

**ANALYSIS OF INFLATION FACTOR USED IN SETTING OUTLIER
THRESHOLDS
FY 2003**

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At the request of the California Healthcare Association, the American Hospital Association, the Association of American Medical Colleges and the Federation of American Hospitals, I conducted this analysis of the inflation factor proposed for use in setting the FY 2003 outlier thresholds.

I am the President of Henry W. Zaretsky & Associates, Inc., which I formed in August 1981. In this position, I furnish consulting services to hospitals and to other health care providers in various matters pertaining to health care economics. I obtained a doctoral degree in 1974 from the University of California at Davis, in economics, with an emphasis on health care economics. I was Director of Research and Development at the California Hospital Association (now, the California Healthcare Association) from September 1972 to April 1978, where I was responsible for a variety of research matters relating to the economic regulation of hospitals and other health care facilities. In April 1978, I was appointed by Governor Edmund G. Brown, Jr. as the first director of the California Office of Statewide Health Planning and Development. With that agency, I administered California's state health planning program, which, among other things, required hospitals to obtain state approval for significant capital projects based upon a demonstration of project need and cost effectiveness. I have also from time to time served as a lecturer at various California universities in health care planning, regulation and financial management. I have authored numerous publications involving a wide variety of health care matters. I am very familiar with the Medicare Prospective Payment System (PPS) and have regularly advised clients and performed analyses concerning PPS since it was first proposed. My background is described in greater detail in my curriculum vitae, which is attached.

INTRODUCTION

The purpose of this report is to describe my analysis of CMS's proposed approach to project inflation in cost per case between 2001 and 2003, for use in setting outlier thresholds.¹ The annual rates of change in cost per case are projected for the fiscal years 2000 to 2003 through a three-year moving average of the differences in annual rates of change. Thus, the projection for 2000 is based on the average of the differences in rates of change from 1996-97 through 1998-99. This average difference is then added to the

¹ This approach is set forth in, *Proposed Rules, Federal Register/* Vol. 67, No. 90/ May 9, 2002, pp.31510-11.

1999 rate of change to yield the projection for 2000. The 2001 projection is generated in the same manner, using one-year later data (including the projection for 2000), and so on to 2003.

This method is a marked departure from methods used previously by CMS to project hospital cost increases. Previous methods took the rate of increase for the most recent period for which data were available (generally three years prior to the target year), and held that rate constant throughout the projection period. Since the FY 2000 cost reports are not yet available to yield a 2000 inflation factor, due to processing delays, rather than use the increase in costs from 1998 to 1999 as the inflation factor, CMS is proposing the three-year moving average. This method is not necessarily intended for future use, should more current data become available. Apparently, CMS's preferred approach is its traditional method.

The analysis described here takes the proposed method and applies it to historical data starting in 1984, to generate projections for all years from 1991 to 1999. These projections are then compared to actual data for this period. Three other projection methods are also employed for this time period, and their output compared to historical data. The three other methods are as follows:

- (1) A three-year moving average of annual rates of change (rather than differences in rates of change);
- (2) The annual rate of change carried forward four years (i.e., for 2003, the rate of change would be that for 1999); and
- (3) The market basket index.

Based on the analysis discussed below, if CMS will not apply the 1999 rate of change to future periods, I recommend it adopt the market basket projection as the inflation factor. This recommendation is based on the following:

- (1) Of all projection methods reviewed here, the market basket yields the most stable projections and most closely tracks actual cost increases, at least since 1991;***
- (2) The market basket measures changes in the prices of hospital inputs;***
- (3) It is already used as a basis for setting PPS rates; and***
- (4) The CMS method yields the most volatile projections over the historical period, and projects a more than trebling of inflation rates from 1999 to 2003, with no justification for this rapid acceleration in cost inflation.***

COMPARISON OF THE FOUR METHODS

As indicated above, CMS apparently intends the projection method proposed for FY 2003 as a one-time approach necessitated by lack of current data. Thus, if complete FY 2000 cost-report data were available, the implication is CMS would take the rate of change between 1999 and 2000, and carry that annual rate forward to FY 2003. Unlike a usual three-year moving average, which in the case of rates of change in cost is based on the average rate of change of the three most recent periods, this stop-gap projection method is based on the three year average of differences in rates of change (i.e., differences of differences, or the change in the rate of change). As will be shown below, this indirect method of projecting rates of change results in highly volatile projections, and projects a rate of change for 2003 of 7.9 percent, more than three times the rate of change for the most recent historical year (2.4 percent in 1999).

