Working Paper Series
Congressional Budget Office
Washington, D.C.

THE SLOWDOWN IN MEDICARE SPENDING GROWTH

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Washington, D.C.

July 2006
2006-08

Abstract

The rate of so-called “excess” growth in Medicare spending per beneficiary has varied widely over the last several decades, and growth has slowed substantially in recent years. (Excess growth is defined as growth beyond the combination of the general rate of economic growth and the rate of change in the age composition among beneficiaries.) The annual rate of excess growth fell from 5.5 percent over the period from 1975 to 1983 to 0.9 percent over the period from 1992 to 2003. Changes in provider payment policies might help explain the observed slowdown. Those changes include the implementation of a prospective payment system for short-stay hospitals, and, more recently, the imposition of mechanisms to control aggregate Medicare physician spending. Possible alternative explanations—increases in managed care enrollment, changes in Medicare cost sharing, and a system-wide spending slowdown—do not account for the slowdown in Medicare spending. The slowdown is of an economically important magnitude and deserves further study.

Introduction

The federal Medicare program, which provides near-universal health insurance to the elderly and also covers some non-elderly disabled, has been expanded substantially with the recent addition of the Part D drug benefit. Furthermore, the number of beneficiaries, after growing fairly slowly for many years, will soon begin to grow rapidly with the retirement of the "baby-boom" generation. This confluence of events has prompted analysts to warn that Medicare will face a serious financing problem in the coming decades (Medicare Trustees, 2006; Congressional Budget Office, 2005; Fuchs, 1998). This paper examines and interprets long-term historical trends in Medicare spending. This backward-looking analysis will, it is hoped, contribute to a larger process of examining and interpreting basic facts about the program.

The analysis first describes the historical rate of excess growth for overall Medicare spending and for spending in three major service categories: hospital care, physician and clinical services, and post-acute care. "Excess growth" is defined as growth beyond the rate attributable to the combination of the rate of general economic growth and the rate of change in the age composition among Medicare beneficiaries. The key findings are that historical trends in excess growth differ sharply by time period and by type of service, and that the rate of spending growth has slowed in each service category in recent years.

The analysis then examines the evidence for and against alternative explanations for the recent spending slowdown. The timing and magnitude of the spending slowdown are not

consistent with three possible explanations: growth in managed care enrollment, changes in Medicare cost sharing, and a system-wide spending slowdown (i.e., a slowdown affecting both Medicare beneficiaries and non-Medicare beneficiaries). The Medicare spending slowdown is consistent with an alternative explanation deserving further analysis: the gradual tightening in Medicare's provider payment policies. The analysis concludes by showing that the observed slowdown in the historical rate of excess Medicare spending growth is of an economically important magnitude.

Data and Methods

"Medicare spending," as used here, refers to total government payments for Medicare-covered services, excluding beneficiary cost-sharing and third-party payments. Medicare spending represents the amount that must be financed by the federal government out of tax revenues, beneficiary premiums, or debt. This study calculates a per-beneficiary measure of real Medicare spending, which equals inflation-adjusted Medicare spending divided by the number of Medicare beneficiaries. To account for general price increases, Medicare spending is inflated to 2003 dollars, using the implicit gross domestic product (GDP) price deflator (Bureau of Economic Analysis, 2004). To calculate the effect of changes in the age composition among Medicare beneficiaries, the number of beneficiaries within each age group (under 65, 65 to 69, 70 to 74, 75 to 79, 80 to 84, and 85 and up) is combined with estimates of spending per beneficiary within each age group. A detailed description of the methods and data used in this analysis is included in the Technical Appendix.

The analysis focuses on 1975 to 2003 (the most recent year for which data are available). Within that historical period, three sub-periods are analyzed: 1975 to 1983, 1983 to 1992 and 1992 to 2003. Those breakpoints are chosen to coincide with the introduction of two major Medicare payment system changes: the inpatient hospital prospective payment system in 1983 and a mechanism to control aggregate spending on physician services in 1992. The period prior to 1975 is excluded because Medicare spending growth during the early start-up years of the program was highly volatile and the eligible population was expanded substantially.[1] Medicare spending by service category is taken from the National Health Expenditures (NHE) data (Centers for Medicare and Medicaid Services, 2005).[2] The resident population is taken from U.S. Census historical data through 2000 and projections through 2003 (Hobbs and Stoops, 2002).

This paper analyzes total Medicare spending on health care services and analyzes separate subtotals for the three major Medicare service categories: hospital care, physician and clinical services (which includes office-based and outpatient services), and post-acute care (which includes skilled nursing facility, SNF, and home health

[1] From 1966 (the first year in which Medicare had any spending) to 1975, annual growth in real Medicare personal health care spending per beneficiary was 17.0 percent (author's calculation). The periods with the highest growth were the start-up years from 1966 to 1969, and the years 1973 to 1975 when eligibility was expanded to the non-elderly disabled population.

[2] In the National Health Expenditures database, spending on these hospital-based post-acute care providers are included in "Hospital Care." Using unpublished data from the CMS Office of the Actuary, spending on these hospital-based post-acute care providers is estimated for each year, and that amount is shifted from the "Hospital Care" category to the "Home Health" and "Nursing Home" categories. A detailed description of that shifting is available from the author.

spending).[3] The three service categories are analyzed separately because substantially different policies regarding cost sharing and regulatory and payment policy have been in effect across these service categories. Therefore, spending trends are not necessarily expected to be similar across these different types of providers.

This analysis does not measure Medicare spending on pharmaceuticals because outpatient pharmaceuticals were not part of the Medicare benefits package until recently. The issues relating to Medicare spending on pharmaceuticals have been examined in detail elsewhere (Newhouse, 2004; Congressional Budget Office, 2004a).

Defining Excess Spending Growth

"Excess" spending growth represents the difference between real growth in Medicare spending per beneficiary and the combination of two factors: the change in the age composition among Medicare beneficiaries, and the increase in real GDP per capita.[4] The

[3] The share of Medicare spending accounted for by hospital care, physician and clinical services, home health care, and skilled nursing facilities was nearly 100 percent in the 1960s and 1970s, and has since dropped to about 94 percent (author's calculation). The remaining 6 percent includes durable medical equipment, other (non-physician) professional services, dental care, and non-durable medical products.

[4] Excess spending growth can be calculated in several different ways, all of which yield exactly the same growth rates–a fact can generate some confusion. In its most general form, excess growth is calculated as a residual using the following identity: 1+the annual rate of growth in nominal Medicare spending = (1+general price growth) * (1+population growth) * (1+growth in Medicare beneficiaries as a fraction of the population) * (1+change in the age composition among Medicare beneficiaries) * (1+real growth in gross domestic product per capita) * (1+excess growth). Note that excess growth can also be calculated as follows, by reformulating the above identity: 1+real growth in Medicare spending per capita = (1+growth in Medicare beneficiaries as a fraction of the population) * (1+change in the age composition among Medicare beneficiaries) * (1+real growth in gross domestic product per capita) * (1+excess growth). Or, equivalently, excess growth can be calculated as follows: 1+real growth in Medicare spending per beneficiary = (1+change in the age composition among Medicare beneficiaries) * (1+real growth in gross domestic product per capita) * (1+excess growth). The key point is that exactly the same measure of excess growth can be calculated based either on growth in nominal Medicare spending (identity 1), real growth in Medicare spending per capita (identity 2), or real growth in Medicare spending per beneficiary (identity 3).

concept of excess growth provides a convenient summary statistic for historical trends, and has been used elsewhere as the basis for official projections of Medicare spending. Until recently, the Medicare Trustees generated their intermediate projection of long-term Medicare spending growth by assuming an average excess growth rate of 1 percent (Medicare Trustees, 2006).[5] Seemingly slight differences in the assumed rate of excess growth—1 percent versus 2 percent, for example—yield substantial differences over the long term in the growth in Medicare spending.

