) a matched comparison group of beneficiaries who entered nursing homes around the time other beneficiaries entered PACE, and (2) repeated the entire analysis. We found that:

- After program entry, members of the matched comparison group of nursing home entrants died much more quickly than members of the PACE group. In most six-month intervals, the difference was about 20 percentage points.

- Combined Medicare and Medicaid expenditures for members of the PACE group were lower than those for members of the matched comparison group. (Methods and results are presented in detail in Appendix B.)

The great difference in the groups' mortality rates, even after the groups were matched on baseline characteristics, suggests that nursing home entrants are not a suitable comparison group for new PACE participants. It is implausible that members of the PACE group would have experienced a mortality trajectory like that of the nursing home comparison group had PACE been unavailable. Thus, it is also implausible that Medicare and Medicaid expenditures for the group of nursing home entrants are an accurate representation, on average, of what PACE participants would have experienced in the absence of PACE.

We do not consider the group of nursing home entrants to be a credible comparison group for PACE entrants. However, we used the results of the comparison to identify the proportion of PACE participants that would have had to have entered nursing homes directly—and exhibited the mortality trajectory we observed in the matched comparison group—in order to offset the effects of PACE on Medicare and Medicaid expenditures presented in this chapter. We present the results of this analysis in Chapter IV.

IV. SUMMARY AND DISCUSSION

A. SUMMARY OF FINDINGS

This study generated two sets of estimates of the effect of PACE on Medicare and Medicaid expenditures, relying in both cases on a propensity-score matched sample of beneficiaries entering HCBS programs as a comparison group. The first set of estimates was produced by contrasting mean per-person per-month expenditures for the PACE group over successive six-month intervals with those for the matched comparison group. Monthly Medicare expenditures were similar for the two groups (that is, estimated effects were not statistically significant) in 9 out of 10 six-month intervals following enrollment. By contrast, monthly Medicaid expenditures for the PACE group exceeded those for the matched comparison group in all 4 six-month intervals following enrollment. The estimated effects on Medicaid were large and highly significant, but diminished from $926 per-person per-month in the first interval to $536 in the fourth interval.

The second set of estimates was produced by comparing *actual* per-person per-month expenditures for the PACE group with *predicted* expenditures, using regression models of expenditures for the comparison group in the appropriate time period to make the prediction. This approach reduced the potential for bias but also generated large standard errors and thus wide confidence intervals. Differences in Medicare expenditures that were statistically insignificant in the comparison of unadjusted means also were insignificant under the regression-adjusted approach. Differences in Medicaid expenditures were large and retained their positive or negative values under both approaches; however, standard errors in the regression-adjusted approach were such that we could not reject a null hypothesis of no PACE effect using conventional cutoffs for statistical significance. Actual Medicare and Medicaid expenditures for

sample members in the PACE group in the first six-month interval were about 30 percent greater than the combined predicted expenditures. By the fourth interval, combined actual expenditures exceeded predicted expenditures by only 13 percent. As we also saw in the unadjusted results, PACE affected Medicaid expenditures much more than it affected Medicare expenditures, although the effect on Medicaid expenditures did diminish over time.

These findings are generally consistent with previous research about the effects of PACE on public expenditures. As described in Chapter I, an evaluation of the PACE demonstration by White et al. (2000) found that Medicare capitation payments to PACE organizations were somewhat lower than projected FFS expenditures for a comparison group of nonparticipants in the first follow-up year, and that Medicaid capitation payments were much higher than projected expenditures. The Washington Department of Health's study of the PACE program in Seattle found that Medicaid expenditures for PACE participants were much higher than for HCBS users, and about the same as expenditures for nursing home residents. Moreover, the gap between Medicaid expenditures for PACE participants and those for HCBS users narrowed over time, as our results also suggested. (The Washington study did not assess Medicare expenditures.) The consistency of the results found here with those of previous studies suggests our results are not due to chance, despite the lack of statistical significance under the regression-adjusted approach.

In a parallel analysis, reported in Appendix B, we compared expenditures for the PACE group to those for a matched sample of nursing-home entrants in the nine study states. That analysis found that combined Medicare and Medicaid expenditures for PACE participants in the first six-month interval were 38 percent lower than combined predicted expenditures had those same participants entered nursing homes. The Medicare portion of the actual expenditures was 55 percent lower than the predicted expenditures, while the Medicaid proportion of the actual expenditures was 15 percent lower than the predicted expenditures. As with the unadjusted

results, differences between the actual and predicted Medicaid expenditures remained roughly constant in subsequent intervals, while differences in Medicare expenditures became closer to zero.

B. PACE AND QUALITY OF CARE

PACE exists to help frail seniors avoid nursing home placement by providing high-quality care in a community setting. Any assessment of the costs of PACE must consider this goal. In particular, our finding that Medicaid spends more money per-person per-month on new PACE participants than on a matched sample of new users of HCBS must be interpreted in light of what we know about the relative quality of care—and quality of life—these programs provide.

In a companion report to this analysis, Schimmel et al. (forthcoming) used survey data collected one to three years after program entry to compare self-reported measures of quality of care in PACE, relative to that reported by an HCBS comparison group. Their findings in four areas are summarized as follows:

- Health Status and Functioning
    - PACE participants were more likely than those in the comparison group to describe their health status favorably and were more likely to say their health had improved in the past year.
    - PACE had no apparent effect on beneficiaries' self-reported ability to perform activities of daily living.

- Care Management
    - PACE participants were more likely than members of the comparison group to have advanced directives or living wills.
    - PACE participants said pain interfered with their normal routine less often than members of the comparison group.
    - PACE participants were less likely than members of the comparison group to report unmet needs in dressing and moving around indoors. PACE and comparison group members were equally likely to report unmet needs for other daily activities.

- PACE and comparison group members were equally likely to report that they had fallen or lost weight without intending to.

- Beneficiary Satisfaction

    - PACE participants were less likely than members of the comparison group to say obtaining needed care required a great deal of energy.
    - Most beneficiaries were very satisfied with their paid personal care, medical care, and quality of life, regardless of whether they received PACE services or HCBS.

- Health Care Use

    - PACE participants were much more likely than members of the comparison group to say their hearing was tested at least once a year, and somewhat more likely to say their eyesight was tested at least once a year.
    - PACE participants were more likely to be up-to-date in vaccinations for influenza and pneumonia.
    - PACE participants were less likely to report they had been hospitalized for at least one night in the past year.
    - PACE participants were more likely than members of the comparison group to report a nursing home stay of at least one night in the past year.

It thus appears that PACE favorably affects several important health-care utilization and care-management outcomes, relative to its best alternative. States must consider whether these favorable effects are worth the additional per-person monthly expenditures.

C. LIMITATIONS OF THE STUDY

This analysis has important limitations pertaining to (1) the comparability of the PACE and HCBS samples; (2) the selection of study states based on the availability of Medicaid data; (3) the exclusion from the sample of beneficiaries who belonged to managed care organizations before program entry; and (4) states providing services whose costs may not be reflected in Medicaid claims. We describe each limitation below.

1. **Comparability of the Samples**

    The comparability of treatment and comparison groups is always of paramount concern when a nonexperimental design is used for evaluation of social and health programs. To the extent that beneficiaries who enter PACE, rather than an HCBS program, differ in motivation or in other characteristics that are both (1) not measured, and (2) correlated with health care expenditures, there will always be a potential for biased estimation of PACE impacts. Although propensity-score matching should mitigate bias, there are undoubtedly unmeasured differences between PACE participants and comparison group members that could account for part of the differences in observed expenditures. For example, it is possible that the two groups differed in their willingness to give up their primary care physicians—a requirement of PACE, but not of HCBS. Beneficiaries who are not willing to give up their physicians may exhibit different service-use habits than other beneficiaries, in ways our analysis could not control for and in ways that affect expenditures.

2. **State Selection**

    Study states were limited to those that had both PACE and HCBS programs in 1999 and that submitted timely, accurate MSIS data then. Although we conducted tests to assess the sensitivity of results to the inclusion of data from California and Massachusetts—both of which have relatively large PACE enrollment and above-average per-person Medicare FFS expenditures— we cannot determine how the results might have differed if other states had been included in the study.

3. **Managed Care Enrollment Prior to Program Entry**

    We excluded from the analysis 426 beneficiaries (22 percent of the potential study sample) who entered PACE in 1999 or 2000 because they had been enrolled in Medicare managed care

for some or all of the 12 months prior to program entry. Because Medicare claims—the source

of most of the variables we used for propensity-score matching—do not exist for managed care

enrollees, we could not have constructed propensity scores for these beneficiaries. We therefore

have no basis for determining whether PACE effects for beneficiaries who enter from managed

care differ from effects for beneficiaries who enter from FFS.

