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Medicare Part D Program Evaluation: Analysis of the Impact of Medicare Part D on the FFS Program

Report

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EXECUTIVE SUMMARY

Background: The Medicare Part D benefit, established in the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 (P.L. 108-173) and codified in the *Federal Register,* January 28, 2005 (42 CFR Parts 400, 403, 411, 417, and 423), represents arguably the largest expansion in Medicare benefits since the program's inception in 1965. When the new program began in 2006, an estimated 43 million Medicare beneficiaries were eligible for "creditable" prescription drug coverage under Part D, either through Part D drug plan coverage, or through employer/union retiree drug coverage that qualifies for the Medicare retiree drug subsidy. In our tabulation of a cross-section of Medicare beneficiaries as of July 1, 2006, there were 21.2 million enrollees in Part D plans, retiree drug subsidy plans had 6.83 million enrolled, and 5.67 million had at least one other source of coverage.[1] This report focuses on potential impacts of the Part D program in 2006, the program's first year.

Improved and affordable access to prescription drugs, in theory, can improve beneficiary overall health status, and greater adherence to drug regimens may in some cases reduce the need for other forms of health care. For example, beneficiaries who have more consistent access to prescription drugs to control blood pressure may over time be less likely to suffer and be hospitalized for a heart attack. These impacts on costs and utilization can be difficult to measure and potential impacts on the utilization of other health care services can sometimes take a number of years to manifest. Related studies to date present mixed results. Among the studies of the effects of a drug benefit are those by Wrobel et al. (2004) and by RTI (Gilman et al., 2003). The study done by Wrobel et al. used the Medicare Current Beneficiary Survey (MCBS), and did not find a statistically significant effect of drug coverage on Medicare spending. The study done by RTI (Gilman et al., 2003) examined the impact of state-sponsored drug coverage for low income beneficiaries in Vermont. One of the research questions addressed the effect on Medicare expenditures, but the study found no decline in Medicare costs. Another more recent study (Zhang et al., 2009) found that enrollment in a Medicare Advantage Part D plan was associated with increased spending on prescription drugs. Groups that had no or minimal drug coverage before the implementation of Part D had reductions in other medical spending that approximately offset the increased spending on drugs, but medical spending increased in the group that had more generous previous coverage.

Purpose and Overview of the Report: The major goals of these analyses conducted in a FFS (fee for service) Medicare population are:

- to produce descriptive statistics that relate Part D enrollment to beneficiary characteristics, and
- to estimate the impact of Part D enrollment on Part A and Part B utilization and expenditures.

[1] CMS published somewhat higher numbers of 24 million and 7 million for the first two categories in January 2007. The difference is likely due to the month of tabulation.

The technical approach and data used to analyze these issues are described separately in the next section of this report. This report begins the process of assessing potential impacts of expanded drug coverage on other Medicare health care services and costs for the first year (2006) of implementation. To accomplish this preliminary analysis, we employed a range of different analytic methods to identify preliminary evidence of the impact of Part D of Medicare FFS spending. Given the limited time (1 year) included in these analyses, we did not anticipate finding evidence of strong impacts in all analyses. Rather, our goal was to complete a scan of possible areas for demonstrated impact of Part D on Medicare FFS, using a variety of different analytic approaches. Results from this broad set of different analyses would then provide further direction for future research. These methods included a complete descriptive analysis looking for relationships between Part D enrollment and specific population and geographic characteristics (presented in Section 3). The next analyses used a time series approach to identify possible changes in aggregate and targeted Medicare fee-for-service (FFS) spending before and after implementation of Part D (found in Section 4). The final series of analyses used multivariate regression to estimate the impact of Part D enrollment on FFS spending and to determine which beneficiary characteristics and other factors contribute to any observed impact (summarized in Section 5). Taken together, these disparate analyses may signal the most promising directions for future research to identify potential impacts of Part D enrollment on Medicare FFS spending.

For this project, it is important to understand that our analyses focus on the impact of enrollment in Part D on Medicare FFS, rather than the impact of drug coverage in Part D. The context of the introduction of Part D is not one in which people did not have access to drugs prior to this coverage. Part D improved access to and/or affordability of drugs for part of the population. Prior to Part D, Medicare beneficiaries acquired drugs using mainly a mix of self-payment, private insurance, employer-based or retiree-based insurance, Medicaid, State pharmacy assistance, Veterans Administration (VA), and TRICARE. The availability and comprehensiveness of coverage has been changing over time. In this context, beneficiaries made enrollment and utilization decisions that have been reflected in the use of other Medicare services.

Summary of Descriptive Findings: The descriptive analyses suggest that there were some small yet persistent differences in the characteristics of Medicare Part D enrollees and nonenrollees. These differences are important considerations for future analyses of impacts of Medicare Part D on spending and utilization as they inform policy makers and researchers of potential selection bias in Part D. Evidence of systematic selection bias in all of Part D, or certain segments and options within Part D, may indicate that long term changes in Medicare FFS spending and utilization after Part D implementation may in part be explained by differences in who did (or did not) enroll rather than the efficacy of the benefit per se. Highlights of the descriptive analysis include the following:

Descriptive Part D Enrollment Differences

- Nearly half (45.7%) of all Medicare FFS beneficiaries elected a Part D plan. An unexpectedly large proportion of FFS beneficiaries (18.8%) had no known source of prescription drug coverage; this may be attributable to slow Part D take-up rates during the first year of program implementation and may decrease over time.

- Compared with the FFS population as a whole, FFS beneficiaries in the youngest age group (aged 0–64, primarily eligible for Part D through disability status) were more likely (60.1%) to enroll in a PDP, less likely to have an alternative source of creditable coverage (20.7%), and more likely to have no reported coverage (19.1%).

- Almost all (93.7%) of Medicare Advantage (MA) enrollees elected Part D coverage. But despite mandated access to at least a basic benefit, a small proportion of MA enrollees (3.7%) reported no known Part D coverage. This gap may result from MA enrollees who chose not to pay the additional premium associated with Part D coverage, may not have felt they needed the coverage, and/or may have simply been misinformed about the separate Part D enrollment process for their plan.

- Among Private Fee-for-Service (PFFS) beneficiaries, our analysis found that a high percentage (88.5%) of PFFS enrollees elected either an MA prescription drug plan (MA-PD) or stand-alone prescription drug plan (PDP). This PFFS figure is below the Part D take-up rate (93.7%) for MA enrollees but well above the FFS rate (45.7%). The analysis also found that 7.0% of PFFS enrollees reported no known prescription drug coverage, a larger proportion than MA enrollees overall (3.7%).

Descriptive Differences in Enrollment Characteristics

- Among the aged beneficiary groups, increasingly older aged groups were associated with increased likelihood of enrolling in Part D, decreased likelihood of having other creditable coverage, and an increased likelihood of having no reported source of prescription drug coverage. This finding is consistent with the theory that older beneficiaries—with, on average, greater health care needs—are more likely to voluntarily enroll in programs for additional benefits.

- FFS Part D enrollees had higher hospital inpatient spending in both 2005 and 2006 compared with FFS beneficiaries overall and relative to all groups of Part D nonenrollees. PDP enrollees also had, in both 2005 and 2006, a greater number of hospital stays, and a greater proportion of this group had at least one hospitalization. These figures increased between 2005 and 2006, suggesting that, in the first year of the Part D program, enrollment in a Part D PDP plan did not reduce the incidence of hospitalizations per se.

- FFS analyses also found that FFS beneficiaries categorized in a CMS HCC or RxHCC (and hence those beneficiaries with predictable future health care expenditures) were more likely to enroll in a PDP plan compared with the FFS population as a whole.

- The analyses of MA enrollees found that older age groups (who traditionally have more difficulty understanding and navigating MA plan processes) were more likely than younger groups to have no known coverage. Similar patterns were noted among PFFS enrollees.

- There were substantively small but persistent indications that some older Medicare beneficiaries, and beneficiaries diagnosed in prior years with chronic, more costly diseases (having been categorized in a CMS HCC or RxHCC group) were more likely to enroll in a Part D plan.

Descriptive Geographic Differences

- FFS Part D enrollment take-up rates tended to be higher in rural areas and in regions characterized as heavily rural. We found that the proportion of FFS population that reported no known coverage—across FFS, MA, and PFFS groups—was slightly higher in urban than in rural areas.

- FFS Part D enrollees in urban areas were more likely than rural beneficiaries to elect a basic coverage rather than an enhanced plan. These findings were reversed for MA enrollees. MA enrollees in urban areas were more likely than rural populations to enroll in Part D, although, as a whole, almost all MA enrollees did elect a Part D plan.

- Contrary to the findings in the FFS analysis, MA enrollees in rural areas were less likely to elect enhanced plans than enrollees in urban areas. We found no substantive differences in geographic enrollment patterns among PFFS enrollees.

Summary of Time Series Analyses: We conducted a set of basic time series analyses to determine whether, at this early point, we could observe any major shifts in Medicare FFS spending and utilization after the implementation of Part D, given the enrollment decisions of beneficiaries. Time series analyses conducted as the second major part of this task found little evidence that implementation of Part D had an impact on the largest part of Medicare spending and utilization. While Medicare rates of inpatient spending and utilization are decreasing over time, we saw no evidence that the specific implementation of Part D or enrollment in Part D had a significant impact on this existing secular trend. Findings of note include the following key points:

Time Series Analysis—Impacts on Total FFS Inpatient Expenditures and Utilization

- The FFS aggregate time series analysis of expenditures and utilization showed overall trend decreases after the implementation of Part D. However, it is difficult to definitely attribute these changes to implementation of Part D. These small decreases could also result from the overall secular care trend of shifts from hospital inpatient to outpatient care.

- Results separating spending and utilization trends for Part D enrollees and nonenrollees also found no evidence that Part D reduced FFS inpatient spending. This set of analyses found that inpatient expenditures for beneficiaries not enrolled in Part D decreased *more* in each target time period than for those enrolled in Part D—a finding actually counter to the hypothesis that access to prescription drugs through Part D could affect a decrease in Medicare inpatient costs.

- In a similar analysis, we found that average monthly inpatient stays per 1,000 did initially decrease at a more rapid rate for Part D enrollees. However, these decreases were reversed and were outpaced by greater decreases among non Part D enrollees in later time periods.

- Regression based time series analyses on the total FFS groups also failed to identify a lasting effect of Part D for those who enrolled.

Time Series Analysis—Impacts on Subpopulation Inpatient Expenditures and Utilization

- Additional analyses conducted on particularly high-cost, prescription drug–sensitive beneficiaries, those diagnosed with CHF, also yielded no evidence of Part D's theoretical negative impact on broader Medicare spending or utilization. When comparing inpatient expenditures and stays for different time periods in 2006 and 2007, in both cases, the CHF population not enrolled in Part D shows larger declines than those for Part D enrollees.

- The subanalysis focusing on the non-low-income subsidy population yielded similar results. We hypothesized that one reason for the higher expenditures and lack of impact was the disproportionate percentage of low-income subsidy (LIS) beneficiaries enrolled in Part D during the early implementation period. Medicaid and other beneficiaries who were deemed eligible for the low-income subsidies were enrolled automatically in Part D, but because most already had drug coverage through state programs, Part D would have little impact on Medicare inpatient spending and utilization for this group. Still, contrary to our hypotheses, nonenrollees in the non-LIS group exhibited greater decreases in inpatient spending and utilization. Additional regression analysis found no impact from Part D.

Summary of Multivariate Analyses: Lacking systematic evidence of major aggregate shifts in Medicare FFS spending and utilization after the implementation of Part D, we took a more subtle analytical approach to attempt to estimate Part D impacts controlling for a range of beneficiary characteristics. In other words, while we did not find evidence of major aggregate impacts of Part D, it is entirely plausible that such impacts exist only for selected subpopulations, and only evident once other factors are controlled for.

In the final series of analyses, difference-in-difference regression models were estimated that included variables to control for many patient characteristics besides being a Part D enrollee. In these analyses, the variables marking various types of drug coverage did not distinguish between people who buy (and presumably adhere to) prescription drug regimens and those who do not. Beneficiaries with no markers for Part D or other coverage may have unknown coverage, may have no coverage but still purchase and take drugs, or may not take drugs. The models we estimated therefore measure only the effect of having Part D compared to not having Part D. Key findings include the following points, particularly that the sets of samples in this analysis produced contradictory results:

Difference in Difference Analysis

- The sample that indicated that Part D reduced Part A and B Medicare expenditures is a panel of people that had continuous enrollment in fee-for-service Medicare from January 2004 through December 2006. The year 2004 is not in the set of observations, but it provides diagnostic information for the year 2005 observations. This sample was not a cross-section of Medicare at two points in time, but followed the 2005 people over time. This model showed that for this panel of beneficiaries, those who enrolled tended to be higher users of services than those who did not enroll, and that enrollees who were in Part D for most of the year showed a decrement in their higher spending compared to similar non-enrollees.

- The other sample did not follow the same beneficiaries from year to year, although there was considerable overlap. In the second sample, a cross-section of beneficiaries in 2005 (who had been in fee-for-service Medicare throughout 2004) was analyzed. The regression of this cross-section comparison produced estimated Part D effects that were the opposite of the panel sample. The long-term enrollees had Part D effects in 2006 that resulted in increased Part A and B utilization compared with similar non-enrollees.

- The difference-in-difference analyses done thus far yielded equivocal results. The cross-section results are unexpected but seem more robust than the panel results, which may be confounded by regression to the mean. It may be the case that there are so many potentially confounding effects in the before-and-after and enrollee-non-enrollee comparisons that teasing out the true effect of Part D may require more years of data if it can be measured at all.

Report Summary: The findings presented in this report should be considered very preliminary. While we sought to identify potential impacts of Part D on Medicare FFS spending and utilization, it is highly likely that evidence of these impacts may take many more years to become evident and observable. These analyses, using a range of different methodological approaches, may not be definitive but do yield interesting results and may provide direction for future research. One finding that all the approaches support is that there was, at least at the start of Part D, selection into the program by beneficiaries incurring higher costs.

Taken together, these results seem to suggest that the impacts of Part D on Medicare FFS spending and utilization may not be manifest in the aggregate, among the beneficiary population as a whole and causing overall shifts in spending and utilization patterns. Rather, given the different enrollment (or non-enrollment) decisions of specific populations, and given the apparent lack of a shift in overall Medicare spending and utilization trends, it seems more likely that impacts will be found among specific subpopulations and for targeted conditions. Our overall sense of the range of analyses we conducted suggests that the impacts of Part D on Medicare FFS may be quite subtle and focused. Future research may therefore concentrate on these targeted subpopulations.

SECTION 1
PROJECT BACKGROUND

The Medicare Part D benefit, established in the Medicare Prescription Drug, Improvement and Modernization Act (MMA) of 2003 (P.L. 108-173) and codified in the *Federal Register,* January 28, 2005 (42 CFR Parts 400, 403, 411, 417, and 423), represents arguably the largest expansion in Medicare benefits since the program's inception in 1965. When the new program began in 2006, an estimated 43 million Medicare beneficiaries were eligible for "creditable" prescription drug coverage under Part D, either through Part D drug plan coverage, or through employer/union retiree drug coverage that qualifies for the Medicare retiree drug subsidy. In our tabulation of a cross-section of Medicare beneficiaries as of July 1, 2006 there were 21.2 million enrollees in Part D plans; retiree drug subsidy plans had 6.83 million enrolled and 5.67 million had at least one other source of coverage.[2]

Coverage for the prescription drug benefit is provided through stand-alone prescription drug plans (PDPs), which offer only prescription drug coverage, or through Medicare Advantage prescription drug plans (MA-PDs), which offer prescription drug coverage that is integrated with the health care coverage that Medicare Advantage (MA) provides to Medicare beneficiaries under Part C of Medicare. Stand-alone PDPs must offer a basic prescription drug benefit, and MA-PDs must offer either a basic prescription drug benefit or broader coverage for no additional cost. If this required level of coverage is offered, PDPs or MA-PDs may also offer supplemental prescription drug benefits through enhanced alternative coverage for an additional premium, or MA-PDs may use Part A and B rebate credits.

This report focuses on potential impacts of the Part D program in 2006, the program's first year. In 2006, the Part D defined standard prescription drug benefit, with an average premium across PDPs and MA-PDs of $24.01 per month for basic benefits,[3] included an annual $250 deductible that the beneficiary was responsible for paying. Between $251 and the initial coverage limit of $2,250, the Part D plan was responsible for 75 percent of costs, and the beneficiary paid a 25 percent co-insurance. There was no coverage between $2,251 and $5,100. Beneficiaries were responsible for all costs between the initial coverage limit and the $5,100 threshold, which corresponded to $3,600 in true out-of-pocket costs (TrOOP).[4] Catastrophic coverage began at the attachment point or threshold of $3,600 in TrOOP. Costs in catastrophic coverage were split three ways, with the government providing reinsurance equal to 80 percent,

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[2] CMS published somewhat higher numbers of 24 million and 7 million for the first two categories in January, 2007. The difference is likely due to the month of tabulation.

[3] For 2006 and 2007 Part D plan premiums, see Greenwald, Block, Kautter, et al. (2007).

[4] A payment for a prescription drug constitutes an "incurred cost" and counts toward a beneficiary's TrOOP threshold only if the payment is made by or on behalf of the beneficiary. Assistance from a state pharmaceutical assistance program or from a patient assistance program sponsored by a pharmaceutical assistance program generally counts toward the TrOOP threshold. However, if the beneficiary is reimbursed for the costs by insurance, a group health plan, or other third-party arrangement, the payments do not count toward the TrOOP threshold. Payments for drugs that are not included on the plan formulary also do not count toward the TrOOP threshold (Covington & Burling, 2005).

the Part D plan covering 15 percent, and the beneficiary paying the greater of 5 percent co-insurance or co-payments of $2 for generic drugs and $5 for nongeneric drugs.

Improved and affordable access to prescription drugs, in theory, can improve beneficiary overall health status and greater adherence to drug regimens may in some cases reduce the need for other forms of health care. For example, beneficiaries who have more consistent access to prescription drugs to control blood pressure may over time be less likely to suffer and be hospitalized for a heart attack. These impacts on costs and utilization can be difficult to measure and potential impacts on the utilization of other health care services can sometimes take a number of years to manifest. Related studies to date present mixed results. Among the studies of the effects of a drug benefit are those by Wrobel et al. (2004) and by RTI (Gilman et al. 2003). The study done by Wrobel et al. used the Medicare Current Beneficiary Survey (MCBS), and did not find a statistically significant effect of drug coverage on Medicare spending. The study done by RTI (Gilman et al., 2003) examined the impact of state-sponsored drug coverage for low income beneficiaries in Vermont. One of the research questions addressed the effect on Medicare expenditures, but the study found no decline in Medicare costs. Another more recent study (Zhang, et al., 2009) found that enrollment in a Medicare Advantage Medicare Part D plan was associated with increased spending on prescription drugs. Groups that had no or minimal drug coverage before the implementation of Part D had reductions in other medical spending that approximately offset the increased spending on drugs, but medical spending increased in the group that had more generous previous coverage.

The context of the introduction of Part D is not one of people not having access to drugs prior to this coverage. Part D will improve access to and/or affordability of drugs for part of the population. Prior to Part D, Medicare beneficiaries acquired drugs using mainly a mix of self-payment, private insurance, employer-based or retiree-based insurance, Medicaid, State pharmacy assistance, Veterans Administration (VA), and TRICARE. The availability and comprehensiveness of coverage has been changing over time. In this context, beneficiaries made enrollment and utilization decisions that have been reflected in the use of other Medicare services.

Beneficiaries with chronic conditions may represent the population that is most likely to benefit from increased access to prescription drugs. These beneficiaries are more likely to need a greater number of prescription drugs and are most susceptible to suffer expensive health care complications if they do not adhere to their prescribed drug regimens. Expanded access to drugs may reduce hospitalizations and/or other medical complications. Therefore, under the next phase of this project, this evaluation will focus more intensively on potential impacts of Part D on health care costs and utilization for beneficiaries with chronic illnesses. It will also focus on adherence to drug regimens. While the Part D program theoretically expands access to affordable drugs, actual access may depend on enrollment in the most appropriate Part D plan—one that covers the specific drugs needed and cost sharing at levels that promote improved therapy adherence. Monitoring of enrollment patterns by plan and benefit type for beneficiaries with chronic illness will begin to address the question of whether this vulnerable population is achieving the best possible access to drug benefits.

The primary focus of this report is to assess selected potential impacts of Part D on the traditional Medicare fee-for-service (FFS) program. One of the contentions made in conjunction

with offering a drug benefit is that the costs of the benefit to the payer will be offset, at least partially, by reductions in costs to the payer for other health services. This aspect of the effect of a drug benefit is related to assumptions that subsidizing the purchase of drugs (the essence of the benefit) will lead to improved access to useful drugs, improved adherence to drug regimens, and conditional on the drugs being effective, reductions in the progress of disease and medical costs related to complications and exacerbations. If most people for whom drugs are useful are already buying and taking drugs, the effect of the benefit is marginal and the main effect is in shifting costs. If the numbers in the Medicare Current Beneficiary Survey (MCBS) for 2001 hold for the period just before 2006, then about one-third of Medicare beneficiaries had no drug coverage and an additional group had part-year coverage. If almost two-thirds of the beneficiaries had some coverage, and most others bought drugs out of pocket, the overall effect of Part D on other Medicare costs may be hard to detect, especially in the short run.

The main drivers of costs in the Medicare program are related to chronic diseases such as diabetes, cardiac disease (sometimes a complication of diabetes), and pulmonary disease. These diseases are generally treated over a long period of time, and drugs to mitigate the progress of the disease must also be taken over a long period. Concomitant with the pattern of drug treatment, if there are savings from a benefit, the savings would accumulate over a period of years, the same interval over which costs of complications and exacerbations accrue. Short-term savings will be small and related to the diminution of the probability of an expensive medical event in the period observed. Drugs taken for episodes of nonchronic disease are not expected to produce large long-term savings; they are usually taken during a potentially expensive short-term event and may or may not be cheaper substitutes for surgery or other treatment. Many such drugs are already covered by Medicare Part A or Part B (e.g., intravenous drugs). Most are taken for a relatively short time.

The major goals of the FFS analysis are:

- to produce descriptive statistics that relate Part D enrollment to beneficiary characteristics, and

- to estimate the impact of Part D enrollment on Part A and Part B utilization and expenditures.

The technical approach and data used to analyze these issues are described separately in the next section of this report. This report begins the process of assessing potential impacts of expanded drug coverage on other Medicare health care services and costs for the first year (2006) of implementation. To accomplish this preliminary analysis, we employed a range of different analytic methods to identify preliminary evidence of the impact of Part D of Medicare FFS spending. Given the limited time (one year) included in these analyses, we did not anticipate finding evidence of strong impacts in all analyses. Rather, our goal was to complete a scan of possible areas for demonstrated impact of Part D on Medicare FFS, using a variety of different analytic approaches. Results from this broad set of different analyses would then provide further direction for future research. These methods included a complete descriptive analysis looking for relationships between Part D enrollment and specific population and geographic characteristics (presented in Section 3). The next analyses used time series analysis to identify possible changes in aggregate and targeted Medicare FFS spending before, and after, implementation of Part D

(found in Section 4). The final series of analyses used multivariate regression to the impact of Part D enrollment on FFS spending, and determine which beneficiary characteristics and other factors contribute to any observed impact (summarized in Section 5). Taken together, these disparate analyses may signal the most promising directions for future research to identify potential impacts of Part D enrollment on Medicare FFS spending.

SECTION 2
TECHNICAL APPROACH OVERVIEW

2.1 Descriptive Statistics that Relate Part D Enrollment to Beneficiary Characteristics

The purpose of this part of the Part D evaluation was to describe key differences in the fee-for-service beneficiary population's characteristics of enrollees and nonenrollees in Medicare Part D PDP plans. For comparison purposes we also analyzed and compared the characteristics and enrollment patterns of Part D MA and Private Fee-for-Service (PFFS) enrollees and nonenrollees. Specific research questions for this initial part of the Task 3 analyses include:

- Are there differences in the characteristics of Part D enrollees and nonenrollees?
- Are there geographic differences in the types of plans chosen by Part D enrollees and nonenrollees?

In this analysis, we will not be able to detect differences in populations with and without drug coverage as many Part D nonenrollees may actually have creditable or partial coverage elsewhere. Instead, we will detect whether there are any systematic differences in the populations who enroll specifically in Part D for prescription drug coverage versus choose not to enroll and may (or may not) have alternative coverage. Results from the analysis may indicate whether the Medicare sponsored Part D program for beneficiaries enrolls a population that may be in some way be different from nonenrollees. Findings would have implications for possible risk selection and other cost predictions for the Medicare Part D program.

2.2 Estimate the Impact of Part D Enrollment on Part A and Part B Utilization

In this second set of analyses we will be begin to address the issue of whether FFS beneficiary enrollment in Medicare Part D has had a substantive impact on the utilization and spending patterns of enrollees and compared with non–Part D enrollees. Specific research questions to be addressed in this section of the Task 3 analyses include:

- Overall, does Part D affect Part A/B spending or utilization? How much?
- For persons with no, or poor, drug insurance, did Part D affect Part A and Part B spending or utilization? How much?
- Does the benefit design of a Part D plan influence the effects observed?
- How do the effects differ for the Medicaid and other low income populations?

As is often the case when a treatment effect is to be measured, there are other changes in the environment that are correlated with the advent of the treatment. Some of the issues to be considered in observing Part D effects are (a) payment and policy changes in Part A and B, (b) the shift in population from fee-for-service to MA plans related to both Part D payment for their drug liability and the introduction of bidding in Part C payment and its relation to MA-PD premiums, (c) the existence of the Medicare discount drug card in 2004–2005, (d) state pharmacy assistance programs for the elderly, and (e) possible biased selection into Part D.

Different analyses deal with the issues differently. Items c and d, the drug discount card and state programs, are among the factors that may or may not be dealt with fully in this project because of data issues. A large-scale primary data collection from at least 20 states would be required for the latter. We do not propose doing this. The Medicare discount drug card had an enrollment of about 3.8 million—less than 10 percent of Medicare beneficiaries.

SECTION 3
DESCRIPTIVE STATISTICS RELATING PART D ENROLLMENT TO BENEFICIARY CHARACTERISTICS

3.1 Introduction

In the first set of analyses in our analytic scan for impacts of Medicare Part D enrollment on Medicare FFS, we conducted an extensive descriptive analysis. Descriptive analyses are important for understanding the underlying patterns in the data, and can signal specific populations that merit more in-depth study. For this descriptive analysis, the 2005 and 2006 data were analyzed. The 5 percent beneficiary files were used to profile the population according to characteristics of 2006 and in some cases, of the prior year, 2005. Beneficiary risk adjustment files for the Centers for Medicare & Medicaid Services (CMS) Hierarchical Condition Categories (HCCs) and CMS Prescription Drug Hierarchical Condition Categories (RxHCCs) were used to summarize clinical history information that should have been known to the beneficiaries before making a decision on the drug plan best suited to their needs. The CMS file indicating drug coverage from other sources (e.g., Federal Employees Health Benefits [FEHB], TRICARE, VA, etc.) was used to categorize other creditable coverage.[5]

We present in the analysis a multidimensional descriptive profile of the Medicare population as it pertains to the Part D benefit. In the analyses, we subdivided both personal characteristics and the drug plan options. Having Part D was treated as a whole and was divided into plan type. Beneficiaries who were placed in either CMS-HCC or CMS RxHCC diagnostic groups in 2005 were analyzed and compared with the overall population. This was done to determine whether beneficiaries who were identified and knew of an existing disease with likely future cost and utilization impacts made different Part D enrollment choices than the population as a whole. In addition to tables which compared characteristics of Part D enrollees and nonenrollees, we analyzed geographic comparisons of enrollees and nonenrollees in different prescription drug plan types. Differences in enrollee and nonenrollee plan choice among regions may signal underlying policy and payment issues that result in disparities of choice for beneficiaries residing in these different geographic areas.

3.2 Fee for Service Enrollee Characteristics[6]

The first set of descriptive analyses compared a wide range of characteristics and spending patterns of Medicare FFS beneficiaries who were enrolled in Medicare Part D, had other creditable coverage, or according to Medicare enrollment files were not enrolled in a prescription drug plan. The goal of these analyses was to determine whether there were any

[5] A combination of CMS files was used to assemble the data: Extracts from the Enrollment data base (EDB), Management Information Integrated Repository (MIIR), the Common Medicare Environment (CME), the HPMS plan file, and risk adjustment score files. Spending data were from the claims for the 5% sample of Medicare beneficiaries, Medicare Standard Analytical Files with supplements from the National Claims History 100% files.

[6] All tables referred to in this section of the report are available by request as a separate document of Appendices.

systematic differences in the characteristics and/or plan choice patterns for Medicare Part D enrollees compared with nonenrollees.

A summary of the characteristics of FFS Part D enrollees and nonenrollees is shown in **Table A.1**. Among FFS beneficiaries, 45.7 percent elected a PDP plan—not quite half of this group. Substantial proportions of FFS beneficiaries had retiree prescription drug coverage (19.6%) or other sources of creditable coverage (16.0%). A surprisingly large number of FFS beneficiaries (18.8%) had no known source of prescription drug coverage. This proportion of beneficiaries with no coverage may change over time as the Part D program matures. These distributions did vary somewhat by beneficiary characteristics. As a group, FFS beneficiaries in the youngest age group (aged 0–64, primarily eligible for Part D through disability status) were more likely (60.1%) to enroll in a PDP, less likely to have an alternative source of creditable coverage, but also more likely to have no reported coverage (19.1%). Among the aged beneficiary groups, increasingly older aged groups were associated with increased likelihood to enroll in Part D, decreased likelihood to have other creditable coverage, and an increased likelihood to have no reported source of prescription drug coverage. Females were more likely to enroll in Part D relative to males but were also more likely to have no reported coverage. We also found that a somewhat smaller proportion of FFS beneficiaries categorized as White enrolled in Part D, although this was offset by slightly higher rates of enrollment in other creditable coverage.

Table A.1 also compared Medicare annualized spending for FFS Part D enrollees and nonenrollees for 2005 and 2006. A few findings are of note. First, FFS enrollees in Part D electing a Prescription Drug Plan (PDP) had higher hospital inpatient spending in both 2005 and 2006 compared with FFS beneficiaries as a whole, and relative to all groups of Part D nonenrollees. PDP enrollees also had, in both 2005 and 2006, a greater number of hospital stays, and a greater proportion of this group had at least one hospitalization. These figures increased between 2005 and 2006, suggesting that, at this early stage, enrollment in a Part D PDP plan did not reduce the incidence of hospitalizations per se. We did, however, find that percent increases in hospital spending and utilization were lower among Part D enrollees compared with nonenrollees, suggesting that Part D enrollment may be associated with a slowing, if not a decrease, in Medicare Parts A and B, inpatient hospital spending and use. Medicare beneficiaries with no known prescription drug coverage exhibited by far the highest rates of growth in Medicare Parts A and B, as well as inpatient hospital spending and use.

The next set of analyses summarizes a range of demographic characteristics for all enrollees in different categories of Medicare Part D prescription drug plans. Under the Part D program, participating organizations have the option of offering basic versus enhanced benefits. There are also variants of basic and enhanced benefits. These variants of plan offerings are important to understanding the full range of options available to beneficiaries. Among basic plan variants, the Part D **defined standard benefit** in 2006 consisted of (1) a $250 deductible, (2) 75 percent coverage (25% coinsurance) up to an initial coverage limit of $2,250, (3) a coverage gap in which enrollees pay 100 percent of the cost, and (4) a catastrophic benefit of 95 percent coverage once out-of-pocket spending of $3,600 had been incurred. Sponsoring organizations also had the flexibility to offer a benefit that is actuarially equivalent to the standard defined benefit. The two types of actuarially equivalent plans were (1) standard coverage with

actuarially equivalent[7] cost sharing and (2) **basic alternative coverage**.[8] In addition to the defined standard benefit and its two actuarially equivalent variants, Medicare Part D plans are also able to offer **enhanced alternative** prescription coverage, which exceeds standard coverage. This enhanced coverage often includes supplemental benefits including reduced cost sharing, increased initial coverage limit or reduced deductible, provision of some coverage through the coverage gap, or any combination of these benefits.

In general, we found no evidence of systematic and substantive differences in the characteristics of PDP enrollees who chose different PDP plan options. **Table A.2** shows that, across the entire PDP population, the largest proportion of 2006 PDP enrollees (42.1%) chose the basic alternative plans. The smallest proportions of enrollees (about 16%) chose the actuarially equivalent or enhanced plans. Most (45%) of enrollees with any low income subsidy elected the basic alternative plans. Interestingly, a small proportion (2.9%) of those with low income subsidies enrolled in enhanced plans, presumably paying the premium difference between the basic and enhanced plan out of pocket. Our analysis found few differences between the demographic characteristics of enrollees in the different PDP 2006 options, although there were some minor exceptions. Compared with enrollees in other plan types, a larger proportion of enrollees in the actuarially equivalent plans were Black. In turn, a larger proportion of enrollees in enhanced plans were White. The demographic analyses in **Tables A.3** and **A.4** repeat these analyses looking separately at beneficiaries without and with low income subsidies (LISs). Non-LIS enrollees (Table A.3) under age 65 (primarily the disabled population) showed a small preference for enrollment in an enhanced plan, consistent possibly with their greater perceived need for prescription drug utilization. Analysis of LIS enrollees (Table A.4) shows few substantive differences among the characteristics of LIS enrollees choosing different PDP options.