Suppose excess Medicare spending growth is 0 percent. In that case, real Medicare spending per beneficiary within each beneficiary age group would grow at the same rate as real GDP per capita. Note that, even with 0 percent excess growth, both real Medicare spending per beneficiary and the share of GDP devoted to Medicare spending would increase, but the increase in the GDP share would reflect only population aging. Under a 1 percent excess growth scenario, real Medicare spending per beneficiary within each beneficiary age group would grow at the rate of real GDP per capita plus 1 percent.

[5] The Medicare Trustees, in their most recent report, have revised their long-term projection methodology. They assume that the long-term average rate of excess growth will be 1 percent, but they allow for a varying time trend driven by changes in technology adoption and in the affordability to individuals of premiums and cost sharing. (Medicare Trustees, 2006) The Congressional Budget Office also uses "excess cost growth" to measure historical trends and project Medicare spending. CBO's excess cost growth is conceptually the same as the excess spending growth used in this paper, although the details of calculation differ.

Results

Real Medicare spending per beneficiary on personal health care increased from $1,787 in 1975 to $6,705 in 2003 (both in 2003 dollars), an annual real growth rate of 4.8 percent. Of the 4.8 percent annual real growth, the change in the age composition of the elderly population accounted for 0.2 percent, and growth in GDP per capita accounted for 2.1 percent. The remaining 2.5 percent represents excess growth.

Table 1 provides more details on the historical growth in Medicare spending and the growth components from 1975 to 2003, for total Medicare spending, separately for each of the three service categories, and separately for three time periods. As shown in Table 1, the rates of real growth in GDP per capita and the change in the age composition among Medicare beneficiaries were fairly stable across the time periods examined. For total Medicare spending and for each of the three Medicare spending categories, excess spending growth during the most recent period (1992 to 2003) is substantially lower than excess spending growth during either of the earlier periods (1975 to 1983 and 1983 to 1992) and lower than the long-run (1975 to 2003) rate of excess spending growth. For example, excess Medicare spending growth averaged 2.5 percent over the period from 1975 to 2003, but only 0.9 percent for the period from 1992 to 2003.

Figures 1 through 3 illustrate trends in excess growth separately for each spending category.[6] As shown in Figure 1, excess growth in Medicare spending on hospital care

[6] Rates of excess growth in Medicare spending fluctuate sharply from year to year, due to variability in Medicare spending growth and general economic conditions. Two techniques are used to smooth the trends

was quite high from the 1970s through the mid-1980s. Since the mid-1980s, however, excess growth in Medicare hospital spending has fluctuated around 0 percent, ranging from 3 percent to -4 percent.

Figure 2 illustrates excess growth in real Medicare spending on physician and clinical services. During the 1970s and 1980s, excess growth was quite high, generally ranging between 4 percent and 8 percent. Beginning around 1990, excess growth moderated somewhat and since then has generally been between 0 percent and 4 percent. There was a substantial uptick in excess growth in 1999 through 2003.

Figure 3 illustrates excess growth in Medicare post-acute spending, which includes home health and skilled nursing facility services. This category accounts for a small share of Medicare spending, and has the most volatile spending trends (note that the vertical axis for this figure uses a different scale from Figures 1 and 2). Extremely high rates of excess spending growth occurred during the 1990s, followed by a period of negative excess growth in the late 1990s and early 2000s. Similar to the trends in hospital spending, there was an uptick in excess growth in the last years of the analysis (2002 and 2003).

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shown in Figures 1 through 3. First, I calculate excess growth using the long-term rate of growth in real GDP per capita (2.1 percent) rather than the year-by-year rate of growth in real GDP per capita. Second, excess growth rates are calculated over three-year periods. For example, the excess growth rate shown for 1975 reflects the annual rate of excess growth from 1972 to 1975, the excess growth rate shown for 1976 reflects the annual rate of excess growth from 1973 to 1976, etc.

Why Did Excess Growth in Medicare Spending Slow Down?

One possible explanation for the slowdown in excess Medicare spending growth is that Medicare's provider payment policies and regulations have changed over time and have affected growth rates. During the early history of the Medicare program, in the 1960s and 1970s, policymakers were striving to attract participating providers and fees paid to providers were set very generously (Starr, 1982). Faced with rapidly increasing spending in the 1970s and 1980s, Congress began to change Medicare's payment systems, with the goal of reining in spending growth (Foster, 2000). The implementation of the inpatient prospective payment system for hospitals in 1983 was the most substantial constraint imposed on provider payments to that point. Prior to 1983, hospitals were paid by Medicare under cost reimbursement; in that system, hospitals were rewarded financially for increasing the intensity of care they provided and the costs they incurred. Under the inpatient prospective payment system, which was introduced in 1983 and is still in effect, hospitals are not reimbursed for all costs they incur. Instead, hospitals are paid a fixed rate per discharge, adjusted for the patient's diagnosis, which creates a strong incentive to limit costs per discharge. As seen in Figure 1, the implementation of the inpatient prospective payment system coincided with a substantial and sustained reduction in excess spending growth in Medicare hospital spending.

Medicare payments to physicians have been tightened in several stages (Congressional Budget Office, 2004b). Prior to 1975, there was little spending restraint, and both the fees per physician visit and the volume of visits increased rapidly. After 1975, annual

increases in physician fees were limited to the general rate of inflation (as measured by the Medicare Economic Index), but spending continued to increase rapidly because of volume increases. The Congress froze fee levels from 1984 to 1986 and, later, in separate pieces of legislation (OBRA87, OBRA89, and OBRA90), selectively reduced fees for what was termed "overvalued" procedures. Those changes in the 1980s coincided with a slowdown in excess spending growth for physicians (see Figure 2).

Because restraints on physician fees did not, by themselves, appear to succeed in restraining Medicare physician spending, in 1992 policymakers began to institute changes to the physician payment system. Those changes tied the increase in fee levels to the increase in volume. The goal was for growth in volume to result, in a mechanical way, in reductions in fee updates, thereby constraining total spending. At the time Medicare introduced the physician fee schedule in 1992, fee increases were tied for the first time to volume increases, using the Volume Performance Standard (VPS). But, the VPS turned out to generate considerable volatility in annual updates, and was replaced in 1998 with the sustainable growth rate (SGR) formula. The SGR, which is used to update physician fees from year to year, targets an aggregate spending cap. That cap is set so that total Medicare fee-for-service spending on physician services will grow at a rate equal to the growth in real GDP per capita plus growth in the number of Medicare fee-for-service beneficiaries plus growth due to legislative or regulatory changes in the benefit package. If allowed to operate as constructed, the SGR aggregate cap would, assuming a constant benefit package, limit excess growth in Medicare physician spending to about 0 percent. Congress, however, has overridden the SGR-based updates several times in recent years,

with the result that the current level of aggregate spending significantly exceeds the aggregate cap.

Spending trends in post-acute care appear to be highly volatile and highly sensitive to Medicare's payment and regulatory policies. In 1988, the Department of Health and Human Services (HHS) settled a class action suit brought against it in federal district court (Duggan vs. Bowen). In the settlement, HHS agreed to clarify and ease its post-acute benefit eligibility restrictions (Liu et al., 2003). Following that agreement, Medicare spending growth for post-acute care was extremely high (Fishman et al., 2003). The Medicare Catastrophic Coverage Act of 1988 (MCCA-1988), though in effect only for a short time, also prompted growth in Medicare spending by substantially increasing nursing facilities' participation in the Medicare program (Vladeck, 1997).

The Balanced Budget Act of 1997 (BBA-1997) constrained Medicare payments for hospitals and for post-acute care by reducing the growth in hospital payment rates and by mandating the implementation of new prospective payment systems for skilled nursing facilities and home health agencies. BBA-1997 also coincided with a regulatory tightening on fraud and abuse in the hospital, home health, and hospice benefits. Following these changes, excess growth in Medicare hospital spending declined substantially, and there was an even sharper drop in post-acute excess spending growth. For each of the three categories of Medicare spending, however, excess growth was relatively high in the years 2002 and 2003. Those spending increases were likely driven by Medicare policy changes in the Balanced Budget Refinement Act of 1999 (BBRA-

1999) and the Benefits Improvement and Protection Act of 2000 (BIPA-2000). Those pieces of legislation expanded benefits to include some preventive services and contained wide-ranging payment increases meant to mitigate the negative impact of the BBA-1997 on providers (Congressional Research Service, 2001a; b).