4.   Expenditures Not Reflected in Claims

Claims do not necessarily reflect all the costs incurred by service providers. For example,

some states do not pay for case management services on a fee-for-services basis, and thus will

have no claims data to reflect these services even though Medicaid does pay for them. Members

of the comparison group are more likely than PACE participants to have such non-reported

expenditures (although non-reported expenditures could be incurred for PACE sample members

who disenroll from PACE during followup). As a result, our analysis may slightly underestimate

Medicaid expenditures in the matched comparison group.

D. PACE AND ITS ALTERNATIVES

Whether PACE is estimated to increase or decrease total health care expenditures depends

on the alternative intervention that is used as a point of comparison. If HCBS is considered as

the alternative for PACE participants, then the results presented here suggest that PACE leads to

increased per-person expenditures. Moreover, the results suggest that Medicaid bears the brunt

of the increase. If, however, PACE participants would immediately enter nursing homes were

PACE not available as an option, then the results presented in Appendix B suggest that PACE

might reduce per-person spending. Medicare would experience large short-run savings, and

Medicaid would realize more modest savings over a longer period.

While the effect of PACE on health care expenditures probably lies somewhere between these two sets of results, no firm evidence exists about the proportion of PACE participants that would have immediately entered nursing homes in the absence of PACE.

Using estimates of the effects of PACE on combined Medicare and Medicaid expenditures, drawn from Tables III.3 and B.6, we calculated the *net* cost or savings that would result under varying assumptions about the proportion of participants (y) who avoid immediate nursing home-admission as a result of PACE. We assume the remaining proportion (1-y) would otherwise have entered HCBS programs. For each of four follow-up periods, we computed the value of y necessary for a net PACE saving of zero.

During the first six-month interval, when expenditures for PACE participants were considerably less than those for the nursing home group (by $2,161 per person per month) and losses relative to HCBS were modest ($816 per person per month), PACE would have produced a net saving only if more than 27 percent of participants would have immediately entered a nursing home, rather than an HCBS program, in the absence of PACE (Table IV.1). During the second interval, when the difference between expenditures for the PACE and nursing home groups was more modest, but the effects relative to HCBS stayed level with those in the first interval, PACE would have produced a net saving only if 55 percent of PACE participants would have entered a nursing home by this point had PACE not been available to them.

Whether these proportions are plausible is open to debate. In their study of the PACE demonstration, Chatterji et al. (1998) found that 30 percent of beneficiaries who applied to and were found eligible for PACE, but did not enroll, had one or more nursing home admissions within the subsequent six months. They did not report what fraction of those who entered nursing homes did so at about the same time they would have entered PACE. Studies of nursing home entry among community-dwelling dually eligible beneficiaries typically report low entry

TABLE IV.1

BREAK-EVEN ANALYSIS

| Months from Program Entry | Difference in Expenditures for PACE Group and: (Dollars) | | Proportion That Would Go Directly to: | | | | Net Effect (Dollars) |
	Nursing Home Group[a] (a)	HCBS Group[b] (b)	Nursing Home Care (y)	HCBS (1-y)	(a) * (y)	(b) * (1-y)	[b * (-1-y)]
1 to 6	-2,161	816	0.10	0.90	-216	734	518
	-2,161	816	0.20	0.80	-432	653	221
	-2,161	816	0.27	0.73	-592	592	0
	-2,161	816	0.30	0.70	-648	571	-77
	-2,161	816	0.40	0.60	-864	490	-375
7 to 12	-663	800	0.40	0.60	-265	480	215
	-663	800	0.50	0.50	-332	400	69
	-663	800	0.55	0.45	-363	363	0
	-663	800	0.60	0.40	-398	320	-78
	-663	800	0.70	0.30	-464	240	-224
13 to 18	-292	747	0.60	0.40	-175	299	124
	-292	747	0.70	0.30	-204	224	20
	-292	747	0.72	0.28	-210	210	0
	-292	747	0.80	0.20	-234	149	-84
	-292	747	0.90	0.10	-263	75	-188
19 to 24	-603	431	0.30	0.70	-181	302	121
	-603	431	0.40	0.60	-241	259	17
	-603	431	0.42	0.58	-251	251	0
	-603	431	0.50	0.50	-302	216	-86
	-603	431	0.60	0.40	-362	172	-190

Note: In each of the four panels, the shaded row shows the proportion of PACE participants that—in the absence of PACE—would have had to have entered a nursing home directly, and the proportion that would have had to have begun using HCBS, for PACE to have break-even effects on combined Medicare and Medicaid expenditures.

[a]From the bottom panel of Table B.6.

[b]From the bottom panel of Table III.3.

rates. In the recent Cash and Counseling demonstration for nursing-home eligible Medicaid beneficiaries, for example, roughly 8 percent of 1,004 Arkansas Medicaid beneficiaries (75 percent of whom were elderly) used Medicaid nursing facility services in the study's follow-up year (Dale et al. 2003). The proportion of PACE participants who would immediately enter nursing homes in the absence of PACE would need to be substantially higher than this for the associated savings to offset the losses PACE appears to generate relative to the HCBS comparison group.

E. CONCLUSION

This analysis suggests that, in nine of the states where PACE operated in 1999, the effect of PACE was to increase monthly per-person expenditures for Medicare and Medicaid combined, relative to a matched comparison group of HCBS users. In a parallel analysis, PACE was estimated to decrease expenditures relative to nursing home care. For the savings relative to nursing home care to offset the higher expenditures relative to the matched HCBS comparison group, at least 30 percent of PACE participants would have had to have been nursing-home bound in the absence of PACE. This analysis addresses only one aspect of the PACE program. As noted, a companion report examines the effects of PACE on service use, care management, health and functioning, and beneficiary satisfaction. Another describes in detail how PACE programs are implemented and the importance PACE team members ascribe to the services they provide. In making decisions about the future of the PACE program, the federal and state governments should consider findings from these other reports, as well as results on expenditures.

REFERENCES

Centers for Medicare & Medicaid Services. "Program of All-Inclusive Care for the Elderly (PACE) History." Baltimore, MD: CMS, November 1998.

Chatterji, Pinka, Nancy R. Burstein, David Kidder, and Alan White. "The Impact of PACE on Participant Outcomes." Cambridge, MA: Abt Associates, Inc., July 1998.

Dale, Stacy, Randall Brown, Barbara Phillips, Jennifer Schore, and Barbara Lepidus Carlson. "The Effects of Cash and Counseling on Personal Care Services and Medicaid Costs in Arkansas." *Health Affairs* Web Exclusive, November 19, 2003.

Department of Health and Human Services, Health Care Financing Administration. "Medicare and Medicaid Programs: Programs of All-Inclusive Care for the Elderly (PACE); Final Rule." *Federal Register*, vol. 64, no. 226, November 24, 1999, pp. 66234 – 66304.

Gibson, Mary Jo, Steven R. Gregory, Ari N. Houser, and Wendy Fox-Grage. "Across the States: Profiles of Long-Term Care," sixth edition. Washington, DC: AARP Public Policy Institute, 2004.

Gold, Marsha. "Geographic Variation in Medicare Per Capita Spending: Should Policy-Makers Be Concerned?" New Brunswick, NJ: The Robert Wood Johnson Foundation, July 2004.

Greene, William. *Econometric Analysis*. New York, NY: Macmillan Publishing Co., 1990.

Gross, Diane L., Helena Temkin-Greener, Stephen Kunitz, and Dana Mukamel. "The Growing Pains of Integrated Health Care for the Elderly: Lessons from the Expansion of PACE." The Milbank Quarterly, vol. 82, no. 2, 2004, pp. 257-282.

Kaiser Family Foundation. "Medicaid 1915(c) Home and Community-Based Service Programs: Data Update." Washington, DC: The Henry J. Kaiser Family Foundation, July 2005.

Mancuso, David, Greg Yamashiro, and Barbara Felver. "PACE: An Evaluation." Report 8.26. Olympia, WA: Washington State Department of Social and Health Services Research & Data Analysis, June 29, 2005.

National PACE Association. "PACE and Medicare Risk Adjustment." Available at [http://www.npaonline.org/website/article.asp?id=808]. Accessed March 22, 2007.

Rosenbaum, P., and D. Rubin. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika,* vol. 70, no. 1, 1983, pp. 41-55.

Schimmel, Jody, Valerie Cheh, Robert Schmitz, and Peter Kemper. "The Effects of PACE on Care Quality." Draft report. Princeton, NJ: Mathematica Policy Research, Inc., forthcoming.

Wennberg, John E. and Megan McAndrew Cooper. "The Quality of Medical Care in the United States: A Report on the Medicare Program." The Dartmouth Atlas of Health Care 1999. Chicago, IL: Health Forum, Inc., 1999.