The next analyses focus on risk adjustment scores for different groupings of FFS Part D enrollees. The HCC categories represent diagnostic groupings associated with significant future total health care costs. Differences in the proportions of Part D enrollees and nonenrollees by HCC category that differ substantively from total enrollment proportions may signal preferences for coverage and/or selection issues. **Table A.5** compares the proportion of Part D enrollees and nonenrollees in CMS-HCC risk adjustment categories. In general, we found that FFS beneficiaries categorized in a CMS-HCC group (and hence those beneficiaries with predictable future health care expenditures) were more likely to enroll in a PDP plan compared with the FFS population as a whole. For example, 85.5 percent of beneficiaries placed in HCC1 (HIV/AIDS) chose a PDP plan; this compares with a total of 45.7 percent of the total FFS population who enrolled in a PDP plan. These findings suggest that Medicare beneficiaries with high predicted

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[7] Actuarially equivalent plans have an overall structure similar to the defined standard benefit, but the cost sharing can differ from the 25% coinsurance under the standard defined benefit. These actuarially equivalent plans may have tiered co-payments, for example of low dollar amounts for generic drugs and higher dollar amounts for preferred and nonpreferred brand-name drugs.

[8] Under the basic alternative option, plans can have a different overall structure for the benefit, although they have to be actuarially equivalent to the standard benefit. Basic alternative benefit structures can include reductions in the deductible, changes in cost sharing, and a modification of the initial coverage limit. These benefit package alternative features provide coverage with an actuarial value equal to the defined standard coverage.

overall health care costs were more likely to enroll in Part D than any opt for other forms of creditable coverage, or opt for no known prescription drug coverage.

In **Table A.6**, enrollment in CMS HCC risk adjustment categories are analyzed for PDP enrollees in different Part D plan types. In general, we observed few substantive differences among the distribution of proportions of enrollees diagnosed in these HCC categories among the enrollees in different PDP plan types. The vast majority of Part D enrollees (83.8%) chose basic plans in 2006, and hence most beneficiaries in all HCC categories had the equivalent of basic Part D coverage. However, there were a few cases in which beneficiaries placed in an HCC category, and therefore diagnosed with a serious illness predicted to have cost implications in future years, chose basic plans at a rate higher than the total PDP enrollment population. For example, a higher proportion of patients (93.9%) diagnosed with HIV/AIDS (HCC1) enrolled in basic rather than enhanced plans. This finding may be related to beneficiary's eligibility for LISs, which only subsidize the costs of basic plans. These general conclusions change somewhat when non-LIS (**Table A.7)** and LIS **(Table A.8)** are analyzed separately. We found a number of substantively small but persistent differences in the proportions of non-LIS and LIS beneficiaries who showed a preference for enhanced plans relative to the total population. Analysis of total non-LIS enrollees shows, as expected, a larger proportion of enrollees in enhanced plans as compared with LIS enrollees; 70.7 percent of non-LIS enrollees chose a basic plan and 29.3 percent chose an enhanced plan. There were, however, many examples of HCC diagnostic categories in which the proportion of non-LIS enrollees in basic versus enhanced plans differed from the total non-LIS distributions. For example, a larger proportion of non-LIS enrollees in HCC1 (HIV/AIDS), HCC51 (Drug/Alcohol Psychosis), HCC52 (Drug/Alcohol Dependence), HCC54 (Schizophrenia), HCC72 (Multiple Sclerosis), and HCC177 (Amputation Status, Lower Limb/Amputation Complications) chose enhanced plans over basic plans, relative to the total non-LIS population. Overall, the analysis suggests that beneficiaries placed in an HCC diagnostic group showed a slight but persistent preference for enhanced plans compared with the overall FFS population. This is not surprising because beneficiaries categorized in HCCs have been diagnosed with illnesses associated with higher overall health care costs. As expected, **Table A.8** shows that practically all (97.1%) of LIS enrollees were in basic plans, driven by the subsidy only for that level of coverage. In a few instances, LIS enrollees in certain HCC disease categories were enrolled disproportionately in enhanced plans. These included: HCC7 (Metastatic Cancer & Acute Leukemia), HCC38 (Rheumatoid Arthritis & Inflammatory Connective Tissue Disease), HCC81 (Acute Myocardial Infarction), HCC107 (Cystic Fibrosis), HCC157 (Vertebral Fractures w/o Spinal Cord Injury), and HCC174 (Major Organ Transplant Status).

The last set of demographic analyses uses a different risk adjustment methodology that predicts prescription drug care spending rather than total health care spending. **Table A.9** shows the distribution RxHCC scores for FFS Part D enrollees and nonenrollees. Similar to the analysis of HCC scores, we found that slightly larger proportions of Part D enrollees with diagnoses in these high prescription cost groups chose PDP plans compared with the FFS population as a whole. These findings again suggest that Medicare beneficiaries with predicted prescription drug use were more likely to enroll in Part D than to opt for other forms of creditable coverage or no coverage. Additional analyses (summarized in **Table A.10**) show the distribution of all PDP enrollees by plan type. As noted earlier, the majority of 2006 PDP enrollees chose a basic plan type. In a few instances, distributions of individuals in basic versus enhanced plans differed

somewhat from what would be expected based on simple enrollment. For example, 93 percent of beneficiaries with diagnoses categorized in RxHCC1 (HIV/AIDS) enrolled in basic plans; a larger proportion than the 83.8 percent of all PDP basic plan enrollees. While these small substantive differences were found in selected RxHCCs, in general we found enrollment trends by RxHCC tended to follow the overall PDP enrollment distribution by plan type. **Tables A.11** and **A.12** show RxHCC category enrollment by plan type for non-LIS and LIS enrollees, respectively. Results were similar to the HCC analysis, and showed small but persistent preferences among both non-LIS enrollees (who are not constrained by subsidy amounts) and LIS enrollees placed in an RxHCC group for enhanced plans, compared with the total FFS population.

3.3 FFS Enrollee Geographic Distributions

The next set of analyses of FFS PDP enrollees considers whether there were any geographic differences in the Part D enrollment patterns. Substantive differences could suggest differing preferences for certain PDP plans types and/or access to plan issues.

Geographic enrollment patterns for FFS beneficiaries into Part D PDPs, other creditable coverage and no known coverage are summarized in **Table A.13.** Overall, 45.7 percent of FFS beneficiaries enrolled in a PDP, 19.6 percent had other retiree drug coverage subsidies, 16.0 percent reported creditable coverage from some other source (e.g., TRICARE or VA), and the remaining 18.8 percent had no known coverage. Compared with the total FFS population distributions, beneficiaries in urban areas were slightly less likely to be enrolled in a PDP, but more likely to have creditable coverage and more likely to report no coverage. The Northeast Census Region had the lowest (41.0%) proportion of the population enrolled in a PDP and the highest proportion (20.7%) of no known coverage. There was variation in coverage choice among PDP regions; a few findings are particularly noteworthy. Region 16 (Wisconsin) had the highest proportion of FFS beneficiaries (27.7%) with no known coverage. Region 25 (Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming) had the lowest proportion (15.0%) of FFS enrollees with no known coverage. At 59.7%, Region 20 (Mississippi) had the highest proportion of the FFS enrollees in a PDP, and Region 33 (Hawaii) had by far the lowest proportion (28.4%) of FFS enrollees in a PDP plan.

The geographic analysis is continued in **Table A.14**, which shows geographic distributions of FFS PDP enrollees by plan type. Urban populations were less likely (at 15.1%) to enroll in PDP enhanced plans, compared with rural populations (19.1%). The Northeast had the lowest percentage (10.1%) of PDP enrollees who chose enhanced plans, compared with the South (with 20.1% in enhanced plans). There was minimal variation in preferences for basic versus enhanced plans by census region. We also noted some variation among basic versus enhanced plan choice by PDP region. Regions 24 (Kansas) and 25 (Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming) differed from the FFS Part D population as a whole with far greater enrollment in enhanced plans. Conversely, Regions 33 (Hawaii) and 34 (Alaska) had very little enrollment in enhanced plans, likely as a result of reduced plan option offerings. These results are repeated for non-LIS and LIS populations in **Tables A.15** and **A.16**, respectively. Geographic patterns observed were similar to FFS as a whole for these subpopulations.

3.4 Medicare Advantage Part D Enrollee Characteristics

The second group of descriptive analyses compared characteristics of MA beneficiaries who enrolled in Medicare Part D, had other creditable coverage, or according to Medicare enrollment files were not enrolled in a prescription drug plan. For this group, we summarized characteristics and enrollment choices for 2006, the Part D program's first year. The goal of these analyses was to once again identify any systematic differences in the characteristics and/or Medicare spending patterns for Medicare Part D enrollees compared with nonenrollees. While all MA enrollees (including those in Health Maintenance Organizations [HMOs], Local and Regional Preferred Provider Organizations [PPOs], and Special Needs Plans [SNPs]) must be offered at least basic Part D coverage as part of their total benefits package, enrollees are not required to accept such coverage. MA enrollees cannot choose a stand-alone PDP plan, though it is possible for enrollees in MA to have separate wraparound coverage specifically negotiated by former employers and/or offered through other programs such as TRICARE and the VA.

Table B.1 summarizes the characteristics of MA beneficiaries enrolled and not enrolled in Part D. In summary, we found that almost all (93.7%) of MA enrollees elected Part D coverage. Small proportions of MA enrollees had either retiree subsidy coverage (0.6%) or other creditable coverage (2.0%). Despite mandated access to at least a basic benefit, a small proportion of MA enrollees (3.7%) reported no known Part D coverage. This gap may be because some MA enrollees chose not to pay the additional premium associated with Part D coverage, may not have felt they needed the coverage, and/or may have simply been misinformed about the separate Part D enrollment process for their plan. This last explanation may be consistent with the additional finding that MA enrollees in older age groups (who traditionally have more difficulty understanding and navigating MA plan processes) were slightly more likely than younger groups to have no known coverage. We also found that White and Native American MA enrollees were more likely than other racial groups to elect no Part D coverage.

The next set of analyses compared the characteristics of MA-PD enrollees who chose different plan type options. Similar to PDPs, MA-PDs can offer a range of basic and enhanced plan types. In general, we found little evidence of systematic and substantive differences in the characteristics of MA-PD enrollees who chose different plan options types. **Table B.2** shows that, across the entire MA-PD population, most enrollees (66.9%) chose the enhanced plans. This differs from the FFS PDP analysis in which the most (42.1%) chose basic plans. The finding can be explained by the fact that MA-PDs can use Part C savings to subsidize premiums for enhanced Part D options as an overall incentive to attract and retain enrollees. Many MA plans take advantage of this ability, and enrollees have responded through higher enrollment in enhanced plans relative to FFS PDP enrollees. Similar to FFS PDP enrollees, the smallest proportions of MA-PD enrollees (4.7%) chose the actuarially equivalent plans. Most (49.7%) enrollees with any LIS elected enhanced plans, again likely driven by reduced premiums offered by MA-PD plans. Similar to the FFS PDP analysis, the MA-PD analysis found few differences between the demographic characteristics of enrollees in the different plan options. The demographic MA-PD analyses are repeated in **Tables B.3** and **B.4**, looking separately at non-LIS and LIS MA-PD beneficiaries. Like the total MA-PD population, most non-LIS enrollees (Table B.3) are enrolled in enhanced plans. This subsidization of the enhanced option is not available for PDPs, and therefore far fewer LIS enrollees are able to elect this option. Deemed LIS

enrollees with zero co-pay were least likely to enroll in enhanced plans, perhaps because this group was also most likely to be auto assigned. We found few substantive differences among the demographic characteristics of LIS enrollees choosing different MA-PD options.

The next set of analyses focused on groupings of MA-PD enrollees according to HCC categories. **Table B.5** shows a comparison of the proportion of MA-PD enrollees and nonenrollees in CMS HCC risk adjustment categories. In general, we found that MA-PD enrollees categorized in a CMS HCC group (and hence those beneficiaries with predictable future year health care expenditures) were more likely to enroll in an MA-PD plan compared with the MA population as a whole. As we found in the FFS population, beneficiaries placed in HCC1 (HIV/AIDS) provide a good example. Table B.5 shows that 98.4 percent of beneficiaries diagnosed with HIV/AIDS enrolled in an MA-PD, and only 0.9 percent of this group had no known coverage. This compares with 93.7 percent of the total MA population who elected an MA-PD plan, and 3.7 percent who had no known prescription drug coverage. This general pattern was replicated across many of the HCC diagnostic groupings. These findings suggest that MA beneficiaries with high predicted overall health care costs were more likely to enroll in their plans Part D option, likely as a result of their increased expected use of the benefit.

In **Table B.6**, enrollment in CMS HCC risk adjustment categories are analyzed for MA-PD enrollees in different Part D plan types. In general, we observed few substantive differences among the distribution of proportions of enrollees placed in HCC categories. Benefiting from common subsidies of enhanced plans by MA organizations, a majority of MA-PD enrollees (66.9%) chose enhanced plans in 2006. However, we found that MA-PD beneficiaries placed in HCC categories were often more likely to enroll in basic rather than enhanced plan options. Returning to the example of HCC1 (HIV/AIDS), we found that only 44.0 percent of these high cost enrollees chose an enhanced plan; much lower than the 66.9 percent enhanced plan enrollment found in the total MA-PD population. This finding may be related to the limitation of LISs to the cost of the basic benefit package. **Tables B.7** and **B.8** repeat this analysis for non-LIS and LIS beneficiaries, respectively. **Table B.7** does in fact show that enrollment in enhanced plans is higher among non-LIS beneficiaries. Among all non-LIS MA-PD enrollees, 71.9 percent elected an enhanced plan and 28.1 percent chose a basic plan. These patterns and proportions remain generally consistent among HCC categorized enrollees, with some groups showing slightly higher enrollment in enhanced plans, and some slightly lower; substantive differences were relatively small. As expected, Table B.8 shows that among all MA-PD LIS enrollees, enrollment was close to even split between basic and enhanced plans. This is likely explained by the availability of low or no-additional cost enhanced plans offered by many, but not all, MA plans. This availability, subsidized in MA-PD plans by savings realized under Part C, allows more LIS beneficiaries access to enhanced plans compared with the FFS PDP options. Still, there were instances in which LIS enrollees in certain HCC disease categories were enrolled disproportionately in basic plans. Examples included: HCC1 (HIV/AIDS), HCC51 (Drug and Alcohol Psychosis), HCC54 (Schizophrenia), and HCC67 (Quadriplegia).

The final set of MA demographic analyses used a different risk adjustment methodology that predicts prescription drug care spending rather than total non- drug health care spending. **Table B.9** shows the distribution RxHCC scores for MA Part D enrollees and nonenrollees. Similar to the analysis of HCC scores, we found persistent and slightly larger proportions of MA enrollees with diagnoses in these high prescription cost groups chose their plans' MA-PD option

compared with the MA population as a whole. These findings confirm that beneficiaries with predicted prescription drug use were more likely to enroll in Part D than any opt for other forms of creditable coverage or no coverage. Additional analyses (summarized in **Table B.10**) show the distribution of all MA-PD enrollees by plan type. As noted earlier, the majority of 2006 MA-PD enrollees (66.9%) chose an enhanced plan type. In a few instances, distributions of individuals in basic versus enhanced plans differed somewhat from what would be expected based on enrollment patterns in the MA population as a whole. For example, the majority (56.0%) of beneficiaries with diagnoses categorized in RxHCC1 (HIV/AIDS) enrolled in basic plans; a larger proportion than the 33.1 percent of all MA-PD basic plan enrollees. Conversely, a much smaller proportion (24.9%) of MA-PD beneficiaries categorized as RxHCC135 (Nephritis) enrolled in basic plans, compared with the total MA-PD population. While these small substantive differences were found in selected RxHCCs, in general we found that enrollment trends by RxHCC tended to follow the overall MA-PD enrollment distribution by plan type. **Tables B.11** and **B.12** show RxHCC category enrollment by plan type for MA-PD non-LIS and LIS enrollees. Results were similar to the HCC analysis and showed small but persistent preferences among both non-LIS and LIS enrollees (who are not constrained by subsidy amounts) for enhanced plan options, compared with the overall MA-PD population.

3.5 Medicare Advantage Enrollee Geographic Distributions

The next set of analyses looks for geographic differences in the enrollment patterns for MA enrollees. Substantive differences could suggest differing preferences for certain MA-PD plans types and/or access to plan concerns.

Geographic enrollment patterns of MA enrollees for Part D MA-PDs, other creditable coverage, and no known coverage are summarized in **Table B.13.** Across the entire population of beneficiaries enrolled in MA plans, 93.7 percent of MA beneficiaries elected Part D options, 0.6 percent had other retiree drug coverage subsidies, 2.0 percent reported creditable coverage from some other source (e.g., TRICARE or VA), and the remaining 3.7 percent had no known coverage. Compared with these overall MA population distributions, beneficiaries in urban areas were slightly more likely to be enrolled in an MA-PD, and were less likely to report no coverage. MA enrollees in rural areas were less likely than their urban counterparts to elect Part D and were much more likely to report no known Part D coverage. This finding may signal at least some beneficiary informational issues because all MA enrollees were offered at least a basic Part D option. Similar to the findings for the FFS population, the Northeast Census Region had the lowest (84.4%) proportion of population enrolled in an MA-PD and the highest proportion (9.0%) of no known coverage. There was variation in the distribution of prescription drug option enrollment by MA region; a few findings are particularly noteworthy. Region 3 (New York) and Region 6 (Pennsylvania and West Virginia) had the lowest proportion of MA beneficiaries electing MA-PDs, compensated in part by higher rates of creditable coverage and no known coverage.

Table B.14 summarizes geographic distributions of MA-PD enrollees by Part D plan option. Urban populations' plan type choices were similar to that of the overall MA population. However, enrollees in rural areas were more likely to elect basic plans and less likely to choose enhanced plans. The Northeast Census Region had by far the lowest (50.9%) proportion of MA enrollees in enhanced plans, compared with the Midwest (with 80.9% in enhanced plans) at the

other extreme. We also noted some variation among basic versus enhanced plan choice by MA-PD region. Regions 1 (New Hampshire, Maine), 9 (Florida), 16 (Louisiana, Mississippi), and 22 (Nevada) differed from the MA Part D population as a whole, with far greater enrollment in enhanced plans. Conversely, Regions 8 (Georgia, South Carolina), 11(Michigan), and 19 (Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming) had very little enrollment in enhanced plans, likely as a result of reduced plan option offerings. Alaska had no MA-PD plans in July 2006. These results are repeated for non-LIS and LIS populations in **Tables B.15** and **B.16**, respectively.

3.6 Private Fee-for-Service Part D Enrollee Characteristics

The third set of descriptive analyses compared characteristics of enrollees in PFFS plans who elect Medicare Part D, had other prescription drug creditable coverage, or according to Medicare enrollment files did not have any known prescription drug plan coverage. The goal of these analyses was once again to identify any systematic differences in the characteristics of Medicare Part D enrollees compared with nonenrollees. PFFS enrollees are described separately from Medicare managed care enrollees because, under Medicare rules, PFFS plans are different from other MA plans. They are not required to set up provider networks and key for Part D is that PFFS plans are not required to offer their enrollees an MA-PD option. When this is the case, PFFS enrollees are allowed to enroll in a stand-alone PDP option. Many PFFS plans did not offer MA-PD coverage in 2006, although this did increase substantially by 2007 (Greenwald et al., 2008). Similar to MA enrollees, PFFS enrollees may have separate wraparound coverage specifically negotiated by former employers and/or offered through other programs such as TRICARE and the VA.

Table C.1 summarizes the characteristics of PFFS beneficiaries enrolled and not enrolled in a Part D option. The analysis found that a high percentage (88.5%) of PFFS enrollees elected either an MA-PD or PDP plan. This PFFS figure is below the Part D take-up rate (93.7%) for MA enrollees but well above the FFS rate (45.7%) for elected Part D coverage. Small proportions of PFFS enrollees had either retiree subsidy coverage (1.0%) or other creditable coverage (3.5%). We found that 7.0 percent of PFFS enrollees reported no known prescription drug coverage, a larger proportion than MA enrollees overall (3.7%). Similar to patterns noted among MA enrollees, we found that PFFS enrollees in older age groups (who traditionally have more difficulty understanding and navigating MA plan processes) were more likely than younger groups to have no known coverage. Also similar to findings for MA enrollees, this analysis found that White and Native American PFFS enrollees were more likely than other racial groups to elect no Part D coverage.

We next compared the characteristics of PFFS enrollees who chose different plan options. Enrollees in PFFS MA-PD and PFFS PDP plans are shown separately. **Table C.2** shows that, across all PFFS MA-PD enrollees, virtually all (97.0%) chose an enhanced plan. The finding may in part be explained if PFFS plans that choose to offer an MA-PD are able to use Part C savings to subsidize premiums for enhanced Part D options as an overall incentive to attract and retain enrollees. PFFS enrollees with any low income subsidy also overwhelmingly elected enhanced plans, again likely driven by reduced premiums offered by PFFS plans. Similar to the FFS PDP and MA-PD analyses, the PFFS analysis found few differences between the demographic characteristics of enrollees in the different plan options. The demographic PFFS

MA-PD analyses are repeated in **Tables C.3** and **C.4**, looking separately at non-LIS and LIS PFFS beneficiaries. Like the total PFFS MA-PD population, virtually all (96.9%) non-LIS enrollees (Table C.3) are enrolled in an enhanced plan. There is little substantive variation in this trend among different population groups. Analysis of LIS enrollees (Table C.4) also shows that almost all (97.3%) of this PFFS MA-PD group are also enrolled in an enhanced plan, once again with little variation among the different demographic groups.

The analysis of plan options continues with PFFS PDP enrollees. **Table C.5** shows that PFFS enrollees whose plans do not offer an MA-PD, and who then must obtain Part D coverage in a stand-alone PDP plan, enroll in a range of options; 37 percent enroll in an enhanced plan and the remaining chose one of the basic benefit options. The differences in enrollment patterns between the PFFS MA-PD and PFFS PDP enrollees underscores the likely impact of subsidized premiums for enhanced plans possible for MA-PDs but not available for PDPs. The demographic PFFS PDP analyses are repeated in **Tables C.6** and **C.7**, looking separately at non-LIS and LIS PFFS beneficiaries. There was little substantive variation in the enrollment patterns among these population groups.

The next set of analyses focused on groupings of PFFS enrollees according to HCCs. **Table C.8** shows a comparison of the proportion of total PFFS plan enrollees and nonenrollees by CMS-HCC risk adjustment categories. As noted in both the FFS and MA-PD analyses, we found that PFFS Part D enrollees who were categorized into many of the CMS-HCC groups (and hence those beneficiaries with predictable future year health care expenditures) were slightly more likely to enroll in a Part D plan compared with the PFFS population as a whole. These findings confirm that beneficiaries with high predicted overall health care costs were more likely to enroll in a Part D option, likely as a result of their increased expected use of the benefit. The HCC analyses are repeated in **Tables C.9** through **C.11** for total, non-LIS and LIS PFFS enrollees in MA-PD plans, followed by **Tables C.12** through **C.14** for total, non-LIS and LIS PFFS enrollees in PDPs.

The final set of PFFS demographic analyses used a different risk adjustment methodology that predicts prescription drug care spending rather than total non-drug health care spending. **Table C.15** shows the distribution RxHCC scores for all PFFS Part D enrollees and nonenrollees. Similar to the analysis of HCC scores, we found persistent and slightly larger proportions of PFFS enrollees with diagnoses in these high prescription cost groups elected to enroll in a Part D plan (either an MA-PD or a PDP) compared with the PFFS population as a whole. Additional analyses (summarized in **Table C.16**) show the distribution of all PFFS MA-PD enrollees by Part D plan type. As noted previously, virtually all PFFS MA-PD enrollees (97.0%) opted for an enhanced plan and this pattern persisted across the subset of beneficiaries categorized in RxHCCs. **Tables C.17** and **C.18** show RxHCC category enrollment by plan type for PFFS MA-PD non-LIS and LIS enrollees. The RxHCC analysis continued for PFFS PDP enrollees by Part D plan type. Without the possibility of premium subsidies, **Table C.19** shows that the majority of PFFS PDP enrollees (63.0%) elected basic plans. However, as noted in the other risk category analyses, PFFS PDP enrollees categorized in some the RxHCCs showed a disproportionate preference for basic plans; these included enrollees in RxHCC1 (HIV/AIDS), RxHCC24 (Chronic Viral Hepatitis), and RxHCC65 (Schizophrenia). We also found instances of the opposite, in which PFFS PDP enrollees categorized in an RxHCC disproportionately enrolled in enhanced plans. Examples include: RxHCC33 (Inflammatory Bowel Disease), RxHCC43

(Polymyalgia Rheumatica), RxHCC52 (Disorders of Immunity), RxHCC81 (Parkinson's Disease), and RxHCC186 (Major Organ Transplant Status). **Tables C.20** and **C.21** show RxHCC category enrollment by plan type for PFFS PDP non-LIS and LIS enrollees.

3.7 PFFS Enrollee Geographic Distributions

The next set of analyses on the PFFS population looked for geographic differences in the enrollment patterns. A summary of geographic enrollment patterns for PFFS enrollees in a Part D plan, other creditable coverage and no known coverage is summarized in **Table C.22.** Overall, 88.5 percent of PFFS beneficiaries elected either an MA-PD or PDP Part D options, 1.0 percent had other retiree drug coverage subsidies, 3.5 percent reported creditable coverage from some other source (e.g., TRICARE or VA), and the remaining 7.0 percent had no known coverage. These figures are similar to the MA population, with slightly fewer PFFS enrollees electing a Part D option and slightly more having no known coverage—a finding not unexpected since PFFS plans are not required to offer a Part D plan to their enrollees. We found no substantive differences in enrollment patterns between urban and rural populations. Similar to findings for the FFS and MA populations, the Northeast Census Region had the lowest (65.8%) proportion of population enrolled in a Part D plan, and the highest proportion (18.6%) of no known coverage. There was variation in the distributions of prescription drug option enrollment by MA region. As in the MA analysis, Region 3 (New York) had the lowest proportion of PFFS beneficiaries electing a Part D plan, offset by higher rates of creditable coverage, and no known coverage.

Table C.23 summarizes geographic distributions of PFFS MA-PD enrollees by Part D plan option. Both urban and rural populations' plan type choice was similar to the overall PFFS MA-PD enrolled population, with almost all enrollees electing an enhanced plan. We also noted that in Region 24 (California), enrollment patterns were drastically different than the total PFFS MA-PD population; 61.2 percent of California PFFS MA-PD enrollees elected a basic plan, and 38.3 percent chose an enhanced plan. These patterns were repeated for non-LIS and LIS populations in **Tables C.24** and **C.25**. Similarly, **Table C.26** shows the geographic distribution of PFFS PDP enrollees by plan option. The majority (63.0%) of PFFS PDP enrollees elected a basic plan, and 37 percent chose an enhanced plan. Among this PFFS group, there were few distributional differences between urban and rural PFFS PDP enrollees. Enrollees in the Southern Census Region were less likely to enroll in a basic plan and were more likely to enroll in an enhanced plan, relative to the total PFFS PDP population. Region 10 (Alabama and Tennessee) differed most from the group. In these states, a greater proportion (89.4%) chose a basic plan and fewer (10.6%) elected an enhanced plan. These analyses are shown for non-LIS and LIS populations in **Tables C.27** and **C.28.**

3.8 Summary of Enrollee versus Nonenrollee Characteristic and Geographic Differences

The purpose of this extensive descriptive analysis was a first step in a series of analyses looking for impacts of Part D enrollment on Medicare FFS. Specifically, we sought to determine whether there were any systematic differences between the characteristics, plan type choices among of Medicare Part D enrollees and nonenrollees in total, and across different geographic areas. Observed differences in these descriptive analyses were used to focus our subsequent analyses, and may inform additional future analyses.

The first research question for this set of analyses was:

- Are there differences in the characteristics of Part D enrollees and nonenrollees?

Overall, we did not find large substantive differences in the characteristics between Part D enrollees and nonenrollees. However, we did find very different Part D take-up rates between FFS versus MA and PFFS enrollees, likely as a result of premium subsidies offered by managed care plans available through Part A and B savings. While observed differences were substantively small, there were nonetheless persistent indications that some older Medicare beneficiaries, and beneficiaries diagnosed in prior years with chronic more costly diseases, were more likely to enroll in a Part D plan. This may indicate they perceived a greater need for coverage, and a greater expectation of using prescription drug and potentially other services. Therefore, these groups may be of interest as a subpopulation for focused cost impact analyses.

Among FFS beneficiaries, 45.7 percent—not quite half of this group—elected a PDP plan. Substantial proportions of FFS beneficiaries had retiree prescription drug coverage (19.6%) or other sources of creditable coverage (16.0%). A somewhat unexpectedly large proportion of FFS beneficiaries (18.8%) had no known source of prescription drug coverage; this may be attributable to slow Part D take-up rates during the first year of program implementation and may decrease over time. Distributions of enrollee and nonenrollee characteristics did vary somewhat. Compared with the FFS population as a whole, FFS beneficiaries in the youngest age group (aged 0–64, primarily eligible for Part D through disability status) were more likely (60.1%) to enroll in a PDP, less likely to have an alternative source of creditable coverage (20.7%), but also more likely to have no reported coverage (19.1%). Among the aged beneficiary groups, increasingly older aged groups were associated with increased likelihood of enrolling in Part D, decreased likelihood of having other creditable coverage, and an increased likelihood of having no reported source of prescription drug coverage. This finding is consistent with the theory that older beneficiaries, with, on average, greater health care needs, are more likely to voluntarily enroll in programs for additional benefits. Additionally, we found that FFS enrollees in Part D had higher hospital inpatient spending in both 2005 and 2006 compared with FFS beneficiaries overall and relative to all groups of Part D nonenrollees. PDP enrollees also had, in both 2005 and 2006, a greater number of hospital stays, and a greater proportion of this group had at least one hospitalization. These figures increased between 2005 and 2006, suggesting that, in the first year of the Part D program, enrollment in a Part D PDP plan did not reduce the incidence of hospitalizations per se. We also found that the percent increases in hospital spending and utilization were lower among Part D enrollees compared with nonenrollees, suggesting that Part D enrollment may be associated with a slowing, if not a decrease, in Medicare Parts A and B, inpatient hospital spending and use. Medicare beneficiaries with no known prescription drug coverage exhibited by far the highest rates of growth in Medicare Parts A and B inpatient hospital spending and use. The FFS analyses also found that FFS beneficiaries categorized in a CMS HCC or RxHCC (and hence those beneficiaries with predictable future health care expenditures) were more likely to enroll in a PDP plan compared with the FFS population as a whole.

The analyses of Part D enrollee versus nonenrollee characteristics for Medicare beneficiaries electing either MA or PFFS prescription drug plans differed from the FFS findings. Contrary to the FFS analyses, we found that almost all (93.7%) of MA enrollees elected Part D

coverage. Despite mandated access to at least a basic benefit, a small proportion of MA enrollees (3.7%) reported no known Part D coverage. This gap may be because some MA enrollees chose not to pay the additional premium associated with Part D coverage, may not have felt they needed the coverage, and/or may have simply been misinformed about the separate Part D enrollment process for their plan. Also contrary to the FFS findings, the MA analyses found that MA enrollees in older age groups (who traditionally have more difficulty understanding and navigating MA plan processes) were more likely than younger groups to have no known coverage. Among PFFS beneficiaries, our analysis found that a high percentage (88.5%) of PFFS enrollees elected either an MA-PD or PDP plan. This PFFS figure is below the Part D take-up rate (93.7%) for MA enrollees but well above the FFS rate (45.7%). The analysis also found that 7.0 percent of PFFS enrollees reported no known prescription drug coverage, a larger proportion than MA enrollees overall (3.7%). Similar to patterns noted among MA enrollees, PFFS enrollees in older age groups were also more likely than enrollees in younger groups to have no known coverage. Also similar to findings for MA enrollees, this analysis found that White and Native American PFFS enrollees were more likely than other racial groups to elect no Part D coverage. Finally, consistent with the FFS analyses, both MA and PFFS beneficiaries categorized in many CMS HCC or RxHCC groups in 2005 were slightly more likely to elect Part D compared with the populations as a whole.

The next research question that this set of analyses address related to potential geographic differences between Part D enrollees and nonenrollees. Specifically,

- Are there geographic differences in the types of plans chosen by Part D enrollees and nonenrollees?

Our analysis did find some difference in the enrollment decisions of Medicare beneficiaries in different geographic regions. These findings differed between the FFS and managed care populations. FFS Part D enrollment take-up rates tended to be higher in rural areas, and in regions characterized as heavily rural. We found that the proportion of FFS population that reported no known coverage was slightly higher in urban than in rural areas. FFS Part D enrollees in urban areas were more likely than rural beneficiaries to elect a basic coverage rather than an enhanced plan. These findings were reversed for MA enrollees. MA enrollees in urban areas were more likely than rural populations to enroll in Part D, although as a total, almost all MA enrollees did elect a Part D plan. However, contrary to the findings in the FFS analysis, MA enrollees in rural areas were less likely to elect enhanced plans than enrollees in urban areas. We found no substantive differences in geographic enrollment patterns among PFFS enrollees.

Specifically for the FFS population, the geographic analyses found that beneficiaries in urban areas were slightly less likely to be enrolled in a PDP but more likely to have creditable coverage and more likely to report no coverage. The Northeast Census Region (a mixed area with some concentration of rural counties) had the lowest (41.0%) proportion of the population enrolled in a PDP and the highest proportion (20.7%) of no known coverage. There was variation in coverage choice among PDP regions; a few finding are particularly noteworthy. Region 16 (Wisconsin) had the highest proportion of FFS beneficiaries (27.7%) with no known coverage. Region 25 (Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming—essentially the heavily rural Great Plain states) had the lowest proportion (15.0%) of FFS

enrollees with no known coverage. We also found that rural populations were more likely (at 19.1%) to enroll in PDP enhanced plans, compared with urban populations (15.1%).