The historical data and the projections generated by the four methods are shown in Table 1. The historical data on annual rates of change were obtained from two sources: (1) for 1996-1999, the data are from the *Proposed Rules*; and (2) for all prior years they are from the 1997 *ProPAC Report to Congress*.² Starting in 1985, there was a fairly steady downward trend in annual rate of change until 1996, when a turning point appeared. The four most recent years show increases in rates of change. I am not aware of any model, given available data up to the mid-1990s, that could have predicted this turning point.

The column labeled “Predicted: CMS Method” applies the method in the *Proposed Rules* to the historical data going back to 1984. (Using the CMS method, the 1991 projection requires calculation of moving averages, with the difference in the rate of change between 1984 and 1985 as the starting point.) The column labeled “Predicted: Alternative Method” uses a simple three-year moving average of annual rates of change, as opposed to differences in rates of change.

The next column displays the Market Basket index. This is the FY 1992-based index. The historical and projected data from 1995 to 2003 are from Table 4 in the *Proposed Rules*, and the earlier data are from the 1997 *ProPAC Report*. CMS has proposed using a new market basket for FY 2003, based on 1997 weights. Since historical data for this index only go back to 1995, the 1991-99 comparisons of actual to predicted use the former market basket. In addition, 1995-99 comparisons are also made, using the FY 1997-based market basket (shown in the last column). The next column, “Predicted: Four Year Lag,” shows projections based on a four-year lag; i.e., the 1999 rate of change is assumed to be the same in 2003. This is similar to the usual CMS method, except that it uses a four-year rather than three-year lag. Since 2000 data are not available, CMS rejected this alternative. “Rather than use the rate of cost increase from hospitals’ FY 1998 and FY 1999 cost reports to project the rate of increase from FY 2001

² Prospective Payment Assessment Commission, *Medicare and the American Health Care System: Report to Congress*, June 1997

to FY 2003, we are proposing ...”.³ I believe, however, the four-year lag approach should be considered a viable option, as it closely mirrors what CMS has done in the past.

The bottom row in Table 1 contains the two-year inflation factors generated by each projection that would be used to bring FY 2001 charges up to FY 2003. The CMS projection suggests a 15-percent two-year inflation factor. The simple moving average results in a two-year inflation factor of 4.1 percent. The 1992-based market basket yields a two-year inflation factor of 5.9 percent. The 1997-based market basket yields a 7.1-percent two-year factor. And, the four-year lag results in a 4.8-percent two-year factor.

**TABLE 1
ACTUAL AND PROJECTED
ANNUAL RATE OF CHANGE IN COST PER CASE
AND MARKET BASKET**

Year	Actual	Predicted: CMS Method*	Predicted: Alternative Method**	92 Market Basket***	Predicted: Four Year Lag****	97 Market Basket*****
1984	1.018			1.049		
1985	1.110			1.039		
1986	1.096			1.039		
1987	1.091			1.035		
1988	1.090			1.047		
1989	1.092			1.055		
1990	1.082			1.045		
1991	1.070	1.135	1.096	1.044	1.091	
1992	1.046	1.070	1.092	1.032	1.090	
1993	1.012	1.090	1.091	1.031	1.092	
1994	0.989	1.066	1.087	1.026	1.082	
1995	0.988	1.036	1.078	1.031	1.070	1.028
1996	0.970	0.978	1.061	1.024	1.046	1.023
1997	1.004	0.907	1.035	1.021	1.012	1.016
1998	1.024	0.881	1.008	1.029	0.989	1.027
1999	1.024	0.928	0.993	1.025	0.988	1.027
2000		1.042	1.017	1.036	0.970	1.033
2001		1.055	1.022	1.041	1.004	1.042
2002		1.065	1.021	1.028	1.024	1.037
2003		1.079	1.020	1.030	1.024	1.033
2001-2003		1.150	1.041	1.059	1.048	1.071

* Three-year moving average of differences in annual rates of change.