White, Alan J., Yvonne Abel, and David Kidder. "A Comparison of the PACE Capitation Rates to Projected Costs in the First Year of Enrollment." Cambridge, MA: Abt Associates, Inc., October 27, 2000.

**APPENDIX A
PROPENSITY SCORE MATCHING METHODS**

In order to assemble a comparison group that resembled PACE participants (in terms of pre-program characteristics) as closely as possible, we computed propensity scores for PACE and HCBS participants in each area selected for analysis, choosing those HCBS participants whose scores most nearly match those of PACE participants in the same state. The propensity score, $p(X_i)$, is simply the estimated probability that an individual with characteristics X_i enrolled in PACE. Rosenbaum and Ruben (1983) showed that the propensity score extracts all information from X relating to differences between treated and untreated subjects. That is, if T_i is an indicator variable equal to one if individual i is a PACE participant and is zero otherwise, then conditional on the value of the propensity score, T and X are independent.

At each PACE site selected for analysis, we selected all dual eligibles who enrolled in PACE or HCBS programs in 1999 or 2000. (ZIP codes used to define PACE market areas are shown in Table A.1.) We used Medicare Part A claims data for the year prior to entry to estimate the following logistic equation:

(5.1) $f(p_{it}) = X_{it\text{-}1}b;$ $t = 1999, 2000$

where $f(p) = ln[p/(1\text{-}p)]$ and p is the probability of PACE enrollment. Elements of X_i include measures such as age group; race; use of hospital, skilled nursing facilities, and home health care in the year prior to entry into PACE or HCBS; and diagnosis (from claims) of stroke, dementia, or hip fracture.

The logistic model [5.1] was estimated separately for each state and estimated coefficients were used to compute the estimated probability of PACE enrollment (that is, the propensity score) for each person from the PACE and HCBS populations. Each PACE participant was then matched to the dual-eligible beneficiary whose propensity score was nearest. This process produced matched samples of PACE and HCBS participants. Tables A.2 to A.10 show values of matching variables for each state.

TABLE A.1

PACE MARKET-AREA ZIP CODES USED FOR PROPENSITY SCORE MATCHING

PACE Organization	ZIP Codes	Communities
California		
Los Angeles H0534	90001-90068	Los Angeles
	90070-90185	Los Angeles
	90280	South Gate
	90601-90612	Whittier
	90640	Montebello
San Francisco H9202	94080-94083	South San Francisco
	94101-94188	San Francisco
	94401-94497	San Mateo
Oakland H0596	94577-94579	San Leandro
	94601-94619	Oakland, Emeryville
	94621-94705	Oakland, Emeryville, Berkeley
	94702-94720	Berkeley
Sacramento H0589	95758-95759	Elk Grove
	95812-95842	Sacramento
	95851-95899	Sacramento
Colorado		
Denver H0649	80001-80004	Arvada, Aurora, Broomfield, Commerce City
	80020-80021	Broomfield
	80026-80031	Lafayette, Louisville, Westminster
	80110-80112	Englewood
	80120-80130	Littleton
	80150-80299	Englewood, Littleton, Denver
	80401-80419	Golden
Maryland		
Baltimore H2107	20707-20709	Laurel
	21201-21203	Baltimore
	21205-21207	Baltimore, Gwynn Oak
	21209-21218	Baltimore
	21219-21222	Sparrow's Pt, Middle River, Essex, Dundalk
	21224	Baltimore
	21229-21233	Baltimore
	21237	Rosedale
Massachusetts		
Worcester H2268	01545-01550	Shrewsbury
	01562	Spencer
	01602-01610	Worcester
	01612-01655	Paxton, Worcester
East Boston H2249	02128	Boston
	02149-02152	Everett, Chelsea, Revere, Winthrop
Cambridge H2269	02138-02145	Cambridge, Somerville
	02148	Malden
	02155	Medford
	02474,02476	Arlington
	02478	Belmont

PACE Organization	ZIP Codes	Communities
Dorchester H2267	02116-02122	Boston
	02124-02126	Boston
	02130-02132	Jamaica Plain, Roslindale, West Roxbury
	02135	Boston (Brighton)
	02136	Boston (Hyde Park)
	02169	Quincy
	02184	Braintree
	02186	Milton
	02215	Boston
	02368	Randolph
	02445-02446	Brookline
Dorchester H2215	02115	Boston
	02118-02122	Boston
	02124-02126	Boston, Mattapan
	02130-02131	Jamaica Plain, Roslindale
	02136	Boston (Hyde Park)
Michigan		
Detroit H2358	48201-48216	Detroit
	48219	Detroit
	48221	Detroit
	48223-48228	Detroit
	48230	Detroit
	48234-48235	Detroit
	48238	Detroit
Ohio		
Cleveland Heights H3680	44102-44106	Cleveland
	44108-44112	Cleveland
	44117-44118	Cleveland, Euclid
	44128	Cleveland
Cincinnati H3679	45201-45299	Cincinnati
South Carolina		
Columbia H2149	29016	Blythewood
	29033	Cayce
	29036	Chapin
	29044-29045	Eastover, Elgin
	29052-29053	Gadsden, Gaston
	29063	Irmo
	29071-29073	Lexington
	29160	Swansea
	29169-29172	W. Columbia
	29201-29292	Columbia
Texas		
El Paso H4561	79901-79999	El Paso
Wisconsin		
Milwaukee H5249	53129	Greendale
	53132	Franklin
	53150-53151	Muskego, New Berlin
	53154	Oak Creek
	53172	S Milwaukee
	53202-53235	Milwaukee

TABLE A.2

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, CALIFORNIA

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.327	0.257
Dementia	0.191	0.194
Chronic Illness	0.681	0.662
Age in Years		
66 to 74	0.243	0.233
75 to 84	0.419	0.421
85 or older	0.338	0.346
Race/Ethnicity		
White	0.219	0.246
Black	0.220	0.202
Hispanic	0.045	0.055
Other	0.516	0.497
Service Use in Past 12 Months		
Any inpatient services	0.537	0.505
Any skilled nursing facility services	0.249	0.194
Any home health care services	0.398	0.359
Any inpatient stay in past 30 days	0.055	0.034
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	14,385	11,743
Total Part B	4,590	4,378
Total Part A squared	784,005,639	522,753,888
Total Part B squared	55,401,371	57,360,369
Unweighted Sample Size	**382**	**247**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE A.3

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, COLORADO

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.116	0.203
Dementia	0.290	0.348
Chronic Illness	0.652	0.667
Age in Years		
66 to 74	0.261	0.305
75 to 84	0.333	0.275
85 or older	0.406	0.420
Race/Ethnicity		
White	0.609	0.681
Black	0.116	0.087
Hispanic	0.232	0.174
Other	0.043	0.058
Service Use in Past 12 Months		
Any inpatient services	0.420	0.420
Any skilled nursing facility services	0.188	0.217
Any home health care services	0.348	0.319
Any inpatient stay in past 30 days	0.087	0.072
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	7,143	8,848
Total Part B	3,641	3,793
Total Part A squared	245,171,475	342,599,806
Total Part B squared	38,591,300	38,194,697
Unweighted Sample Size	**69**	**61**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

A.7

TABLE A.4

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, MASSACHUSETTS

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.284	0.287
Dementia	0.196	0.222
Chronic Illness	0.665	0.724
Age in Years		
66 to 74	0.222	0.211
75 to 84	0.451	0.484
85 or older	0.327	0.305
Race/Ethnicity		
White	0.781	0.757
Black	0.175	0.207
Hispanic	0.011	0.007
Other	0.033	0.029
Service Use in Past 12 Months		
Any inpatient services	0.491	0.498
Any skilled nursing facility services	0.255	0.276
Any home health care services	0.560	0.571
Any inpatient stay in past 30 days	0.055	0.073
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	13,135	13,515
Total Part B	7,121	9,863
Total Part A squared	631,179,960	588,393,933
Total Part B squared	153,117,738	340,277,620
Unweighted Sample Size	**275**	**205**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE A.5

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, MARYLAND

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.313	0.122
Dementia	0.165	0.174
Chronic Illness	0.635	0.583
Age in Years		
66 to 74	0.383	0.731
75 to 84	0.391	0.104
85 or older	0.226	0.165
Race/Ethnicity[a]		
White		
Black		
Hispanic		
Other		
Service Use in Past 12 Months		
Any inpatient services	0.426	0.183
Any skilled nursing facility services	0.113	0.070
Any home health care services	0.348	0.443
Any inpatient stay in past 30 days	0.017	0.009
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	9,438	3,792
Total Part B	3,641	1,421
Total Part A squared	392,288,928	94,309,623
Total Part B squared	42,862,474	3,611,205
Unweighted Sample Size	**115**	**15**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

[a]Race/ethnicity measures were not included in the logistic models for this state because there was little variation in the racial/ethnic composition of PACE organizations.