Results for the geographic analyses among MA beneficiaries differed. Overall, the vast majority of MA enrollees elected a Part D plan. Unlike their FFS counterparts, beneficiaries in urban areas were slightly more likely to be enrolled in an MA-PD and were less likely to report no coverage. MA enrollees in rural areas were much less likely than their urban counterparts to elect Part D and more likely to report no known Part D coverage. This finding may signal some beneficiary informational issues since all MA Part D enrollees were guaranteed at access to at least a basic Part D option through their MA plan. Similar to finding for the FFS population, the Northeast Census Region had the lowest (84.4%) proportion of population enrolled in an MA-PD, and the highest proportion (9.0%) of no known coverage. Urban populations' plan type choice was similar to the overall MA population. However, opposite of the findings in the FFS analysis, rural areas were less likely to elect enhanced plans (42.3%) compared with urban areas (68.0%).

The next section takes our analysis in a different direction. While the descriptive analysis presented in this section found that there were small, but persistent, differences in the demographic and geographic characteristics of Part D enrollees versus non-enrollees, it does not inform us of whether these individual decisions to enroll (or not enroll) in Part D in 2006 had any impact on the overall or subpopulation spending trends for Medicare FFS. In other words, did enrollment in Part D—either as a whole or for sub-populations—appear to alter the trajectory of Medicare FFS spending? The time series analyses summarized in the next section seek to address this issue.

SECTION 4
MEDICARE PART D TIME SERIES ANALYSIS

4.1 Introduction

One potential benefit of the Medicare Part D drug benefit is that it could positively impact Part A and Part B utilization and costs. In this section, we use time series analysis to analyze whether FFS beneficiary enrollment in Medicare Part D had an impact on utilization and spending patterns. We look at both inpatient expenditures and inpatient stays because inpatient hospitalizations are most likely to be impacted by Part D.

We first analyzed monthly inpatient expenditures and inpatient stays for the total FFS population and separately for those enrolled in Part D and not enrolled in Part D. We then looked at two different subsets of the population: (1) beneficiaries with congestive heart failure and (2) non-LIS FFS beneficiaries. Changes in inpatient expenditures can have periodic variability. Therefore, we also studied expenditures separately for three different time periods reflecting no Part D (January–December 2005), the enrollment transition (January–May 2006) and the post transition months (June–December 2006). Yin et al. (2008) also used the pre-, enrollment, and post-transition month time periods in their analysis of Part D on prescription drug use and out-of-pocket costs by the elderly. With some exceptions, May 15 was the enrollment deadline for 2006 and the full short-term effects of Part D would be expected to be most apparent in the latter half of the year.

While these basic analyses provide an overall picture of trends and helped us to determine whether changes in Medicare inpatient spending and utilization were observed around the time Part D was implemented, they were insufficient to attribute observed changes specifically to Part D. Therefore, we then conducted a series of time series regression analyses to attempt to isolate and describe the factors influencing observed changes in Medicare inpatient spending and utilization trends.

The primary data source for this time series analysis was a 5% file of Part A/B beneficiary claims and demographics for 2005–2007. We supplemented this file with monthly Part D enrollment from the MIIR and CME databases. Information on beneficiaries LIS status, either deemed or low income subsidy came from the monthly MIIR files for 2006 and 2007. We identified FFS beneficiaries by month. A beneficiary was considered FFS in any given month if he or she was enrolled in Part A, Part B, or both and not enrolled in an MA plan. We did not exclude new enrollees or beneficiaries with Medicare as their secondary payer.

4.2 Results: Descriptive Time Series Analyses

The analysis began with a simple time series of all Medicare FFS beneficiaries from 2005 to 2007. For each month, we looked at enrollment, total Medicare inpatient expenditures, and inpatient stays. This analysis allowed us to test for any changes in aggregate Medicare spending or utilization patterns after the implementation of Part D. While any primary effects would be expected among those enrolled in Part D (and hence with access to drug benefits), using a combined time series mitigates the problem of changing composition of beneficiaries in the first few months of the Part D program. We concentrated our analysis on inpatient expenditures and stays because we expected that they were most likely to be impacted by the Part D program. In

theory, beneficiaries with access to necessary prescription drugs for the ongoing treatment of diagnosed diseases may be less likely to be hospitalized. Through assured access to prescription drug regimens as a result of enrollment in Part D, we might expect Part D enrollment to be associated with a decrease in the number of inpatient stays and inpatient expenditures.

Table 4.1 shows per capita monthly inpatient expenditures and inpatient stays per 1,000 beneficiaries from 2005 through 2007 for Medicare FFS beneficiaries. When calculating inpatient expenditures, we downwardly adjusted expenditures for months after each October to compensate for payment rate increases related to inpatient market basket updates.[9] In **Table 4.1**, we see that inpatient expenditures and inpatient stays appear relatively constant overall but with noticeable monthly variation. In particular, inpatient stays and expenditures spike in the first quarter of each year, although the exact month varies. The graph in **Figure 4.1** shows the monthly variation in inpatient expenditures and stays. In all three years, there was a small spike in inpatient expenditures between February and March of each year. The reason for this is unclear, but as this occurs throughout the entire analytic period, it is unlikely to be related to implementation of Part D.

In order to control for the apparent periodic variation in inpatient spending and utilization unrelated to Part D implementation, we smoothed monthly expenditures and stays over several months and then looked at the annual growth rate. For this analysis, we divided the year into three parts, January to May, June to September, and October to December. We chose these divisions for several reasons. First, because enrollment in Part D was not closed until June 2006, ramping up from January to May, any comparisons of January to May from one year to the next are complicated by unstable enrollment. Therefore, we wanted to segregate these months in our analysis and concentrate on the remainder of the year. For inpatient expenditures, we then split the remainder of the year between June to September and October to December because changes to the inpatient fee schedule are implemented in October. We did not split the remainder of the year for inpatient stays because the fee schedule would impact payments, not stays. **Tables 4.2** and **4.3** show the smoothed monthly averages for inpatient expenditures and stays.

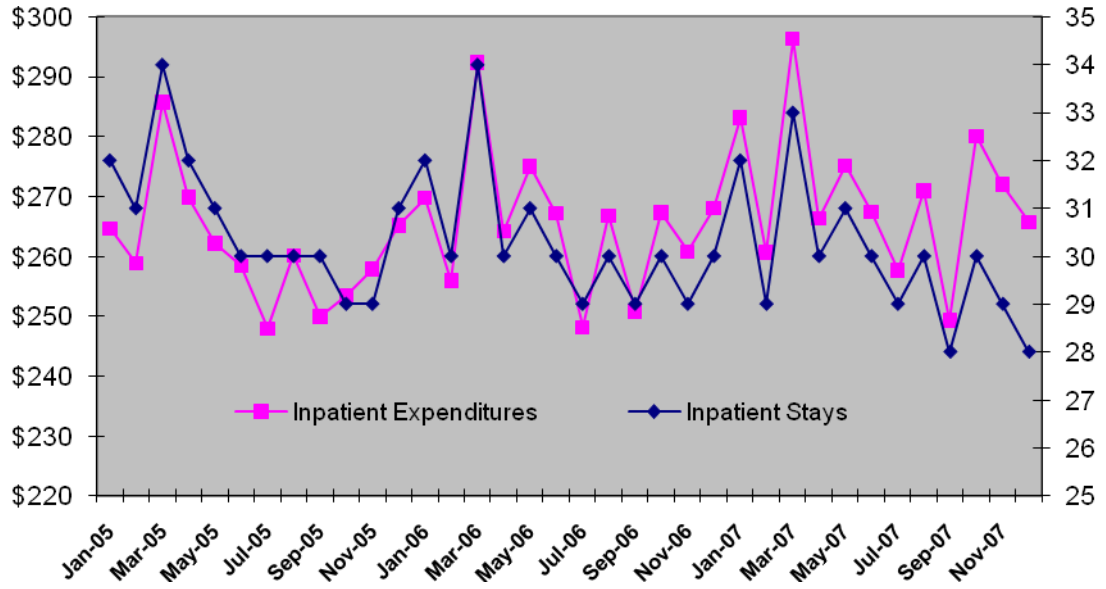
[9] Inpatient expenditures were reduced 3.5% for FY2006, an additional 3.7% for FY2007 and 3.3% for FY2008.

Table 4.1
FFS Beneficiaries: Per Capita Inpatient Expenditures and Inpatient Stays per 1,000 Beneficiaries

Date	Adjusted inpatient spending	Inpatient stays
January 2005	$264.64	32
February 2005	$258.89	31
March 2005	$285.76	34
April 2005	$269.88	32
May 2005	$262.18	31
June 2005	$258.44	30
July 2005	$247.94	30
August 2005	$260.15	30
September 2005	$249.92	30
October 2005	$244.78	29
November 2005	$249.19	29
December 2005	$256.19	31
January 2006	$260.61	32
February 2006	$247.33	30
March 2006	$282.46	34
April 2006	$255.23	30
May 2006	$265.71	31
June 2006	$258.11	30
July 2006	$239.79	29
August 2006	$257.79	30
September 2006	$242.34	29
October 2006	$249.03	30
November 2006	$242.99	29
December 2006	$249.73	30
January 2007	$263.82	32
February 2007	$242.87	29
March 2007	$276.07	33
April 2007	$248.12	30
May 2007	$256.39	31
June 2007	$249.20	30
July 2007	$240.05	29
August 2007	$252.48	30
September 2007	$232.25	28
October 2007	$252.60	30
November 2007	$245.34	29
December 2007	$239.68	28

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Figure 4.1
FFS Beneficiaries: Per Capita Monthly Inpatient Expenditures and Inpatient Stays per 1,000 Beneficiaries



NOTE: Note: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Table 4.2
FFS Beneficiaries: Average Monthly Inpatient Expenditures
Selected Time Periods

Time period	Inpatient expenditures	Year-over-year change
January–May 2005	$268.27	—
June–September 2005	$254.11	—
October–December 2005	$250.05	—
January–May 2006	$262.26	−2.24%
June–September 2006	$249.51	−1.81%
October–December 2006	$247.25	−1.12%
January–May 2007	$257.46	−1.83%
June–September 2007	$243.49	−2.41%
October–December 2007	$245.87	−0.56%

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Table 4.3
FFS Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries
Selected Time Periods

Time period	Inpatient stays	Year-over-year change
January–May 2005	32.45	—
June–December 2005	29.89	—
January–May 2006	31.19	−3.90%
June–December 2006	29.43	−1.56%
January–May 2007	31.00	−0.59%
June–December 2007	29.04	−1.30%

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

In **Table 4.2**, we see that average monthly expenditures decreased year-over-year for each time period. Similarly, **Table 4.3** shows that the average number of inpatient stays decreases after the implementation of Part D and shows a continued decline. However, it is difficult to definitely attribute these changes to implementation of Part D. These small decreases could also result from the overall secular care trend of shifts from hospital inpatient to outpatient care. In the subsequent analyses, we will look for further evidence by comparing subpopulations.

In this series of analyses, we looked at Part D and non–Part D beneficiaries separately and compared the trends in inpatient expenditures and stays. In theory, if Part D is impacting changes in inpatient utilization, we would expect a larger decline among beneficiaries enrolled in Part D than beneficiaries not enrolled in Part D. For this analysis, we divided the FFS population each month into two cohorts: those enrolled in Part D that month and those not enrolled in Part D that month. Consequently, the set of beneficiaries changed each month as beneficiaries died, enrolled in Medicare, and enrolled or disenrolled from Part D.

We began by looking at our sample sizes for each month and the estimated total enrollment based on our 5% sample. **Table 4.4** shows our sample size and estimated population for Part D enrollment. Consistent with the enrollment ramp-up period, we see that Part D enrollment grew almost 60 percent between January and June of 2006 from 512,674 to 809,335 (10,253,480 to 16,186,700).[10] It then remained fairly constant within 5% of 800,000 (16,000,000). Because of these changes, we will need to be cautious of any analysis based on the beginning of 2006. Another reason for caution is much of the initial enrollment is from beneficiaries eligible for low income subsidies, who were automatically enrolled in Part D and therefore during the start up period become an unrepresentative proportion of the analysis.

[10] Numbers in parentheses and right of Table 4.4 are estimates of the full population from the 5% sample.

Table 4.4
Part D Enrollment by Month

Date	Sample Part D enrollment	Estimated Part D enrollment[10]
January 2006	512,674	10,253,480
February 2006	575,495	11,509,900
March 2006	608,694	12,173,880
April 2006	643,733	12,874,660
May 2006	730,057	14,601,140
June 2006	809,335	16,186,700
July 2006	809,349	16,186,980
August 2006	812,979	16,259,580
September 2006	823,214	16,464,280
October 2006	825,454	16,509,080
November 2006	825,869	16,517,380
December 2006	825,716	16,514,320
January 2007	831,549	16,630,980
February 2007	829,191	16,583,820
March 2007	826,951	16,539,020
April 2007	822,921	16,458,420
May 2007	822,255	16,445,100
June 2007	822,399	16,447,980
July 2007	828,181	16,563,620
August 2007	829,813	16,596,260
September 2007	831,792	16,635,840
October 2007	833,650	16,673,000
November 2007	834,473	16,689,460
December 2007	834,460	16,689,200

Note: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data

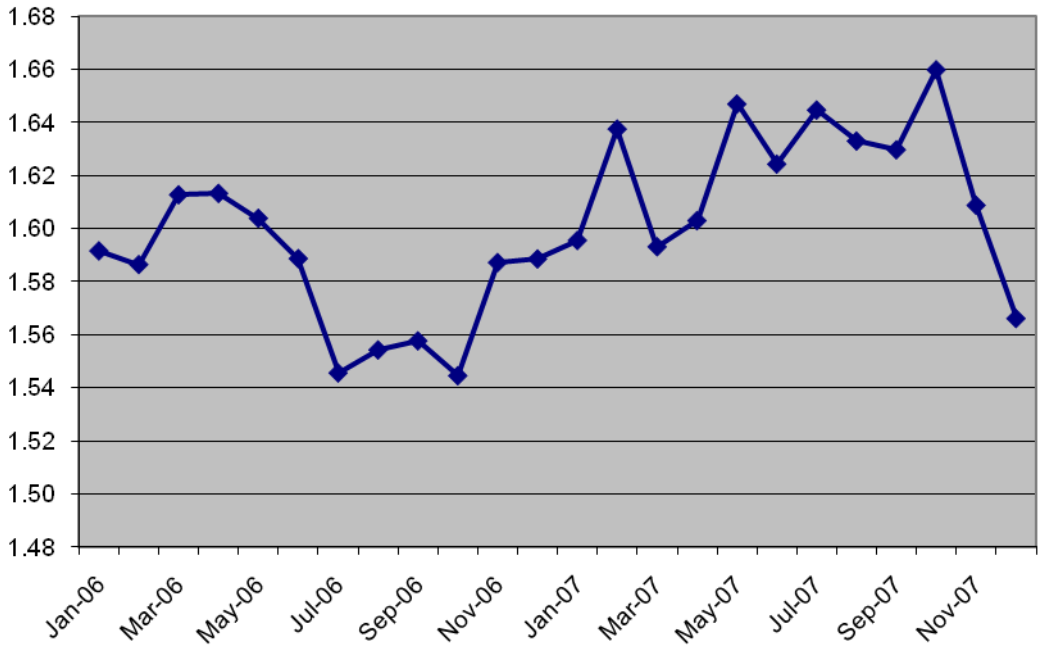
Table 4.5 presents per capita inpatient expenditures separately for beneficiaries enrolled in Part D and those not enrolled in Part D. **Figure 4.2** shows the ratio of inpatient expenditures for beneficiaries enrolled in Part D to those not enrolled. Notable in **Table 4.5** and **Figure 4.2** are the average inpatient expenditures for beneficiaries enrolled in Part D at more than 50% higher than those not enrolled in Part D. This finding could be attributed to two potential sources. First, beneficiaries eligible and enrolled with low income subsidies (and who, as noted earlier, are a large and disproportionate part of the 2006 enrollees) historically have higher than average Medicare expenditures. Second, among the non-LIS beneficiaries, those in poorer health may have selected into Part D at higher rates than those beneficiaries in better health.

Table 4.5
FFS Beneficiaries: Per capita Medicare Adjusted Inpatient Expenditures Part D and Not Part D Enrolled

Date	Part D enrolled	Not Part D enrolled
January 2006	$355.65	$223.45
February 2006	$330.95	$208.62
March 2006	$377.90	$234.31
April 2006	$338.02	$209.52
May 2006	$342.47	$213.52
June 2006	$324.13	$204.03
July 2006	$297.50	$192.49
August 2006	$320.42	$206.16
September 2006	$300.81	$193.12
October 2006	$307.89	$199.35
November 2006	$303.98	$191.52
December 2006	$312.64	$196.81
January 2007	$329.52	$206.53
February 2007	$306.74	$187.31
March 2007	$344.84	$216.45
April 2007	$310.89	$193.94
May 2007	$324.96	$197.30
June 2007	$314.04	$193.33
July 2007	$303.58	$184.57
August 2007	$318.34	$194.94
September 2007	$292.56	$179.51
October 2007	$320.59	$193.13
November 2007	$307.42	$191.09
December 2007	$297.09	$189.70

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Figure 4.2
Ratio of per Capita Monthly Inpatient Expenditures: Part D Enrolled to Not Part D Enrolled



NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

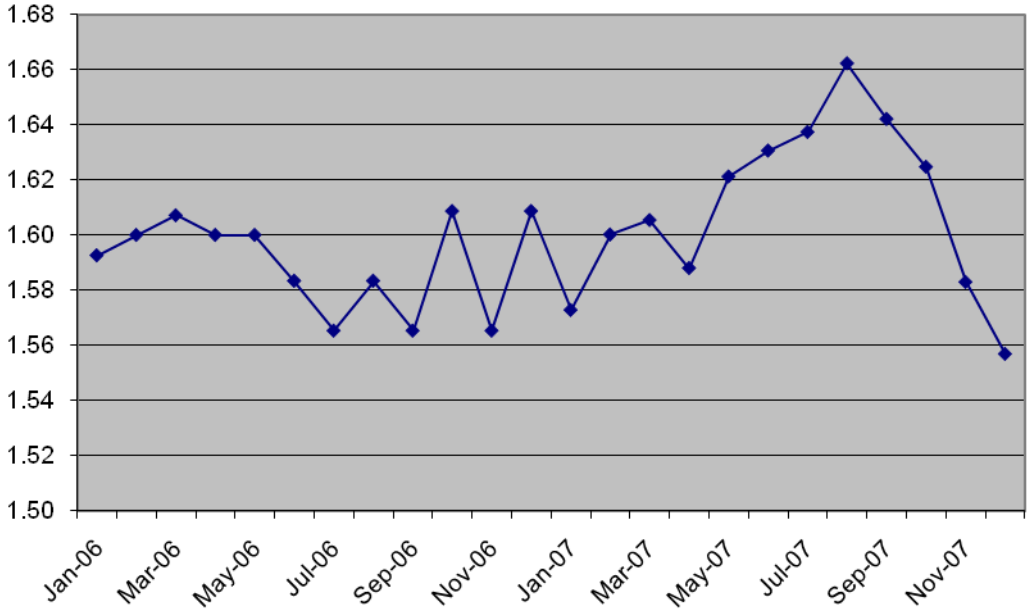
Continuing the analysis, **Table 4.6** shows the average monthly number of inpatient stays per 1,000 beneficiaries for beneficiaries enrolled and not enrolled in Part D. **Figure 4.3** shows the ratio of their inpatient stays. Part D inpatient stays, like the expenditures, are more than 50% higher than for those not enrolled in Part D. We also note that in both the inpatient expenditure and inpatient stay time series, the ratio initially falls from January to June 2006 as beneficiaries enroll in Part D and then appears to rise until December 2007, when the ratio decreases 10 percentage points. Enrollment in the transition period is dominated by the low income subsidy beneficiaries in January and then a flow of non–low income beneficiaries until June.

Table 4.6
FFS Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries Part D and Not Part D Enrolled

Date	Part D enrolled	Not Part D enrolled
January 2006	43	27
February 2006	40	25
March 2006	45	28
April 2006	40	25
May 2006	40	25
June 2006	38	24
July 2006	36	23
August 2006	38	24
September 2006	36	23
October 2006	37	23
November 2006	36	23
December 2006	37	23
January 2007	40	25
February 2007	37	23
March 2007	42	26
April 2007	37	24
May 2007	39	24
June 2007	37	23
July 2007	36	22
August 2007	38	23
September 2007	35	21
October 2007	38	23
November 2007	36	23
December 2007	35	23

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Figure 4.3
FFS Beneficiaries: Ratio of Inpatient Stays per 1,000 Beneficiaries Part D to Not Part D Enrolled



NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Our analysis found differences in inpatient expenditures and inpatient stays between Part D enrollees and non-enrollees—specifically that both are significantly higher for beneficiaries enrolled in Part D. However, the results do not allow us to identify the specific impact attributable to Part D on inpatient expenditures and stays. To attempt to isolate this impact, we analyzed the year-over-year changes for set time periods for those enrolled in Part D compared to those not enrolled in Part D. Analyzing changes for selected time periods in 2006 and 2007 helps control, in part, for the unexplained fluctuations in Medicare inpatient spending and use (documented in earlier tables). **Tables 4.7** and **4.8** show the average per capita inpatient expenditures and stays for these selected time periods. Findings in **Table 4.7** show that inpatient expenditures for beneficiaries not enrolled in Part D decreased more in each selected time period than for those enrolled in Part D. In the short run, this is counter to the hypothesis that access to prescription drugs through Part D could affect a decrease in Medicare inpatient costs. **Table 4.8** repeats this analytic approach with average monthly inpatient stays; results differ from the spending analysis. In this case, average monthly inpatient stays per 1000 decreased at a more rapid rate between the January to May periods for Part D enrollees. However, these decreases reversed and were greater among non-Part D enrollees for the remainder of the year; the June to December period. Overall, this set of analyses suggest that, at best, there was no evidence of decrease attributable to Part D enrollment, and only limited evidence for a decrease in utilization among Part D enrollees.

Table 4.7
FFS Beneficiaries: Average Monthly Inpatient Expenditures for Part D and Not Part D Enrolled—Selected Time Periods

Time period	Part D inpatient expenditures	Part D year-over-year change	Not Part D inpatient expenditures	Not Part D year-over-year change
January–May 2006	$348.60	—	$218.08	—
June–September 2006	$310.68	—	$198.96	—
October to December 2006	$308.17	—	$195.89	—
January–May 2007	$323.40	−7.23%	$200.31	−8.15%
June–September 2007	$307.11	−1.15%	$188.09	−5.46%
October to December 2007	$308.36	0.06%	$191.31	−2.34%

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Table 4.8
FFS Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries for Part D and Not Part D Enrolled—Selected Time Periods

Time period	Part D inpatient stays	Part D year-over-year change	Not Part D inpatient stays	Not Part D year-over-year change
January–May 2006	41.6	—	25.8	—
June–December 2006	36.9	—	23.2	—
January–May 2007	38.8	−6.89%	24.3	−6.06%
June–December 2007	36.5	−1.00%	22.5	−2.94%

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

4.3 Results: FFS Time Series Regression Analyses

In an attempt to isolate the impact of Part D on Medicare inpatient expenditures and utilization, we constructed a set of time series regression analyses. In these regressions, we looked for a potential change in the rate of increase in Medicare expenditures and or a shift in the intercept as a result of the Part D program.

We defined several variables for our regression analysis. **Table 4.9** describes the key variables used in the regressions. The key variables of interest in the regressions are PARTD, PARTD_T, and Part D_ENROLL_T. The coefficient of the variable PARTD is the average change in inpatient expenditures (or stays) during the time the Part D program was fully operational, and represents the impact on all FFS beneficiaries, not just those enrolled in Part D. The variable PARTD_T coefficient identifies the change in the trend for inpatient expenditures (stays) once the Part D program was fully operational. Only the variable PartD_ENROLL_T captures any additional impact on the time trend for Part D enrollees only.

Table 4.9
Regression Variables[11]

Variable	Description	Purpose
D_ENROLL	Equals 1 for beneficiaries enrolled in Part D.	Average difference in expenditures (stays) for beneficiaries enrolled in Part D
PARTD	Equals 1 from June 2006 to December 2007 and 0 in all other months. Identifies the time period when Part D was fully operational	Average difference in expenditures or stays for all FFS beneficiaries once the Part D program was fully operational
T	Counts months 1–24 beginning January 2006.	Control for the time trend in expenditures and stays.
PARTD_T	PARTD*T.	Change in the slope of the time trend as a result of Part D being in existence.
PARTD_ENROLL_T	PARTD*T*D_ENROLL	Change in the time trend as a result of Part D for Part D enrollees only.

Tables 4.10 and **4.11** present the results of the time series regressions. A number of models of increasing complexity are presented. In **Table 4.10**, none of the variable estimates indicate any significant impact of Part D on the trend for inpatient expenditures. The variable D_ENROLL, which is equal to one for those enrolled in Part D indicates a higher level of inpatient spending among those who joined Part D. Consistent with earlier descriptive tables, T is negative, indicating the overall trend in inpatient spending over time; still, T is insignificant after the addition of PARTD which controls for the time period after Part D became fully operational. The regressions also show an additional decrease in inpatient expenditures during the Part D time period for all FFS beneficiaries. PARTD is negative and significant in specifications 2–4 picking up average lower spending in the post-June 2006 period. However, we do not find any change in the rate of decrease of inpatient expenditures or an additional effect on just Part D enrollees. PARTD_T which captures the change in the slope of the time trend after Part D is slightly positive but not statistically significant. Similarly, PARTD _ENROLL_T, measuring any change in the slope of the time trend for Part D enrollees beyond those of FFS in general is slightly negative but has no reasonable statistical significance. In Specifications 2–4 the coefficient of PARTD shows an average decrease of $23.46 to $28.04 in inpatient expenditures once Part D is fully implemented, but no additional drop for beneficiaries enrolled in Part D based on the coefficient of PARTD_ENROLL_T seen in specification 4.

[11] * in Table 4.9 indicates multiplication of variables.

Table 4.10
Time Series Regression Analyses: FFS Monthly Adjusted Inpatient Expenditures

	(1)	(2)	(3)	(4)
INTERCEPT	218.45**	224.91**	229.13**	226.67**
	(4.54)	(4.28)	(9.09)	(9.48)
D_ENROLL	120.09**	120.09**	120.09**	125.0**
	(3.96)	(3.45)	(3.48)	(6.33)
T	−1.47**	−0.505	−1.91	−1.91
	(0.286)	(0.350)	(2.69)	(2.69)
PARTD	—	−23.46**	−28.04**	−28.04**
		(5.968)	(10.58)	(10.60)
PARTD_T	—	—	1.43	1.63
			(2.71)	(2.73)
PARTD_ENROLL_T	—	—	—	−0.41
				(0.446)
N	48	48	48	48
R^2	.9547	.9664	.9667	.9673
ADJ-R^2	.9527	.9642	.9636	.9634

NOTES: 1. Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level.
2. Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Similarly, results shown in **Table 4.11** indicate no impact of Part D on inpatient stays for Part D enrollees separate from the impact on all FFS enrollees. As with the regressions on inpatient expenditures, Part D enrollees have higher average inpatient stays than beneficiaries not enrolled and there was a decrease in average inpatient stays after Part D was fully operational for all FFS beneficiaries. In all 4 specifications, the coefficient on D_ENROLL is between 14.30 and 15.02 and significant showing a large difference in the rate of inpatient stays (more than 50 percent more based on an intercept of 26.08 to 28.15) between beneficiaries enrolled in Part D and those not enrolled. The negative trend in inpatient stays, captured by T, is only significant in the first specification. In specifications 2–4, T is no longer significant, but PARTD, shows an average decrease in inpatient stays between 2.77 and 4.2 per 1000 after June 2006. Finally, specifications 3 and 4 show no impact of Part D on the slope of the time trend while specification 4, the variable PartD_ENROLL_T shows no impact of Part D on Part D enrollee inpatient stays.

Table 4.11
Time Series Regression Analyses: FFS Monthly Inpatient Stays per 1,000 Beneficiaries

	(1)	(2)	(3)	(4)
Intercept	26.08**	26.84**	28.15**	27.79**
	(0.552)	(0.536)	(1.10)	(1.14)
D_ENROLL	14.30**	14.30**	14.30**	15.02**
	(0.482)	(0.423)	(.429)	(.761)
T	−0.179**	−0.065	−0.500	−0.50
	(0.035)	(0.043)	(.325)	(.324)
PARTD	—	−2.77**	−4.20**	−4.20**
		(0.734)	(1.28)	(1.28)
PARTD_T	—	—	0.443	0.473
			(.328)	(.328)
PARTD_ENROLL_T	—	—	—	−0.060
				(.054)
N	48	48	48	48
R^2	.9528	.9644	.9658	.9668
Adj-R^2	.9507	.9619	.9626	.9629

NOTES: 1.Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level.
2. Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

4.4 Results: Congestive Heart Failure Subanalysis

Lacking significant findings related to the impact of Part D on overall Medicare inpatient spending and utilization, we tested for impacts on a specific, targeted disease—one that is costly to Medicare and a common chronic diagnosis among many Medicare beneficiaries. Part D drug coverage could, in theory, be of greater benefit to beneficiaries with a drug treatable chronic condition such as congestive heart failure (CHF). While we did not see an impact in the general Medicare population from Part D, we may see an impact on the subset of beneficiaries with CHF.

In this section, we analyzed inpatient spending and inpatient stays for beneficiaries with CHF. Beneficiaries with CHF were identified using the HCC disease groupings applied to the diagnoses in the 5% file beneficiaries (HCC80). To construct our CHF time series, we identified three cohorts of beneficiaries and then extracted their Medicare expenditures and inpatient stays. The first cohort received an HCC risk score based on 2004 claims, the second cohort based on 2005 claims and the third cohort based on 2006 claims. We then constructed the time series using 2005 expenditures and stays for the first cohort, 2006 for the second, and 2007 for the third. We did not use a repeated cross section of beneficiaries because the HCC risk scores were assigned based on the previous year's claims and diagnosis.

We began this subanalysis of the impact of Part D on CHF beneficiary expenditures and inpatient stays using all CHF beneficiaries enrolled in traditional FFS Medicare. **Table 4.12** shows average monthly inpatient spending and stays for FFS beneficiaries with CHF. Comparing

Table 4.12 to **Table 4.1**, we note that CHF beneficiaries have approximately 4 times as many inpatient stays and inpatient expenditures as the overall Medicare FFS population.

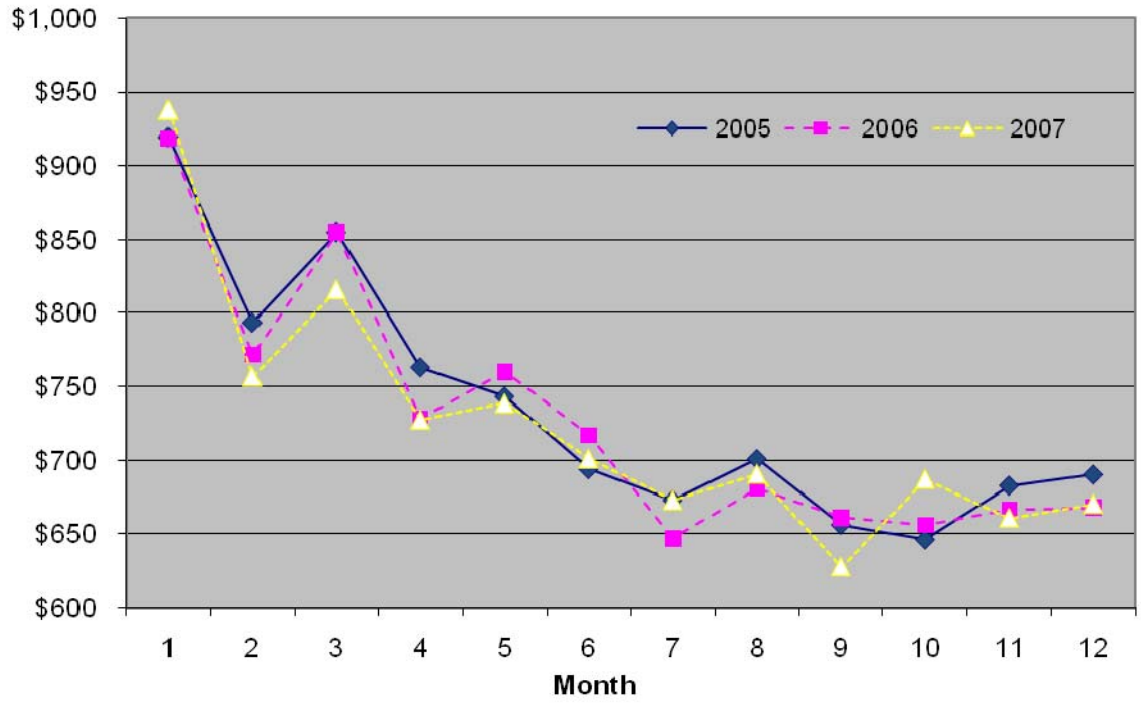
Table 4.12
CHF Beneficiaries: Per Capita Inpatient Expenditures and Inpatient Stays per 1,000 Beneficiaries

Date	Inpatient spending	Inpatient stays
January 2005	$919.38	100.4
February 2005	$793.59	90.3
March 2005	$855.01	96.1
April 2005	$763.18	87.6
May 2005	$743.40	83.7
June 2005	$694.02	80.7
July 2005	$673.10	78.6
August 2005	$700.99	80.1
September 2005	$656.44	77.7
October 2005	$646.34	75.8
November 2005	$682.95	78.3
December 2005	$690.40	81.5
January 2006	$918.15	98.8
February 2006	$771.54	85.9
March 2006	$854.51	95.6
April 2006	$728.44	83.0
May 2006	$759.84	85.2
June 2006	$717.00	81.4
July 2006	$647.00	75.9
August 2006	$680.77	78.8
September 2006	$661.11	75.7
October 2006	$655.87	77.7
November 2006	$666.77	77.2
December 2006	$667.79	80.1
January 2007	$938.25	101.8
February 2007	$756.84	85.3
March 2007	$816.17	93.4
April 2007	$727.59	84.7
May 2007	$738.69	84.8
June 2007	$700.93	81.0
July 2007	$672.77	77.5
August 2007	$690.60	80.4
September 2007	$627.29	73.8
October 2007	$687.04	79.8
November 2007	$660.78	76.5
December 2007	$670.42	78.0

NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

Because our CHF data consists of three cohorts of beneficiaries (one for each year) rather than a repeated cross section of beneficiaries by month as in the earlier analyses, we adjusted our analytic approach. In order to determine whether inpatient spending and stays decreased at the same time that Part D went into effect, we analyzed the trend in expenditures and stays from 2005 to 2007. Unlike in the earlier repeated cross section, we did not expect to see a linear trend for the combined 3 years. Rather, we expected that expenditures and stays would be higher at the beginning of each calendar year when all CHF beneficiaries were alive and then decrease over the course of the year as the sickest, and most likely costliest, of the CHF beneficiaries in the cohort would die off. However, we expected that if Part D had an impact, the rate of decrease would be higher in 2006 than 2005 and even higher in 2007 as benefits provided under Part D had an increasing chance to impact beneficiary health. We concentrated our analysis on the difference in the magnitude of decrease between 2005, 2006, and 2007. **Figure 4.4** shows inpatient expenditures for CHF beneficiaries separately for 2005, 2006, and 2007.