What direct evidence is there that provider payment policy reforms might explain the observed slowdown in excess growth in Medicare spending? In the physician setting, the fact that Medicare spending growth was constrained following implementation of the fee schedule flows from the mechanics of the update formulas. By the design of the VPS and the SGR, aggregate Medicare payments are capped, and under the SGR total Medicare payments to physicians are limited to grow roughly in line with aging plus inflation plus real growth in GDP per capita. In the physician setting, the design of the current payment system should lead to a low rate of excess growth. The fact that excess growth in Medicare physician spending in recent years has not been lower reflects, in part, the fact that the design of the SGR system has been repeatedly overridden.[7]

In the hospital setting, there is no mechanical relationship linking payment rates to volume growth, but a cycle of cost constraint appears to have taken hold, probably due to

[7] Several factors have contributed to excess growth over 0 percent for physician and clinical services since 1992. First, the VPS, which was in place until 1998, did not explicitly set its spending targets based on overall economic growth. Second, the "physician and clinical services" spending category in the National Health Accounts includes payments for some outpatient procedures which are not paid for under the physician fee schedule. Third, the SGR mechanism does not impose a year-by-year cap on spending, but instead sets a target level of spending for each year and then adjusts the growth in fee levels up or down based on whether actual spending has fallen short of or exceeded the target. The rate of excess growth in physician payments under the SGR is not, therefore, guaranteed to be 0 percent in each year, but is meant to average roughly 0 percent over the long term. Fourth, actual physician spending has substantially exceeded the SGR target, resulting in scheduled reductions in physician payments, which have been averted by legislation that temporarily overrode the SGR formula. Fifth, the BIPA-2000 expanded the benefits package to include preventive benefits.

the imposition of the hospital prospective payment system. Early research on the effects of the hospital prospective payment system reported that it prompted hospitals to constrain the growth in their costs per discharge and that cost-constraining behavior was greater in hospitals that faced reductions in their payment levels. The same set of responses to prospective payment by Medicare has been documented more recently in the skilled nursing facility setting and in the home health setting (White, 2005; McKnight, 2002; Mathematica Policy Research, 2001). Under prospective payment, when providers constrain their costs per unit, their payments are unaffected and their profits increase. High profits send a signal to the Congress that payment rates may be constrained without necessarily harming beneficiaries' access to care. With prospective payment systems in place, providers tend to engage in a cycle of constraining their costs, thereby reducing the payments they receive in future years.

Besides constraints on provider payments, there are several alternative explanations for the Medicare spending slowdown. One possible explanation is the increase in managed care enrollment both within and outside the Medicare program. Laurence Baker has argued that increasing system-wide enrollment in HMOs, combined with cost containment efforts by those organizations, has had spillover effects that have reduced Medicare fee-for-service spending (Baker, 1999; 1997). To test the magnitude of this spillover phenomenon, the estimated coefficients from Baker's regressions of Medicare spending on HMO enrollment are combined with the observed levels of HMO enrollment to generate hypothetical levels of Medicare spending per beneficiary for each year, assuming that HMO enrollment was held constant at the 1975 level. Over the last three

decades, the system-wide HMO enrollment share increased substantially, from about 3 percent in 1975, to about 25 percent in 2003 (National Center for Health Statistics, 2003). The coefficients from Baker's analysis imply that the increase in HMO enrollment lowered the annual rate of excess growth in Medicare spending by about 0.09 percentage points from 1975 to 1983, by 0.17 percentage points from 1983 to 1992, and by 0.17 percentage points from 1992 to 2003. To put it another way, Baker's results imply that, if there had been no increase in system-wide managed care enrollment, excess spending growth would have been 0.09 percentage points higher in the period from 1975 to 1983, and 0.17 percentage points higher in the period from 1992 to 2003. This calculation shows, first, that Baker's estimated magnitude of the HMO spillover effect is quite small in relation to the observed changes over time in the rate of excess growth and, second, that the estimated effect of increasing HMO enrollment on the rate of excess growth was not substantially greater in later periods. Together, those findings suggest that Baker's HMO spillover effect cannot account for most of the observed slowdown in the rate of excess Medicare spending growth.

Although increasing system-wide enrollment in managed care may have slightly reduced the rate of excess Medicare spending growth, the growth in managed care enrollment among Medicare beneficiaries probably increased somewhat the rate of growth in Medicare spending. Several researchers have argued that, because of inadequate risk adjustment in the payment system for Medicare managed care plans, Medicare pays more for managed care enrollees than Medicare would have paid for those enrollees if they had remained in the fee-for-service program (Brown et al., 1993; U.S. General Accounting

Office, 2000). Therefore, increases over time in managed care enrollment among Medicare beneficiaries probably increased total Medicare spending. To get a crude measure of the magnitude of this effect on rates of excess growth, the share of Medicare enrollees in HMOs in each year is multiplied by the amount of overpayment estimated by the U.S. Government Accountability Office (13 percent). Those estimates imply that, if no Medicare beneficiaries had enrolled in managed care, the annual rate of excess growth in Medicare spending per beneficiary would have been 0.05 percentage points lower from 1975 to 1983, 0.05 percentage points lower from 1983 to 1992, and 0.06 percentage points lower from 1992 to 2003. That managed care overpayment effect is quite small in relation to the observed spending slowdown.

To put the magnitudes of the managed care results in perspective, the increase in managed care enrollment among Medicare beneficiaries (based on GAO's estimates) raised excess growth by less than one tenth of 1 percent in each period. Baker's HMO spillover effect could account for excess growth in the more recent period (1992 to 2003) about 0.1 percentage point lower compared with the earlier period (1975 to 1983). However, the observed decline in the annual rate of excess growth, from 5.5 percent over the period from 1975 to 1983 to 0.9 percent over the period from 1992 to 2003, is so large that it swamps the estimates of the managed care effects.

Another possible explanation for the spending slowdown comprises the changes in beneficiary cost sharing. Over the last several decades, Medicare's cost-sharing requirements have been adjusted repeatedly. Medicare's inpatient hospital deductible

more than tripled in real terms, from $256 in 1975 (in GDP-inflated 2003 dollars) to $840 in 2003; the skilled nursing facility daily coinsurance increased by the same proportion, rising from $32 to $105. The deductible for physician services, on the other hand, declined substantially in real terms, from $167 in 1975 (in GDP-inflated 2003 dollars) to $100 in 2003 (U.S. House of Representatives, 2004).

The more-than-tripling in real terms of the inpatient deductible and skilled nursing facility daily coinsurance may have reduced Medicare spending growth in two ways: first, by shifting some of the financing burden for hospital care from the Medicare program onto beneficiaries and third-party insurers and, second, by inducing lower levels of utilization. But several facts argue against the increase in inpatient cost sharing as an explanation for the observed slowdown in excess Medicare spending growth. First, the period of rapid increase in real cost sharing for hospital care occurred between 1975 and 1990; after that point, the inpatient deductible actually fell in real terms. That pattern of increase in cost sharing for hospital care does not explain (and, in fact, would tend to act counter to) a spending slowdown in more recent years. Second, most Medicare beneficiaries are shielded from the inpatient deductible by supplemental insurance, and the fraction of Medicare beneficiaries with some type of supplemental insurance has grown over time. In 1977, 80 percent of elderly Medicare beneficiaries had some type of supplemental coverage; by 1999 the share of beneficiaries with supplemental coverage (including HMO) had risen to 88 percent (Cafferata, 1984; Laschober et al., 2002). Nearly all sources of supplemental coverage pay Medicare's inpatient hospital deductible. Third, the results of the RAND Health Insurance Experiment (HIE) indicate

that the effect of cost sharing on the use of hospital care operates primarily by affecting the number of physician contacts. Though the RAND HIE does not provide direct evidence on the cross-elasticity of demand for inpatient care with respect to outpatient cost sharing, it seems reasonable to suppose that the decline in Medicare's deductible for physician services increased hospitalizations, all else equal, and offset to some extent the increase in the inpatient deductible. Finally, the real income of the elderly has increased over the last three decades, blunting the impact on utilization of the increase in the hospital deductible.