TABLE A.6

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, MICHIGAN

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.369	0.345
Dementia	0.286	0.298
Chronic Illness	0.821	0.774
Age in Years		
66 to 74	0.215	0.166
75 to 84	0.440	0.417
85 or older	0.345	0.417
Race/Ethnicity		
White	0.024	0.024
Black	0.833	0.893
Hispanic	0.000	0.000
Other	0.143	0.083
Service Use in Past 12 Months		
Any inpatient services	0.548	0.488
Any skilled nursing facility services	0.226	0.214
Any home health care services	0.643	0.655
Any inpatient stay in past 30 days	0.036	0.012
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	16,459	14,151
Total Part B	7,191	6,508
Total Part A squared	834,112,007	752,897,995
Total Part B squared	105,270,189	78,211,193
Unweighted Sample Size	**84**	**70**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE A.7

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, OHIO

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.342	0.253
Dementia	0.247	0.241
Chronic Illness	0.703	0.652
Age in Years		
66 to 74	0.285	0.273
75 to 84	0.437	0.449
85 or older	0.278	0.278
Race/Ethnicity[a]		
White		
Black		
Hispanic		
Other		
Service Use in Past 12 Months		
Any inpatient services	0.443	0.424
Any skilled nursing facility services	0.209	0.203
Any home health care services	0.342	0.310
Any inpatient stay in past 30 days	0.063	0.032
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	8,791	9,079
Total Part B	4,289	3,908
Total Part A squared	347,152,278	328,498,521
Total Part B squared	75,418,333	58,591,704
Unweighted Sample Size	**158**	**118**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

[a]Race/ethnicity measures were not included in the logistic models for this state because there was little variation in the racial/ethnic composition of PACE organizations.

A.11

TABLE A.8

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, SOUTH CAROLINA

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.389	0.398
Dementia	0.370	0.370
Chronic Illness	0.685	0.648
Age in Years		
66 to 74	0.287	0.241
75 to 84	0.352	0.278
85 or older	0.361	0.481
Race/Ethnicity		
White	0.278	0.379
Black	0.657	0.528
Hispanic	0.000	0.000
Other	0.065	0.093
Service Use in Past 12 Months		
Any inpatient services	0.528	0.574
Any skilled nursing facility services	0.120	0.204
Any home health care services	0.444	0.463
Any inpatient stay in past 30 days	0.046	0.037
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	9,074	9,904
Total Part B	3,920	3,253
Total Part A squared	273,392,632	285,467,625
Total Part B squared	39,727,716	19,572,723
Unweighted Sample Size	**108**	**71**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE A.9

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, TEXAS

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.202	0.185
Dementia	0.163	0.129
Chronic Illness	0.792	0.758
Age in Years		
66 to 74	0.297	0.270
75 to 84	0.461	0.494
85 or older	0.242	0.236
Race/Ethnicity		
White	0.236	0.247
Black	0.017	0.006
Hispanic	0.719	0.713
Other	0.028	0.034
Service Use in Past 12 Months		
Any inpatient services	0.472	0.494
Any skilled nursing facility services	0.051	0.045
Any home health care services	0.404	0.360
Any inpatient stay in past 30 days	0.067	0.079
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	7,709	9,956
Total Part B	4,684	5,441
Total Part A squared	291,108,438	670,057,356
Total Part B squared	65,086,867	86,255,774
Unweighted Sample Size	**178**	**161**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

TABLE A.10

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, BY GROUP, WISCONSIN

	PACE Group	Comparison Group
Diagnoses in Past 12 Months		
Stroke	0.239	0.261
Dementia	0.172	0.269
Chronic Illness	0.709	0.701
Age in Years		
66 to 74	0.262	0.291
75 to 84	0.410	0.321
85 or older	0.328	0.388
Race/Ethnicity		
White	0.448	0.418
Black	0.276	0.328
Hispanic	0.007	0.015
Other	0.269	0.239
Service Use in Past 12 Months		
Any inpatient services	0.597	0.582
Any skilled nursing facility services	0.231	0.179
Any home health care services	0.410	0.418
Any inpatient stay in past 30 days	0.052	0.030
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	14,179	7,563
Total Part B	5,496	4,185
Total Part A squared	864,447,898	229,498,984
Total Part B squared	125,557,490	56,090,000
Unweighted Sample Size	**134**	**102**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or HCBS in 1999 or 2000.

APPENDIX B
THE ANALYSIS USING A MATCHED COMPARISON GROUP
OF NURSING HOME ENTRANTS

In comparing expenditures for the PACE group to those for a group of nursing home entrants, we used the methods and data sources described in the body of this report. In this appendix, we present the results of (1) sample selection and propensity score matching, and (2) the comparison of expenditures.

A. SAMPLE SELECTION AND PROPENSITY SCORE MATCHING

1. Sample Selection

After the PACE sample was drawn, the sampling frame for a nursing home comparison group consisted of the remaining dually eligible beneficiaries who were new entrants to nursing homes in PACE market areas and met the other selection criteria used for the PACE sample. Where possible, we identified new nursing home entrants by the nursing home admission date in the long-term care record of the state Medicaid Analytic eXtract (MAX) files. MAX files for three of the nine study states, however, do not include admission dates. In these cases, we identified new nursing home entrants by searching for the first Medicaid nursing home claim between April 1999 and December 2000, and then looking back at the three preceding months. If there were no nursing home claims in those three months *and* the Medicaid enrollment date preceded the nursing home claim date, we considered the beneficiary to be a new nursing home entrant as of the date of the first claim. By requiring that Medicaid enrollment precede the first nursing home claim, we excluded from the nursing home sampling frame already-institutionalized beneficiaries who had "spent down" to Medicaid eligibility. This step reduces the likelihood that the nursing home group would be sicker, on average, than the PACE group. Across the nine study sites, 13,503 nursing home residents met the sampling frame criteria.

2. Propensity Score Matching

After the initial stage of sample selection, the PACE and nursing home groups were not statistically comparable on measurable characteristics (Table B.1). We refined the composition of the nursing home group through the method of propensity score matching described in the body of this report. Using that method, 1,198 nursing home residents were identified as suitable matches for the 1,503 PACE sample members. On average, each member of the nursing home group matched to 1.3 members of the PACE group. Table B.2 shows the number of sample members each study state contributed.

After matching and pooling the samples across states, the PACE and nursing home groups differed on one of the characteristics we measured at program entry (Table B.3). Compared to the PACE group, the nursing home group had a slightly larger proportion of white members and a slightly smaller proportion of black members (significant at the 0.10 level). Compared to the PACE group, slightly larger proportions of the nursing home group had diagnoses of stroke, dementia, and other chronic illnesses, but the differences were not statistically significant. The PACE and nursing home groups were equally likely to have used inpatient services in the 12 months before program entry (about 50 percent) and to have had an inpatient stay in the 30 days before program entry (about 5 percent). Mean Medicare Parts A and B expenditures were slightly higher for the nursing home group than for the PACE group, but not significantly so.

B. RESULTS

1. Mortality in the Follow-Up Period

After program entry, the PACE and nursing home groups exhibited markedly different mortality rates (Table B.4). Six months after program entry, 19 percent of the nursing home group was deceased, compared to 6 percent of the PACE group. By the end of month 18, the mortality rates for the two groups differed by 20 percentage points, and the gap remained about

TABLE B.1

SAMPLE CHARACTERISTICS BEFORE MATCHING, BY GROUP
(Percentages, Unless Otherwise Noted)

Characteristic	PACE Group	Nursing Home Group
Age in Years		***
66 to 74	26.8	24.0
75 to 84	42.1	40.0
85 or older	31.4	36.0
Race/Ethnicity		***
White	37.1	52.0
Black	33.5	25.0
Hispanic	11.1	6.0
Other	18.2	17.0
Diagnoses in Past 12 Months		
Stroke	29.4	34.0***
Dementia	21.4	26.0***
Chronic illness[a]	69.9	74.0***
Service Use in Past 12 Months		
Any inpatient services	50.2	70.0***
Any skilled nursing facility services	19.7	36.0***
Any home health care services	43.5	41.0***
Any inpatient stay in past 30 days	5.4	42.0***
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	11,783	18,820***
Total Part B	5,094	7,046***
Sample Size	**1,503**	**13,503**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: The variables in this table were used to calculate propensity scores, by state.