Figure 4.4
CHF Beneficiaries: Per Capita Monthly Inpatient Expenditures by Year



Based on **Figure 4.4**, inpatient expenditures, adjusted for increases in the inpatient market basket, show a similar initial level and decline in each of the 3 years. Interestingly, there is also a spike in expenditures in March of each year. To smooth out some of the secular spikes and the general downward trend in CHF inpatient utilization, we compared year-over-year changes for groups of months. As in earlier analyses, we split the year into three parts for inpatient expenditures and two parts for inpatient stays. The three time periods for inpatient expenditures control for the Part D enrollment period and the change in the inpatient market basket. The two time periods for inpatient stays control for the Part D enrollment period from January to May 2006. **Tables 4.13** and **4.14** present the year-over-year changes for CHF

Table 4.13
CHF Beneficiaries: Average Monthly Inpatient Expenditures—Selected Time Periods

Time period	Inpatient expenditures	Year-over-year change
January–May 2005	$816.20	—
June–September 2005	$681.27	—
October–December 2005	$673.04	—
January–May 2006	$807.83	−1.02%
June–September 2006	$676.69	−0.67%
October–December 2006	$663.43	−1.43%
January–May 2007	$797.03	−1.34%
June–September 2007	$673.21	−0.51%
October–December 2007	$672.81	1.41%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.14
CHF Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries—Selected Time Periods

Time period	Inpatient stays	Year-over-year change
January–May 2005	91.8	—
June–December 2005	79.0	—
January–May 2006	88.5	−3.57%
June–December 2006	77.6	−1.79%
January–May 2007	90.1	1.83%
June–December 2007	78.2	0.78%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.14 shows a similar pattern for inpatient stays. There is a decrease in inpatient stays from 2005 to 2006 but than an increase from 2006 to 2007. The increase from 2006 to 2007 also differs from that of the general FFS population (**Table 3**) which had a small, but negative decreases in 2007 inpatient stays compared with 2006.

The analysis continues by separating CHF beneficiaries by their Part D enrollment status and then comparing the trends in inpatient expenditures and stays. In theory, if Part D is impacting inpatient utilization, we would expect a larger decline among beneficiaries enrolled in Part D than beneficiaries not enrolled in Part D. **Tables 4.15** and **4.16** show per capita inpatient expenditures and inpatient stays per 1,000 beneficiaries by Part D enrollment status.

Table 4.15
CHF Beneficiaries: Per Capita Medicare Inpatient Expenditures Part D and Not Part D Enrolled

Date	Part D enrolled	Not Part D enrolled
January 2006	$986.89	$874.92
February 2006	$839.70	$719.96
March 2006	$951.01	$774.26
April 2006	$801.56	$661.91
May 2006	$827.98	$686.66
June 2006	$783.16	$633.80
July 2006	$697.84	$582.96
August 2006	$730.70	$617.63
September 2006	$709.89	$597.28
October 2006	$720.60	$570.80
November 2006	$717.95	$599.57
December 2006	$740.25	$572.63
January 2007	$1,003.91	$848.43
February 2007	$831.27	$654.99
March 2007	$884.90	$722.21
April 2007	$791.05	$641.04
May 2007	$804.50	$649.05
June 2007	$764.89	$613.66
July 2007	$743.21	$574.22
August 2007	$753.46	$602.51
September 2007	$690.60	$538.59
October 2007	$771.06	$569.31
November 2007	$710.63	$591.01
December 2007	$719.29	$602.07

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

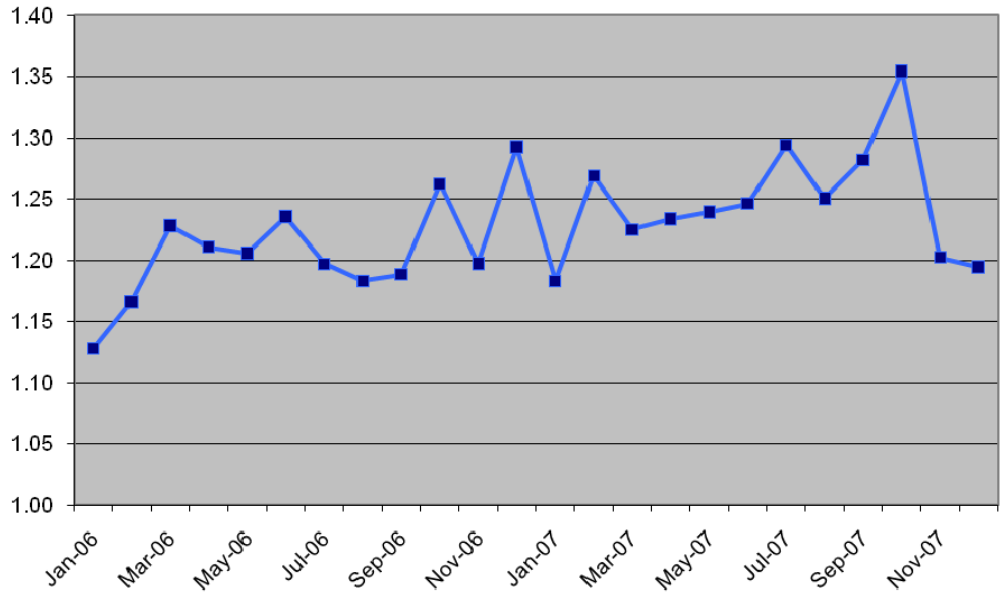
Table 4.16
CHF Beneficiaries: Per Capita Inpatient Stays Part D and Not Part D Enrolled per 1,000 Beneficiaries

Date	Part D enrolled	Not Part D enrolled
January 2006	108.5	92.8
February 2006	96.8	77.7
March 2006	106.9	86.3
April 2006	91.7	75.0
May 2006	93.9	75.9
June 2006	88.5	72.6
July 2006	82.4	67.8
August 2006	86.2	69.5
September 2006	81.7	67.8
October 2006	85.2	68.0
November 2006	84.4	67.7
December 2006	87.9	69.8
January 2007	109.3	91.6
February 2007	92.6	75.4
March 2007	101.5	82.2
April 2007	91.2	75.7
May 2007	91.4	75.7
June 2007	88.9	70.2
July 2007	84.5	67.7
August 2007	89.4	67.8
September 2007	81.1	63.6
October 2007	88.0	68.2
November 2007	82.8	67.7
December 2007	83.0	71.0

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data

We found smaller differences in inpatient utilization between CHF beneficiaries enrolled and not enrolled in Part D, compared with the general FFS population. As **Figure 4.5** shows inpatient expenditures for CHF Part D enrollees varies from 13% to 35% higher, with an average of 23%, compared with an average of 60% for the general FFS population. Because the two CHF populations are more similar in their inpatient utilization than the general FFS population, comparing their changes before and after Part D may be more reasonable.

Figure 4.5
CHF Beneficiaries: Ratio of Per Capita Monthly Inpatient Expenditures: Part D Enrolled to Not Part D Enrolled



NOTE: Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

In **Tables 4.17** and **4.18**, we compare inpatient expenditures and stays for different time periods in 2006 and 2007. In both cases, the population not enrolled in Part D shows larger declines than those in Part D. The lone exception is October to December 2007, where inpatient expenditures increased 1.06 percent compared to a year earlier for those enrolled in Part D, but 1.09 percent for non-enrolled.

Table 4.17
CHF Beneficiaries: Average Monthly Inpatient Expenditures by Part D Enrollment Status: Selected Time Periods

Time period	Part D inpatient expenditures	Part D year-over-year change	Not Part D inpatient expenditures	Not Part D year-over-year change
January–May 2006	$877.67	—	$750.25	—
June–September 2006	$730.61	—	$608.10	—
October–December 2006	$726.19	—	$580.99	—
January–May 2007	$864.72	−1.47%	$704.58	−6.09%
June–September 2007	$738.29	1.05%	$582.68	−4.18%
October–December 2007	$733.88	1.06%	$587.34	1.09%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.18
CHF Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries
Selected Time Periods Part D and Not Part D Enrolled

Time period	Part D inpatient expenditures	Part D year-over-year change	Not Part D inpatient expenditures	Not Part D year-over-year change
January–May 2006	99.2	—	82.1	—
June–December 2006	85.2	—	69.1	—
January–May 2007	97.3	−1.88%	80.3	−2.26%
June–December 2007	85.4	0.31%	68.0	−1.51%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data

To identify the isolated potential impact of Part D on Medicare inpatient spending and utilization, we ran two sets of regressions on each of our dependent variables, adjusted inpatient expenditures and inpatient stays per 1,000 beneficiaries. The first set of regressions for each independent variable analyzed the entire 2-year time period. The second set of regressions looked at each year separately. The purpose of looking at each year separately was to determine if there was steeper slope (faster rate of decline) in 2007 compared with 2006. For these analyses, we created two additional variables, MONTH and D_ENROLL_MONTH. The variable month differs from the variable T in both how it is defined and its interpretation. The variable month takes on the values 1–12 and resets in January of each year, whereas T is continuous and does not reset at the beginning of each year. The variable month captures the decrease in the dependent variable throughout the year due to changes in the composition of the CHF cohort (sicker dying earlier in the year) and any underlying trend in inpatient expenditures (stays). This differs from the variable T in that T only captures the underlying trend in inpatient expenditures (stays). We use month rather than the T in the earlier regressions because our data consists of two panels, one for each year, rather than the earlier repeated cross section. D_ENROLL_MONTH interacts D_ENROLL and MONTH and will tell us if there is a different rate of change in expenditures(or stays) for Part D enrollees. We use the D_ENROLL_MONTH variable in lieu of PARTD_ENROLL_MONTH in the combined regression.

Table 4.19 presents the results of the regressions on adjusted inpatient expenditures. Results for all regression specifications are consistent with the previous CHF descriptive. The average difference between the Part D and Non-Part D inpatient utilization, measured by D_ENROLL is statistically significant in all specifications. Part D enrollees had an average of $131 to $169 *higher* inpatient expenditures per month per beneficiary and an additional 17.07 to 18.4 inpatient stays per 1000 beneficiaries. In specifications 4 and 5, we compared 2006 and 2007. In these specifications, we checked whether average inpatient expenditures are lower in 2007 than 2006 and/or if they decreased at a faster rate. We found that the sum of Intercept and D_ENROLL (or initial average monthly adjusted inpatient expenditure for part D enrollees) was lower by $16 in 2007 suggesting that Part D may have had a small negative effect on expenditures. However, expenditures decreased almost 27 percent more per month in 2006 than 2007 at $22.43 compared to $17.65 suggesting no net or lasting effect.

Table 4.19
CHF Beneficiaries: Adjusted Inpatient Expenditures

	(1) 2006–2007	(2) 2006–2007	(3) 2006–2007	(4) 2006	(5) 2007
Intercept	794.25**	858.63**	857.11**	803.48**	748.64**
	(18.67)	(36.08)	(37.81)	(32.09)	(32.81)
D_ENROLL	144.86**	144.87**	147.93**	131.03**	169.75**
	(14.29)	(13.79)	(24.11)	(45.37)	(46.39)
MONTH	−18.07**	−39.53**	−39.53**	−22.43**	−17.65**
	(2.42)	(10.68)	(10.80)	(4.36)	(4.46)
PARTD	−39.17*	−111.58**	−111.57**	—	—
	(20.60)	(40.38)	(40.85)		
PARTD_MONTH	—	22.54**	22.80**	—	—
		(10.95)	(11.20)		
PARTD_ENROLL_MONTH	—	—	−0.521	—	—
			(3.35)		
D_ENROLL_MONTH	—	—	—	0.548	−2.25
				(6.16)	(6.30)
N	48	48	48	24	24
R^2	.8227	.8386	.8387	.8209	.8121
Adj-R^2	.8106	.8236	.8195	.7940	.7839

NOTES: 1.Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level.
2. Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data

Table 4.20 shows the results of the regression on inpatient stays. Specifications 1–3 analyze the entire time period, while specifications 4 and 5 look at 2006 and 2007 separately. Looking at the coefficient on D_ENROLL, all of the specifications show a statistically significant higher rate of inpatient stays among Part D enrollees from 17.1 to 18.4 more inpatient stays per 1000 beneficiaries. The effect of Part D is more ambiguous. The coefficient on PARTD is negative in specifications 1–3 corresponding to a decrease in average inpatient stays during the time Part D was fully operational. However, while there is a large average decrease in expenditures after Part D is fully operational, the coefficient on PARTD_MONTH is strongly positive. Taken together, inpatient stays are lower the first 5 months (June–November 2006) than before Part D was fully operational and higher beginning December 2006. This is true even after controlling for Part D enrollment (D_ENROLL) and the jump up in stays at the beginning of 2007 (MONTH). In specification 3, we also looked for an impact of Part D on Part D enrollees; however, the coefficient on D_ENROLL_MONTH was both small (at −0.146) and insignificant. In the last two specifications, average inpatient stays for Part D enrollees, measured by the sum of the intercept and D_ENROLL are initially lower in 2007 at 102.4 per 1000 Part D beneficiaries compared to 104.1 in 2006. However, inpatient stays fall 0.18 stays per 1000 beneficiaries faster in 2006 than 2007as measured by the variable month. The net result is that inpatient stays are on average lower in the beginning of 2007 than 2006, but higher at the end of

2007 than 2006 suggesting little or no effect from Part D. Finally, we found no effect of Part D on Part D enrollees different from those not enrolled. The coefficients on the variables PARTD _ENROLL_MONTH and D_ENROLL_MONTH were all very insignificant suggesting no impact of Part D specific to Part D enrollees only.

Table 4.20
CHF Beneficiaries: Inpatient Stays per 1,000 Beneficiaries

	(1) 2006–2007	(2) 2006–2007	(3) 2006–2007	(4) 2006	(5) 2007
Intercept	86.95**	92.61**	92.18**	86.31**	84.01**
	(1.78)	(3.47)	(3.62)	(3.18)	(3.04)
D_ENROLL	17.07**	17.07**	17.92**	17.78**	18.40**
	(1.36)	(1.32)	(2.31)	(4.49)	(4.30)
MONTH	−1.65**	−3.53**	−3.53**	−1.86**	−1.68**
	(.231)	(1.03)	(1.04)	(0.432)	(0.413)
PartD	−3.26	−9.62**	−9.62**	—	—
	(1.96)	(3.88)	(3.91)		
PartD_MONTH	—	1.98*	2.05*	—	—
		(1.05)	(1.07)		
PartD_ENROLL_MONTH	—	—	−0.146	—	—
			(0.321)		
D_ENROLL_MONTH	—	—	—	−0.133	−0.179
				(0.611)	(0.584)
N	48	48	48	24	24
R^2	.8490	.8605	.8611	.8388	.8459
Adj-R^2	.8387	.8476	.8446	.8146	.8228

NOTES: 1.Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level.
2. Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data

4.5 Results: Non-LIS Subanalysis

In this section, we present result from inpatient expenditures and stays for non-LIS beneficiaries. As stated before, many low income subsidy (LIS) beneficiaries already received drug coverage through Medicaid so the impact of Part D on their expenditures and utilization should be minimal. Therefore, by removing LIS beneficiaries from our data, we may be able to see some effect from Part D. We identified LIS beneficiaries using the MIIR monthly data. A beneficiary was considered LIS in that month if either the DEEMED or LIS Applicant indicator was present. (The applicants for LIS status are a small proportion of LIS enrollees.) Based on this definition, the non-LIS population was approximately 78% of the total FFS.

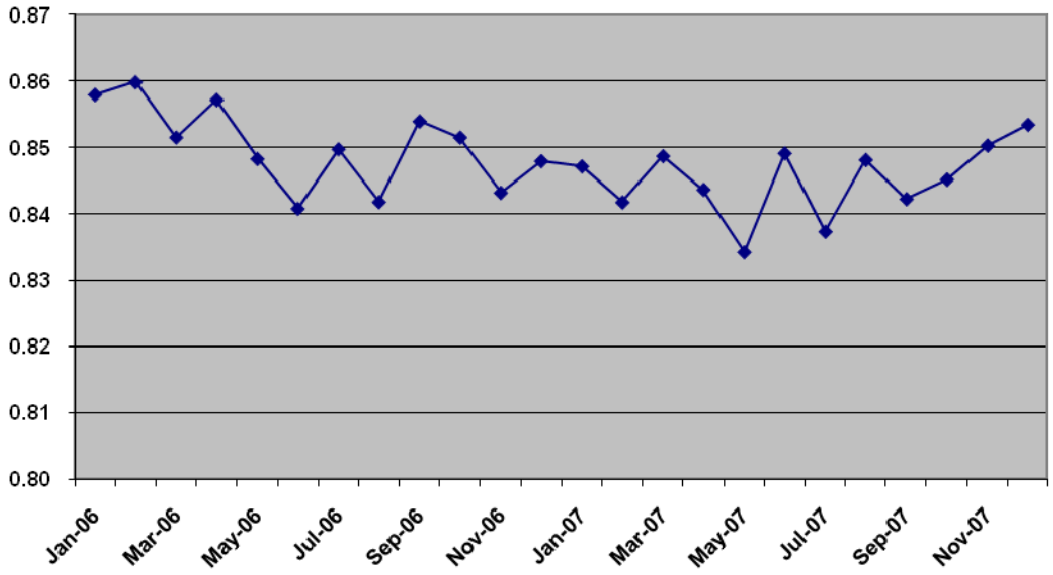
Table 4.21 shows inpatient expenditures and stays for the non-LIS population from 2006 to 2007. We see that inpatient expenditures and stays are lower for the non-LIS FFS population compared with the FFS population. **Figure 4.6** demonstrates that per capita non-LIS inpatient expenditures are roughly 85% of total per capita FFS. Non-LIS inpatient stays per 1,000 beneficiaries are also roughly 85% of total FFS as shown in **Figure 4.7**. This difference is driven by the low income population which historically has a higher level of inpatient expenditures and stays. In **Table 4.22** and **4.23**, we compared per capita inpatient expenditures and inpatient stays per 1,000 beneficiaries for LIS, non-LIS and total FFS beneficiaries. Per capita LIS inpatient expenditures are on average 80.5% higher than non-LIS, while inpatient stays are 80% higher. This finding may have confounded the earlier analysis in which the percent of the Part D enrollees receiving a LIS changed each month, especially during the enrollment ramp-up period.

Table 4.21
FFS Non-LIS Population: Per Capita Monthly Expenditures and Inpatient Stays per 1,000 Beneficiaries

Date	Adjusted inpatient expenditures	Inpatient stays
January 2006	$223.60	27.0
February 2006	$212.67	25.2
March 2006	$240.54	28.5
April 2006	$218.79	25.7
May 2006	$225.41	26.2
June 2006	$217.03	25.5
July 2006	$203.77	24.1
August 2006	$217.01	25.4
September 2006	$206.96	24.4
October 2006	$212.06	24.9
November 2006	$204.90	24.3
December 2006	$211.77	25.1
January 2007	$223.50	27.3
February 2007	$204.45	24.8
March 2007	$234.31	28.2
April 2007	$209.34	25.3
May 2007	$213.89	25.7
June 2007	$211.61	25.0
July 2007	$201.01	23.9
August 2007	$214.15	25.3
September 2007	$195.62	23.3
October 2007	$213.51	25.4
November 2007	$208.62	24.7
December 2007	$204.57	24.4

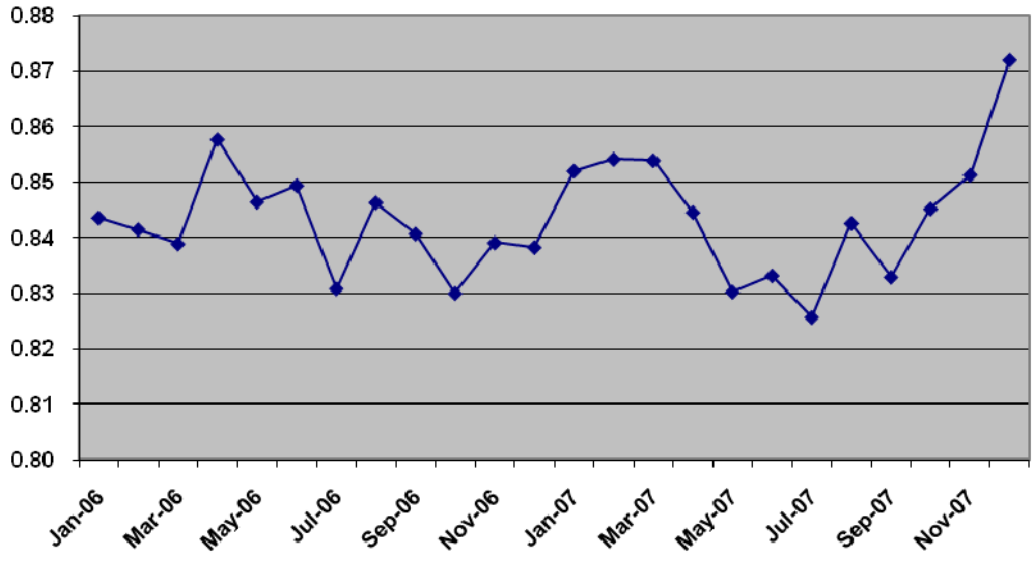
NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Figure 4.6
Ratio of Per Capita Monthly Inpatient Expenditures: Non-LIS FFS to FFS



NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Figure 4.7
Ratio of Average Inpatient Stays per 1,000 Beneficiaries: Non-LIS FFS to FFS



NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.22
Per Capita Adjusted Inpatient Expenditures, LIS, Non-LIS, and Total FFS

Date	LIS	Non-LIS	FFS
January 2006	$389.50	$223.60	$260.61
February 2006	$367.16	$212.67	$247.33
March 2006	$426.14	$240.54	$282.46
April 2006	$379.01	$218.79	$255.23
May 2006	$400.93	$225.41	$265.71
June 2006	$394.85	$217.03	$258.11
July 2006	$359.37	$203.77	$239.79
August 2006	$392.72	$217.01	$257.79
September 2006	$359.00	$206.96	$242.34
October 2006	$370.63	$212.06	$249.03
November 2006	$368.02	$204.90	$242.99
December 2006	$373.96	$211.77	$249.73
January 2007	$402.98	$223.50	$263.82
February 2007	$376.57	$204.45	$242.87
March 2007	$422.36	$234.31	$276.07
April 2007	$384.31	$209.34	$248.12
May 2007	$406.06	$213.89	$256.39
June 2007	$382.09	$211.61	$249.20
July 2007	$378.53	$201.01	$240.05
August 2007	$389.09	$214.15	$252.48
September 2007	$363.53	$195.62	$232.25
October 2007	$393.52	$213.51	$252.60
November 2007	$378.38	$208.62	$245.34
December 2007	$367.56	$204.57	$239.68

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.23
Average Inpatient Stays per 1,000 Beneficiaries, LIS, Non-LIS, and FFS

Date	LIS	Non-LIS	FFS
January 2006	47.4	27.0	32
February 2006	44.7	25.2	30
March 2006	50.9	28.5	34
April 2006	45.2	25.7	30
May 2006	47.2	26.2	31
June 2006	45.9	25.5	30
July 2006	43.7	24.1	29
August 2006	46.3	25.4	30
September 2006	43.4	24.4	29
October 2006	44.8	24.9	30
November 2006	43.9	24.3	29
December 2006	44.5	25.1	30
January 2007	48.4	27.3	32
February 2007	44.8	24.8	29
March 2007	50.7	28.2	33
April 2007	46.1	25.3	30
May 2007	47.9	25.7	31
June 2007	45.7	25.0	30
July 2007	45.4	23.9	29
August 2007	47.4	25.3	30
September 2007	43.7	23.3	28
October 2007	46.1	25.4	30
November 2007	43.9	24.7	29
December 2007	43.3	24.4	28

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

As in the previous analyses, our next step was to smooth the monthly variation in inpatient utilization using comparisons between selected time periods. **Table 4.24** and **Table 4.25** show the averages and year-over-year changes for inpatient expenditures and inpatient stays. In both tables, there was a decrease in 2007 compared with 2006, although we found a larger decrease during the Part D enrollment period. One reason for this may be that sicker beneficiaries, in need of drug coverage, were the first to enroll into Part D, causing a rise in average expenditures and stays in 2006. In June (at the end of the Part D enrollment period) a group of healthier beneficiaries apparently enrolled in Part D, thus bringing down the average expenditures and stays. We attempted to control for this ramp-up period effect in the next section when we considered non-LIS beneficiaries by Part D enrollment status.

Table 4.24
Non-LIS FFS Beneficiaries: Average Monthly Adjusted Inpatient Expenditures, Selected Time Periods

Time period	Inpatient expenditures	Year-over-year change
January–May 2006	$224.20	—
June–September 2006	$211.19	—
October–December 2006	$209.58	—
January–May 2007	$217.10	−3.2%
June–September 2007	$205.59	−2.7%
October–December 2007	$208.89	−0.3%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.25
Non-LIS FFS Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries, Selected Time Periods

Time period	Inpatient stays	Year-over-year change
January–May 2006	26.5	—
June–December 2006	24.8	—
January–May 2007	26.3	−1.1%
June–December 2007	24.6	−1.0%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

In our earlier analysis of inpatient utilization for Part D enrolled beneficiaries, we found that: (1) inpatient utilization was 50% to 60% higher among Part D enrollees than for beneficiaries not enrolled in Part D and (2) there was no significant effect of Part D on inpatient utilization for those enrolled in Part D. We hypothesized that one reason for the higher expenditures and lack of impact was the disproportionate percentage of LIS beneficiaries enrolled in Part D during the early implementation period. Medicaid and other beneficiaries who were deemed eligible for the low income subsidies were enrolled automatically in Part D, but because most already had drug coverage through state programs, Part D would have little impact on Medicare inpatient spending and utilization for this group. In this analytic section, we reanalyzed inpatient expenditures and stays by Part D enrollment status for non-LIS beneficiaries. **Table 4.26** shows the estimated non-LIS enrollment, followed by **Table 4.27,** which analyzes per capita monthly inpatient expenditures for non-LIS FFS beneficiaries by their Part D enrollment status.

Table 4.26
Non-LIS Beneficiaries: Part D Enrollment

Date	Estimated Part D	Percent of Non-LIS FFS
January 2006	3,732,940	13.2%
February 2006	4,681,600	16.6%
March 2006	5,196,300	18.5%
April 2006	5,787,060	20.7%
May 2006	6,682,980	24.0%
June 2006	8,160,080	29.5%
July 2006	8,145,560	29.5%
August 2006	8,151,660	29.5%
September 2006	8,278,260	29.9%
October 2006	8,290,620	30.0%
November 2006	8,284,280	29.9%
December 2006	8,257,700	29.8%
January 2007	8,722,780	31.5%
February 2007	8,701,460	31.4%
March 2007	8,667,860	31.3%
April 2007	8,582,900	31.0%
May 2007	8,546,080	30.9%
June 2007	8,529,780	30.8%
July 2007	8,621,100	31.1%
August 2007	8,621,680	31.0%
September 2007	8,631,980	31.0%
October 2007	8,639,760	30.9%
November 2007	8,635,740	30.8%
December 2007	8,616,580	30.6%

NOTES: 1. Estimated Part D enrollment is the sample enrollment multiplied by 20.
2. Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

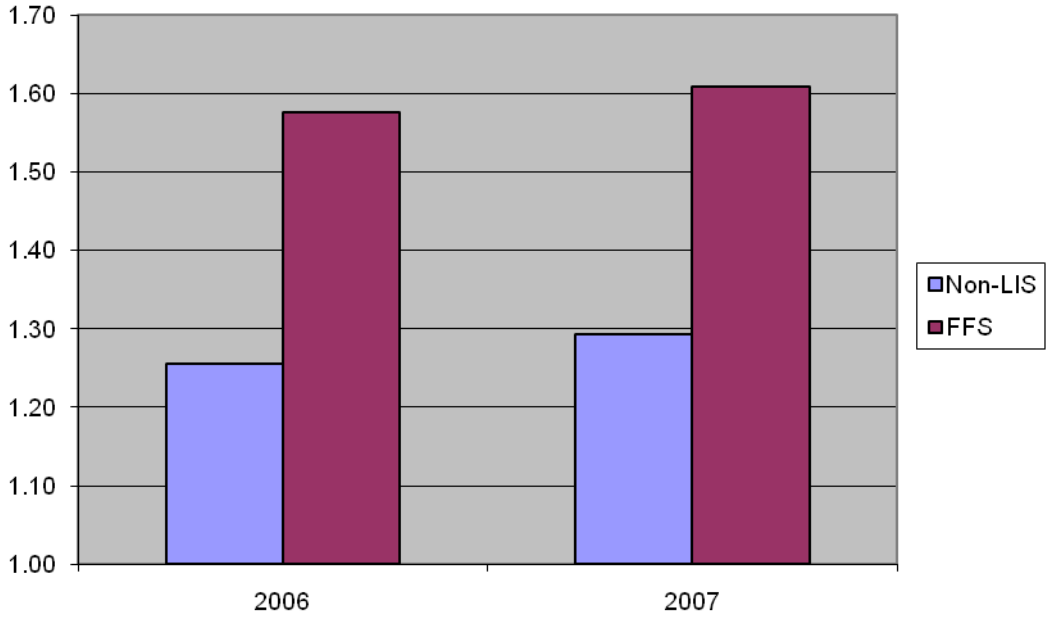
Table 4.27
Non-LIS FFS: Per Capita Adjusted Medicare Inpatient Expenditures Part D and Not Part D Enrolled

Date	Part D enrolled	Not Part D enrolled
January 2006	$266.45	$217.11
February 2006	$257.32	$203.79
March 2006	$291.15	$229.06
April 2006	$271.15	$205.13
May 2006	$272.51	$210.50
June 2006	$255.04	$201.10
July 2006	$238.27	$189.34
August 2006	$251.61	$202.54
September 2006	$244.68	$190.83
October 2006	$256.41	$197.00
November 2006	$242.38	$188.87
December 2006	$253.98	$193.83
January 2007	$265.51	$203.95
February 2007	$246.08	$184.89
March 2007	$278.77	$213.28
April 2007	$245.94	$191.61
May 2007	$254.04	$194.89
June 2007	$251.58	$191.88
July 2007	$235.88	$182.54
August 2007	$253.19	$193.31
September 2007	$229.24	$177.69
October 2007	$253.23	$191.60
November 2007	$244.48	$189.18
December 2007	$230.82	$188.55

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

The first thing of note regarding the comparison of inpatient expenditures for beneficiaries enrolled and non-enrolled in Part D is that the differential between enrollees and non-enrollees shrinks almost by half once LIS beneficiaries were removed; from more than 50 percent to less than 30 percent. **Figure 4.8** shows the ratio of inpatient expenditures by year for Part D enrolled relative to those not enrolled for the total FFS and for the non-LIS FFS population. We also see in **Figure 4.8** that inpatient expenditures for non-LIS Part D enrollees increased faster than for non-enrolled beneficiaries, both among the non-LIS FFS population and the overall FFS population—a short run finding counter to the hypothesis that Part D coverage could result in lower inpatient spending.