Yet another possible explanation for the slowdown in excess Medicare spending growth is that Medicare spending trends are simply following system-wide trends, and that there has been a slowdown in spending growth among populations other than Medicare beneficiaries. To test this possibility, published and unpublished data were gathered from earlier research on historical levels of spending per person among the elderly and non-elderly (Meara et al., 2004).[8] Those historical levels of spending per person were used to calculate rates of excess growth in health spending per person separately for the elderly and non-elderly. Nearly all of the elderly are enrolled in Medicare, while less than 3 percent of the non-elderly are enrolled in Medicare. If the Medicare spending slowdown simply reflected system-wide trends, we would expect to find a similar slowdown in excess spending growth among the non-elderly. However, Figure 4 shows that the rate of excess growth in health spending among the non-elderly was actually fairly low (0.4 percent) over the period from 1970 to 1977. Excess growth among the non-elderly

[8] These spending measures, because they are based on national surveys, are available only for the years 1970, 1977, 1987, 1996 and 2000.

increased to 2.9 percent over the period from 1987 to 1996. The annual rate of excess spending growth among the elderly, on the other hand, has declined steadily over time, from 4.2 percent over the period from 1970 to 1977 to -1.3 percent over the period from 1996 to 2000. These results indicate that the slowdown in Medicare spending growth was not paralleled by a similar slowdown among the non-elderly and was not simply a reflection of system-wide spending trends.

A widely held belief among health economists in the U.S. is that technological change is the primary driver behind growth in health care spending. That view is not necessarily inconsistent with the theory that Medicare payment changes have affected the rate of spending growth. The early proponents of the technological change argument pointed out that the reimbursement environment affects incentives surrounding the development and diffusion of new technologies (Weisbrod, 1991; Cutler, 1995).

Is the Slowdown in Excess Medicare Spending Growth of an Economically Important Magnitude?

The rate of excess growth in Medicare spending fell from 5.5 percent over the period from 1975 to 1983 to 0.9 percent over the period from 1992 to 2003. Is that difference large enough to deserve further research attention? To examine that question, three hypothetical trends in Medicare spending as a share of GDP are generated over the period from 1975 to 2003, using the three rates of excess growth observed over each sub-period: 1975 to 1983, 1983 to 1992, and 1992 to 2003. Each of those hypothetical trends starts

with actual Medicare spending as a share of GDP in 1975, and then increases at a rate determined by the actual rate change in Medicare beneficiaries as a fraction of the population and the actual rate of change in the age composition among Medicare beneficiaries, combined with the hypothetical rate of excess growth.

Figure 5 compares the actual historical trend in Medicare spending as a share of GDP and the hypothetical shares of GDP using different excess growth rates. That figure shows that, if applied over long periods of time, the observed differences in historical rates of excess Medicare spending growth will generate very large differences in Medicare spending. If excess growth in Medicare spending had, beginning in 1975, continued at the actual rate that occurred over the period from 1975 to 1983, Medicare spending as a share of GDP would have reached 5.6 percent in 2003, more than twice as large as Medicare's actual share of GDP in 2003 (2.5 percent). If, on the other hand, excess growth in Medicare spending throughout the period from 1975 to 2003 had matched the actual rate over the period from 1992 to 2003, Medicare spending as a share of GDP would equal only 1.6 percent in 2003, more than one-third less than the actual level.

The differences across those hypothetical scenarios in Medicare spending as a share of GDP are very large relative to the current level of Medicare spending, and are even large relative to the total federal budget and the economy as a whole. The implication of the hypothetical scenarios in Figure 5 is that the slowdown Medicare spending growth is a large and important phenomenon that deserves further attention.

Discussion

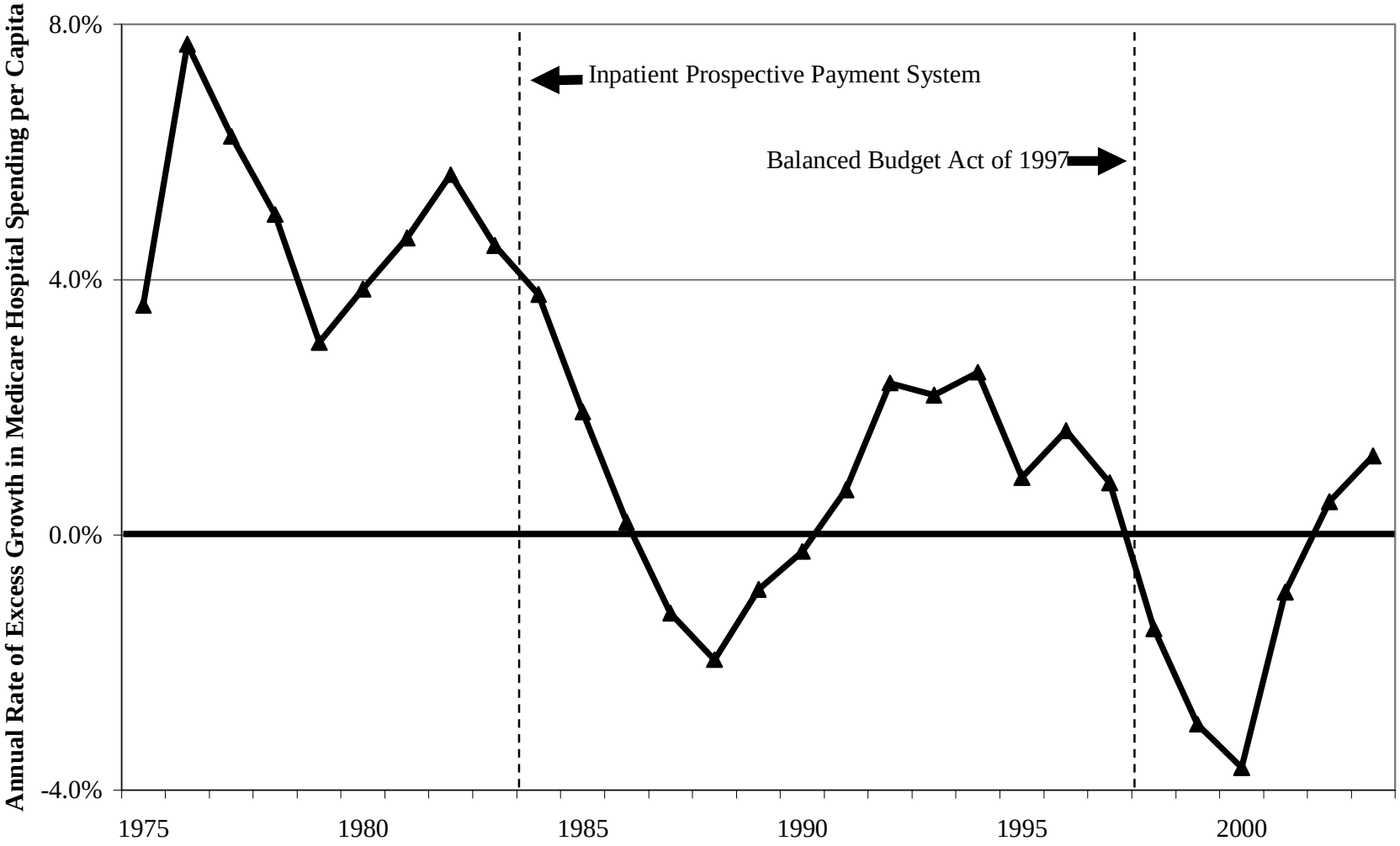
The key finding of this paper—that excess growth in Medicare spending has slowed substantially in recent years—is consistent with earlier research (Boccuti and Moon, 2003; Levit et al., 2003; Meara, et al., 2004). One question that arises from that finding is whether the trends in Medicare spending were driven primarily by Medicare's policies or were driven by system-wide forces such as technological change and an increase in managed care enrollment among the non-elderly. This analysis suggests that the Medicare spending slowdown was not simply a reflection of spending trends among non-Medicare beneficiaries and may have been driven primarily by changes in Medicare's provider payment policy. The second question raised by this research is whether the observed slowdown in Medicare spending growth reflects a short-term aberration or a long-term shift. The answer to that question depends on whether the observed changes in the rate of excess growth represent an accumulation of shifts in the level of Medicare spending or represent a more fundamental shift in the underlying rate of growth. The analysis notes that excess growth has shown some increase recently. More research is needed on these topics.