[a]Includes diabetes, rheumatoid arthritis and osteoarthrosis, hip fractures, chronic obstructive pulmonary disease, and asthma.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

TABLE B.2

SAMPLE DISTRIBUTION, BY STATE AND GROUP

State	PACE Group	Nursing Home Group
California	382	328
Colorado	69	64
Massachusetts	275	236
Maryland	115	87
Michigan	84	72
Ohio	158	143
South Carolina	108	62
Texas	178	95
Wisconsin	134	111
Unweighted Sample Size	**1,503**	**1,198**

Source: Medicare Group Health Plan file and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

SAMPLE CHARACTERISTICS AT PROGRAM ENTRY, PACE AND NURSING HOME GROUPS
(Percentages, Unless Otherwise Noted)

Characteristic	PACE Group	Nursing Home Group
Age in Years		
66 to 74	26.8	26.5
75 to 84	42.1	42.9
85 or older	31.4	30.7
Race/Ethnicity		*
White	37.1	41.8
Black	33.5	28.8
Hispanic	11.1	11.4
Other	18.2	18.0
Diagnoses in Past 12 Months		
Stroke	29.4	30.6
Dementia	21.4	22.1
Chronic illness[a]	69.9	72.5
Service Use in Past 12 Months		
Any inpatient services	50.2	49.8
Any skilled nursing facility services	19.7	17.8
Any home health care services	43.5	43.9
Any inpatient stay in past 30 days	5.4	5.2
Mean Medicare Costs in Past 12 Months (Dollars)		
Total Part A	11,783	11,995
Total Part B	5,094	5,175
Weighted Sample Size[b]	**1,503**	**1,503**

Source: Medicare EDB and Standard Analytic Files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: The variables in this table were used to calculate propensity scores, by state.

[a]Includes diabetes, rheumatoid arthritis and osteoarthrosis, hip fractures, chronic obstructive pulmonary disease, and asthma.

[b]Observations in the nursing home sample are weighted by the number of PACE sample members each case matched to. The unweighted sample size is 1,198.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

TABLE B.4

TIME FROM PROGRAM ENTRY TO DEATH, PACE AND NURSING HOME GROUPS
(Cumulative Percentages)

Deceased By End of:	PACE Group	Nursing Home Group
Month 6	5.8	19.1
Month 12	12.8	29.6
Month 18	18.6	38.7
Month 24	24.4	45.8
Month 30	30.5	52.2
Month 36	36.4	58.2
Month 42	40.2	62.3
Month 48	45.3	65.5
Month 54	50.6	69.5
Month 60	54.8	73.1
Weighted Sample Size[a]	**1,503**	**1,503**

Source: Medicare EDB for beneficiaries entering PACE or a nursing home in 1999 or 2000.

[a]Observations in the nursing home sample are weighted by the number of PACE sample members each case matched to. The unweighted sample size is 1,198.

that size for the duration of the follow-up period. By the end of month 60, 73 percent of the nursing home group was deceased, compared to 55 percent of the PACE group. *The differential mortality rates indicate that, despite the use of propensity score matching, the PACE and nursing home samples differed systematically in ways we could not measure, but that we expect would be related to health care expenditures.*

2.   Unadjusted Differences in Expenditures

Mean per-person per-month Medicare expenditures for the PACE group were significantly lower than those for the nursing home group in the first two six-month intervals, but not thereafter (Table B.5). Mean per-person per-month Medicaid expenditures for the PACE group were significantly lower than those for the nursing home group in all four intervals.

3.   Characteristics That Helped Explain Expenditures in the Follow-Up Period

a.   In the Medicare Models

Mortality was a consistent predictor of Medicare expenditures in the regression models used to predict expenditures—the coefficients on the mortality variable were positive and highly significant in all models but one (data not shown). The coefficient on the variable indicating the diagnosis of a chronic illness other than dementia was also positive and significant in nearly all the models for Medicare expenditures, and the coefficient on the variable for prior Part B expenditures was positive and significant in most models. In the first two intervals covering Medicare expenditures, the coefficients on all state variables were negative and significant (relative to California); significance was sporadic in later intervals but the coefficients were consistently negative. The models had R^2 values ranging from 0.29 in the first interval to 0.16 in the tenth.

TABLE B.5

UNADJUSTED MEAN PER-PERSON PER-MONTH EXPENDITURES,
PACE AND NURSING HOME GROUPS
(Dollars)

Months from Entry	PACE Group	Nursing Home Group	Difference
Medicare			
1 to 6	1,445	3,389	-1,944***
7 to 12	1,453	1,669	-216**
13 to 18	1,435	1,404	31
19 to 24	1,471	1,638	-167
25 to 30	1,533	1,662	-130
31 to 36	1,571	1,484	87
37 to 42	1,600	1,896	-296
43 to 48	1,684	2,190	-506
49 to 54	1,663	1,810	-146
55 to 60	1,662	1,767	-105
Medicaid			
1 to 6	2,072	2,446	-373***
7 to 12	2,180	2,628	-448***
13 to 18	2,292	2,644	-352***
19 to 24	2,328	2,750	-422***
Medicare and Medicaid Combined			
1 to 6	3,517	5,835	-2,318***
7 to 12	3,633	4,297	-664***
13 to 18	3,727	4,048	-321***
19 to 24	3,799	4,388	-589***

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: Per-month expenditures are the sum of expenditures in the interval divided by the number of months alive. Each sample member has a weight equal to their matching weight times their share of the sample's months alive, where share of the months alive is calculated separately for the PACE and nursing home samples. The significance of the difference between the samples was determined through t-tests.

*Difference between comparison group and PACE significantly different from 0 at the .10 level, two-tailed test.
** Difference between comparison group and PACE significantly different from 0 at the .05 level, two-tailed test.
*** Difference between comparison group and PACE significantly different from 0 at the .01 level, two-tailed test.

b. In the Medicaid Models

In the models for Medicaid expenditures, the coefficients on three variables were statistically significant in all four intervals. Having a diagnosis of dementia in the 12 months prior to nursing home entry was associated with higher Medicaid expenditures. Being a sample member in Maryland or Ohio, relative to California, was associated with higher Medicaid expenditures; other factors being equal, in the four intervals. R^2 values ranged from 0.11 in the first interval to 0.17 in the fourth.

4. Differences in Expenditures After Adjusting for Sample Characteristics

a. Medicare Expenditures

Actual per-person per-month Medicare expenditures for the PACE group were much smaller than predicted expenditures in the first six-month interval (Table B.6 and Figure B.1). Thereafter, differences between actual and predicted expenditures were much smaller and not statistically significant. In the first interval, actual expenditures for the PACE group were $1,445 per-person per-month on average and predicted expenditures were $3,231, for a difference of $1,786 per-person per-month. During that interval, actual per-person per-month expenditures for the nursing home group were driven by inpatient services, skilled nursing-facility services, and outpatient services (Figure B.2). Expenditures for all these services were much lower in subsequent intervals.

b. Medicaid Expenditures

Actual per-person per-month Medicaid expenditures were less than predicted expenditures by $340 to $471 in all four intervals, but the regression-adjusted differences were not statistically significant (Table B.6 and Figure B.3). The results suggest that state Medicaid agencies base

TABLE B.6

ACTUAL AND PREDICTED PER-PERSON PER-MONTH EXPENDITURES
(Dollars)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if in Nursing Home	Difference	N[a]
Medicare				
1 to 6	1,445	3,231	-1,786*	1,503
7 to 12	1,453	1,681	-228	1,416
13 to 18	1,435	1,387	48	1,310
19 to 24	1,471	1,674	-203	1,224
25 to 30	1,533	1,717	-184	1,136
31 to 36	1,571	1,534	37	1,044
37 to 42	1,600	1,887	-287	956
43 to 48	1,684	2,290	-606	899
49 to 54	1,663	1,991	-328	822
55 to 60	1,662	1,690	-28	742
Medicaid				
1 to 6	2,072	2,447	-375	1,503
7 to 12	2,180	2,651	-471	1,416
13 to 18	2,292	2,632	-340	1,310
19 to 24	2,328	2,728	-400	1,224
Medicare and Medicaid Combined				
1 to 6	3,517	5,678	-2,161	1,503
7 to 12	3,633	4,296	-663	1,416
13 to 18	3,727	4,019	-292	1,310
19 to 24	3,799	4,402	-603	1,224

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the nursing home sample. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Nursing home sample members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]N is the number of PACE sample members alive when the interval begins.

*Significantly different from zero at the .10 level, two-tailed test.