Figure 4.8
Ratio of Inpatient Expenditures, Part D Enrollees to Non-Enrollees, Non-LIS and All FFS Populations



NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

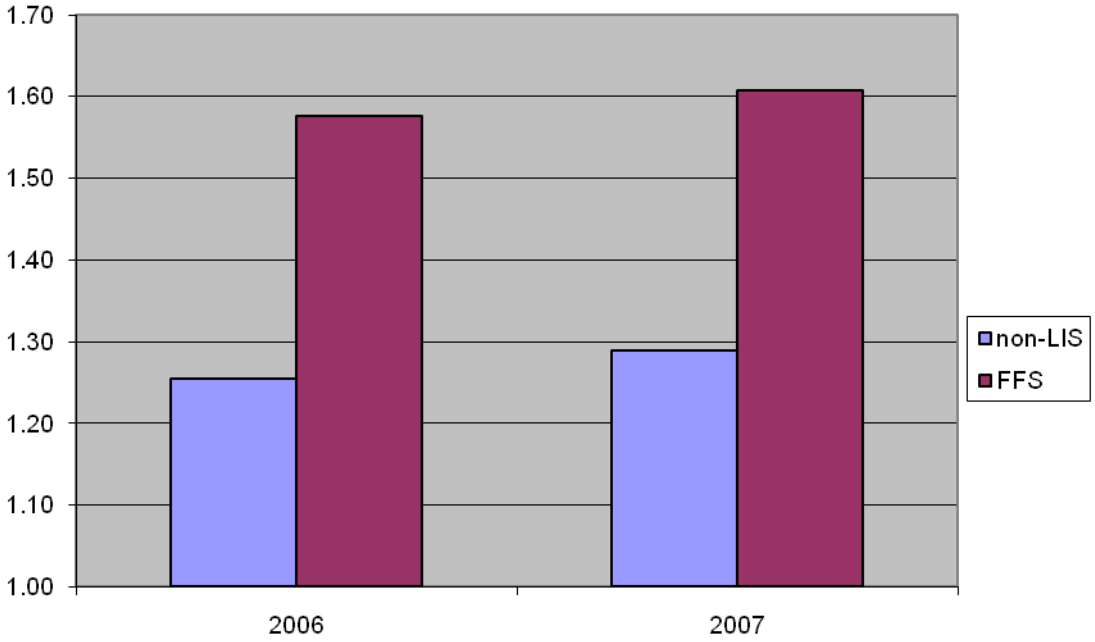
Table 4.28 shows monthly inpatient stays per 1,000 non-LIS FFS beneficiaries by Part D enrollment status. Inpatient stays followed the same pattern as inpatient expenditures. When beneficiaries receiving a LIS are removed, the difference between Part D and non–Part D enrolled beneficiaries falls from more than 50% to less than 30%. However, the ratio of Part D to not Part D enrolled grew between 2006 and 2007 suggesting that inpatient stays for Part D enrolled beneficiaries did not decrease as much as for non–Part D enrolled—even after removing LIS beneficiaries. **Figure 4.9** shows the ratio of inpatient stays for Part D enrolled to non-enrolled for the total FFS and for the non-LIS FFS population.

Table 4.28
Non-LIS FFS: Average Inpatient Stays per 1,000 Beneficiaries

Date	Part D enrolled	Not Part D enrolled
January 2006	32.4	26.2
February 2006	30.8	24.1
March 2006	34.6	27.1
April 2006	31.8	24.2
May 2006	31.4	24.6
June 2006	30.2	23.5
July 2006	28.1	22.4
August 2006	29.9	23.5
September 2006	28.6	22.6
October 2006	29.2	23.1
November 2006	28.8	22.4
December 2006	29.9	23.1
January 2007	32.0	25.0
February 2007	29.3	22.6
March 2007	33.6	25.6
April 2007	29.6	23.3
May 2007	30.3	23.5
June 2007	29.7	22.7
July 2007	27.9	21.9
August 2007	30.0	22.8
September 2007	27.3	21.2
October 2007	29.9	22.9
November 2007	28.8	22.4
December 2007	27.9	22.5

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Figure 4.9
Ratio of Average Inpatient Stays, Part D Enrollees to Non-Enrollees, Non-LIS and All FFS Populations



Note: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

The pattern for inpatient stays is almost identical as that for inpatient expenditures. Inpatient stays for Part D enrolled increased relative to non–Part D enrolled beneficiaries in 2007 compared with 2006. One reason for this could be the ramp-up period in which, as shown in **Table 4.26**, non-LIS enrollment in Part D more than doubled from 13.2% of non-LIS FFS in January 2006 to 29.5% in June 2006. In order to control for this change, we again looked at average inpatient expenditures and inpatient stays by time period. **Tables 4.29** and **4.30** present the year-over-year changes by time period for adjusted inpatient expenditures by Part D enrollment status. As with the total FFS population, inpatient expenditures and utilization in general fell faster for those not enrolled with Part D, with the exception of October to December 2007. However, comparing **Tables 4.29** and **4.30** to **Table 4.7** and **4.8**, inpatient expenditures and utilization fell more for non-LIS beneficiaries than for FFS beneficiaries overall.

Table 4.29
Non-LIS FFS Beneficiaries: Average Monthly Inpatient Expenditures Part D and Not Part D Enrolled, Selected Time Periods

Time period	Part D inpatient expenditures	Part D year-over-year change	Not Part D inpatient expenditures	Not Part D year-over-year change
January–May 2006	$272.33	—	$213.22	—
June–September 2006	$247.39	—	$195.96	—
October to December 2006	$247.87	—	$193.23	—
January–May 2007	$258.10	−5.22%	$197.73	−7.27%
June–September 2007	$242.44	−2.00%	$186.36	−4.90%
October to December 2007	$242.85	−2.02%	$189.78	−1.79%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

Table 4.30
Non-LIS FFS Beneficiaries: Average Monthly Inpatient Stays per 1,000 Beneficiaries Part D and Not Part D Enrolled, Selected Time Periods

Time period	Part D inpatient expenditures	Part D year-over-year change	Not Part D inpatient expenditures	Not Part D year-over-year change
January–May 2006	32.2	—	25.3	—
June–December 2006	29.2	—	23.0	—
January–May 2007	31.0	−3.67%	24.0	−4.96%
June–December 2007	29.0	−1.55%	22.3	−2.68%

NOTE: Based on 5% file of Beneficiaries.
SOURCE: RTI analysis of CMS data.

To control for the Part D enrollment period, potential bias and the effect of other factors, we conducted regression analyses on the non-LIS FFS populations. We used the same specifications as in the earlier regressions. **Tables 4.31** and **4.32** show the results of the regressions on monthly adjusted inpatient expenditures and stays.

In **Table 4.31**, all four specifications show that average inpatient expenditures for Part D enrollees are $56 to $57 more than for those non-enrolled. This is smaller than the $120 difference among all Part D enrollees, but still suggestive of adverse selection into Part D. The variable T, shows a small, but steady decline in inpatient expenditures but is only significant in the first two specifications. The only Part D variable which is significant is PARTD in specification 2. It has a coefficient of −15.52 which corresponds to an average decrease of $15.52 in inpatient expenditures once Part D was implemented. However, none of the Part D variables, or PARTD in the other specifications are statistically different from 0, suggesting that

after controlling for LIS beneficiaries, Part D had no affect on inpatient expenditures either through a shift in the intercept or in the slope of the time trend.

Table 4.31
Non-LIS FFS Beneficiaries: Monthly Adjusted Inpatient Expenditures

	(1) 2006–2007	(2) 2006–2007	(3) 2006–2007	(4) 2006
Intercept	2111.59**	215.86**	211.22**	211.70**
	(3.60)	(3.57)	(7.57)	(4.69)
D_ENROLL	56.17**	56.17**	56.17**	57.21**
	(3.14)	(2.87)	(2.89)	(5.33)
T	−1.15**	−0.51*	−0.703	0.703
	(0.227)	(0.292)	(2.24)	(2.27)
PARTD	—	−15.52**	−11.56	−11.56
		(4.98)	(8.82)	(8.92)
PARTD_T	—	—	−1.24	−1.19
			(2.26)	(2.29)
PARTD_ENROLL_T	—	—	—	−0.088
				(.375)
N	48	48	48	48
R^2	.8851	.9059	.9065	.9066
Adj-R^2	.8800	.8895	.8978	.8955

NOTES: 1. Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level
2. Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

We found similar results, as shown in **Table 4.32,** for non-LIS inpatient stays. Part D enrollees had an average of 6.6 more inpatient stays per 1000 beneficiaries per month than those not enrolled in Part D. Similarly, the coefficient on T is very small and only significant in the first specification. The variable PARTD, however, is negative and significant in specifications 2–4 corresponding to an average decrease of 1.84 to 2.35 inpatient stays per 1000 beneficiaries after Part D was implemented regardless of enrollment status. However, as with inpatient expenditures, there is no effect of Part D on the trend in inpatient stays or on inpatient stays for those enrolled in Part D

Table 4.32
Non-LIS FFS Beneficiaries: Monthly Inpatient Stays per 1,000 Beneficiaries

	(1) 2006–2007	(2) 2006–2007	(3) 2006–2007	(4) 2006
Intercept	25.06**	25.57**	26.04**	25.94**
	(0.452)	(0.453)	(0.962)	(1.01)
D_ENROLL	6.60**	6.60**	6.60**	6.79**
	(0.394)	(0.365)	(0.368)	(0.677)
T	−0.13**	−0.05	−0.21	−0.21
	(0.028)	(0.037)	(0.284)	(0.287)
PARTD	—	−1.84**	−2.35**	−2.35**
		(0.632)	(1.12)	(1.13)
PARTD _T	—	—	0.16	0.17
			(0.287)	(0.291)
PARTD _ENROLL_T	—	—	—	−0.02
				(0.047)
N	48	48	48	48
R^2	.8699	.8910	.8917	.8920
Adj-R^2	.8641	.8835	.8817	.8791

NOTES: 1. Parentheses indicate the standard error. ** indicates significance at the 5% level
* indicates significance at the 10% level
2. Based on 5% file of Beneficiaries
SOURCE: RTI analysis of CMS data.

4.6 Summary of Time Series Analyses

In the time series analysis, we attempted to isolate the impact of enrollment in Medicare Part D on Medicare inpatient spending and utilization. Specific research questions were:

- Overall, did Medicare Part D affect Part A/B inpatient spending or utilization? How much?

- How did the effects differ for the Medicaid and other low income populations?

Collectively, our set of descriptive and regression based time series analyses suggest that the Part D program did not result in reduced Medicare inpatient spending or utilization, at least not as of 2007. While Medicare rates of inpatient spending and utilization are decreasing over time, we saw no evidence that the specific implementation of Part D or enrollment in Part D had a significant impact on this existing secular trend.

Our FFS aggregate time series analysis of inpatient expenditures and utilization did show overall decreases after the implementation of Part D. However, it is difficult to definitely attribute these changes to implementation of Part D. These small decreases could also result from the overall secular care trend of shifts from hospital inpatient to outpatient care. Results separating spending and utilization trends for Part D enrollees and non-enrollees also found no

evidence that Part D reduced FFS inpatient spending. This set of analyses found that inpatient expenditures for beneficiaries not enrolled in Part D decreased *more* in each target time period than for those enrolled in Part D—a finding counter to hypothesis that access to prescription drugs through Part D could affect a decrease in Medicare inpatient costs. In a similar analysis, we found that average monthly inpatient stays per 1,000 did initially decrease at a more rapid rate for Part D enrollees. However, these decreases were reversed and were outpaced by greater decreases among non–Part D enrollees in later time periods. Overall, this set of analyses suggest that, at best, there was no evidence of decreases attributable to Part D enrollment, and only limited evidence for a short-term decrease in utilization among Part D enrollees. Regression-based time series analyses also failed to identify a lasting effect of Part D those who enrolled. Though our findings suggest that Part D enrollees, who had higher inpatient spending and utilization compared with nonenrollees, did slow that spending in initial time periods post-Part D implementation, the effect is not sustained.

Additional analyses conducted on particularly high-cost, prescription drug-sensitive beneficiaries diagnosed with CHF also yielded no evidence of Part D's theoretical negative impact on broader Medicare spending or utilization. When comparing inpatient expenditures and stays for different time periods in 2006 and 2007, in both cases, the population not enrolled in Part D shows larger declines than those for Part D enrollees. Our subanalysis focusing on the non-LIS population yielded similar results. In the analysis of inpatient utilization for Part D enrolled beneficiaries, we found that: (1) inpatient utilization was 50% to 60% higher among Part D enrollees than for beneficiaries not enrolled in Part D and, (2) there was no significant effect of Part D on inpatient utilization for those enrolled in Part D. We hypothesized that one reason for the higher expenditures and lack of Part D impact might be the disproportionate percentage of LIS beneficiaries enrolled in Part D during the first year of implementation. Medicaid beneficiaries were enrolled automatically in Part D, but since most already had drug coverage through state programs, Part D would therefore have little additional impact differential impact on Medicare inpatient spending and utilization. Still, contrary to our hypotheses, non-Part D beneficiaries in the low income group, which includes Medicaid beneficiaries, exhibited greater decreases in inpatient spending and utilization compared to the non-LIS Part D enrolled group. Additional regression analysis found no Part D impacts.

The time series analyses presented in this section found some very limited evidence of small shifts in Medicare FFS spending and utilization trends after implementation of Part D. However, as noted, these types of analyses cannot necessarily attribute observed shifting trends to implementation of Medicare Part D. We did not observe major systematic trend decreases in Medicare FFS spending after the implementation of Part D. Several interpretations of this lack of findings are possible. First, by analyzing only one year post implementation, our analysis does not allow for sufficient time for large scale impacts of Part D on Medicare FFS to manifest. Second, it is also possible that impacts of Part D on Medicare FFS spending and utilization are not observable in the aggregate, and may instead occur only within selected subpopulations and/or once other factors have been controlled for in the analysis. Therefore, the next element in our "environmental scan" of Part D impact analyses focused on multivariate difference in difference modeling approach. These analyses, summarized in Section 5, are the most "refined" and are aimed at estimating changes in FFS spending and utilization, controlling for the many potential patient characteristics besides being a Part D enrollee.

SECTION 5
IMPACT OF PART D ON MEDICARE SPENDING 2005–2006

5.1 Introduction

The analysis of spending trends over time presented in Section 4 controlled for only a few beneficiary characteristics that might have a relationship to the likelihood of enrolling in Part D. This analysis was useful for identifying potentially major changes in Medicare FFS spending and utilization trends, acknowledging that such major trend departures may take many more years to manifest. It is also quite possible that impacts of Part D on Medicare FFS will not be observable at such a macro level, and instead may only be evident in certain target populations, for certain disease categories, and evident only when controlling for other factors. Therefore, we continued our investigation of the impact of Part D on Medicare FFS by conducting a series of more sensitive multivariate analyses.

We began this set of analyses by excluding the dual eligible population most likely to have had continuous drug coverage throughout the period. Of those beneficiaries who joined voluntarily there still could have been selection biases that would affect the spending trend comparison to the non-joiners. To control for selection effects in measuring the effect of Part D on total Medicare and inpatient spending we used a difference-in-difference modeling approach, controlling for population characteristics. In this approach, two years of data were analyzed, 2005, the year before Part D was implemented, and 2006, the implementation year. A simple comparison of two years can not reveal effects of the "treatment" of implementing Part D; there are many confounding changes over the years in addition to the implementation of Part D. There are differences from year-to-year in payment policies, payment levels and the fee-for-service population profile, as well as a difference between enrollees and non-enrollees, as well as whether or not Part D was in effect. The difference between the year-to-year differences is the effect that is to be measured. The analysis was done on a number of Medicare subpopulations, cross-sections of beneficiaries and panels of continuing beneficiaries. The results will be described after the formulation of the model is discussed.

The data contain two years of observations (2005, 2006). For each year there is a set of variables that are used as predictors of spending for that year. The dependent variable can be total expenditures or expenditures on a component of Medicare services. The predictor variables include a broad range of beneficiary characteristics that are known to affect spending and the variables indicating drug coverage.

For each prediction year, 2005 and 2006 the main predictor variables conceptually are:

1. Demographic variables

    a. 24 age/sex classes such as female60–64, female65–69, female70–74, etc. There are 12 groups for each sex category. The under-65 age categories also capture that a beneficiary is eligible by disability.
    b. Originally disabled. This is a marker for beneficiaries who are at least age 65, but who once had eligibility as a disabled beneficiary.

    These variables are used to capture spending not captured by the more clinical variables, which encompass many, but not all, medical conditions.

2. Diagnosis/Condition categories. These are the Hierarchical Condition Categories (HCCs) developed for CMS to predict costs for payment of Medicare Advantage (MA) plans. The HCCs used here capture the most important conditions for predicting spending in the Medicare population. These groupings are clusters of ICD-9-CM diagnosis codes that have been grouped by both clinical homogeneity and predicted cost implications. There are separate sets of these, one used to predicted Part A and B costs and the other for Part D costs. Because we are predicting Part A and B costs, the former set was used.

   For this modeling, the beneficiary diagnoses from the year prior to each prediction year were used. This is not related to the fact that the HCCs are being used this way in the payment system for MA plans; it is because the prevalence of diseases in the prediction years could be affected by the presence of the drug plan. This endogeneity of a variable that should be predicting as though Part D was not present is removed by using prior year diagnoses, 2004 to predict 2005 and 2005 to predict 2006.

   In order to use these variables effectively we restricted the study population to those beneficiaries who had been in fee-for-service Part A and B for 12 months of each diagnosis year. This provides full information on the whole sample.

3. End-stage Renal Disease

   a. ESRD in dialysis or transplant status
   b. ESRD in post-graft status

   ESRD is associated with very high costs for dialysis treatment and transplants. Even after a kidney transplant, those in post-graft status incur costs greater than that of beneficiaries with similar demographic and disease characteristics.

4. Long-term Institutionalized (LTI). This is a marker for a person considered a nursing home resident. Prior research has indicated that models for the community dwelling tend to over predict spending when applied to the LTI population. These people are costly to Medicare on average but use less Medicare covered care than people with similar disease constellations in the community. The operational definition is that used for the MA program. It draws on the nursing home MDS 90-day patient assessments to start a LTI period, and a discharge lasting at least 30 days to end the period. In this model it is the fraction of a year in LTI status.

5. Year_2006 is a marker differentiating 2006 from 2005. The average effect of policy and payment changes is captured here.

6. Part_D_enrollee is a control variable that is intended to capture differences in Medicare spending for the type of beneficiaries who decide to enroll from those who do not, which is not captured by the more explicit predictors. For people who are enrollees it is set to 1 in both years.

7. Part_D_enrollee_2006 is the variable that captures the effect of the program on spending for enrollees. It is set to 1 for enrollees only in 2006. It is important to be

aware that the population that is not enrolled in Part D does not necessarily have no drug coverage and may also be buying drugs completely out of pocket. The Part D variable and variables for other types of coverage do not distinguish people who are taking drugs from those who are not.

The model in skeleton form is:

$$
\begin{aligned}
\text{Spending} = \quad & (a_1 \times \text{demographic}_1 + a_2 \times \text{demographic}_2 + \ldots.) \times \text{Year\_2005} \\
& + (a_1 \times \text{demographic}_1 + a_2 \times \text{demographic}_2 + \ldots) \times \text{Year\_2006} \times m_d \\
& + (b_1 \times \text{HCC}_1 + b_2 \times \text{HCC}_2 + \ldots) \times \text{Year\_2005} \\
& + (b_1 \times \text{HCC}_1 + b_2 \times \text{HCC}_2 + \ldots) \times \text{Year\_2006} \times m_h \\
& + \text{other clinical variables in similar form} \\
& + (\text{lti}_1 \times \text{long-term institutionalized}) \times \text{Year\_2005} \\
& + (\text{lti}_1 \times \text{long-term institutionalized}) \times \text{Year\_2006} \times m_{\text{lti}} \\
& + t_1 \times \text{Year\_2006} \\
& + e_1 \times \text{Part\_D\_enrollee} \\
& + d_1 \times \text{Part\_D\_enrollee} \times \text{Year\_2006} \\
& + f_1 \times \text{Other drug coverage variables}
\end{aligned}
$$

The coefficients in the model, which are the incremental spending contributions of the variables, are designated a_i, b_i, et cetera. Coefficients with the same name are constrained to have the same value each time they appear. Coefficients that are constrained may have different effects in each of the years because the coefficients of variables, or the aggregates of related variables, are multiplied by a multiplier, m_i for 2006. This multiplier estimates a percentage change from the effects of the variables in 2005.

This approach differs from the more usual simple additive term for the "treatment" year. It allows groups of predictor variables to vary in their 2006 effects vs. 2005 effects as well as allowing a treatment year additive effect.

Conceptually, in a difference-in-difference regression analysis, if the equation pertaining to 2005 is subtracted from the equation for 2006, the difference is an equation in which terms that are identical in both years, like Part_D_enrollee, vanish. Terms that are similar, but different in magnitude, like the demographics or clinical terms, become the 2006–2005 differences for those terms. Terms that appear as non-zero in only one year remain in the difference equation, e.g., the year term and Part D enrollment in 2006.

The difference equation above that applies to non-enrollees is subtracted from the difference equation for the enrollees. There are some terms in this equation that have the same

coefficients for the Part D and non-Part D beneficiaries. These terms vanish from this difference. Such terms are those related to the demographic and clinical variable sets. In addition, the Year_2006 term applies equally to both groups and is differenced away. The only term that remains of the difference-in-difference process is $d_1 \times$ Part_D_enrollee $\times$ Year_2006, in which d_1 is the effect of actual enrollment in Part D in the implementation year. The magnitude of this term is the Part D effect sought, the treatment effect.

In the models estimated, the Part D effect has been allowed to vary by how many months a person was enrolled in 2006. There are separate Part D effects estimated for people with 12, 11, 10 … 1 month of enrollment. As will be seen, the greatest proportion of enrollees was enrolled 12 months, but many enrolled later and at the end of the extended open enrollment period. Both the characteristic of being an early or late enrollee and the duration of enrollment are captured.

5.2 Data

This analysis incorporated data on Medicare fee-for-service beneficiaries who were <u>not</u> low income by the definitions used by the program. Most of the low-income beneficiaries were auto-enrolled into the Part D program in 2006 and the enrollment was confounded with the time effect. The beneficiaries who were in the Part D category of "Deemed," based on State data for people receiving Medicaid or assistance with paying for Medicare are the vast majority of the low income population who receive a subsidy. There were too few people in the low-income non-enrollees to make a valid group to contrast utilization with. Their utilization of Part A and B services was also quite different from those who are not officially low income, making any use of this group as a contrast to determine the Part D effect a dubious effort.

The basic criteria used in defining the analytic populations for prediction years 2005 and 2006 are listed below. The term "base year" refers to the year prior to the prediction year.

1. Both Part A and B coverage for 12 months in the base and prediction year.

2. No MA plan enrollment in the base and prediction year.

3. No Medicare Secondary Payer status in either year.

4. No Deemed, other low-income subsidy status or Medicaid buy-in months.

These criteria were intended to be sure we have complete information on each beneficiary with respect to characteristics, such as diagnoses and spending.

The three populations used to estimate the equations presented here included two panel studies and a cross-section approach.

1. Beneficiaries with full information from 2004 through 2006, with no decedents in any year.

2. Beneficiaries with full information from 2004 through 2006, including decedents in 2006.

3. Beneficiaries with full information in 2004 and 2005 for the 2005 observations, and those with full information in 2005 and 2006 for the 2006 observations. Decedents in 2005 and 2006 were excluded.

The last populations allow people who were not in the 2004 full information sample, and thus not among those for whom we have 2005 observations in the panel studies, to enter the data for the 2006 observations if they have full 2005 information. This creates two cross-sections without an aging of the population. The exclusion of decedents from some of the analyses is done because many decedents have conditions that are too far advanced for a relatively brief period drug insurance to have an effect. Since they have relatively high Medicare costs they can distort the findings.

Data for the analyses were gathered from a variety of Medicare program sources. Eligibility and entitlement data were from the Denominator file, Enrollment data base, Management Information Integrated Repository (MIIR), and the Common Medicare Environment (CME). Spending data were from the claims for the 5% sample of Medicare beneficiaries. The Medicare Standard Analytical Files with supplements from the National Claims History 100% files were used.

5.3 Descriptive Statistics

In order to understand some of the characteristics of the regression analyses it is best to have a description of the populations in each of the samples. Note that the populations in the samples do not mirror the overall population profiled in the descriptive statistics in Section 3 of this report. There are also a number of salient differences that emerge among the samples in this analysis. **Table 5.1** describes the 5% panel of beneficiaries who had full information from 2004 and survived through 2006. Among the findings, we note that the average age of the beneficiaries is higher than the program mean because there are no entering 65-year old beneficiaries after January 2004. The 2005 mean of 74.1 rises to 75.1 in 2006, as expected. Higher age brackets gain numbers over the year. The population who are marked as originally disabled grows by about 9% as disabled beneficiaries age 64 move into the aged, originally disabled category. The LTI population is relatively small, but has a large percentage increase in 2006. There is no offset due to death in this sample. The spending variables show a much larger increase than would be observed in comparing two annual cross-sections of Medicare enrollment. This overall 20% increase is an important factor when looking at year-to-year changes. There is considerable variation in the rate of increase for different spending types. Inpatient spending increases 18% and is a large component of the mean. Physician and supplier services are another large component, and increase at 12%. There are much larger increases in the smaller components. Home health grew 37% and hospice, a very small component, grew at 197%.

We also found that beneficiaries with other creditable coverage (CC), including TRICARE (military health system), Veterans Health Care (VA), Federal Employee Health Benefits (FEHB) and State pharmacy assistance programs, are a substantial portion of the sample. These are a mixture of mostly secondary payers with some situations for which the CC program is primary. If a person uses the VA directly for some of their services, the VA would be the primary payer for these. Many people with CC also enrolled in Part D. This variable is

available only starting in 2006. A large portion of the sample, 30%, is part of the Retiree Drug Subsidy (RDS) program in which employers provide drug coverage and are directly subsidized by the Medicare program. If beneficiaries are enrolled in Part D and RDS they are counted in the RDS category. In the important Part D enrollment variables it may be seen that 34% of the sample enrolled in Part D. About 44% of these enrollees had 12 months of coverage. Enrollment continued to grow, with a notable number starting coverage in June. About 97% of the enrollees had at least 7 months of coverage.

Table 5.2 describes the panel that includes those who died in 2006. The total sample is about 4% larger when decedents are included. A few differences were noteworthy. As might be expected, the average age is a bit higher for this panel, as decedents are allowed into the sample. The year-to-year growth in the LTI population is lower, with the number in this group about 46% higher in 2005 when the 2006 decedents are present. The percentage increase in spending is 25% when the decedents in 2006 are present. There are no decedents in the 2005 observations, as this is a panel that has to live at least until January 1, 2006. The presence of decedents in 2006 makes the overall spending growth 5 percentage points higher. The inpatient spending growth is now 32% compared to 18%, reflecting high hospital use among decedents.

Next, **Table 5.3** describes the third sample that consists of two cross-sections, each of which has no decedents. This sample includes beneficiaries who have full information for 2004 through 2005 forming the 2005 observations and beneficiaries with full information for 2005 though 2006 forming the 2006 observations. The two populations are comparable in that both exclude decedents. There is no systematic aging of the populations due to tracking the same people over the two years. There is much overlap in the two populations, but new people enter in 2006 and some people are no longer present who were in the 2005 sample.

Table 5.1
Selected descriptive statistics
Panel study, non-LI, non-Medicaid, excluding decedents

Variable	Mean (2005)		Mean (2006)
Age	74.1		75.1
Female age groups	**Number (2005)**	**Number (2006)**	**% Change**
Female, 0–34 Years	537	450	−16%
Female, 35–44 Years	2,198	1,904	−13%
Female, 45–54 Years	6,739	6,165	−9%
Female, 55–59 Years	6,233	5,904	−5%
Female, 60–64 Years	8,386	7,880	−6%
Female, 65–69 Years	108,939	84,234	−23%
Female, 70–74 Years	123,995	125,582	1%
Female, 75–79 Years	114,943	118,664	3%
Female, 80–84 Years	88,281	94,885	7%
Female, 85–89 Years	45,604	53,775	18%
Female, 90–94 Years	16,291	21,047	29%
Female, 95 Years or Over	3,867	5,523	43%
Female, Total	526,013	526,013	
Male age groups	**Number (2005)**	**Number (2006)**	**% Change**
Male, 0–34 Years	1,066	900	−16%
Male, 35–44 Years	3,729	3,246	−13%
Male, 45–54 Years	10,592	9,762	−8%
Male, 55–59 Years	9,560	9,132	−4%
Male, 60–64 Years	11,316	10,882	−4%
Male, 65–69 Years	94,578	74,229	−22%
Male, 70–74 Years	103,821	106,212	2%
Male, 75–79 Years	86,230	91,271	6%
Male, 80–84 Years	57,115	63,781	12%
Male, 85–89 Years	24,227	29,918	23%
Male, 90–94 Years	6,395	8,774	37%
Male, 95 Years or Over	961	1,483	54%
Male, Total	409,590	409,590	
Other characteristics	**Number (2005)**	**Number (2006)**	**% Change**
Sample total	935,603	935,603	
Age ≥65, originally eligible by disability	47,426	51,500	9%
Long-term care institutionalized	3,793	6,287	66%
Dialysis or transplant status	2,946	3,655	24%
Post-graft status	1,171	1,257	7%

(continued)

Table 5.1 (continued)
Selected descriptive statistics
Panel study, non-LI, non-Medicaid, excluding decedents

Medicare spending	Mean ($) (2005)	Mean ($) (2006)	% Change
Physician/supplier	1,888	2,123	12%
Laboratory	98	109	11%
Durable Medical Equipment	175	212	21%
Inpatient	2,201	2,608	18%
Skilled Nursing Facility	270	434	60%
Hospital Outpatient	762	881	16%
Home Health	253	347	37%
Hospice	41	121	197%
Total	5,689	6,835	20%

Drug coverage	Number (2006)	% of Sample
Creditable coverage	165,717	17.7%
Retiree Drug Subsidy	278,676	29.8%
Part D coverage Months		
Month 1	663	0.1%
Month 2	569	0.1%
Month 3	649	0.1%
Month 4	5,597	0.6%
Month 5	794	0.1%
Month 6	991	0.1%
Month 7	55,770	6.0%
Month 8	35,509	3.8%
Month 9	23,453	2.5%
Month 10	20,214	2.2%
Month 11	36,190	3.9%
Month 12	141,692	15.1%
Total Part D coverage	322,091	34.4%

SOURCE: program: reg03a_chk

Table 5.2
Selected descriptive statistics
Panel study, non-LI, non-Medicaid, including decedents

Variable	Mean (2005)		Mean (2006)
Age	74.4		75.4
Female age groups	**Number (2005)**	**Number (2006)**	**% Change**
Female, 0–34 Years	542	455	−16%
Female, 35–44 Years	2,216	1,914	−14%
Female, 45–54 Years	6,819	6,237	−9%
Female, 55–59 Years	6,333	6,000	−5%
Female, 60–64 Years	8,576	8,050	−6%
Female, 65–69 Years	110,223	85,205	−23%
Female, 70–74 Years	126,277	127,659	1%
Female, 75–79 Years	118,365	121,862	3%
Female, 80–84 Years	92,892	99,334	7%
Female, 85–89 Years	50,110	58,404	17%
Female, 90–94 Years	19,224	24,403	27%
Female, 95 Years or Over	5,028	7,082	41%
Female, Total	546,605	546,605	
Male age groups	**Number (2005)**	**Number (2006)**	**% Change**
Male, 0–34 Years	1,073	906	−16%
Male, 35–44 Years	3,789	3,298	−13%
Male, 45–54 Years	10,800	9,951	−8%
Male, 55–59 Years	9,819	9,361	−5%
Male, 60–64 Years	11,702	11,241	−4%
Male, 65–69 Years	96,437	75,696	−22%
Male, 70–74 Years	106,906	109,081	2%
Male, 75–79 Years	90,480	95,313	5%
Male, 80–84 Years	61,729	68,389	11%
Male, 85–89 Years	27,660	33,710	22%
Male, 90–94 Years	8,036	10,782	34%
Male, 95 Years or Over	1,347	2,050	52%
Male, Total	429,778	429,778	
Other characteristics	**Number (2005)**	**Number (2006)**	**% Change**
Sample total	976,383	976,383	
Age ≥65, originally eligible by disability	50,254	54,444	8%
Long-term care institutionalized	5,532	7,523	36%
Dialysis or transplant status	3,781	4,173	10%
Post-graft status	1,219	1,279	5%

(continued)

Table 5.2 (continued)
Selected descriptive statistics
Panel study, non-LI, non-Medicaid, including decedents

Medicare spending	Mean ($) (2005)	Mean ($) (2006)	% Change
Physician/supplier	1,997	2,256	13%
Laboratory	101	111	10%
Durable Medical Equipment	194	221	14%
Inpatient	2,429	3,194	32%
Skilled Nursing Facility	335	528	58%
Hospital Outpatient	821	921	12%
Home Health	293	381	30%
Hospice	85	214	151%
Total	6,254	7,825	25%

Drug coverage	Number (2006)	% of Sample
Creditable coverage	168,276	17.2%
Retiree Drug Subsidy	289,685	29.7%
Part D coverage Months		
Month 1	1,891	0.2%
Month 2	1,853	0.2%
Month 3	1,946	0.2%
Month 4	6,835	0.7%
Month 5	2,034	0.2%
Month 6	2,160	0.2%
Month 7	56,734	5.8%
Month 8	36,343	3.7%
Month 9	24,208	2.5%
Month 10	20,875	2.1%
Month 11	36,759	3.8%
Month 12	141,693	14.5%
Total Part D coverage	333,331	34.1%

SOURCE: reg03b_chk

Table 5.3
Selected descriptive statistics
Cross-section study, non-LI, non-Medicaid, excluding decedents

Variable	Mean (2005)	Mean (2006)	
Age	74.0	74.1	
Female age groups	**Number (2005)**	**Number (2006)**	**% Change**
Female, 0–34 Years	1,237	1,178	−5%
Female, 35–44 Years	4,264	3,995	−6%
Female, 45–54 Years	10,987	10,606	−3%
Female, 55–59 Years	9,052	9,278	2%
Female, 60–64 Years	11,907	11,632	−2%
Female, 65–69 Years	123,895	119,294	−4%
Female, 70–74 Years	141,236	134,885	−4%
Female, 75–79 Years	133,061	127,380	−4%
Female, 80–84 Years	106,471	102,997	−3%
Female, 85–89 Years	59,776	59,814	0%
Female, 90–94 Years	24,112	24,171	0%
Female, 95 Years or Over	6,660	6,588	−1%
Female, Total	632,658	611,818	−3%
Male age groups	**Number (2005)**	**Number (2006)**	**% Change**
Male, 0–34 Years	2,129	2,081	−2%
Male, 35–44 Years	6,625	6,049	−9%
Male, 45–54 Years	16,514	15,834	−4%
Male, 55–59 Years	13,169	13,451	2%
Male, 60–64 Years	15,493	15,379	−1%
Male, 65–69 Years	107,608	104,059	−3%
Male, 70–74 Years	117,400	113,002	−4%
Male, 75–79 Years	98,954	95,642	−3%
Male, 80–84 Years	68,012	66,942	−2%
Male, 85–89 Years	31,054	31,610	2%
Male, 90–94 Years	9,358	9,398	0%
Male, 95 Years or Over	1,639	1,627	−1%
Male, Total	487,955	475,074	−3%
Other characteristics	**Number (2005)**	**Number (2006)**	**% Change**
Sample total	1,120,613	1,086,892	−3%
Age ≥65, originally eligible by disability	63,517	61,537	−3%
Long-term care institutionalized	16,239	15,528	−4%
Dialysis or transplant status	5,049	5,138	2%
Post-graft status	1,571	1,657	5%

(continued)

Table 5.3 (continued)
Selected descriptive statistics
Cross-section study, non-LI, non-Medicaid, excluding decedents

Medicare spending	Mean ($) (2005)	Mean ($) (2006)	% Change
Physician/supplier	1,996	2,094	5%
Laboratory	101	109	8%
Durable Medical Equipment	210	222	5%
Inpatient	2,617	2,660	2%
Skilled Nursing Facility	419	466	11%
Hospital Outpatient	853	913	7%
Home Health	318	347	9%
Hospice	106	127	20%
Total	6,620	6,938	5%

Drug coverage	Number (2006)	% of Sample
Creditable coverage	179,940	16.6%
Retiree Drug Subsidy	301,846	27.8%
Part D coverage Months		
Month 1	1,535	0.1%
Month 2	1,096	0.1%
Month 3	1,423	0.1%
Month 4	7,474	0.7%
Month 5	2,009	0.2%
Month 6	1,852	0.2%
Month 7	64,202	5.9%
Month 8	52,954	4.9%
Month 9	28,461	2.6%
Month 10	25,504	2.3%
Month 11	45,651	4.2%
Month 12	188,516	17.3%
Total Part D coverage	420,677	38.7%

SOURCE: program: reg03c_chk

There are number of important differences in the statistics between the two cross-sections and between these and the panels. The total number of beneficiaries in the 2005 cross-section sample is about 20% larger than in the no-decedent panel because these beneficiaries had to survive only through 2005 rather than through 2006 as well. The number in the 2006 cross-section is less than in the 2005 sample. The shrinkage of the sample in 2006 is due to a shift to the MA program from the fee-for-service program. The introduction of the drug program to both sectors, with payment idiosyncrasies in the MA program resulting in lower drug premiums, made the MA program attractive to many beneficiaries. This change alters the profile of the fee-for-service beneficiaries in 2006. There are disproportionately more LTI and Originally Disabled beneficiaries than in the panel. The spending increase from 2005 to 2006 is typical of that for cross-sections of the Medicare enrollment. The total spending rises by 5%. The inpatient spending rises only 2%. Spending changes will be affected by the selection into MA plans which changed in 2006. Finally, the Part D enrollment markers indicate that a higher proportion of the 2006 cross-section enrolled in Part D than in the panel, 39% compared to 34%. About 45% of the enrollees had 12 months of coverage.