Table 1. Components of Annual Growth in Medicare Spending per Beneficiary, by Type of Service and Time Period

(In percent)	Time Period			
	1975-1983	1983-1992	1992-2003	All (1975-2003)
Real Growth in Medicare Spending per Beneficiary				
Hospital Care	7.0	2.9	2.1	3.7
Physician and Clinical Services	8.5	5.0	4.0	5.6
Post-Acute Care	9.7	14.6	6.5	10.0
All Personal Health Care	7.6	4.3	3.3	4.8
Real Growth in GDP per Capita	1.9	2.4	2.0	2.1
Change in the Age Composition among Medicare Beneficiaries				
Hospital Care	0.1	0.1	0.4	0.2
Physician and Clinical Services	0.0	0.1	0.1	0.1
Post-Acute Care	0.4	0.5	0.8	0.6
All Personal Health Care	0.1	0.1	0.3	0.2
Excess Growth in Real Medicare Spending per Beneficiary				
Hospital Care	4.9	0.3	-0.3	1.4
Physician and Clinical Services	6.5	2.4	1.9	3.3
Post-Acute Care	7.3	11.4	3.5	7.1
All Personal Health Care	5.5	1.8	0.9	2.5

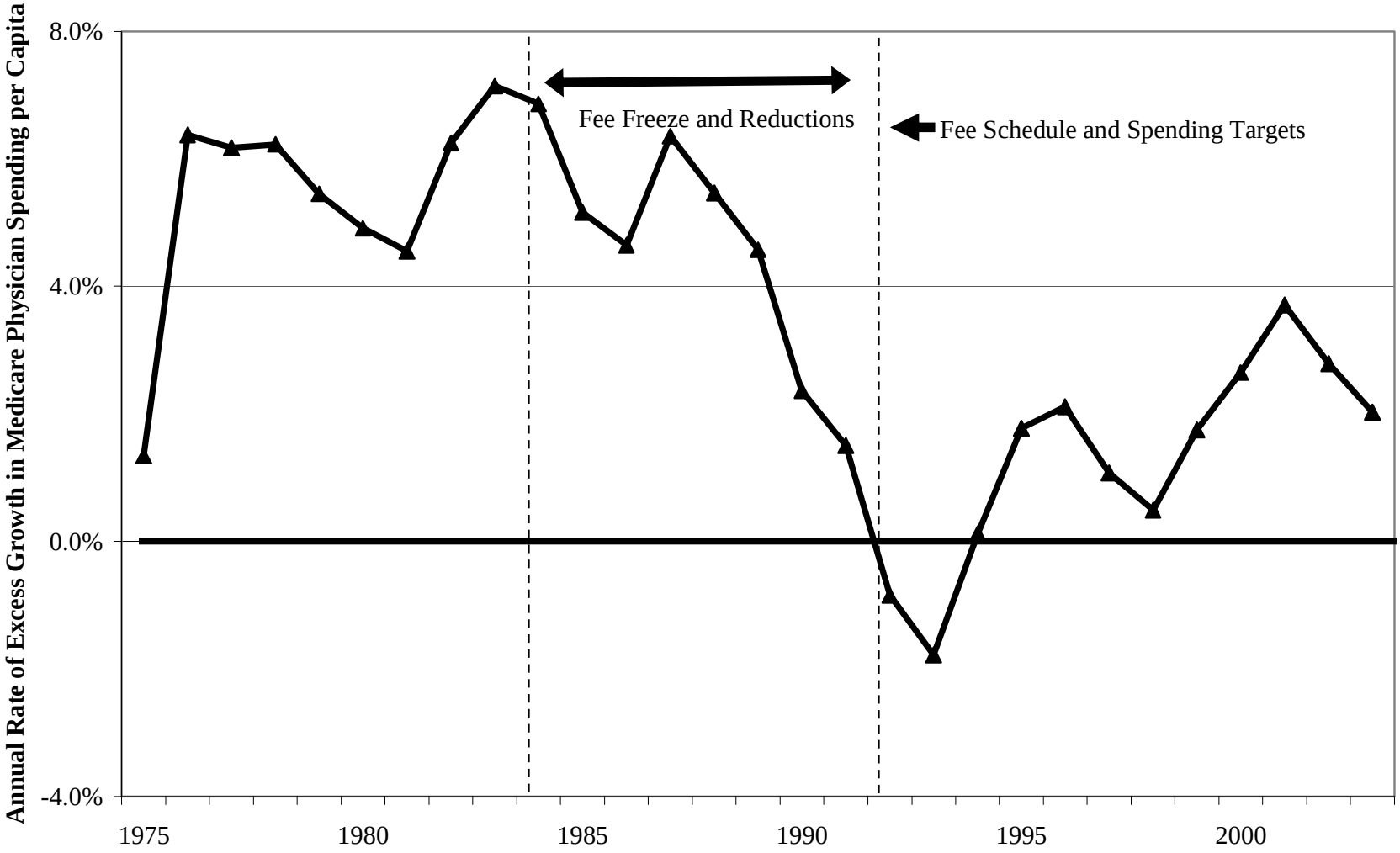
Source: Author's calculation. Note that the "Change in the Age Composition among Medicare Beneficiaries" component differs across spending categories because each spending category uses a different age-spending profile.