FIGURE B.1

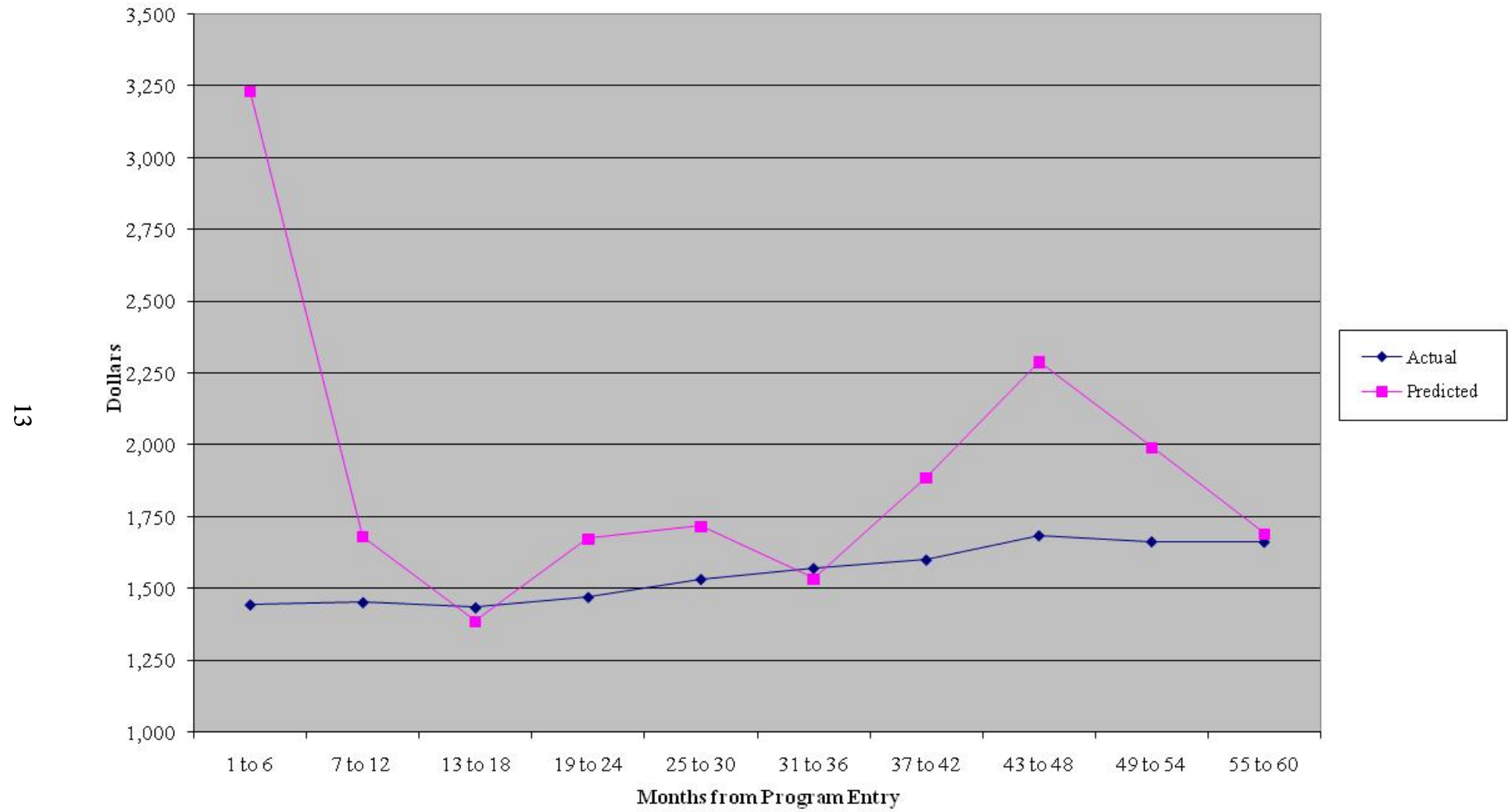ACTUAL AND PREDICTED PER-PERSON PER-MONTH MEDICARE EXPENDITURES

13

FIGURE B.2

MEAN PER-PERSON PER-MONTH MEDICARE EXPENDITURES,
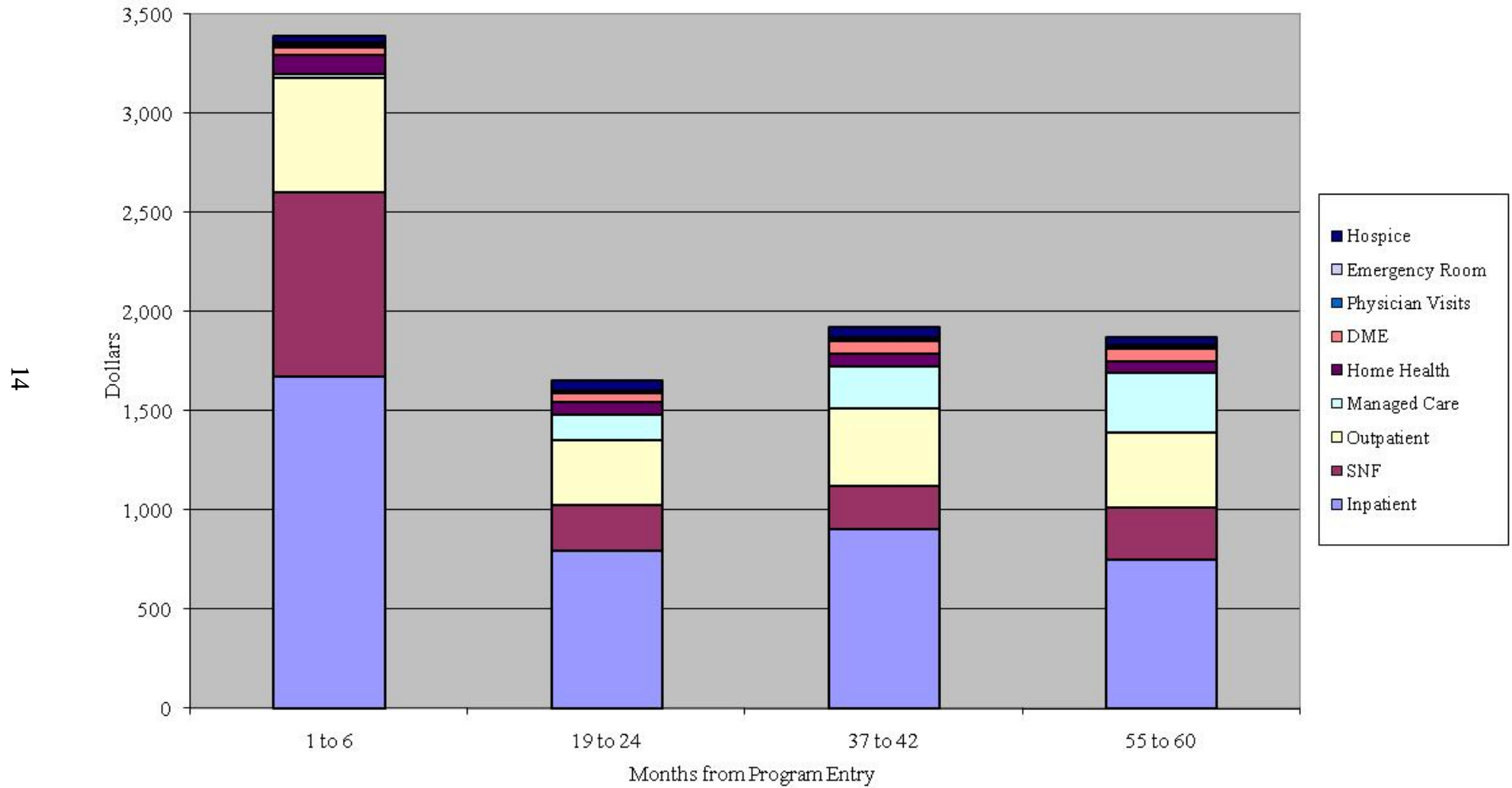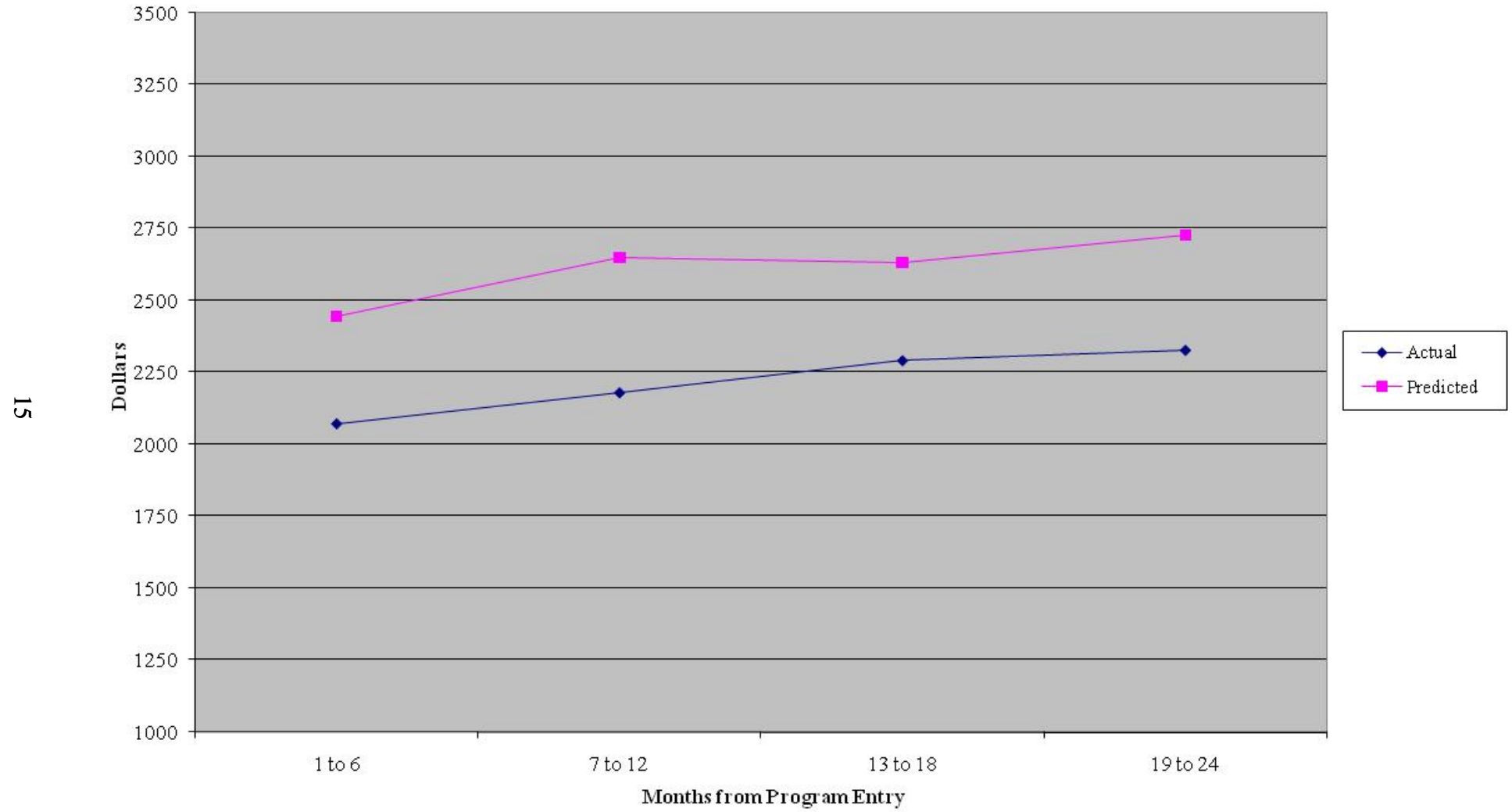BY SERVICE TYPE, NURSING HOME GROUP