5.4 Difference-in-Difference Regression Analyses

The equation to be estimated has a nonlinear form because coefficients were estimated that multiply other estimated coefficients. Because of this, the SAS module Proc Model, which can do nonlinear estimation, was used.[12] A simpler linear model was estimated first and the coefficients were used as starting values in the nonlinear form. The dependent spending variables were annualized when beneficiaries with less than a full year of fee-for-service eligibility were in the data. The observations with short data periods were then down-weighted in the regression itself. Annualized values are the same as average monthly values multiplied by 12.

5.4.1 Total Spending—Panel, No Decedents

The results of the regression on the panel of beneficiaries with full information from 2004 through 2006, no decedents, are in **Table 5.4**. Total spending increased 20% from 2005 to 2006 for these beneficiaries.

The first sets of variables are demographics. The age/sex coefficients are predicted incremental spending for the 2005 observations related to those characteristics. The age/sex coefficients, aside from the relatively small group of females in the lowest age group, rise till age group 65–69 is reached. At that point beneficiaries who are eligible solely by age and not because of disability or ESRD dominate and the coefficient falls. For those over 65 who were eligible as disabled, there is an add-on variable for the status of having been originally disabled. The variable PAR06_DEMOG is the multiplier indicating that, on average the demographic factor component of the prediction is 37% greater in 2006 than 2005.

There are 70 HCC disease groups in the model. The coefficients on these are also for 2005. Note that the pattern of coefficients is reasonable. When there are severity hierarchies, as in the cancers and diabetes, the HCCs higher in the table generally have higher coefficients. Some of these coefficients are relatively small and/or have small numbers of people in the

[12] SAS 9.2 was the statistical software used in this analysis.

disease category. HCC70, Muscular Dystrophy, has few people; the p-value of its coefficient is 0.105, which is not statistically significant at the 0.05 threshold. Dialysis status is also not significant. There is another variable picking up the people in ESRD status with chronic dialysis. These variables, among others, have been left in the regression as we are trying to get the best predictive power for the data, not test hypotheses for these control variables. The variable PAR06_HCC is the multiplier indicating that for 2006 the HCC component of the model would predict, on average, 20% more.

The remaining clinical predictors are for ESRD with dialysis or transplant status and for beneficiaries who are in post-kidney-graft status. Dialysis status predicts a very large increase in spending, more than $42,000 (PAR_ESRDDfrac) in these data. People who are post graft also have higher costs related to maintenance of the transplant or care for the damage done before the transplant, about $6,600 (PAR_ESRDGfrac). The increase in these coefficients for 2006 is 13% for the dialysis/transplant group and 4% for the post-graft group. The last control variable in this group is that for long-term care status. The positive increment for this variable is 13% greater in 2006, as indicated by the PAR06_LTI multiplier.

The time variable that is often used alone to capture differences between years is PAR_06 in the tables. This is an additive variable indicating an increment for a 2006 observation that has not been captured by the demographic and clinical factors. In this case, the year term is negative. Although it is subject to the presence of all the other terms in the model, one can think of it as compensating for some overprediction from the multiplier effects applied to the personal characteristic variable groups above.

A number of variables in this model relate to drug coverage. The first set of Part D variables are variables used in this kind of model to capture the effects of characteristics of people who elect to enroll in the treatment, Part D (PAR05_PTD_MOD_x). In this case we have attempted to capture many observable characteristics in the demographic and clinical variables. Unobserved characteristics differentiating enrollee and non-enrollee beneficiaries are captured here. The "person who will enroll" indicators are set to 1 for enrollees in both 2005 and 2006. Beneficiaries who enroll have been stratified into groups with different months of coverage in case these groups differ in unobserved characteristics. The group with 12 months of coverage would have known the information from their 2005 prior year diagnoses. Those who came in later would also have had information about conditions incident in 2006. There are relatively few beneficiaries with less than 7 months of coverage. The unobserved characteristics could include risk averseness, severity of illness, wealth, other sources of drugs or coverage not captured, etc. This beneficiary effect marks the incremental costs future joiners incurred in 2005 and contributes to the prediction for 2006 as well. The joiner effect is positive. Those who enrolled seem to have had a history of greater expenditures than those who did not join. It seems from this table that those who came in at the end of the open enrollment period may have been lower utilizers than the earlier enrollees and perhaps were torn between joining and the risk of paying a penalty for joining later. This analysis supports the indications in the previous sections that there is selection bias with Part D joiners having been more costly to the program prior to joining.

The treatment effect is the set of variables that mark the actual period of Part D enrollment in 2006 (PAR_PTD_MOD_x). These variables are in bold in the table. Concentrating on those with a long period of enrollment, the effect of Part D on people of the type who joined

Part D is negative. The weighted mean dollar effect for people with 10 to 12 months is -$227. Averaging over all the groups, some of which have positive Part D effects, the effect is -$163. This Part D effect, which applies to 34% of the sample, when averaged over the whole sample population would be -$56 per person. Other drug coverage has effects as well. In this sample, the beneficiaries who had creditable coverage had higher expenditures in general, $379 in 2005 but in 2006 they were only a net of $181 higher. This may reflect that some of them had overlapping Part D. The RDS indicator carries a higher expenditure prediction, $699, and RDS in 2006 is $595 higher than that. The RDS enrollment marker does not overlap with Part D coverage for any individual. Both these coverage indicators were imputed to be the same in 2005 as in 2006, for which we actually had data. The reason for this is that there is a much higher likelihood that people with these other forms of coverage had that coverage in both years, than that they had no such coverage in the prior year. The error of imputing is less than the error of allowing a lack of information to imply no coverage.

Though the treatment effect is negative in this analysis there is the possibility that some of this effect is regression to the mean. In this context, those who had been atypically expensive for their profile in 2005, and were motivated to enroll in Part D, would exhibit a reduced expenditure pattern in 2006. This regression to the mean pattern is frequently observed. In the panel study this effect may be more pointed. All of the beneficiaries in the 2005 panel sample have to be healthy enough to live through 2006. The survival bias in the panel study has created a relatively healthy 2005 cohort of which the atypically expensive beneficiaries were preferentially joiners, selection bias. The combination of relatively low 2005 average spending ($900 less than the cross-section sample in **Table 5.3**), rising steeply into 2006 (regressing up to the mean), combined with the joiners regressing down to the mean could result in the negative coefficients observed.

Table 5.4
Total Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	1,870,000.00	152,560,000	0.1547	132	2.86E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
12,351.6	0.1547	5,689	6,835	1,871,206	1,871,206

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	2,034	333.30	6.1	<.0001
PAR_F35_44	Female, 35–44 Years	1,627	165.50	9.83	<.0001
PAR_F45_54	Female, 45–54 Years	1,857	96.12	19.32	<.0001
PAR_F55_59	Female, 55–59 Years	2,302	97.97	23.5	<.0001
PAR_F60_64	Female, 60–64 Years	2,599	85.65	30.34	<.0001
PAR_F65_69	Female, 65–69 Years	1,869	36.98	50.53	<.0001
PAR_F70_74	Female, 70–74 Years	2,195	34.10	64.37	<.0001
PAR_F75_79	Female, 75–79 Years	2,649	34.18	77.49	<.0001
PAR_F80_84	Female, 80–84 Years	3,052	37.43	81.56	<.0001
PAR_F85_89	Female, 85–89 Years	3,325	45.15	73.65	<.0001
PAR_F90_94	Female, 90–94 Years	3,547	62.74	56.53	<.0001
PAR_F95_GT	Female, 95 Years or Over	3,505	109.30	32.08	<.0001
PAR_M0_34	Male, 0–34 Years	836	238.40	3.51	<.0001
PAR_M35_44	Male, 35–44 Years	1,237	129.40	9.56	<.0001
PAR_M45_54	Male, 45–54 Years	1,307	80.46	16.24	<.0001
PAR_M55_59	Male, 55–59 Years	1,808	81.38	22.21	<.0001
PAR_M60_64	Male, 60–64 Years	2,402	74.48	32.25	<.0001
PAR_M65_69	Male, 65–69 Years	1,866	38.73	48.19	<.0001
PAR_M70_74	Male, 70–74 Years	2,350	35.83	65.6	<.0001
PAR_M75_79	Male, 75–79 Years	2,805	37.78	74.24	<.0001
PAR_M80_84	Male, 80–84 Years	3,097	42.78	72.38	<.0001
PAR_M85_89	Male, 85–89 Years	3,243	54.29	59.74	<.0001
PAR_M90_94	Male, 90–94 Years	3,621	89.47	40.47	<.0001
PAR_M95_GT	Male, 95 Years or Over	3,771	205.50	18.35	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	1,044	39.46	26.45	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	1.37	0.04	34.67	<.0001

(continued)

Table 5.4 (continued)
Total Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	3,671	336.70	10.9	<.0001
PAR_HCC2	Septicemia/Shock	2,394	99.27	24.12	<.0001
PAR_HCC5	Opportunistic Infections	2,399	203.50	11.79	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	10,559	98.25	107.47	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	4,242	101.70	41.7	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	4,288	69.50	61.69	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	1,340	29.68	45.16	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	3,095	62.20	49.76	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	2,389	60.40	39.55	<.0001
PAR_HCC17	Diabetes with Acute Complications	1,590	241.90	6.57	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	1,559	70.19	22.21	<.0001
PAR_HCC19	Diabetes without Complication	1,002	24.63	40.68	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	2,505	119.40	20.99	<.0001
PAR_HCC25	End-Stage Liver Disease	3,333	235.50	14.15	<.0001
PAR_HCC26	Cirrhosis of Liver	1,162	178.00	6.53	<.0001
PAR_HCC27	Chronic Hepatitis	670	200.00	3.35	0.0008
PAR_HCC31	Intestinal Obstruction/ Perforation	1,395	75.45	18.49	<.0001
PAR_HCC32	Pancreatic Disease	1,675	92.34	18.14	<.0001
PAR_HCC33	Inflammatory Bowel Disease	1,445	98.15	14.73	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	2,935	103.90	28.25	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	2,332	41.37	56.37	<.0001
PAR_HCC44	Severe Hematological Disorders	5,713	101.20	56.46	<.0001
PAR_HCC45	Disorders of Immunity	3,795	101.20	37.5	<.0001
PAR_HCC51	Drug/Alcohol Psychosis	2,078	154.60	13.44	<.0001
PAR_HCC52	Drug/Alcohol Dependence	2,447	161.20	15.18	<.0001
PAR_HCC54	Schizophrenia	2,163	145.30	14.88	<.0001

(continued)

Table 5.4 (continued)
Total Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	2,074	53.39	38.84	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	5,759	256.00	22.49	<.0001
PAR_HCC68	Paraplegia	5,764	299.70	19.24	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	3,084	124.80	24.7	<.0001
PAR_HCC70	Muscular Dystrophy	818	504.90	1.62	0.105
PAR_HCC71	Polyneuropathy	1,861	44.86	41.49	<.0001
PAR_HCC72	Multiple Sclerosis	3,047	159.50	19.1	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	3,182	74.94	42.45	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	1,427	69.31	20.59	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	966	315.00	3.07	0.0022
PAR_HCC77	Respirator Dependence/Tracheostomy Status	6,802	315.40	21.56	<.0001
PAR_HCC78	Respiratory Arrest	3,904	398.40	9.8	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	2,027	58.94	34.38	<.0001
PAR_HCC80	Congestive Heart Failure	2,532	31.47	80.44	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,601	88.20	18.15	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	1,903	53.12	35.82	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	1,528	38.63	39.54	<.0001
PAR_HCC92	Specified Heart Arrhythmias	1,676	27.84	60.19	<.0001
PAR_HCC95	Cerebral Hemorrhage	1,880	168.60	11.15	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	1,466	50.43	29.08	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	2,033	106.20	19.15	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	1,747	233.30	7.49	<.0001
PAR_HCC104	Vascular Disease with Complications	3,402	69.63	48.87	<.0001
PAR_HCC105	Vascular Disease	1,778	28.64	62.08	<.0001
PAR_HCC107	Cystic Fibrosis	1,387	677.30	2.05	0.0407
PAR_HCC108	Chronic Obstructive Pulmonary Disease	2,090	28.24	74.02	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	2,403	129.90	18.5	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	1,031	155.60	6.63	<.0001

(continued)

Table 5.4 (continued)
Total Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	1,616	102.70	15.73	<.0001
PAR_HCC130	Dialysis Status	271	245.80	1.1	0.2706
PAR_HCC131	Renal Failure	2,082	48.86	42.62	<.0001
PAR_HCC132	Nephritis	824	170.50	4.83	<.0001
PAR_HCC148	Decubitus Ulcer of Skin	4,795	115.60	41.47	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	2,175	61.68	35.26	<.0001
PAR_HCC150	Extensive Third-Degree Burns	2,854	1779.90	1.6	0.1089
PAR_HCC154	Severe Head Injury	−204	787.00	−0.26	0.7951
PAR_HCC155	Major Head Injury	753	142.50	5.28	<.0001
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	2,628	84.04	31.28	<.0001
PAR_HCC158	Hip Fracture/Dislocation	2,373	78.83	30.1	<.0001
PAR_HCC161	Traumatic Amputation	4,726	325.00	14.54	<.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	1,705	53.77	31.7	<.0001
PAR_HCC174	Major Organ Transplant Status	4,852	266.10	18.24	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	2,833	135.30	20.94	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	3,486	235.80	14.78	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.20	0.01	210.09	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	42,388	279.40	151.71	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.13	0.01	140.49	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	6,625	368.20	17.99	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	1.04	0.08	13.28	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	2,861	216.20	13.23	<.0001
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	1.13	0.10	10.94	<.0001
PAR_Y06	Average increment for observation in 2006 over 2005	−643	109.00	−5.9	<.0001

(continued)

Table 5.4 (continued)
Total Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	1,621	480.30	3.38	0.0007
PAR05_PTD_MOD_2	2 months	1,084	518.40	2.09	0.0365
PAR05_PTD_MOD_3	3 months	2,265	485.50	4.66	<.0001
PAR05_PTD_MOD_4	4 months	479	167.40	2.86	0.0042
PAR05_PTD_MOD_5	5 months	1,477	439.00	3.37	0.0008
PAR05_PTD_MOD_6	6 months	1,001	393.10	2.55	0.0109
PAR05_PTD_MOD_7	7 months	631	58.56	10.77	<.0001
PAR05_PTD_MOD_8	8 months	612	70.67	8.66	<.0001
PAR05_PTD_MOD_9	9 months	1,101	84.83	12.98	<.0001
PAR05_PTD_MOD_10	10 months	1,290	90.82	14.21	<.0001
PAR05_PTD_MOD_11	11 months	1,313	70.15	18.71	<.0001
PAR05_PTD_MOD_12	12 months	1,061	42.37	25.04	<.0001

Parameter	Months enrolled in Part D. Variable marks person in 2006 only	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	−1,230	679.20	−1.81	0.0702
PAR_PTD_MOD_2	2 months	349	733.10	0.48	0.6342
PAR_PTD_MOD_3	3 months	−747	686.60	−1.09	0.2768
PAR_PTD_MOD_4	4 months	202	236.60	0.85	0.3935
PAR_PTD_MOD_5	5 months	300	620.80	0.48	0.6285
PAR_PTD_MOD_6	6 months	87	555.90	0.16	0.8756
PAR_PTD_MOD_7	7 months	258	82.78	3.12	0.0018
PAR_PTD_MOD_8	8 months	132	99.88	1.32	0.1853
PAR_PTD_MOD_9	9 months	−5	119.90	−0.04	0.9682
PAR_PTD_MOD_10	10 months	−385	128.40	−3	0.0027
PAR_PTD_MOD_11	11 months	−528	99.16	−5.33	<.0001
PAR_PTD_MOD_12	12 months	−317	59.77	−5.31	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	379	38.71	9.8	<.0001
PAR_CC	Person with creditable coverage in 2006	−198	54.07	−3.66	0.0002
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	699	34.02	20.55	<.0001
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	595	34.17	17.42	<.0001

SOURCE: program: reg03a

5.4.2 Inpatient Spending—Panel, No Decedents

Table 5.5 presents the regression result for the same sample as above, using inpatient spending as the dependent variable. In this inpatient spending model, the mean of the inpatient spending variable rose from $2,201 to $2,608, 18% from 2005 to 2006 (Table 5.1).

In this case, the demographic terms follow a pattern similar to the total spending coefficients. The multiplier on demographic predictors for 2006 over 2005, 1.14, adds 14% to the 2005 prediction. This is smaller than the 37% demographic add-on for 2006 total spending. The HCC disease group coefficients have a pattern somewhat different from that for the total spending equation because some diseases are not strongly linked to hospitalizations. The multiplier on the HCC contribution for 2006 indicates a 19% higher prediction than for 2005, similar to the percentage for total spending. The coefficient for ESRD with dialysis or transplant status is quite high, but much smaller than that for total spending. Dialysis captures a great deal of spending but is mostly an outpatient procedure. The multiplier for 2006 spending for this group indicates a 25% higher prediction for 2006. The post-graft term is about half of the one in total spending. The change for 2006 is actually a reduction by 4%. For inpatient spending the long-term institutional variable is very small and negative. It, and the multiplier for 2006, are not close to a reasonable statistical significance.

Among the time variables, we found the residual effect of moving from 2005 to 2006 is a negligible and insignificant $22 (p=.66).

Some findings for variables related to drug coverage were notable. As with the total spending case, the joiner effect is positive. The coefficients are rather similar except for a few small groups who were in for a few months. The treatment effect variables are very similar in pattern to those in the full spending model. The magnitude indicates that much of the total effect is captured here. The people in the longest three enrollment groups had an average effect of -$227. For inpatient spending it is -$213. For all the enrollees the effect on total spending was -$163; the effect on inpatient spending is -$103. Inpatient spending in 2005 was 39 percent of the total for this population. The -$213 Part D effect on inpatient spending is 94 percent of the -$227 decrease in total spending related to the longest three groups. For the whole group of enrollees, the -$163 is 63 percent of the change in total expenditures. In this sample, the creditable coverage effect was positive $158 but as in the case of total spending the net effect in 2006 is lower, $59. This again may reflect that some of them had overlapping Part D. The RDS indicator carries a higher inpatient expenditure prediction, $276, and RDS in 2006 is $216 higher than that. The RDS enrollment marker does not overlap with Part D coverage for any individual. As in all the models the 2005 values for CC and RDS were imputed from the 2006 values as a best approximation.

As with the discussion of the total spending model there is evidence of selection of costlier beneficiaries into the program. There is also the possibility of regression to the mean accounting for at least some of the savings attributed to Part D enrollment.

Table 5.5
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	1,870,000	67,936,487	0.0542	132	1.27E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
8,242.4	0.0541	2,201	2,608	1,871,206	1,871,206

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	932	247.00	3.77	0.0002
PAR_F35_44	Female, 35–44 Years	641	122.20	5.24	<.0001
PAR_F45_54	Female, 45–54 Years	524	70.92	7.39	<.0001
PAR_F55_59	Female, 55–59 Years	637	72.66	8.76	<.0001
PAR_F60_64	Female, 60–64 Years	909	63.19	14.39	<.0001
PAR_F65_69	Female, 65–69 Years	494	25.93	19.04	<.0001
PAR_F70_74	Female, 70–74 Years	688	23.79	28.94	<.0001
PAR_F75_79	Female, 75–79 Years	911	23.70	38.45	<.0001
PAR_F80_84	Female, 80–84 Years	1,068	25.54	41.79	<.0001
PAR_F85_89	Female, 85–89 Years	1,053	30.44	34.61	<.0001
PAR_F90_94	Female, 90–94 Years	969	43.55	22.25	<.0001
PAR_F95_GT	Female, 95 Years or Over	669	81.01	8.26	<.0001
PAR_M0_34	Male, 0–34 Years	242	175.90	1.37	0.1698
PAR_M35_44	Male, 35–44 Years	502	94.63	5.31	<.0001
PAR_M45_54	Male, 45–54 Years	571	57.41	9.95	<.0001
PAR_M55_59	Male, 55–59 Years	916	59.27	15.45	<.0001
PAR_M60_64	Male, 60–64 Years	1,231	55.39	22.22	<.0001
PAR_M65_69	Male, 65–69 Years	731	26.25	27.85	<.0001
PAR_M70_74	Male, 70–74 Years	997	25.17	39.6	<.0001
PAR_M75_79	Male, 75–79 Years	1,211	27.46	44.12	<.0001
PAR_M80_84	Male, 80–84 Years	1,323	31.28	42.29	<.0001
PAR_M85_89	Male, 85–89 Years	1,203	38.96	30.87	<.0001
PAR_M90_94	Male, 90–94 Years	1,190	65.21	18.25	<.0001
PAR_M95_GT	Male, 95 Years or Over	981	154.90	6.33	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	672	30.23	22.23	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	1.14	0.05	24.01	<.0001

(continued)

Table 5.5 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	1,002	225.30	4.45	<.0001
PAR_HCC2	Septicemia/Shock	1,249	66.54	18.78	<.0001
PAR_HCC5	Opportunistic Infections	908	136.20	6.67	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	1,569	62.58	25.07	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	1,113	67.76	16.43	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	788	45.92	17.17	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	197	19.73	9.96	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	1,314	41.63	31.57	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	995	40.42	24.61	<.0001
PAR_HCC17	Diabetes with Acute Complications	724	161.90	4.47	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	687	46.99	14.62	<.0001
PAR_HCC19	Diabetes without Complication	439	16.49	26.6	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	1,271	80.00	15.89	<.0001
PAR_HCC25	End-Stage Liver Disease	2,123	157.80	13.45	<.0001
PAR_HCC26	Cirrhosis of Liver	661	119.20	5.54	<.0001
PAR_HCC27	Chronic Hepatitis	86	133.90	0.64	0.5201
PAR_HCC31	Intestinal Obstruction/ Perforation	869	50.59	17.19	<.0001
PAR_HCC32	Pancreatic Disease	847	61.84	13.7	<.0001
PAR_HCC33	Inflammatory Bowel Disease	528	65.68	8.04	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	1,427	69.61	20.5	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	753	27.54	27.33	<.0001
PAR_HCC44	Severe Hematological Disorders	1,426	67.09	21.25	<.0001
PAR_HCC45	Disorders of Immunity	196	67.32	2.92	0.0035
PAR_HCC51	Drug/Alcohol Psychosis	1,263	103.60	12.2	<.0001
PAR_HCC52	Drug/Alcohol Dependence	1,754	108.10	16.22	<.0001
PAR_HCC54	Schizophrenia	1,338	97.39	13.74	<.0001

(continued)

Table 5.5 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	703	35.66	19.72	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	1,982	171.30	11.57	<.0001
PAR_HCC68	Paraplegia	2,419	200.60	12.06	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	998	83.48	11.95	<.0001
PAR_HCC70	Muscular Dystrophy	−213	338.00	−0.63	0.5287
PAR_HCC71	Polyneuropathy	646	29.95	21.56	<.0001
PAR_HCC72	Multiple Sclerosis	619	106.60	5.81	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	820	49.91	16.44	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	625	46.40	13.46	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	920	210.90	4.36	<.0001
PAR_HCC77	Respirator Dependence/Tracheostomy Status	5,368	212.30	25.28	<.0001
PAR_HCC78	Respiratory Arrest	2,404	266.80	9.01	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	1,040	39.57	26.29	<.0001
PAR_HCC80	Congestive Heart Failure	1,371	21.43	64	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,394	59.29	23.52	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	1,232	35.76	34.46	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	847	25.97	32.63	<.0001
PAR_HCC92	Specified Heart Arrhythmias	826	18.74	44.07	<.0001
PAR_HCC95	Cerebral Hemorrhage	1,274	113.00	11.28	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	577	33.74	17.1	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	616	71.02	8.68	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	455	156.20	2.92	0.0036
PAR_HCC104	Vascular Disease with Complications	1,839	46.90	39.22	<.0001
PAR_HCC105	Vascular Disease	819	19.22	42.6	<.0001
PAR_HCC107	Cystic Fibrosis	887	453.30	1.96	0.0503
PAR_HCC108	Chronic Obstructive Pulmonary Disease	926	18.94	48.9	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	1,192	87.00	13.7	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	703	104.20	6.75	<.0001

(continued)

Table 5.5 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	543	68.73	7.9	<.0001
PAR_HCC130	Dialysis Status	−1,866	164.80	−11.33	<.0001
PAR_HCC131	Renal Failure	952	32.77	29.04	<.0001
PAR_HCC132	Nephritis	394	114.10	3.45	0.0006
PAR_HCC148	Decubitus Ulcer of Skin	1,313	77.03	17.05	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	696	41.19	16.89	<.0001
PAR_HCC150	Extensive Third-Degree Burns	1,367	1,191.20	1.15	0.2513
PAR_HCC154	Severe Head Injury	8	526.90	0.02	0.9872
PAR_HCC155	Major Head Injury	114	95.39	1.2	0.2303
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	1,016	56.22	18.08	<.0001
PAR_HCC158	Hip Fracture/Dislocation	766	52.68	14.55	<.0001
PAR_HCC161	Traumatic Amputation	830	217.40	3.82	0.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	846	36.05	23.46	<.0001
PAR_HCC174	Major Organ Transplant Status	2,867	178.30	16.08	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	1,151	90.58	12.71	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	1,554	157.90	9.84	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.19	0.01	133.36	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	9,954	186.30	53.43	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.25	0.02	51.6	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	3,453	245.70	14.05	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	0.94	0.10	9.88	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	−74	144.10	−0.52	0.6064
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	2.32	4.74	0.49	0.6238
PAR_Y06	Average increment for observation in 2006 over 2005	−22	50.13	−0.43	0.6657

(continued)

Table 5.5 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents excluded

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	997	320.50	3.11	0.0019
PAR05_PTD_MOD_2	2 months	748	345.90	2.16	0.0306
PAR05_PTD_MOD_3	3 months	1,146	324.00	3.54	0.0004
PAR05_PTD_MOD_4	4 months	440	111.70	3.94	<.0001
PAR05_PTD_MOD_5	5 months	705	292.90	2.41	0.0161
PAR05_PTD_MOD_6	6 months	494	262.30	1.88	0.0595
PAR05_PTD_MOD_7	7 months	263	39.08	6.73	<.0001
PAR05_PTD_MOD_8	8 months	184	47.17	3.9	<.0001
PAR05_PTD_MOD_9	9 months	475	56.61	8.39	<.0001
PAR05_PTD_MOD_10	10 months	550	60.61	9.08	<.0001
PAR05_PTD_MOD_11	11 months	572	46.82	12.21	<.0001
PAR05_PTD_MOD_12	12 months	414	28.29	14.63	<.0001

Parameter	Months enrolled in Part D. Variable marks person in 2006 only.	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	−973	453.20	−2.15	0.0318
PAR_PTD_MOD_2	2 months	19	489.20	0.04	0.9687
PAR_PTD_MOD_3	3 months	−187	458.10	−0.41	0.6834
PAR_PTD_MOD_4	4 months	82	157.80	0.52	0.6037
PAR_PTD_MOD_5	5 months	154	414.30	0.37	0.7094
PAR_PTD_MOD_6	6 months	71	371.00	0.19	0.8473
PAR_PTD_MOD_7	7 months	115	55.24	2.08	0.0372
PAR_PTD_MOD_8	8 months	99	66.65	1.48	0.1377
PAR_PTD_MOD_9	9 months	−33	80.03	−0.41	0.6808
PAR_PTD_MOD_10	10 months	−270	85.68	−3.15	0.0016
PAR_PTD_MOD_11	11 months	−288	66.17	−4.36	<.0001
PAR_PTD_MOD_12	12 months	−186	39.88	−4.67	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	158	26.06	6.06	<.0001
PAR_CC	Person with creditable coverage in 2006	−99	36.41	−2.71	0.0067
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	276	22.74	12.13	<.0001
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	216	22.78	9.47	<.0001

Source program: reg03f

5.4.3 Total Spending—Panel, Including 2006 Decedents

The results of the regression on the panel of beneficiaries with full information from 2004 through 2006, including 2006 decedents, are shown in **Table 5.6**. As described in the section on descriptive statistics, this panel has more people and higher costs. Total spending increased 25 percent from $6,254 in 2005 to $7,825 in 2006 for these beneficiaries.

The demographic coefficients are somewhat larger in this sample as would be expected when decedents are added. The exception is the add-on for being originally disabled, which is slightly smaller. Because the decedents are only present in 2006 the multiplier converting 2005 coefficients to 2006 coefficients is larger, adding 64 percent to the demographic prediction.

The HCC disease groups generally have higher coefficients. Those for mental disorders are about the same as for the sample without decedents. This is likely because these HCCs are dominated by the under 65 population with a relatively low death rate. The multiplier variable PAR06_HCC, indicates an increase of 33 percent for 2006 rather than the 20 percent for the sample without decedents.

The coefficients for both the ESRD terms are slightly smaller when decedents are included as is the multiplier for 2006. For the post-graft group the multiplier term actually indicates a 9 percent drop for 2006. The long-term care status group is larger in both years when 2006 decedents are included. This is related to the higher proportion of decedents among beneficiaries in long-term care status. The cost implications are slightly smaller. In 2006 however, related to the high mortality rate of this group, the costs associated with this population are 26 percent less than in 2005. The nursing home patients who survive 2005 may be being dying relatively early in 2006 with reduced numbers of hospital admissions.

In this total spending model, the time variable PAR_06 that captures characteristics not in the model representing to account for spending change going to 2006, is negative as in the first sample, but is larger in magnitude. There are many other variables capturing the year-to-year increases in Medicare spending.

The variables related to drug coverage yielded interesting results. The coefficients characterizing people who would enroll in Part D are very different when the decedents are included. They are positive as in the other sample. However, there are selection effects that are reflected in the coefficients for number of Part D months. For the longer-term enrollees, from 7 to 12 months, the coefficients are considerably smaller than they are in the no-decedent model. On the other hand, the short-term enrollees exhibit coefficients that are considerably larger. The 2006 decedent group approximately doubles the number of people in these short term groups and they are apparently heavy utilizers in 2005. The number of beneficiaries in the longer term categories is only slightly increased. With the decedents increasing the coefficients in many components of the model, the coefficients for the long-term enrollees, dominated by non-decedents, are much smaller.