Figure 1. Excess Growth in Medicare Hospital Spending



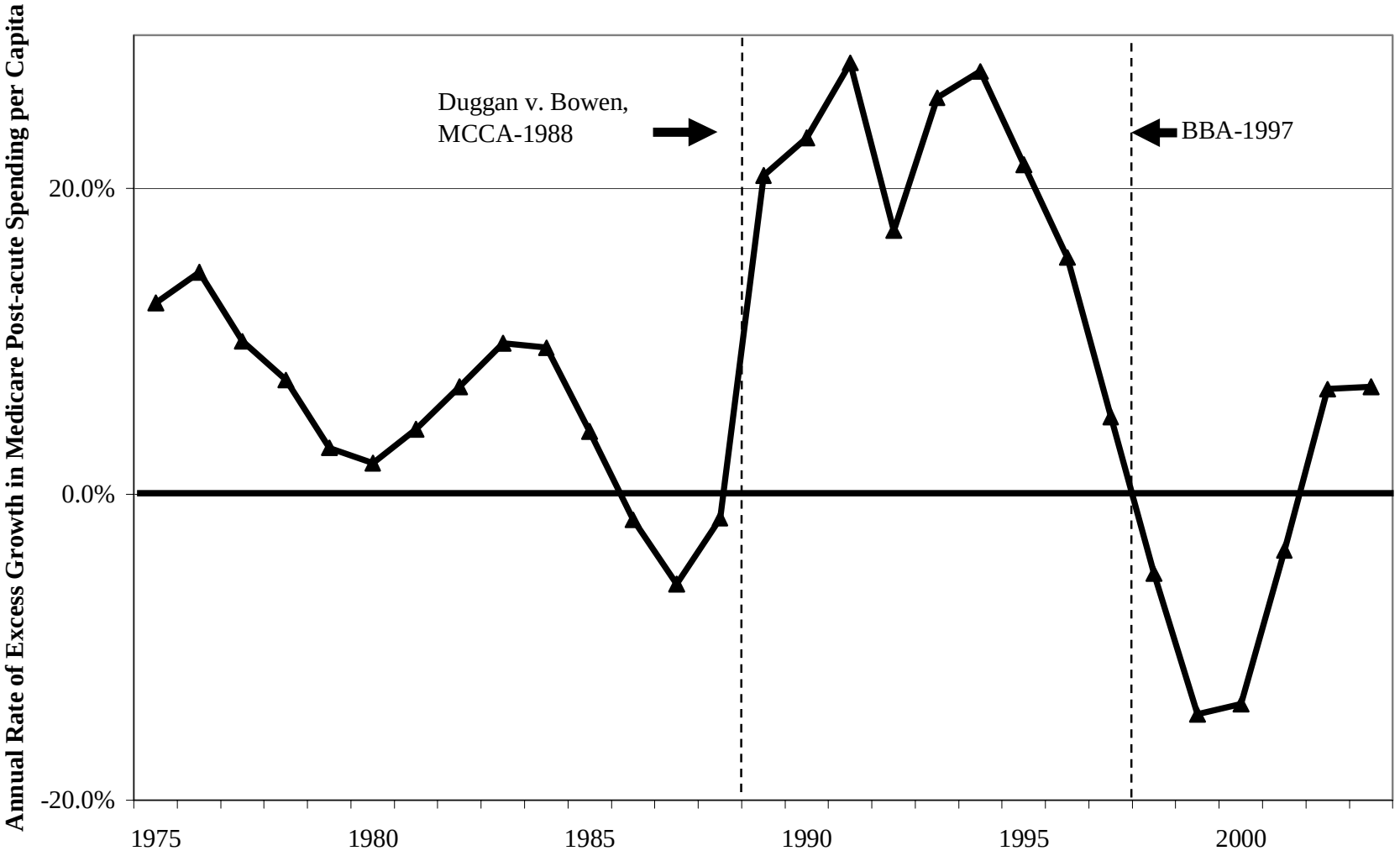
Source: author's calculations.

Figure 2. Excess Growth in Medicare Physician Spending



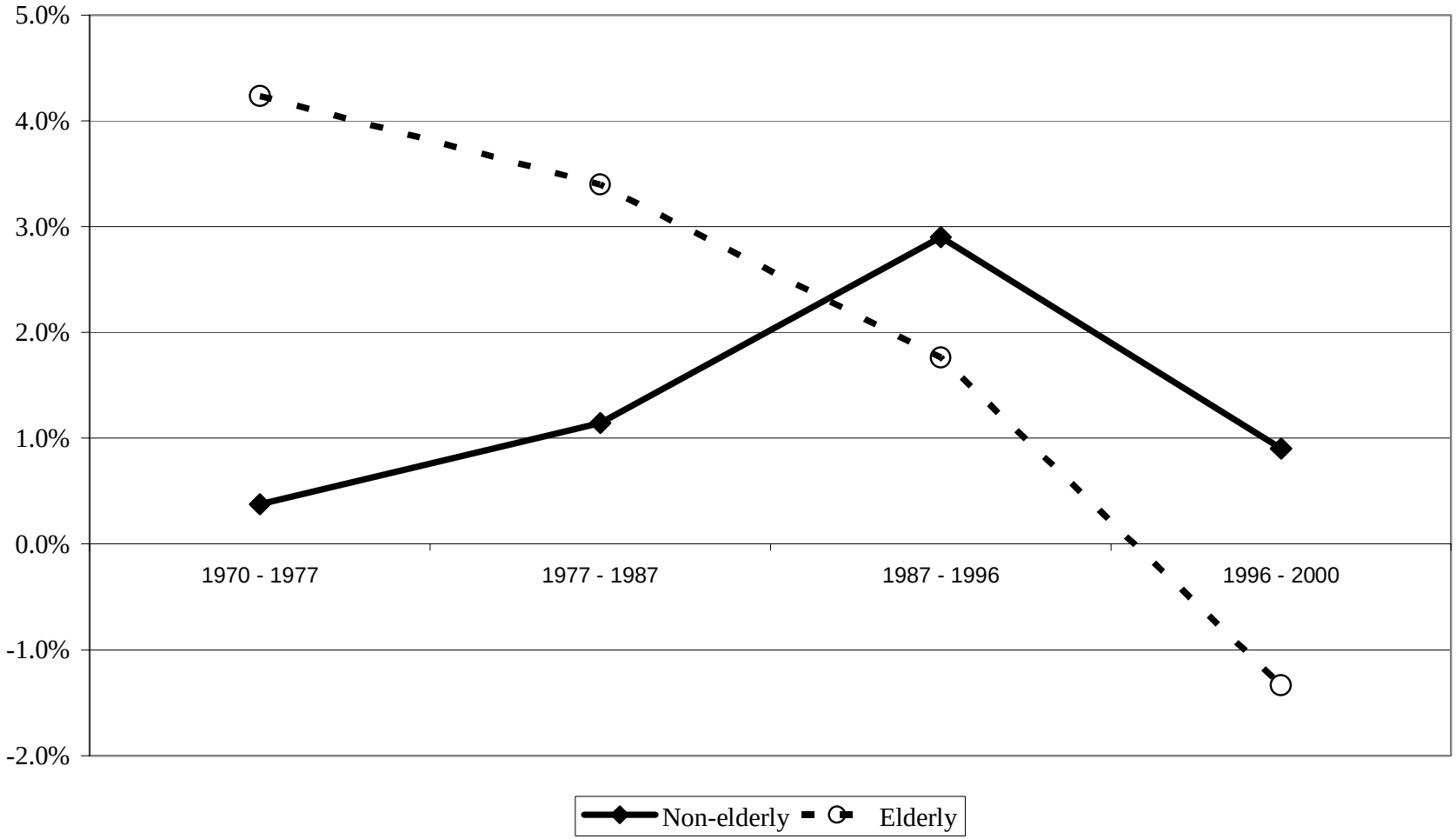
Source: author's calculations.