FIGURE B.3

ACTUAL AND PREDICTED PER-PERSON PER-MONTH MEDICAID EXPENDITURES

15

their PACE payment rates more on the rates they pay nursing homes and less on expenditures for users of home- and community-based services.

Medicaid expenditures for nursing facility services comprised the bulk of actual per-person per-month expenditures for the nursing home group in all four intervals (Figure B.4). Expenditures for cross-over claims diminished after the first interval (which is consistent with the pattern of declining Medicare expenditures), while expenditures for prescription drugs and other Medicaid services (which would include stays in psychiatric hospitals, for example) increased.

5. Sensitivity Tests

We repeated the sensitivity tests associated with mortality, disenrollment, and state selection with data for the nursing home group.

a. Mortality

To explore whether the differential mortality rates in the PACE and nursing home groups were driving the overall results—particularly the large difference between actual and predicted Medicare expenditures during the first follow-up interval—we conducted a subgroup analysis dividing the sample into survivors (those who survive the entire interval) and decedents (those who die during the interval).

Medicare. As expected, Medicare expenditures were much higher for decedents than survivors, and differences between actual and predicted expenditures were generally very different for decedents and survivors (Table B.7). Actual Medicare expenditures were much lower than predicted expenditures (by $1,544) even for the subgroup of survivors, in the first interval. Whether this effect should be attributed to PACE or to noncomparability of PACE

FIGURE B.4

MEAN PER-PERSON PER-MONTH MEDICAID EXPENDITURES,
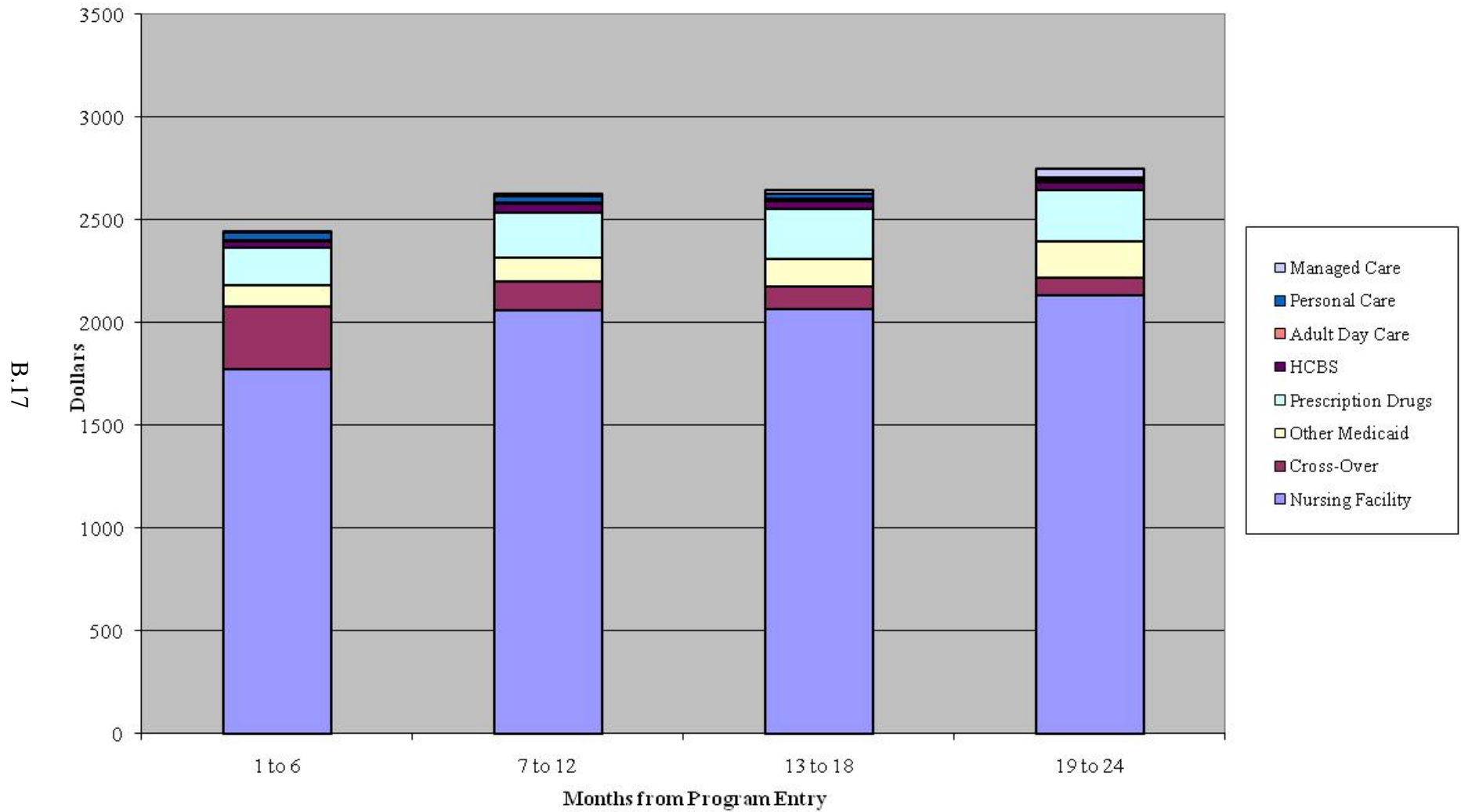BY SERVICE TYPE, NURSING HOME SAMPLE

B.17

TABLE B.7

ACTUAL AND PREDICTED PER-PERSON PER-MONTH EXPENDITURES, BY MORTALITY STATUS
(Dollars)