The treatment effect coefficients (in bold) indicating being an enrollee in 2006 are marked strongly by selection effects rather than causal ones. Overall, interpretation of this model is difficult, as the inclusion of decedents raises the average spending level of the sample and the coefficients in general. There are selection effects associated with the decedents as well. The

short-term enrollees, dominated by decedents, have very large positive coefficients associated with being in Part D; most are more than $10,000. The short Part D enrollment likely reflects the fact that many decedents are only alive for a short time and are expensive for that time. The numbers are dramatically different in the groups with few decedents. The coefficients for all groups enrolled 7 months or more are negative. Only the coefficients for the 10, 11 and 12 month groups are statistically significant. The negative coefficients have larger magnitude than those in the nondecedent model. This is likely best interpreted as an offset to the overall larger predictions related to the inclusion of decedents in the sample. These longer term enrollees are mostly the same people who were in the model with no decedents. The creditable coverage coefficient is negative in this population and the value for 2006 is much more negative. The RDS indicator is positive at about half the value it has without decedents. The 2006 value is slightly less. Overall, interpretation of this model is difficult, as the inclusion of decedents has a profound effect throughout the coefficient set. The variables indicating months of Part D enrollment contain such different proportions of decedents that it becomes apparent that the length of enrollment in Part D is correlated with the months alive in 2006 and average monthly expenditures. Lumping all enrollees together in one indicator would just mask the problem.

Table 5.6
Total Medicare Payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	1,950,000	2.24E+08	0.158	132	4.37E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
14,956.1	0.158	6,254	7,825	1,952,766	1,931,752

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	2,278	358.00	6.36	<.0001
PAR_F35_44	Female, 35–44 Years	1,848	179.00	10.33	<.0001
PAR_F45_54	Female, 45–54 Years	2,170	104.50	20.76	<.0001
PAR_F55_59	Female, 55–59 Years	2,604	105.70	24.64	<.0001
PAR_F60_64	Female, 60–64 Years	2,927	92.23	31.74	<.0001
PAR_F65_69	Female, 65–69 Years	2,407	42.29	56.93	<.0001
PAR_F70_74	Female, 70–74 Years	2,701	39.13	69.04	<.0001
PAR_F75_79	Female, 75–79 Years	3,135	38.66	81.08	<.0001
PAR_F80_84	Female, 80–84 Years	3,574	41.49	86.15	<.0001
PAR_F85_89	Female, 85–89 Years	3,955	49.44	80	<.0001
PAR_F90_94	Female, 90–94 Years	4,338	67.18	64.58	<.0001
PAR_F95_GT	Female, 95 Years or Over	4,677	111.70	41.87	<.0001
PAR_M0_34	Male, 0–34 Years	1,209	257.10	4.7	<.0001
PAR_M35_44	Male, 35–44 Years	1,732	139.60	12.41	<.0001
PAR_M45_54	Male, 45–54 Years	1,801	87.61	20.55	<.0001
PAR_M55_59	Male, 55–59 Years	2,312	87.93	26.29	<.0001
PAR_M60_64	Male, 60–64 Years	2,861	80.26	35.64	<.0001
PAR_M65_69	Male, 65–69 Years	2,481	43.56	56.97	<.0001
PAR_M70_74	Male, 70–74 Years	2,986	40.33	74.05	<.0001
PAR_M75_79	Male, 75–79 Years	3,511	42.59	82.45	<.0001
PAR_M80_84	Male, 80–84 Years	3,921	48.41	81	<.0001
PAR_M85_89	Male, 85–89 Years	4,227	60.45	69.93	<.0001
PAR_M90_94	Male, 90–94 Years	4,896	95.38	51.34	<.0001
PAR_M95_GT	Male, 95 Years or Over	5,276	200.90	26.27	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	987	41.05	24.04	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	1.64	0.05	35.75	<.0001

(continued)

Table 5.6 (continued)
Total Medicare Payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	3,464	375.00	9.24	<.0001
PAR_HCC2	Septicemia/Shock	3,296	106.40	30.99	<.0001
PAR_HCC5	Opportunistic Infections	2,575	220.90	11.65	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	12,895	104.50	123.38	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	5,579	109.10	51.13	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	4,749	76.53	62.06	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	1,331	33.08	40.22	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	3,279	68.16	48.11	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	2,409	66.66	36.13	<.0001
PAR_HCC17	Diabetes with Acute Complications	2,045	267.50	7.64	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	1,641	78.28	20.96	<.0001
PAR_HCC19	Diabetes without Complication	1,017	27.45	37.04	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	3,512	125.30	28.02	<.0001
PAR_HCC25	End-Stage Liver Disease	4,778	251.00	19.04	<.0001
PAR_HCC26	Cirrhosis of Liver	1,718	193.60	8.88	<.0001
PAR_HCC27	Chronic Hepatitis	615	223.00	2.76	0.0058
PAR_HCC31	Intestinal Obstruction/ Perforation	1,605	82.46	19.47	<.0001
PAR_HCC32	Pancreatic Disease	1,613	101.70	15.86	<.0001
PAR_HCC33	Inflammatory Bowel Disease	1,392	109.30	12.74	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	2,728	114.50	23.83	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	2,251	45.99	48.95	<.0001
PAR_HCC44	Severe Hematological Disorders	6,384	108.80	58.69	<.0001
PAR_HCC45	Disorders of Immunity	4,477	109.80	40.78	<.0001
PAR_HCC51	Drug/Alcohol Psychosis	2,058	167.90	12.26	<.0001
PAR_HCC52	Drug/Alcohol Dependence	2,382	177.70	13.41	<.0001
PAR_HCC54	Schizophrenia	2,080	162.10	12.83	<.0001

(continued)

Table 5.6 (continued)
Total Medicare Payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	2,047	59.15	34.6	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	6,146	276.00	22.27	<.0001
PAR_HCC68	Paraplegia	5,855	328.10	17.85	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	3,190	136.90	23.3	<.0001
PAR_HCC70	Muscular Dystrophy	710	560.20	1.27	0.2052
PAR_HCC71	Polyneuropathy	1,786	49.62	36	<.0001
PAR_HCC72	Multiple Sclerosis	2,802	178.10	15.73	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	3,320	81.09	40.94	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	1,584	76.20	20.79	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	1,802	337.80	5.33	<.0001
PAR_HCC77	Respirator Dependence/Tracheostomy Status	10,083	337.20	29.9	<.0001
PAR_HCC78	Respiratory Arrest	5,039	428.10	11.77	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	2,640	63.88	41.32	<.0001
PAR_HCC80	Congestive Heart Failure	2,834	34.67	81.73	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,732	96.14	18.01	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	1,775	59.00	30.09	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	1,376	42.80	32.16	<.0001
PAR_HCC92	Specified Heart Arrhythmias	1,738	30.71	56.59	<.0001
PAR_HCC95	Cerebral Hemorrhage	2,265	184.00	12.31	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	1,656	55.32	29.93	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	2,253	115.10	19.58	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	1,687	257.40	6.55	<.0001
PAR_HCC104	Vascular Disease with Complications	3,604	76.25	47.27	<.0001
PAR_HCC105	Vascular Disease	1,827	31.55	57.91	<.0001
PAR_HCC107	Cystic Fibrosis	2,370	755.60	3.14	0.0017
PAR_HCC108	Chronic Obstructive Pulmonary Disease	2,318	31.21	74.27	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	3,431	136.70	25.09	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	1,121	168.50	6.65	<.0001

(continued)

Table 5.6 (continued)
Total Medicare Payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	1,521	113.60	13.39	<.0001
PAR_HCC130	Dialysis Status	5,642	255.70	22.06	<.0001
PAR_HCC131	Renal Failure	2,759	53.24	51.82	<.0001
PAR_HCC132	Nephritis	645	189.60	3.4	0.0007
PAR_HCC148	Decubitus Ulcer of Skin	5,349	121.30	44.1	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	2,366	67.58	35.01	<.0001
PAR_HCC150	Extensive Third-Degree Burns	9,598	1983.90	4.84	<.0001
PAR_HCC154	Severe Head Injury	−595	868.20	−0.69	0.4928
PAR_HCC155	Major Head Injury	957	156.20	6.13	<.0001
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	2,808	91.51	30.69	<.0001
PAR_HCC158	Hip Fracture/Dislocation	2,339	85.67	27.3	<.0001
PAR_HCC161	Traumatic Amputation	4,880	349.40	13.97	<.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	1,575	59.18	26.62	<.0001
PAR_HCC174	Major Organ Transplant Status	5,926	292.60	20.25	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	3,049	145.00	21.03	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	3,914	252.30	15.52	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.33	0.01	212.76	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	41,419	298.50	138.78	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.11	0.01	120.46	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	6,402	436.60	14.66	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	0.91	0.09	10.03	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	2,506	217.80	11.51	<.0001
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	0.74	0.10	7.28	<.0001
PAR_Y06	Average increment for observation in 2006 over 2005	−1,468	154.90	−9.48	<.0001

(continued)

Table 5.6 (continued)
Total Medicare Payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	8,582	345.50	24.84	<.0001
PAR05_PTD_MOD_2	2 months	7,535	349.10	21.59	<.0001
PAR05_PTD_MOD_3	3 months	6,987	340.70	20.51	<.0001
PAR05_PTD_MOD_4	4 months	1,227	183.70	6.68	<.0001
PAR05_PTD_MOD_5	5 months	4,389	333.20	13.17	<.0001
PAR05_PTD_MOD_6	6 months	4,057	323.30	12.55	<.0001
PAR05_PTD_MOD_7	7 months	−8	69.90	−0.11	0.9088
PAR05_PTD_MOD_8	8 months	6	84.27	0.08	0.9386
PAR05_PTD_MOD_9	9 months	487	100.90	4.83	<.0001
PAR05_PTD_MOD_10	10 months	675	108.00	6.25	<.0001
PAR05_PTD_MOD_11	11 months	618	83.90	7.36	<.0001
PAR05_PTD_MOD_12	12 months	280	50.48	5.55	<.0001

Parameter	Months enrolled in Part D. Variable marks person in 2006 only.	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	8,364	592.30	14.12	<.0001
PAR_PTD_MOD_2	2 months	13,795	592.20	23.29	<.0001
PAR_PTD_MOD_3	3 months	13,427	555.70	24.16	<.0001
PAR_PTD_MOD_4	4 months	1,756	266.40	6.59	<.0001
PAR_PTD_MOD_5	5 months	14,156	511.60	27.67	<.0001
PAR_PTD_MOD_6	6 months	10,431	482.50	21.62	<.0001
PAR_PTD_MOD_7	7 months	−84	99.14	−0.85	0.3963
PAR_PTD_MOD_8	8 months	−155	119.50	−1.3	0.1933
PAR_PTD_MOD_9	9 months	−104	143.00	−0.73	0.4656
PAR_PTD_MOD_10	10 months	−579	153.00	−3.78	0.0002
PAR_PTD_MOD_11	11 months	−1,032	118.80	−8.69	<.0001
PAR_PTD_MOD_12	12 months	−1,100	71.57	−15.37	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	−324	45.86	−7.05	<.0001
PAR_CC	Person with creditable coverage in 2006	−678	64.67	−10.48	<.0001
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	328	40.00	8.21	<.0001
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	−56	40.89	−1.37	0.1691

SOURCE: program: reg03b

5.4.4 Inpatient Spending—Panel, Including 2006 Decedents

Table 5.7 presents the regression result for the same sample as above, where the dependent variable is inpatient spending. The pattern of coefficients for inpatient spending parallels the pattern for total spending. Some of the disease coefficients have the same relationship to total spending as in the comparison of the two spending types when decedents were omitted. The Part D treatment effect coefficients are compromised in a similar way as in the total spending model for this population. For this reason, a detailed discussion of the regression results will not be given. The analysis applied to **Table 5.6** applies to this result as well.

Table 5.7
Inpatient Medicare payments 2005 and 2006
Panel study, non-LI, no Medicaid, decedents included

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	1,950,000	113,070,000	0.0597		2.21E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
10,633.3	0.0597	2,429	3,194	1,952,766	1,931,752

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	962	278.00	3.46	0.0005
PAR_F35_44	Female, 35–44 Years	677	138.20	4.9	<.0001
PAR_F45_54	Female, 45–54 Years	640	80.71	7.93	<.0001
PAR_F55_59	Female, 55–59 Years	767	82.13	9.34	<.0001
PAR_F60_64	Female, 60–64 Years	1,053	71.18	14.8	<.0001
PAR_F65_69	Female, 65–69 Years	751	31.27	24.03	<.0001
PAR_F70_74	Female, 70–74 Years	922	28.75	32.08	<.0001
PAR_F75_79	Female, 75–79 Years	1,135	28.29	40.12	<.0001
PAR_F80_84	Female, 80–84 Years	1,313	29.97	43.81	<.0001
PAR_F85_89	Female, 85–89 Years	1,337	34.80	38.43	<.0001
PAR_F90_94	Female, 90–94 Years	1,328	47.51	27.95	<.0001
PAR_F95_GT	Female, 95 Years or Over	1,195	82.96	14.41	<.0001
PAR_M0_34	Male, 0–34 Years	372	198.70	1.87	0.061
PAR_M35_44	Male, 35–44 Years	740	106.70	6.93	<.0001
PAR_M45_54	Male, 45–54 Years	789	65.18	12.11	<.0001
PAR_M55_59	Male, 55–59 Years	1,121	66.69	16.81	<.0001
PAR_M60_64	Male, 60–64 Years	1,407	62.01	22.69	<.0001
PAR_M65_69	Male, 65–69 Years	1,003	31.20	32.15	<.0001
PAR_M70_74	Male, 70–74 Years	1,291	29.85	43.25	<.0001
PAR_M75_79	Male, 75–79 Years	1,561	32.81	47.56	<.0001
PAR_M80_84	Male, 80–84 Years	1,732	37.46	46.23	<.0001
PAR_M85_89	Male, 85–89 Years	1,718	45.14	38.06	<.0001
PAR_M90_94	Male, 90–94 Years	1,834	70.51	26.01	<.0001
PAR_M95_GT	Male, 95 Years or Over	1,885	154.80	12.17	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	650	33.39	19.45	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	1.43	0.06	24.12	<.0001

(continued)

Table 5.7 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	1,019	247.10	4.12	<.0001
PAR_HCC2	Septicemia/Shock	1,781	70.26	25.34	<.0001
PAR_HCC5	Opportunistic Infections	1,170	145.10	8.06	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	2,279	64.32	35.44	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	1,570	71.26	22.03	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	1,012	49.75	20.34	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	191	21.65	8.83	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	1,345	44.89	29.98	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	960	43.85	21.9	<.0001
PAR_HCC17	Diabetes with Acute Complications	964	176.10	5.47	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	700	51.58	13.58	<.0001
PAR_HCC19	Diabetes without Complication	430	18.10	23.74	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	1,734	82.46	21.03	<.0001
PAR_HCC25	End-Stage Liver Disease	2,950	165.60	17.81	<.0001
PAR_HCC26	Cirrhosis of Liver	909	127.20	7.14	<.0001
PAR_HCC27	Chronic Hepatitis	104	146.90	0.71	0.4786
PAR_HCC31	Intestinal Obstruction/ Perforation	894	54.35	16.45	<.0001
PAR_HCC32	Pancreatic Disease	742	66.98	11.08	<.0001
PAR_HCC33	Inflammatory Bowel Disease	527	71.94	7.32	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	1,251	75.48	16.57	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	694	30.18	23.01	<.0001
PAR_HCC44	Severe Hematological Disorders	1,840	70.98	25.93	<.0001
PAR_HCC45	Disorders of Immunity	537	71.58	7.5	<.0001
PAR_HCC51	Drug/Alcohol Psychosis	1,165	110.50	10.54	<.0001
PAR_HCC52	Drug/Alcohol Dependence	1,634	117.10	13.96	<.0001
PAR_HCC54	Schizophrenia	1,171	106.80	10.97	<.0001

(continued)

Table 5.7 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	652	38.88	16.77	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	2,086	181.40	11.5	<.0001
PAR_HCC68	Paraplegia	2,339	216.10	10.82	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	1,063	89.97	11.81	<.0001
PAR_HCC70	Muscular Dystrophy	−307	368.60	−0.83	0.4051
PAR_HCC71	Polyneuropathy	581	32.57	17.83	<.0001
PAR_HCC72	Multiple Sclerosis	461	117.20	3.94	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	807	53.04	15.21	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	643	50.16	12.82	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	1,479	222.00	6.66	<.0001
PAR_HCC77	Respirator Dependence/Tracheostomy Status	7,777	224.60	34.62	<.0001
PAR_HCC78	Respiratory Arrest	3,252	282.50	11.51	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	1,415	42.34	33.42	<.0001
PAR_HCC80	Congestive Heart Failure	1,448	23.46	61.73	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,366	63.59	21.47	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	1,112	39.19	28.38	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	694	28.31	24.53	<.0001
PAR_HCC92	Specified Heart Arrhythmias	820	20.40	40.19	<.0001
PAR_HCC95	Cerebral Hemorrhage	1,472	121.20	12.14	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	642	36.41	17.63	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	701	75.62	9.27	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	419	169.30	2.48	0.0133
PAR_HCC104	Vascular Disease with Complications	1,857	50.62	36.68	<.0001
PAR_HCC105	Vascular Disease	803	20.88	38.45	<.0001
PAR_HCC107	Cystic Fibrosis	1,587	498.80	3.18	0.0015
PAR_HCC108	Chronic Obstructive Pulmonary Disease	998	20.73	48.11	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	1,778	89.96	19.77	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	713	110.80	6.43	<.0001

(continued)

Table 5.7 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents included

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	474	74.75	6.34	<.0001
PAR_HCC130	Dialysis Status	1,882	167.70	11.22	<.0001
PAR_HCC131	Renal Failure	1,347	35.26	38.2	<.0001
PAR_HCC132	Nephritis	244	125.00	1.95	0.0507
PAR_HCC148	Decubitus Ulcer of Skin	1,587	79.27	20.02	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	793	44.39	17.87	<.0001
PAR_HCC150	Extensive Third-Degree Burns	7,628	1,308.40	5.83	<.0001
PAR_HCC154	Severe Head Injury	−89	569.00	−0.16	0.8762
PAR_HCC155	Major Head Injury	275	102.70	2.68	0.0075
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	1,040	60.08	17.31	<.0001
PAR_HCC158	Hip Fracture/Dislocation	711	56.26	12.63	<.0001
PAR_HCC161	Traumatic Amputation	1,245	229.80	5.42	<.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	724	38.99	18.56	<.0001
PAR_HCC174	Major Organ Transplant Status	3,718	193.40	19.22	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	1,113	95.21	11.69	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	1,775	165.90	10.7	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.49	0.01	128.28	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	9,126	207.90	43.9	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.19	0.03	38.37	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	3,463	310.20	11.17	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	0.72	0.11	6.63	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	−497	154.50	−3.22	0.0013
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	2.78	0.91	3.07	0.0021
PAR_Y06	Average increment for observation in 2006 over 2005	−157	79.56	−1.97	0.0483

(continued)

Table 5.7 (continued)
Inpatient Medicare payments 2005 and 2006
Panel-study, non-LI, no Medicaid, decedents included

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	4,132	245.60	16.82	<.0001
PAR05_PTD_MOD_2	2 months	3,396	248.20	13.69	<.0001
PAR05_PTD_MOD_3	3 months	3,075	242.20	12.69	<.0001
PAR05_PTD_MOD_4	4 months	759	130.60	5.81	<.0001
PAR05_PTD_MOD_5	5 months	1,796	236.90	7.58	<.0001
PAR05_PTD_MOD_6	6 months	1,581	229.90	6.88	<.0001
PAR05_PTD_MOD_7	7 months	−16	49.70	−0.33	0.7441
PAR05_PTD_MOD_8	8 months	−70	59.92	−1.17	0.2408
PAR05_PTD_MOD_9	9 months	199	71.73	2.78	0.0054
PAR05_PTD_MOD_10	10 months	290	76.78	3.77	0.0002
PAR05_PTD_MOD_11	11 months	277	59.66	4.64	<.0001
PAR05_PTD_MOD_12	12 months	89	35.90	2.47	0.0136

Parameter	Months enrolled in Part D. Variable marks person in 2006 only.	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	7,167	421.10	17.02	<.0001
PAR_PTD_MOD_2	2 months	10,395	421.00	24.69	<.0001
PAR_PTD_MOD_3	3 months	9,549	395.00	24.17	<.0001
PAR_PTD_MOD_4	4 months	1,135	189.30	6	<.0001
PAR_PTD_MOD_5	5 months	9,466	363.70	26.03	<.0001
PAR_PTD_MOD_6	6 months	6,604	343.00	19.25	<.0001
PAR_PTD_MOD_7	7 months	−258	70.48	−3.67	0.0002
PAR_PTD_MOD_8	8 months	−242	84.94	−2.85	0.0044
PAR_PTD_MOD_9	9 months	−262	101.70	−2.58	0.0099
PAR_PTD_MOD_10	10 months	−579	108.80	−5.32	<.0001
PAR_PTD_MOD_11	11 months	−805	84.48	−9.53	<.0001
PAR_PTD_MOD_12	12 months	−873	50.88	−17.15	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	−144	32.90	−4.37	<.0001
PAR_CC	Person with creditable coverage in 2006	−585	46.42	−12.61	<.0001
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	124	28.47	4.36	<.0001
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	−217	29.06	−7.46	<.0001

SOURCE: program: reg03f.

5.4.5 Total Spending—Cross-Sections Excluding Decedents

The sample for this analysis consists of two cross-sections, neither of which has decedents. The 2005 observations are for individuals with full information for 2004 and 2005. The 2006 observations are for individuals with full information for 2005 and 2006. Unlike the panel samples, there is no requirement for sample members to be in the data from 2004 through 2006. As mentioned in the section on descriptive statistics, an interesting characteristic of this sample is that the 2006 sample is smaller than the 2005 sample. Analysis of the full 5 percent data for these years shows that movement from the fee-for-service part of the program to the MA part is responsible.

As is noted in the descriptive section, the year-to-year changes are not related to the aging and related increased morbidity of the population. There could however, be some change in the clinical profile of the fee-for-service population related to the increase in enrollment in MA plans that also offer drug benefits, often at a lower premium.

In **Table 5.8** the results of the cross-sectional analysis are presented. The mean spending for the 2005 sample is about $1,000 higher than that for the 2005 panel sample because this group does not have to live to the end of 2006 to be included in 2005. The mean for the 2006 segment of the sample is only $100 higher than the 2006 panel sample.

The demographic coefficients are somewhat larger for 2005 than in the panel analysis. The survival requirement, a marker for good health, is not as stringent in this sample. In the cross-section the 2005 sample only has to live through 2005, not through 2006, as in the panel. The multiplier containing the percent increase in the demographic prediction for 2006 adds only 5 percent, the same as the overall spending increase. It was 37 percent in the panel sample. The HCC coefficients are larger for 2005. The multiplier term for 2006 adds 4 percent to the predictors based on disease, much less than the 20 percent for the aging panel sample. The ESRD dialysis/transplant 2005 coefficient is higher, consonant with the rest of the coefficient pattern. The multiplier adds 4 percent for 2006 rather than 13 percent in the panel study. The post-graft 2005 coefficient is slightly lower than it was in the panel. But the multiplier for 2006 is slightly higher, adding 6 percent rather than 5 percent. LTI has a 2005 coefficient of $1,404, whereas the panel LTI beneficiaries had $2,861. The 2006 multiplier on this lower coefficient adds 32 percent to the 2005 number however. The panel multiplier added 13 percent. Since the average spending is higher in the 2005 cross-section (**Table 5.3**) than in the panel sample (**Table 5.1**) it is interesting that the increment associated with LTI is smaller than in the panel regression.

The time variable, marking an additive change unrelated to the beneficiary characteristics captured above, is -$778 compared to -$643 in the panel study. With all the control variables in the model the additive variable for Year 2006 has been consistently negative.

The coefficients for variables marking people who joined Part D are quite different in the cross-section study than in the panel study. There are no decedents in this sample. There are very large 2005 coefficients marking people who joined late in 2006. There are relatively few people joining in the late months; there are no new Medicare enrollees in the sample. (New Medicare enrollees would not have prior year diagnosis data.)These people may have been unwilling or unable to enroll at the beginning but may have been willing to pay a penalty to join late. The

bulk of the enrollees in the 10–12 month categories have very small coefficients characterizing them as different from similar beneficiaries who did not enroll. There are negative coefficients for those who enrolled toward the end of the open enrollment. These people seem to be the people who decided not to risk not having the coverage or paying a penalty. They have relatively small positive coefficients in some tables and negative coefficients in this one.

The treatment effect here is at odds with that in the panel study. The latter study showed negative effects for the 10–12 month enrollees. This cross-section approach shows substantial positive effects for all groups enrolled for at least 7 months. In parallel with the discussion for the panel study, the 10–12 month group has an average treatment effect of $823 while the overall average is $987. The equivalent panel numbers were -$227 and -$163. Spreading the effect over the 2006 sample population is equivalent to increased spending of $382 per person.

Other drug coverage effects are a negative coefficient on 2005 creditable coverage, -$755, with a small net positive in 2006, $153. The RDS indicator is a small negative in 2005, -$87, but is a net $562 in 2006.

The issue of selection bias in the panel studies differs from the cross-section study. The concept of regression to the mean holds when observing the same people over time. In this case there is a mix of different, and on average, younger people entering the second year of the cross-section. All of the beneficiaries in the 2005 panel sample had to be healthy enough to live through 2006. In the 2005 cross-section sample the people have to live only through 2005. The average 2005 cross-section cost is over $900 more in the cross-section than in the healthier 2005 panel. The change in average costs to 2006 shows only a typical growth of 5 percent. This is far less than the 20 percent for the healthy panel becoming more typical.

Because the cross-section samples have a smaller survival bias than the panels and both years have the same survival bias as constructed, there is a smaller cost differential between costly beneficiaries who became joiners and the rest of the cohort—small 2005 joiner coefficients. The treatment effect coefficients for Part D enrollees in 2006 are strongly positive, however. Though regression to the mean may still apply to part of this sample it is not of the same order of magnitude as when an entire cohort was followed. In this case, with a more typical group in the base year, the positive coefficients for the joiners may be a marker for people who have more information than the model can capture. In both the panel study and the cross-section the treatment coefficients become more positive the later the beneficiary enrolls during the normal enrollment period. In this case, in which a regression to the mean effect is not so important, the coefficients are all positive, as opposed to moving from negative to positive. In both studies there is indication of an incentive to enroll with adverse information.

Table 5.8
Total Medicare Payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	2,210,000.00	1.79E+08	0.1736	132	3.95E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
13,370	0.1736	6,620	6,938	2,207,505	2,207,505

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	2,323	267.40	8.69	<.0001
PAR_F35_44	Female, 35–44 Years	2,212	147.30	15.02	<.0001
PAR_F45_54	Female, 45–54 Years	2,387	94.32	25.31	<.0001
PAR_F55_59	Female, 55–59 Years	2,979	100.70	29.59	<.0001
PAR_F60_64	Female, 60–64 Years	3,339	89.60	37.27	<.0001
PAR_F65_69	Female, 65–69 Years	2,503	38.88	64.37	<.0001
PAR_F70_74	Female, 70–74 Years	2,924	36.72	79.61	<.0001
PAR_F75_79	Female, 75–79 Years	3,511	36.90	95.16	<.0001
PAR_F80_84	Female, 80–84 Years	4,011	39.81	100.76	<.0001
PAR_F85_89	Female, 85–89 Years	4,401	48.13	91.44	<.0001
PAR_F90_94	Female, 90–94 Years	4,722	67.59	69.86	<.0001
PAR_F95_GT	Female, 95 Years or Over	4,529	117.80	38.45	<.0001
PAR_M0_34	Male, 0–34 Years	1,159	204.80	5.66	<.0001
PAR_M35_44	Male, 35–44 Years	1,747	121.10	14.42	<.0001
PAR_M45_54	Male, 45–54 Years	2,012	79.65	25.26	<.0001
PAR_M55_59	Male, 55–59 Years	2,449	85.44	28.66	<.0001
PAR_M60_64	Male, 60–64 Years	3,190	79.29	40.24	<.0001
PAR_M65_69	Male, 65–69 Years	2,564	40.67	63.03	<.0001
PAR_M70_74	Male, 70–74 Years	3,207	39.12	81.97	<.0001
PAR_M75_79	Male, 75–79 Years	3,827	41.55	92.11	<.0001
PAR_M80_84	Male, 80–84 Years	4,239	47.24	89.74	<.0001
PAR_M85_89	Male, 85–89 Years	4,504	61.25	73.54	<.0001
PAR_M90_94	Male, 90–94 Years	4,943	101.20	48.85	<.0001
PAR_M95_GT	Male, 95 Years or Over	5,157	231.00	22.33	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	1,338	42.14	31.74	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	1.05	0.02	42.6	<.0001

(continued)

Table 5.8 (continued)
Total Medicare Payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	3,639	275.10	13.23	<.0001
PAR_HCC2	Septicemia/Shock	3,159	100.80	31.35	<.0001
PAR_HCC5	Opportunistic Infections	2,988	214.20	13.95	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	12,941	101.60	127.42	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	5,265	108.20	48.65	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	4,994	74.84	66.74	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	1,503	32.55	46.18	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	3,732	64.74	57.65	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	2,731	63.60	42.94	<.0001
PAR_HCC17	Diabetes with Acute Complications	2,175	248.00	8.77	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	1,795	74.45	24.11	<.0001
PAR_HCC19	Diabetes without Complication	1,160	26.26	44.17	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	2,876	120.00	23.97	<.0001
PAR_HCC25	End-Stage Liver Disease	4,165	237.30	17.55	<.0001
PAR_HCC26	Cirrhosis of Liver	1,539	183.30	8.39	<.0001
PAR_HCC27	Chronic Hepatitis	1,503	201.90	7.45	<.0001
PAR_HCC31	Intestinal Obstruction/ Perforation	1,669	79.69	20.95	<.0001
PAR_HCC32	Pancreatic Disease	2,045	97.54	20.97	<.0001
PAR_HCC33	Inflammatory Bowel Disease	1,629	106.40	15.32	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	3,413	109.00	31.32	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	2,530	44.48	56.88	<.0001
PAR_HCC44	Severe Hematological Disorders	6,696	107.00	62.56	<.0001
PAR_HCC45	Disorders of Immunity	4,594	107.10	42.88	<.0001
PAR_HCC51	Drug/Alcohol Psychosis	2,588	155.90	16.6	<.0001
PAR_HCC52	Drug/Alcohol Dependence	3,018	156.50	19.28	<.0001
PAR_HCC54	Schizophrenia	2,746	122.90	22.35	<.0001

(continued)

Table 5.8 (continued)
Total Medicare Payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	2,330	54.17	43.02	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	7,463	248.50	30.03	<.0001
PAR_HCC68	Paraplegia	6,879	293.90	23.41	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	3,355	132.30	25.36	<.0001
PAR_HCC70	Muscular Dystrophy	1,477	514.70	2.87	0.0041
PAR_HCC71	Polyneuropathy	2,195	48.09	45.65	<.0001
PAR_HCC72	Multiple Sclerosis	3,627	159.20	22.79	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	3,667	78.13	46.93	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	1,766	69.78	25.31	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	1,022	316.40	3.23	0.0012
PAR_HCC77	Respirator Dependence/Tracheostomy Status	7,749	312.80	24.77	<.0001
PAR_HCC78	Respiratory Arrest	5,311	402.70	13.19	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	2,491	61.81	40.31	<.0001
PAR_HCC80	Congestive Heart Failure	3,037	33.04	91.91	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,935	92.68	20.87	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	2,134	56.72	37.63	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	1,708	41.48	41.18	<.0001
PAR_HCC92	Specified Heart Arrhythmias	1,868	30.01	62.26	<.0001
PAR_HCC95	Cerebral Hemorrhage	2,160	176.60	12.23	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	1,777	53.00	33.53	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	2,539	106.70	23.8	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	1,573	235.20	6.69	<.0001
PAR_HCC104	Vascular Disease with Complications	4,010	73.76	54.37	<.0001
PAR_HCC105	Vascular Disease	1,960	30.49	64.29	<.0001
PAR_HCC107	Cystic Fibrosis	2,674	710.70	3.76	0.0002
PAR_HCC108	Chronic Obstructive Pulmonary Disease	2,484	29.79	83.37	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	2,941	131.20	22.42	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	1,262	163.60	7.71	<.0001

(continued)

Table 5.8 (continued)
Total Medicare Payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	1,882	107.40	17.53	<.0001
PAR_HCC130	Dialysis Status	805	240.60	3.35	0.0008
PAR_HCC131	Renal Failure	2,444	51.74	47.24	<.0001
PAR_HCC132	Nephritis	793	179.70	4.41	<.0001
PAR_HCC148	Decubitus Ulcer of Skin	5,411	113.20	47.81	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	2,668	65.22	40.9	<.0001
PAR_HCC150	Extensive Third-Degree Burns	7,928	1722.40	4.6	<.0001
PAR_HCC154	Severe Head Injury	−756	827.70	−0.91	0.3608
PAR_HCC155	Major Head Injury	732	147.90	4.95	<.0001
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	2,982	90.00	33.14	<.0001
PAR_HCC158	Hip Fracture/Dislocation	2,457	82.65	29.73	<.0001
PAR_HCC161	Traumatic Amputation	4,674	315.60	14.81	<.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	1,934	57.48	33.64	<.0001
PAR_HCC174	Major Organ Transplant Status	5,613	273.30	20.53	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	3,514	137.90	25.48	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	4,274	230.70	18.53	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.04	0.00	244.66	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	46,254	246.10	187.96	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.04	0.01	171.49	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	6,319	345.10	18.31	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	1.06	0.08	13.59	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	1,404	114.90	12.22	<.0001
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	1.32	0.13	9.79	<.0001
PAR_Y06	Average increment for observation in 2006 over 2005	−778	91.83	−8.47	<.0001

(continued)

Table 5.8 (continued)
Total Medicare Payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	5,862	213.60	27.44	<.0001
PAR05_PTD_MOD_2	2 months	5,265	220.10	23.92	<.0001
PAR05_PTD_MOD_3	3 months	5,088	208.60	24.39	<.0001
PAR05_PTD_MOD_4	4 months	1,087	135.90	8	<.0001
PAR05_PTD_MOD_5	5 months	2,935	200.00	14.67	<.0001
PAR05_PTD_MOD_6	6 months	2,695	197.80	13.62	<.0001
PAR05_PTD_MOD_7	7 months	−476	57.82	−8.24	<.0001
PAR05_PTD_MOD_8	8 months	−627	62.28	−10.07	<.0001
PAR05_PTD_MOD_9	9 months	−71	78.30	−0.9	0.3666
PAR05_PTD_MOD_10	10 months	143	81.79	1.75	0.08
PAR05_PTD_MOD_11	11 months	140	65.61	2.13	0.0334
PAR05_PTD_MOD_12	12 months	49	40.95	1.2	0.2318

Parameter	Months enrolled in Part D. Variable marks person in 2006 only.	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	−2,179	403.30	−5.4	<.0001
PAR_PTD_MOD_2	2 months	−573	460.60	−1.24	0.2133
PAR_PTD_MOD_3	3 months	373	412.00	0.91	0.3649
PAR_PTD_MOD_4	4 months	317	207.70	1.53	0.1266
PAR_PTD_MOD_5	5 months	1,050	360.00	2.92	0.0035
PAR_PTD_MOD_6	6 months	504	369.10	1.37	0.1721
PAR_PTD_MOD_7	7 months	1,475	82.83	17.81	<.0001
PAR_PTD_MOD_8	8 months	1,292	89.38	14.46	<.0001
PAR_PTD_MOD_9	9 months	1,283	114.60	11.19	<.0001
PAR_PTD_MOD_10	10 months	959	120.20	7.98	<.0001
PAR_PTD_MOD_11	11 months	772	94.68	8.15	<.0001
PAR_PTD_MOD_12	12 months	817	58.35	14.01	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	−755	40.53	−18.64	<.0001
PAR_CC	Person with creditable coverage in 2006	878	56.23	15.61	<.0001
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	−87	34.86	−2.5	0.0123
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	649	35.25	18.42	<.0001

SOURCE: program: reg03c

5.4.6 Inpatient Spending—Cross-Section, Decedents Excluded

In this model, the dependent variable (inpatient spending) is about 19 percent higher in this study for 2005 than in the panel study. The increase from 2005 to 2006 is about 2 percent rather than the 18 percent in the panel sample. The regression results are in **Table 5.9.**

The demographic terms follow a pattern similar to the total spending coefficients. The age/sex coefficients are generally larger as they were in the case of total spending. The Originally-disabled add-on is also larger. The multiplier for 2006 over 2005 reduces the 2006 demographic prediction 11 percent. The panel study of inpatient spending had a 14 percent increase. The multiplier is not simply small for the inpatient spending but is a reduction. The HCC disease groups mostly have larger coefficients than in the panel analysis. The add-on for the HCC prediction for 2006 is 3 percent. The panel study had a 19 percent add-on for HCCs predicting impatient spending. The coefficient for ESRD with dialysis or transplant status is higher than in the panel but has only a 2 percent add-on for 2006. As usual, the inpatient component, while large, is a relatively small part of total spending on dialysis patients. The term for post-graft status has a coefficient about equal to that in the panel study. There is a 9 percent reduction in this predictor for 2006, not far from the 6 percent reduction in the panel sample.