Figure 3. Excess Growth in Medicare Spending on Post-Acute Care



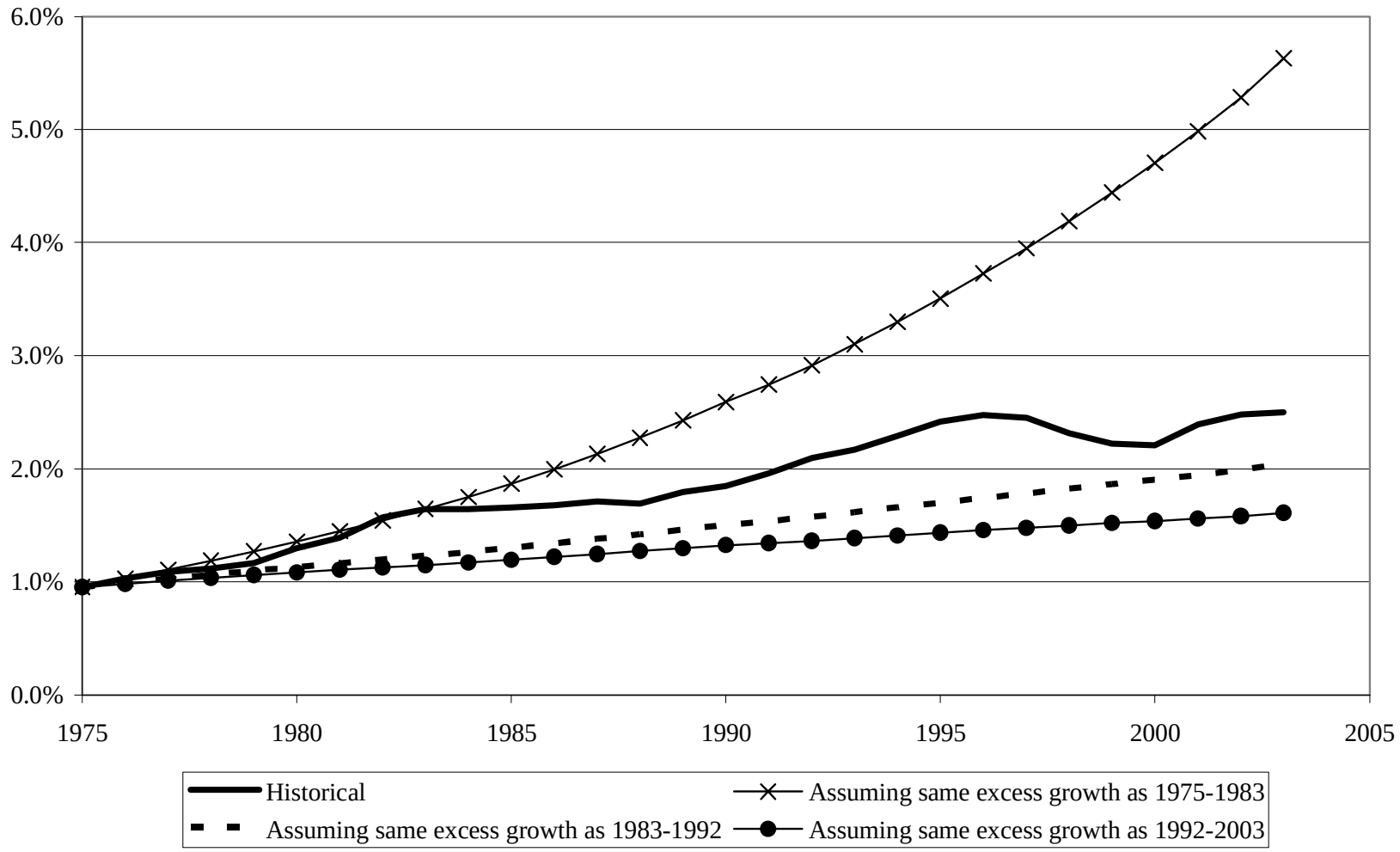
Source: author's calculations.

Figure 4. Annual Rates of Excess Growth in Health Spending per Person for Selected Time Periods, Elderly and Non-Elderly



Source: author's calculations.

Figure 5. Medicare Spending as a Share of GDP, Historical and Hypothetical



Source: author's calculations.

TECHNICAL APPENDIX

Analytical Framework for Decomposing Growth in Medicare Spending

Let $T_{s,y}$ equal total nominal Medicare spending on service *s* in year *y*. Let $T_{s,y}$ be defined as:

$$T_{s,y} = \sum_i B_{i,y} M_{s,i,y} \qquad \text{(eq 1)}$$

where *i* indexes age group, $B_{i,y}$ equals the number of Medicare beneficiaries in age group *i* in year *y*, and $M_{s,i,y}$ equals nominal Medicare spending per beneficiary for service *s* in age group *i* in year *y*.

By expanding equation (1), total Medicare spending can be expressed as follows:

$$T_{s,y} = N_y P_y O_y F_y \left[\sum_i \frac{B_{i,y}}{B_y} \frac{M_{s,i,y}}{P_y} \frac{1}{O_y} \right] \qquad \text{(eq 2)}$$

where N_y is the U.S. resident population in year *y*, P_y is a price index, O_y is real output per capita, F_y is Medicare beneficiaries as a fraction of the resident population, $B_{i,y}/B_y$ is the fraction of Medicare beneficiaries in age group *i* in year *y*, and $M_{s,i,y}/P_y$ is real Medicare spending on service *s* per beneficiary in age group *i* in year *y*.

Let $G_{s,y1,y2}$ be the annualized growth in $T_{s,y}$ between years y_1 and y_2:

$$1+G_{s,y1,y2}=\left(\frac{T_{s,y2}}{T_{s,y1}}\right)^{1/(y_2-y_1)} \qquad \text{(eq 3)}$$

By combining equations (2) and (3), annualized growth can be expressed as the product of six components:

$$1+G_{s,y1,y2}=\left[\frac{N_{y2}}{N_{y1}}\frac{F_{y2}}{F_{y1}}\frac{P_{y2}}{P_{y1}}\frac{O_{y2}}{O_{y1}}\left(\frac{\sum_i \frac{B_{i,y2}}{B_{y2}}M_{s,i,y1}}{\sum_i \frac{B_{i,y1}}{B_{y1}}M_{s,i,y1}}\right)\left(\frac{\sum_i \frac{B_{i,y2}}{B_{y2}}\frac{M_{s,i,y2}}{P_{y2}}}{\sum_i \frac{B_{i,y2}}{B_{y2}}\frac{M_{s,i,y1}}{P_{y1}}}\frac{1}{\left(\frac{O_{y2}}{O_{y1}}\right)}\right)\right]^{1/(y_2-y_1)} \qquad \text{(eq 4)}$$

where

$\left(\frac{N_{y2}}{N_{y1}}\right)^{1/(y_2-y_1)}$ equals (1 + *population growth*)

and

$\left(\frac{F_{y2}}{F_{y1}}\right)^{1/(y_2-y_1)}$ equals (1 + *growth in Medicare beneficiaries as a fraction of the population*)

and

$\left(\frac{P_{y2}}{P_{y1}}\right)^{1/(y_2-y_1)}$ equals (1 + *inflation*)

and

$$\left(\frac{O_{y2}}{O_{y1}}\right)^{1/(y_2-y_1)}$$ equals (1 + *real growth in output per capita*)

and

$$\left(\frac{\sum_i \frac{B_{i,y2}}{B_{y2}} M_{s,i,y1}}{\sum_i \frac{B_{i,y1}}{B_{y1}} M_{s,i,y1}}\right)^{1/(y_2-y_1)}$$ equals (1 + *change in beneficiary age composition*)

and

$$\left(\frac{\sum_i \frac{B_{i,y2}}{B_{y2}} \frac{M_{s,i,y2}}{P_{y2}} \frac{1}{\left(\frac{O_{y2}}{O_{y1}}\right)}}{\sum_i \frac{B_{i,y2}}{B_{y2}} \frac{M_{s,i,y1}}{P_{y1}}}\right)^{1/(y_2-y_1)}$$ equals (1 + *excess growth*)

Note that, in practice, the first five terms are calculated, and then the excess growth term is calculated as a residual (i.e. 1 plus the rate of growth in nominal spending divided by the product of the other five components).

Medicare spending for service *s* in year *y* can also be expressed in terms of real spending per beneficiary, $Z_{s,y}$:

$$Z_{s,y} = \frac{T_{s,y}}{N_y F_y P_y} = O_y \left[\sum_i \frac{B_{i,y}}{B_y} \frac{M_{s,i,y}}{P_y} \frac{1}{O_y}\right] \qquad \text{(eq 5)}$$

The annual rate of growth in $Z_{s,y}$ can then be decomposed into the last three components listed in equation (4): real growth in output per capita, the change in the age composition among Medicare beneficiaries, and excess growth.