Months from Entry	Survived the Entire Interval			Died During the Interval		
	Actual Mean for PACE Group	Predicted Mean if in Nursing Home	Difference[a]	Actual Mean for PACE Sample	Predicted Mean if in Nursing Home	Difference[a]
Medicare						
1 to 6	1,437	2,981	-1,544	1,672	7,763	-6,091
7 to 12	1,418	1,409	9	2,158	4,677	-2,519
13 to 18	1,407	1,209	198	2,072	4,552	-2,480
19 to 24	1,454	1,397	57	1,876	6,175	-4,299
25 to 30	1,497	1,266	231	2,257	5,815	-3,558
31 to 36	1,526	1,308	218	2,411	4,801	-2,390
37 to 42	1,555	1,771	-216	2,844	4,934	-2,090
43 to 48	1,633	2,154	-521	2,574	5,559	-2,985
49 to 54	1,532	1,462	70	3,878	5,014	-1,136
55 to 60	1,599	1,511	88	2,875	4,502	-1,627
Medicaid						
1 to 6	2,070	2,471	-401	2,130	2,242	-112
7 to 12	2,179	2,608	-429	2,200	2,892	-692
13 to 18	2,292	2,617	-325	2,305	2,493	-188
19 to 24	2,330	2,741	-411	2,287	2,166	121
Medicare and Medicaid Combined						
1 to 6	3,507	5,452	-1,945	3,803	10,005	-6,202
7 to 12	3,597	4,017	-420	4,358	7,569	-3,211
13 to 18	3,698	3,826	-128	4,376	7,046	-2,670
19 to 24	3,784	4,137	-353	4,163	8,341	-4,178

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Notes: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the nursing home sample. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores and state. Nursing sample members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No differences were statistically significant at the .10 level.

enrollees to the nursing home comparison group—as evidenced by the striking differences in mortality—cannot be ascertained.

Medicaid. Differences between actual and predicted Medicaid expenditures were similar for the subgroups of survivors and decedents. Actual per-person per-month Medicaid expenditures were less than predicted expenditures in the survivor subgroup (Table B.7). This was also the case in the decedent subgroup in the first three intervals.

b. Disenrollment from PACE

When we excluded PACE disenrollees from the analysis, actual mean expenditures increased slightly (indicating that disenrollees' costs were lower than those of enrollees, and reflecting that most disenrollment in our sample occurred early and probably was not related to nursing home entrance), and predicted mean expenditures increased slightly as well (compare Tables B.6 and B.8).

c. High-Cost States

Medicare. In the first six-month interval, the difference between actual and predicted expenditures was -$1,190 per-person per month without California sample members in the analysis (Table B.9). That difference, while still large, was 33 percent smaller than the difference estimated in the overall analysis (Table B.6). Moreover, without California in the analysis, actual Medicare expenditures for the PACE sample were somewhat greater than predicted expenditures in most other intervals. The change was due to a substantial decrease in predicted expenditures when California was excluded from the analysis. (In other words, Medicare expenditures were relatively high in California, so predicted means decreased when the state was excluded from the analysis.)

TABLE B.8

ACTUAL AND PREDICTED PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING PACE DISENROLLEES
(DOLLARS)

Months from Entry	Actual Mean for PACE Group	Predicted Mean if in Nursing Home	Difference[a]	N[b]
Medicare				
1 to 6	1,436	3,228	-1,792	1,411
7 to 12	1,478	1,703	-225	1,295
13 to 18	1,490	1,400	90	1,152
19 to 24	1,496	1,674	-178	1,046
25 to 30	1,557	1,783	-226	954
31 to 36	1,572	1,578	-6	861
37 to 42	1,623	1,911	-288	760
43 to 48	1,647	2,308	-661	700
49 to 54	1,768	2,119	-351	644
55 to 60	1,731	1,760	-29	569
Medicaid				
1 to 6	2,115	2,449	-334	1,411
7 to 12	2,275	2,616	-341	1,295
13 to 18	2,438	2,635	-287	1,152
19 to 24	2,494	2,737	-243	1,046
Medicare and Medicaid Combined				
1 to 6	3,551	5,677	-2,126	1,411
7 to 12	3,752	4,319	-567	1,295
13 to 18	3,928	4,035	-107	1,152
19 to 24	3,990	4,411	-421	1,046

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the nursing home sample. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Nursing home sample members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No differences were statistically significant at the .10 level.

[b]N is the number of PACE sample members alive when the interval begins and enrolled in PACE throughout the interval.

TABLE B.9

ACTUAL AND PREDICTED PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING CALIFORNIA

(Dollars)Months from Entry	Actual Mean for PACE Group	Predicted Mean if in Nursing Home	Difference[a]	N[b]
Medicare				
1 to 6	1,456	2,646	-1,190	1,121
7 to 12	1,460	1,474	-14	1,058
13 to 18	1,447	1,228	219	980
19 to 24	1,501	1,469	32	919
25 to 30	1,564	1,560	4	853
31 to 36	1,611	1,465	146	778
37 to 42	1,645	1,601	44	710
43 to 48	1,622	1,415	207	664
49 to 54	1,646	1,785	-139	602
55 to 60	1,701	1,554	147	545
Medicaid				
1 to 6	2,097	2,521	-424	1,121
7 to 12	2,161	2,695	-534	1,058
13 to 18	2,254	2,691	-437	980
19 to 24	2,248	2,816	-568	919
Medicare and Medicaid Combined				
1 to 6	3,553	5,167	-1,614	1,121
7 to 12	3,621	4,168	-547	480
13 to 18	3,702	3,919	-217	116
19 to 24	3,749	4,285	-536	400

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the nursing home sample. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Nursing home sample members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No differences were statistically significant at the .10 level.

[b]N is the number of PACE sample members alive when the interval begins.

When Massachusetts was excluded from the analysis, actual mean Medicare expenditures for the PACE sample shifted down slightly, predicted mean expenditures stayed about the same, and the differences between them appeared a bit more favorable for Medicare in some intervals than they did in the overall analysis (compare Tables B.6 and B.10).

Medicaid. In contrast to the Medicare results when California is excluded from the analysis, differences between actual and predicted expenditures appeared slightly more favorable for Medicaid than in the overall analysis (compare Tables B.6 and B.10). Actual expenditures for the PACE sample were less than predicted expenditures in the overall analysis by $340 to $471, but in the analysis without California, actual expenditures were less than predicted expenditures by $424 to $568. The change is due to both a modest decrease in actual expenditures when California is excluded from the analysis and to a modest increase in predicted expenditures.

When Massachusetts was excluded from the Medicaid analysis, the results were quite similar to those for the overall analysis (compare Tables B.6 and B.9). Neither the actual nor the predicted mean expenditures shifted by more than $40, so the differences stayed about the same. (That is, actual Medicaid expenditures for PACE sample members were several hundred dollars less than would be predicted in the absence of PACE.)

TABLE B.10

ACTUAL AND PREDICTED PER-PERSON PER-MONTH EXPENDITURES,
EXCLUDING MASSACHUSETTS

(Dollars)Months from Entry	Actual Mean for PACE Group	Predicted Mean if in Nursing Home	Difference[a]	N[b]
Medicare				
1 to 6	1,372	3,057	-1,685	1,228
7 to 12	1,396	1,694	-298	1,158
13 to 18	1,381	1,378	3	1,070
19 to 24	1,417	1,764	-347	997
25 to 30	1,476	1,778	-302	928
31 to 36	1,485	1,503	-18	850
37 to 42	1,508	1,914	-406	776
43 to 48	1,656	2,388	-732	740
49 to 54	1,651	1,985	-334	682
55 to 60	1,606	1,709	-103	616
Medicaid				
1 to 6	2,063	2,468	-405	1,228
7 to 12	2,196	2,614	-418	1,158
13 to 18	2,300	2,658	-358	1,070
19 to 24	2,359	2,741	-382	997
Medicare and Medicaid Combined				
1 to 6	3,435	5,525	-2,090	1,228
7 to 12	3,592	4,308	-716	1,158
13 to 18	3,682	4,036	-354	1,070
19 to 24	3,777	4,505	-728	997

Source: Medicare Standard Analytic Files, Medicare Advantage county rate books, and Medicaid Analytic eXtract files for beneficiaries entering PACE or a nursing home in 1999 or 2000.

Note: Actual mean expenditures are the sum of expenditures for all sample members during the interval divided by the sum of months alive for all sample members during the interval. Predicted mean expenditures are based on ordinary least squares regression models for the nursing home sample. The dependent variable is the sum of expenditures in the interval divided by the months alive in the interval. The models control for the variables used to calculate propensity scores, state, and whether the sample member died during the interval. Nursing home sample members have a weight equal to the number of PACE sample members they matched to during the propensity-score matching process (described in the text) multiplied by their share of the sample's months alive.

[a]No differences were statistically significant at the .10 level.

[b]N is the number of PACE sample members alive when the interval begins.