For inpatient spending the long-term institutional variable is negative, -$676. In 2006 it goes to -$534. For total expenditures these were positive. In the panel regression for inpatient spending the numbers were also negative, but too small to be statistically significant. The residual time variable additive effect of moving from 2005 to 2006 is negative and significant, as in the same sample model for total spending.

The coefficients related to being an enrollee parallel those of the total spending model for this sample. There are strong positive terms for 2005 for the late enrollees and small and insignificant terms for the early enrollees. They are counter to the results in the panel sample. The treatment effect variables are also very similar in pattern to those in the full spending model. They are positive for all but the two groups of shortest enrollment time. The groups with the longest enrollment time have modest positive and significant coefficients of about $400. The inpatient coefficients for these groups are somewhat less than half of the coefficients for total spending. The inpatient results seem to be a driver of the results for total spending. In this sample, the creditable coverage effect was -$419 in 2005 but this swung to a negligible $42 in 2006. This again may reflect that some of them had overlapping Part D. The RDS indicator swings from -$132 in 2005 to $103 in 2006. The RDS enrollment marker does not overlap with Part D coverage for any individual. As in all the models the 2005 values for CC and RDS were imputed from the 2006 values as a best approximation.

Table 5.9
Inpatient Medicare payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Equation	DF error	MSE	R-square	DF model	SSE
APAYTOT_PY	2,210,000	79,132,573	0.0636	132	1.75E+14

Root MSE	Adjusted R-square	Mean 2005	Mean 2006	Number of observations	Sum of weights
8,895.6	0.0635	2,617	2,660	2,207,505	2,207,505

Nonlinear OLS parameter estimates

Parameter	Demographic Variable (coefficients for 2005)	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_F0_34	Female, 0–34 Years	1,281	192.10	6.67	<.0001
PAR_F35_44	Female, 35–44 Years	1,016	105.30	9.65	<.0001
PAR_F45_54	Female, 45–54 Years	870	67.29	12.93	<.0001
PAR_F55_59	Female, 55–59 Years	1,041	72.29	14.4	<.0001
PAR_F60_64	Female, 60–64 Years	1,339	64.09	20.89	<.0001
PAR_F65_69	Female, 65–69 Years	823	26.94	30.57	<.0001
PAR_F70_74	Female, 70–74 Years	1,049	25.32	41.45	<.0001
PAR_F75_79	Female, 75–79 Years	1,331	25.37	52.47	<.0001
PAR_F80_84	Female, 80–84 Years	1,498	27.15	55.18	<.0001
PAR_F85_89	Female, 85–89 Years	1,480	32.62	45.36	<.0001
PAR_F90_94	Female, 90–94 Years	1,418	46.58	30.44	<.0001
PAR_F95_GT	Female, 95 Years or Over	985	84.07	11.71	<.0001
PAR_M0_34	Male, 0–34 Years	633	146.50	4.32	<.0001
PAR_M35_44	Male, 35–44 Years	935	85.80	10.9	<.0001
PAR_M45_54	Male, 45–54 Years	1,046	55.76	18.75	<.0001
PAR_M55_59	Male, 55–59 Years	1,334	60.62	22	<.0001
PAR_M60_64	Male, 60–64 Years	1,730	56.99	30.35	<.0001
PAR_M65_69	Male, 65–69 Years	1,126	27.53	40.9	<.0001
PAR_M70_74	Male, 70–74 Years	1,468	27.16	54.07	<.0001
PAR_M75_79	Male, 75–79 Years	1,750	29.39	59.52	<.0001
PAR_M80_84	Male, 80–84 Years	1,896	33.48	56.63	<.0001
PAR_M85_89	Male, 85–89 Years	1,778	42.89	41.44	<.0001
PAR_M90_94	Male, 90–94 Years	1,708	71.45	23.91	<.0001
PAR_M95_GT	Male, 95 Years or Over	1,587	165.60	9.58	<.0001

Parameter	Demographic Variable	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ORIGDISA	Age ≥65, originally eligible by disability	847	30.98	27.35	<.0001
PAR06_DEMOG	Multiplier applied to 2005 demographic coefficients for 2006	0.89	0.03	27.68	<.0001

(continued)

Table 5.9 (continued)
Inpatient Medicare payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC1	HIV/AIDS	1,369	184.10	7.44	<.0001
PAR_HCC2	Septicemia/Shock	1,671	67.50	24.76	<.0001
PAR_HCC5	Opportunistic Infections	1,520	143.40	10.6	<.0001
PAR_HCC7	Metastatic Cancer and Acute Leukemia	2,025	65.77	30.8	<.0001
PAR_HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	1,397	72.19	19.35	<.0001
PAR_HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	999	49.69	20.11	<.0001
PAR_HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	231	21.69	10.63	<.0001
PAR_HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	1,602	43.32	36.98	<.0001
PAR_HCC16	Diabetes with Neurologic or Other Specified Manifestation	1,152	42.55	27.07	<.0001
PAR_HCC17	Diabetes with Acute Complications	1,071	166.00	6.45	<.0001
PAR_HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	789	49.83	15.83	<.0001
PAR_HCC19	Diabetes without Complication	523	17.58	29.73	<.0001
PAR_HCC21	Protein-Calorie Malnutrition	1,374	80.34	17.11	<.0001
PAR_HCC25	End-Stage Liver Disease	2,847	159.00	17.91	<.0001
PAR_HCC26	Cirrhosis of Liver	936	122.70	7.63	<.0001
PAR_HCC27	Chronic Hepatitis	758	135.10	5.61	<.0001
PAR_HCC31	Intestinal Obstruction/ Perforation	1,025	53.38	19.2	<.0001
PAR_HCC32	Pancreatic Disease	1,116	65.32	17.09	<.0001
PAR_HCC33	Inflammatory Bowel Disease	599	71.19	8.41	<.0001
PAR_HCC37	Bone/Joint/Muscle Infections/Necrosis	1,750	72.99	23.98	<.0001
PAR_HCC38	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	809	29.66	27.27	<.0001
PAR_HCC44	Severe Hematological Disorders	1,792	71.25	25.14	<.0001
PAR_HCC45	Disorders of Immunity	423	71.39	5.92	<.0001
PAR_HCC51	Drug/Alcohol Psychosis	1,707	104.40	16.35	<.0001
PAR_HCC52	Drug/Alcohol Dependence	2,261	105.00	21.54	<.0001
PAR_HCC54	Schizophrenia	1,832	82.36	22.25	<.0001

(continued)

Table 5.9 (continued)
Inpatient Medicare payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC55	Major Depressive, Bipolar, and Paranoid Disorders	802	36.19	22.16	<.0001
PAR_HCC67	Quadriplegia, Other Extensive Paralysis	2,831	166.20	17.03	<.0001
PAR_HCC68	Paraplegia	2,954	196.60	15.02	<.0001
PAR_HCC69	Spinal Cord Disorders/Injuries	1,131	88.48	12.78	<.0001
PAR_HCC70	Muscular Dystrophy	−0.29	344.50	0	0.9993
PAR_HCC71	Polyneuropathy	795	32.13	24.73	<.0001
PAR_HCC72	Multiple Sclerosis	837	106.40	7.86	<.0001
PAR_HCC73	Parkinson's and Huntington's Diseases	968	52.13	18.57	<.0001
PAR_HCC74	Seizure Disorders and Convulsions	861	46.72	18.43	<.0001
PAR_HCC75	Coma, Brain Compression/Anoxic Damage	801	211.80	3.78	0.0002
PAR_HCC77	Respirator Dependence/Tracheostomy Status	5,968	210.00	28.41	<.0001
PAR_HCC78	Respiratory Arrest	3,536	269.60	13.12	<.0001
PAR_HCC79	Cardio-Respiratory Failure and Shock	1,335	41.46	32.21	<.0001
PAR_HCC80	Congestive Heart Failure	1,645	22.32	73.67	<.0001
PAR_HCC81	Acute Myocardial Infarction	1,628	62.17	26.18	<.0001
PAR_HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	1,443	38.09	37.9	<.0001
PAR_HCC83	Angina Pectoris/Old Myocardial Infarction	944	27.81	33.94	<.0001
PAR_HCC92	Specified Heart Arrhythmias	937	20.14	46.54	<.0001
PAR_HCC95	Cerebral Hemorrhage	1,428	118.30	12.08	<.0001
PAR_HCC96	Ischemic or Unspecified Stroke	687	35.45	19.37	<.0001
PAR_HCC100	Hemiplegia/Hemiparesis	850	71.36	11.91	<.0001
PAR_HCC101	Cerebral Palsy and Other Paralytic Syndromes	366	157.40	2.33	0.0199
PAR_HCC104	Vascular Disease with Complications	2,189	49.55	44.17	<.0001
PAR_HCC105	Vascular Disease	911	20.43	44.61	<.0001
PAR_HCC107	Cystic Fibrosis	1,841	475.50	3.87	0.0001
PAR_HCC108	Chronic Obstructive Pulmonary Disease	1,126	19.96	56.41	<.0001
PAR_HCC111	Aspiration and Specified Bacterial Pneumonias	1,510	87.86	17.18	<.0001
PAR_HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	805	109.50	7.35	<.0001

(continued)

Table 5.9 (continued)
Inpatient Medicare payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	HCC Disease Groups	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	670	71.85	9.32	<.0001
PAR_HCC130	Dialysis Status	−1,862	161.10	−11.56	<.0001
PAR_HCC131	Renal Failure	1,142	34.68	32.94	<.0001
PAR_HCC132	Nephritis	439	120.30	3.65	0.0003
PAR_HCC148	Decubitus Ulcer of Skin	1,547	75.53	20.48	<.0001
PAR_HCC149	Chronic Ulcer of Skin, Except Decubitus	928	43.59	21.29	<.0001
PAR_HCC150	Extensive Third-Degree Burns	5,286	1,152.60	4.59	<.0001
PAR_HCC154	Severe Head Injury	−259	554.10	−0.47	0.6402
PAR_HCC155	Major Head Injury	52	99.00	0.52	0.601
PAR_HCC157	Vertebral Fractures without Spinal Cord Injury	1,153	60.21	19.16	<.0001
PAR_HCC158	Hip Fracture/Dislocation	704	55.25	12.75	<.0001
PAR_HCC161	Traumatic Amputation	801	211.10	3.79	0.0001
PAR_HCC164	Major Complications of Medical Care and Trauma	972	38.50	25.24	<.0001
PAR_HCC174	Major Organ Transplant Status	3,375	183.10	18.43	<.0001
PAR_HCC176	Artificial Openings for Feeding or Elimination	1,503	92.28	16.29	<.0001
PAR_HCC177	Amputation Status, Lower Limb/Amputation Complications	1,941	154.40	12.57	<.0001
PAR06_HCC	Multiplier applied to 2005 HCC coefficients for 2006	1.03	0.01	158.2	<.0001

Parameter	Other Characteristics	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_ESRDDfrac	Fraction of year in dialysis or transplant status	12,458	163.80	76.04	<.0001
PAR06_ESRDD	Multiplier applied to 2005 dial/tp coefficient for 2006	1.02	0.01	69.17	<.0001
PAR_ESRDGfrac	Fraction of year in post-graft status	3,309	229.60	14.41	<.0001
PAR06_ESRDG	Multiplier applied to 2005 post-graft coefficient for 2006	0.91	0.09	9.96	<.0001
PAR_LTIfrac	Fraction of year in long-term care institutionalized	−676	76.35	−8.85	<.0001
PAR06_LTI	Multiplier applied to 2005 LTI coefficient for 2006	0.79	0.14	5.51	<.0001
PAR_Y06	Average increment for observation in 2006 over 2005	−216	48.70	−4.43	<.0001

(continued)

Table 5.9 (continued)
Inpatient Medicare payments 2005 and 2006
Cross-section, non-LI, no Medicaid, decedents excluded

Parameter	Months enrolled in Part D. Variable marks person in both 2005 and 2006	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_PTD_MOD_1	1 month	2,755	142.10	19.38	<.0001
PAR05_PTD_MOD_2	2 months	2,379	146.50	16.24	<.0001
PAR05_PTD_MOD_3	3 months	2,432	138.80	17.52	<.0001
PAR05_PTD_MOD_4	4 months	671	90.44	7.42	<.0001
PAR05_PTD_MOD_5	5 months	1,198	133.10	9	<.0001
PAR05_PTD_MOD_6	6 months	1,126	131.60	8.56	<.0001
PAR05_PTD_MOD_7	7 months	−283	38.47	−7.37	<.0001
PAR05_PTD_MOD_8	8 months	−352	41.43	−8.5	<.0001
PAR05_PTD_MOD_9	9 months	−110	52.10	−2.11	0.0352
PAR05_PTD_MOD_10	10 months	4	54.42	0.08	0.9388
PAR05_PTD_MOD_11	11 months	0	43.66	−0.01	0.9927
PAR05_PTD_MOD_12	12 months	−52	27.25	−1.9	0.0571

Parameter	Months enrolled in Part D. Variable marks person in 2006 only.	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR_PTD_MOD_1	1 month	−973	268.30	−3.63	0.0003
PAR_PTD_MOD_2	2 months	−393	306.50	−1.28	0.1995
PAR_PTD_MOD_3	3 months	437	274.10	1.59	0.1108
PAR_PTD_MOD_4	4 months	172	138.20	1.25	0.2129
PAR_PTD_MOD_5	5 months	959	239.60	4	<.0001
PAR_PTD_MOD_6	6 months	657	245.60	2.68	0.0074
PAR_PTD_MOD_7	7 months	727	55.11	13.19	<.0001
PAR_PTD_MOD_8	8 months	659	59.46	11.08	<.0001
PAR_PTD_MOD_9	9 months	623	76.27	8.17	<.0001
PAR_PTD_MOD_10	10 months	406	79.95	5.08	<.0001
PAR_PTD_MOD_11	11 months	326	63.00	5.18	<.0001
PAR_PTD_MOD_12	12 months	370	38.83	9.54	<.0001

Parameter	Other Drug Coverage	Estimate	Approximate Standard Error	t Value	Approximate Pr > |t|
PAR05_CCI	Person with creditable coverage in 2005 imputed	−419	27.13	−15.45	<.0001
PAR_CC	Person with creditable coverage in 2006	461	37.77	12.22	<.0001
PAR_RDS05	Person with Retiree Drug Subsidy Plan in 2005, imputed	−132	23.22	−5.7	<.0001
PAR_RDS	Person with Retiree Drug Subsidy Plan in 2006	235	23.44	10.02	<.0001

SOURCE: program: reg03h

5.5 Summary of Regression Analyses

In this series of analyses, we sought to refine our earlier approaches by isolating the potential impact of Part D on Medicare FFS spending and utilization. In other words, given the individual enrollment decisions made by certain subpopulations, and controlling as much as possible for secular trends occurring before and after implementation of Part D, is there any isolated change in Medicare FFS that may be attributed to implementation of Part D?

To accomplish this, a series of equations were set up that include variables to control for many patient characteristics besides being a Part D enrollee. Observations were created for 2005, the year before Part D, and 2006, the implementation year. Demographic and clinical variables were intended to separate out the effects of morbidity that might induce a person with high expected drug expenditures to enroll and result in a treatment effect that seemed to increase spending. For each of the sample years the beneficiaries' diseases recorded in the year prior were used as the control variable. The concurrent sample year diseases were not used to avoid the possibility that the diseases recorded in that year would be affected by the presence of Part D coverage. The use of prior year medical conditions, particularly chronic diseases, to predict the next year's spending is accurate for groups of beneficiaries.

The study population included only those who voluntarily enrolled and not the mostly auto-enrolled and atypically high cost low-income subsidy population. This population would have been less likely to show any response to the implementation of Part D because most of them would have had drug coverage in the prior year through Medicaid. Three samples were reported: panels that excluded and included 2006 decedents and cross-sections that excluded decedents in both years. The analyses presented that included decedents were difficult to interpret as the decedents carried very high expenditures and were concentrated in the short-term Part D enrollment indicator variables. The discussion will concentrate on the models that excluded decedents.

In the analyses without decedents, the variables marking various types of drug coverage cannot distinguish between people who buy and take drugs and those who do not. Beneficiaries with no markers for Part D or other coverage may have unknown coverage, may have no coverage but still purchase and take drugs, or may not take drugs. The models thus measure the effect of having Part D coverage compared to not having Part D coverage. They do not measure the effect of having drugs compared to not having drugs.

Two sets of samples in this analysis produced apparently contradictory results. The sample that shows Part D to reduce Part A and B Medicare expenditures is a panel of people that have continuous enrollment in fee-for-service Medicare from January 2004 through December 2006. The year 2004 is not in the set of spending observations, but it provides diagnostic information for the year 2005 observations. This population is in Medicare in 2004 and ages and survives through the period. This is not a sample looking at cross-sections of Medicare at two points in time, but at the same people over time. The model shows that for these people, those who enrolled tended to be higher users of services than those who did not enroll; the soon-to-be-enrollees had higher expenditures in 2005. However, in 2006, enrollees who were in Part D for most of the year showed a net reduction in their higher spending compared to similar non-enrollees.

The other sample did not follow the same beneficiaries from year to year, though there was considerable overlap. In this sample a cross-section of beneficiaries in 2005 who had been in fee-for-service Medicare throughout 2004 formed one cross-section. The other was a similar construct for beneficiaries in 2006 with full Medicare fee-for-service coverage in 2005. For both years decedents were excluded. There could be new entrants each year. Some people who entered Medicare after January 2004 were fully covered in 2005 and could enter the 2006 sample. Some of the people fully covered in 2005 died in 2006 and were dropped from that sample. The resulting samples were similar in age. An unusual feature of these samples was the reduced fee-for-service sample size for 2006. This resulted from the increased rate of enrollment in the MA program in 2006 rather than fee-for-service. The clinical variables in the model should compensate for changes in the overall health of the fee-for-service sample as a result of any biased selection into MA plans. The regression on the cross-section comparison produced estimated Part D effects that were the opposite of that of the panel sample. The long-term enrollees had Part D effects in 2006 that resulted in increased Part A and B utilization compared to similar non-enrollees.

The Part D markers also indicate that in the panel study the type of people who enrolled in Part D relatively early were more expensive by $1,000 in the prior year than the non-enrollees. In the cross-section, the relatively early enrollees were only about $100 more expensive than non-enrollees. This leads to the possible conclusion that the panel members who were more expensive in 2005 enrolled relatively early and were regressing to the mean in their spending at the same time they were enrolled in the program.

The cross-sectional study did not show a substantively higher spending pattern in 2005 for early Part D enrollees compared to non-enrollees. The Part D treatment effect resulting in increased spending seems paradoxical. One salient feature of the cross-section approach is that that younger, healthier people are drawn into the 2006 sample. The cross-section panels have a higher proportion of beneficiaries age 65–69 and lower proportion of those 80–84, for example. Although this is likely the source of the different findings, with all the control variables for demographics and health this is not the entire explanation.

The analysis done thus far has led to equivocal results. The cross-section results are odd but seem more robust than the panel results, which may be confounded by regression to the mean. Because there is a strong survivor effect in the 2005 panel the overall spending for the population rises sharply to a more typical level in 2006. At the same time the joiners, who were atypically expensive, appear to be reducing expenditures to more typical, resulting in the apparent savings for Part D enrollees. It indeed may be that there are so many potentially confounding effects in the before-and-after and enrollee-non-enrollee comparisons that teasing out the true effect of Part D may require many more years of data if it can be measured at all.

SECTION 6
SUMMARY OF FINDINGS

The primary focus of this report was to assess selected potential impacts of the Medicare Part D prescription drug program on the traditional Medicare FFS program. One of the contentions made in conjunction with offering a drug benefit is that the costs of the benefit to the payer will be offset, at least partially, by reductions in costs to the payer for other health services. This effect of a drug benefit is based on the assumption that access to prescription drug coverage, more widely available under Medicare Part D, will lead to improved access to useful drugs, improved adherence to drug regimens, and conditional on the drugs being effective, reductions in the progress of disease and medical costs related to complications and exacerbations. To address these issues, we took a multiple method approach to our analyses, using descriptive, time series and multivariate analytical approaches to test for a wide range of potential impacts. The goal at this preliminary stage was not necessarily to produce the definitive study of the impacts of Part D on Medicare FFS spending and utilization; it will likely be a number of years before the full impact of such a major programmatic change will manifest in the clinical changes that would drive major utilization and spending patterns. Rather, barring the unlikely evidence of major shifts in Medicare FFS spending and utilization after just one year of implementation, we sought to determine where the beginnings of more subtle shifts in beneficiary and geographic subpopulations spending and utilization might be found, and serve as a focus for future work.

Not unexpectedly, our findings based on the brief initial implementation period, offer mixed results.

6.1 Descriptive Analysis of Enrollees versus Non Enrollees

The descriptive analyses suggest that there were some small yet persistent differences in the characteristics of Medicare Part D enrollees and nonenrollees. These differences are important in future analyses of impacts of Medicare Part D on spending and utilization as they inform policy makers and researchers of potential selection bias into the Part D enrollment pool. Highlights of the descriptive analysis include the following:

Descriptive Part D Enrollment Differences

- Note quite half (45.7%) of FFS beneficiaries elected a Part D plan. A large proportion of FFS beneficiaries (18.8%) had no known source of prescription drug coverage; this may be attributable to slow Part D take-up rates during the first year of program implementation and may decrease over time.

- Compared with the FFS population as a whole, FFS beneficiaries in the youngest age group (aged 0–64, primarily eligible for Part D through disability status) were more likely (60.1%) to enroll in a PDP, less likely to have an alternative source of creditable coverage (20.7%), but also more likely to have no reported coverage (19.1%).

- Almost all (93.7%) of MA enrollees elected Part D coverage. But despite mandated access to at least a basic benefit, a small proportion of MA enrollees (3.7%) reported no known Part D coverage. This gap may result from MA enrollees who chose not to

pay the additional premium associated with Part D coverage, may not have felt they needed the coverage, and/or may have simply been misinformed about the separate Part D enrollment process for their plan.

- Among PFFS beneficiaries, our analysis found that a high percentage (88.5%) of PFFS enrollees elected either an MA-PD or PDP plan. This PFFS figure is below the Part D take-up rate (93.7%) for MA enrollees but well above the FFS rate (45.7%). The analysis also found that 7.0% of PFFS enrollees reported no known prescription drug coverage, a larger proportion than MA enrollees overall (3.7%).

Descriptive Differences in Enrollment Characteristics

- Among the aged beneficiary groups, increasingly older aged groups were associated with increased likelihood of enrolling in Part D, decreased likelihood of having other creditable coverage, and an increased likelihood of having no reported source of prescription drug coverage. This finding is consistent with the theory that older beneficiaries, with, on average, greater health care needs, are more likely to voluntarily enroll in programs for additional benefits.

- FFS Part D enrollees had higher hospital inpatient spending in both 2005 and 2006 compared with FFS beneficiaries overall and relative to all other groups not enrolled in the Part D program. PDP enrollees also had, in both 2005 and 2006, a greater number of hospital stays, and a greater proportion of this group had at least one hospitalization. These figures increased between 2005 and 2006, suggesting that, in the first year of the Part D program, enrollment in a Part D PDP plan did not reduce the incidence of hospitalizations per se.

- FFS analyses also found that FFS beneficiaries categorized in a CMS HCC or RxHCC (and hence those beneficiaries with predictable future health care expenditures) were more likely to enroll in a PDP plan compared with the FFS population as a whole.

- The analyses of MA enrollees found that older age groups (who traditionally have more difficulty understanding and navigating MA plan processes) were more likely than younger groups to have no known coverage. Similar patterns were noted among PFFS enrollees.

- There were substantively small but persistent indications that some older Medicare beneficiaries, and beneficiaries diagnosed in prior years with chronic more costly diseases (having been categorized in a CMS HCC or RxHCC group), were more likely to enroll in a Part D plan.

Descriptive Geographic Differences

- FFS Part D enrollment take-up rates tended to be higher in rural areas, and in regions characterized as heavily rural. We found that the proportion of FFS population that reported no known coverage was slightly higher in urban than in rural areas.

- FFS Part D enrollees in urban areas were more likely than rural beneficiaries to elect a basic coverage rather than an enhanced plan. These findings were reversed for MA enrollees. MA enrollees in urban areas were more likely than rural populations to enroll in Part D, although as a total, almost all MA enrollees did elect a Part D plan. MA enrollees in rural areas were more likely to report no known drug coverage.

- Contrary to the findings in the FFS analysis, MA enrollees in rural areas were less likely to elect enhanced plans than enrollees in urban areas. We found no substantive differences in geographic enrollment patterns among PFFS enrollees.

6.2 Time Series Analyses

We conducted a set of basic time series analyses to determine whether, at this early point, we could observe any major shifts in Medicare FFS spending and utilization after the implementation of Part D, given the enrollment decisions of beneficiaries. Time series analyses conducted as the second major part of this task found little evidence that implementation of Part D had an impact on the largest part of Medicare spending and utilization. While Medicare rates of inpatient spending and utilization are decreasing over time, we saw no evidence that the specific implementation of Part D or enrollment in Part D had a significant impact on this existing secular trend. Findings of note including the following key points:

Time Series Analysis—Impacts on Total FFS Inpatient Expenditures and Utilization

- The FFS aggregate time series analysis of expenditures and utilization showed overall trend decreases after the implementation of Part D. However, it is difficult to definitely attribute these changes to implementation of Part D. These small decreases could also result from the overall secular care trend of shifts from hospital inpatient to outpatient care.

- Results separating spending and utilization trends for Part D enrollees and nonenrollees also found no evidence that Part D reduced FFS inpatient spending. This set of analyses found that inpatient expenditures for beneficiaries not enrolled in Part D decreased *more* in each target time period than for those enrolled in Part D—a finding actually counter to hypothesis that access to prescription drugs through Part D could affect a decrease in Medicare inpatient costs.

- In a similar analysis, we found that average monthly inpatient stays per 1,000 did initially decrease at a more rapid rate for Part D enrollees. However, these decreases were reversed and were outpaced by greater decreases among non Part D enrollees in later time periods.

- Regression based time series analyses on the total FFS groups also failed to identify a lasting effect of Part D for those who enrolled.

Time Series Analysis—Impacts on Subpopulation Inpatient Expenditures and Utilization

- Additional analyses conducted on particularly high-cost, prescription drug–sensitive beneficiaries diagnosed with CHF also yielded no evidence of Part D's theoretical negative impact on broader Medicare spending or utilization. When comparing inpatient expenditures and stays for different time periods in 2006 and 2007, in both cases, the CHF population not enrolled in Part D shows larger declines than those for Part D enrollees.

- The subanalysis focusing on the non-LIS population yielded similar results. We hypothesized that one reason for the higher expenditures and lack of impact was the disproportionate percentage of LIS beneficiaries enrolled in Part D during the early implementation period. Medicaid and other beneficiaries who were deemed eligible for the low income subsidies were enrolled automatically in Part D, but because most already had drug coverage through state programs, Part D would have little impact on Medicare inpatient spending and utilization for this group. Still, contrary to our hypotheses, nonenrollees in this non-LIS group exhibited greater decreases in inpatient spending and utilization. Additional regression analysis found no impact from Part D.

6.3 Multivariate Analyses

Lacking systematic evidence of major aggregate shifts in Medicare FFS spending and utilization after the implementation of Part D, we took a more subtle analytical approach to attempt to estimate Part D impacts controlling for a range of beneficiary characteristics. In other words, while we did not find evidence of major aggregate impacts of Part D, it is entirely plausible that such impacts exist only for selected subpopulations, and only evident once other factors are controlled for.

In the final series of analyses, difference-in-difference regression models were estimated that included variables to control for many patient characteristics besides being a Part D enrollee. In these analyses, the variables marking various types of drug coverage did not distinguish between people who buy (and presumably adhere to) prescription drug regimens and those who do not. Beneficiaries with no markers for Part D or other coverage may have unknown coverage, may have no coverage but still purchase and take drugs, or may not take drugs. The models we estimated therefore measure only the effect of having Part D compared to not having Part D. Key findings include the following points, particularly that the sets of samples in this analysis produced contradictory results:

Difference in Difference Analysis

- The sample that indicated that Part D reduced Part A and B Medicare expenditures is a panel of people that had continuous enrollment in fee-for-service Medicare from January 2004 through December 2006. The year 2004 is not in the set of observations, but it provides diagnostic information for the year 2005 observations. The sample looked not at Medicare at two points in time, but at the same people over time. This model showed that for this panel of beneficiaries, those who enrolled

tended to be higher users of services than those who did not enroll, and that enrollees who were in Part D for most of the year showed a decrement in their higher spending compared to similar non-enrollees.

- The other sample did not follow the same beneficiaries from year to year, though there was considerable overlap. In the second sample, a cross-section of beneficiaries in 2005 (who had been in fee-for-service Medicare throughout 2004) was analyzed. The regression of this cross-section comparison produced estimated Part D effects that were the opposite of the panel sample. The long-term enrollees had Part D effects in 2006 that resulted in increased Part A and B utilization compared to similar non-enrollees.

- The difference-in-difference analyses done thus far yielded equivocal results. The cross-section results are unexpected but seem more robust than the panel results, which may be confounded by regression to the mean. It may be the case that there are so many potentially confounding effects in the before-and-after and enrollee-non-enrollee comparisons that teasing out the true effect of Part D may require more years of data if it can be measured at all.

6.4 Summary

While we sought to identify potential impacts of Part D on Medicare FFS spending and utilization, it is highly likely that evidence of these impacts may take many more years to become evident and observable. These analyses, using a range of different methodological approaches, may not be definitive but do yield interesting results and may provide direction for future research. One finding that all the approaches support is that there was, at least at the start of Part D, selection into the program by beneficiaries incurring higher costs.

Taken together, these results seems to suggest that the impacts of Part D on Medicare FFS spending and utilization may not be manifest in the aggregate, among the beneficiary population as a whole and causing overall shifts in spending and utilization patterns. Rather, given the different enrollment (or non-enrollment) decisions of specific populations, and given the apparent lack of a shift in overall Medicare spending and utilization trends, it seems more likely that impacts will be found among specific subpopulations and for targeted conditions. Our overall sense of the range of analyses we conducted suggests that the impacts of Part D on Medicare FFS may be quite subtle and focused, rather than manifesting in a large scale bending of the Medicare spending and utilization curves. Future research may therefore concentrate on these targeted subpopulations.

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