Generating Hypothetical Levels of Medicare Spending as a Fraction of GDP

By modifying equation (2) slightly, we can define $Q_{s,y}$ as Medicare spending on service *s* as a fraction of GDP in year *y*:

$$Q_{s,y} = F_y \left[\sum_i \frac{B_{i,y}}{B_y} \frac{M_{s,i,y}}{P_y} \right] \frac{1}{O_y} \qquad \text{(eq 6)}$$

Medicare spending as a fraction of GDP in year 2 can then be expressed in terms of the fraction of GDP in year 1. In equation (7), year 1 is used as a base year for generating the hypothetical fraction in year 2:

$$Q_{s,y2} = Q_{s,y1} \frac{F_{y2}}{F_{y1}} \left[\frac{\sum_i \frac{B_{i,y2}}{B_{y2}} M_{s,i,y1}}{\sum_i \frac{B_{i,y1}}{B_{y1}} M_{s,i,y1}} \right] \left[\frac{\sum_i \frac{N_{i,y2}}{N_{y2}} \frac{M_{s,i,y2}}{P_{y2}}}{\sum_i \frac{N_{i,y2}}{N_{y2}} \frac{M_{s,i,y1}}{P_{y1}}} \frac{1}{\left(\frac{O_{y2}}{O_{y1}} \right)} \right] \qquad \text{(eq 7)}$$

Equation (7) expresses $Q_{s,y2}$ as the product of four components: the fraction of GDP in the base year ($Q_{s,y1}$), the relative Medicare beneficiaries as a share of the population (F_{y2}/F_{y1}), the relative

beneficiary age composition (the first term in square brackets), and 1 plus the cumulative excess growth (the last term in square brackets). One plus cumulative excess growth is calculated as (1 + the annual rate of excess growth)$^{(y2-y1)}$.

Data Sources and Methods

Total nominal Medicare spending by service category and year for 1960 through 2003 is taken from the National Health Expenditures (NHE), which is produced and distributed by the Center for Medicare and Medicare Services (CMS) Office of the Actuary (Centers for Medicare and Medicaid Services, 2005). The NHE treats spending on hospital-based nursing homes and hospital-based home health agencies as part of the hospital care spending category. To make the results easier to interpret, spending on these hospital-based post-acute providers were shifted into the nursing home care category and the home health care category. The CMS Office of the Actuary provided unpublished data on the fractions of public spending (including Medicare, Medicaid and the State Children's Health Insurance Program) for nursing home care and, separately, for home health care accounted for by hospital-based facilities (Centers for Medicare and Medicaid Services, 2002). These data were available only for 1990 through 2000. The fraction for nursing home care was around 12 percent in all years and the fraction for home health care was around 25 percent in all years. The fractions from 1990 were used impute the fractions for all previous years and the fractions from 2000 were used to impute the fractions for later years. Those fractions were then used to estimate Medicare spending on hospital-based nursing home care and home health care. For example, if 25 percent of public spending on home health care was accounted for by hospital-based facilities, then imputed spending on hospital-

based home health care equals non-hospital based home health care spending (provided in the NHE) multiplied by 25 percent divided by 75 percent (100 percent minus 25 percent). These imputed amounts were then shifted from the NHE hospital care category to the nursing home care category and home health care category. This shifting had little effect on hospital spending (relative to total hospital spending) but had a fairly large effect on total home health care spending and a modest effect on nursing home care spending.

The population is defined as the U.S. resident population. Population totals by age group for 1960 through 1990 are taken from published U.S. decennial census data (Hobbs and Stoops, 2002). The actual population for 2000 and the projected populations for 2001 through 2003 by single-year age are taken from published data available from the U.S. Census (U.S. Census Bureau, 2004). The population projections reflects the "middle-series" assumptions of the U.S. Census Bureau. For historical years for which data were not available (i.e., between decennial censuses), population totals were linearly interpolated within five-year age groups.

The gross domestic product (GDP) is used as the measure of total output, and the annual implicit GDP deflator is used as the price index. GDP and all Medicare spending totals are inflated to 2003 dollars.

Measurement of the historical number of Medicare beneficiaries is not as straightforward as it might seem. Published data are available on the number of Medicare beneficiaries, but these figures represent calendar-year enrollment (i.e. number of individuals enrolled at any point during a calendar year) rather than point-in-time enrollment. Note that mid-year point-in-time

enrollment is the appropriate measure for calculating annual spending per person. Also note that the resident population figures from the U.S. Census are point-in-time measures. The calendar-year Medicare enrollment figures exceed point-in-time figures, with the difference being greatest among the oldest individuals (i.e., those with the highest mortality). CMS recently estimated that 97 percent of the elderly were enrolled in Medicare (Health Care Financing Administration, 2000). To avoid overstating the number of elderly Medicare beneficiaries, the point-in-time number of elderly beneficiaries was estimated as 97 percent of the U.S. elderly resident population within each age group.

To estimate the number of non-elderly Medicare beneficiaries, published calendar-year figures from CMS were used (Centers for Medicare and Medicaid Services, 2003). These figures slightly overstate the point-in-time number of non-elderly beneficiaries, but the discrepancy is likely to be slight.

The data described so far—population totals, the number of Medicare beneficiaries, the Medicare spending totals and GDP—can be used to calculate historical growth in nominal Medicare spending and the first four components of spending growth listed in equation (4). The calculation of the historical "beneficiary age composition" component requires additional calculations. Medicare beneficiaries were divided into six age groups: under 65, 65 to 69, 70 to 74, 75 to 79, 80 to 84, and 85 and up. For each age group and each spending category Medicare spending per person was estimated using publicly available national spending surveys: the 1977 National Medical Care Expenditure Survey (NMCES), the 1987 National Medical Expenditure Survey (NMES) and the 1996 through 2000 waves of the Medical Expenditure Panel Survey (MEPS).

Each of these national surveys records spending data for several categories of spending for a nationally representative sample of the United States non-institutionalized civilian population. Estimates were calculated using survey weights. To increase precision, the 1996 through 2000 survey data were pooled.

The national surveys, by design, do not collect information on nursing facility use or spending. To estimate Medicare spending on nursing facilities for each age group, unpublished Medicare claims data for 1998 were used. The claims-based estimate of Medicare nursing facility spending is added to the home health spending from the national surveys to estimate Medicare post-acute spending by age group. Medicare nursing facility spending data were not available for earlier years; only the 1998 estimates were available for Medicare spending on post-acute care.

The "change in the age composition among Medicare beneficiaries" component was calculated using the per-person spending estimates by age group in a base year, the share of beneficiaries in each age group in the base year, and the share of beneficiaries in each age group in a final year. Note that to calculate the beneficiary aging component, the only relevant information comprises the relative spending (not absolute level of spending) among age groups in the base year and the change in the age composition among beneficiaries. Per-person spending estimates are calculated for 1977, 1987, and 1998 (see Appendix Table 1). The 1998 estimates are used for base years 1988 through 2002, the 1987 estimates are used for base years 1978 through 1987, and the 1977 estimates are used for all prior base years. Note that Medicare physician spending is very nearly equal across age groups, whereas post-acute spending is highly skewed toward older beneficiaries. Because of this difference, the population aging component of spending growth is

larger for post-acute care spending than for other categories of spending. Once the beneficiary age composition component is calculated, the excess spending growth component is calculated as the difference between nominal Medicare spending growth and the sum of the other five components.

Appendix Table 1. Spending per Person Estimated Using National Spending Surveys

Service Category	Age group	Year		
		1977	1987	1998
Hospital Care	Under 65	$1,670.10	$2,348.50	$3,679.83
	65 to 69	$1,273.45	$1,851.73	$2,156.75
	70 to 74	$1,439.84	$1,958.64	$2,464.41
	75 to 79	$2,246.34	$1,872.19	$3,381.86
	80 to 84	$2,539.51	$3,029.98	$4,167.12
	85 and up	$2,676.52	$3,230.35	$4,324.31
Physician and Clinical Services	Under 65	$681.55	$1,679.97	$1,467.82
	65 to 69	$464.52	$878.03	$1,213.84
	70 to 74	$579.46	$875.40	$1,405.17
	75 to 79	$605.14	$1,242.77	$1,668.96
	80 to 84	$481.97	$1,252.04	$1,576.99
	85 and up	$477.49	$943.38	$1,270.74
Post-Acute Care (Home Health Care plus Skilled Nursing Facility Care)	Under 65	n/a	n/a	$701.12
	65 to 69	n/a	n/a	$273.13
	70 to 74	n/a	n/a	$368.57
	75 to 79	n/a	n/a	$719.51
	80 to 84	n/a	n/a	$1,285.97
	85 and up	n/a	n/a	$2,187.27

n/a - not available
Source: author's calculations.

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