** Three-year moving average of annual rates of change.

***Market Basket based on FY 1992 weights.

****Projected annual rate of change for year t equals the rate of change for year $t-4$.

***** Market Basket based on FY 1997 weights, proposed for FY 2003.

³ *Proposed Rules*, p. 31510.

Sources:

Annual percent change in cost per case: (1) Prospective Payment Assessment Commission, *Medicare and the American Health Care System: Report to Congress*, June 1997, p. 129; (2) Medicare Payment Advisory Commission, *Report to The Congress: Medicare Payment Policy*, March 2001, p. 170; (3) Medicare Payment Advisory Commission, *Report to The Congress: Medicare Payment Policy*, March 2002, p. 146; and (4) *Proposed Rules, Federal Register/ Vol. 67, No. 90/ May 9, 2002, p.31511.*

Market Basket: Prospective Payment Assessment Commission, *op. cit.*, and Federal Register, *op. cit.*, p. 31445

Figure 1 compares the actual versus predicted values for all four methods, from 1991 to 1999. Note that the CMS method yields the most volatile projections relative to actual. It starts out far above the actual data, then falls far below. While none of the four methods appears to closely track the actual experience in terms of predicting the turning point in 1996, the market basket has the strongest relationship with the historical data. This is confirmed by a regression analysis, where the actual annual rate of change from 1991 to 1999 is regressed against each of the predictions separately. The results are reported in Tables A1 through A4 at the end of this report. The regression equation reported in Table A3, where the annual rate of change is the dependent variable and the market basket is the independent variable, is the only equation where the relationship is significant at the 0.05 level. Thus, of the four methods evaluated, the market basket has the closest relationship with the historical data. Figure 2 shows similar comparisons for the 1995-99 period, substituting the FY 1997-based market basket for the FY 1992-based market basket. The patterns are similar.

Figure 3 shows the historical data from, 1991 to 1999 and each of the projections from 2000 to 2003 (using the FY 1992 based market basket). The CMS method projects the highest rates of change, and these projections deviate considerably from the recent historical experience (i.e., 1996-99). The other methods suggest a flattening (i.e. the 2003 rate of change is similar to that for 1999). Of the four methods, the market basket results in a mid-range projection. Figure 4 is presents the same data as the previous figure, except the FY 1997 based market basket is substituted for the earlier one. The patterns are nearly identical.

Figures 3 and 4 illustrate how extreme the CMS projection is relative to the historical data and projections derived from other methods. More than trebling the rate of change between 1999 and 2003 (i.e., from 2.4 percent to 7.9 percent), when there are no credible economic forecasts suggesting a major acceleration in economy-wide inflation, could be considered “going out on a limb.” The Office of Management and Budget (OMB), in developing the 2003 federal budget, assumed the annual increase in the Consumer Price Index would average 2.3 percent from 2002 to 2012, and in no year would it exceed 2.4 percent.⁴ Moreover, the Congressional Budget Office and Blue Chip Economic Indicators project average inflation over this 11-year period of 2.4 percent and

⁴ Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2003*, Washington, DC, 2002, p. 25.

2.5 percent, respectively.⁵ These estimates are a far cry from CMS’s 7.9 percent increase in cost per case.

In fact, CMS’s own market basket projections (both FY 1992-and FY 1997-based) reflect an inflation rate in 2003 that is only slightly higher than in 1999 (i.e., no marked acceleration in inflation). MEDPAC has found that, “Preliminary data from the national hospital indicators survey (NHIS) suggest that over the 3-year period of 1999 through 2001, cost growth was at least modestly above growth in the market basket...with nearly all of hospitals’ Medicare lines of business now under prospective payment, hospitals have strong financial incentives to control cost growth.”⁶ There is clearly no indication that an upsurge in hospital cost inflation is expected by 2003.

The conclusion that an upsurge in inflation is not expected is further supported by a comparison of NHIS data from 1985 to 2000 and Medicare data from 1985 to 1999, as shown in Table 2 and Figure 5. Total (all-payer) cost per case and Medicare cost per case track closely. The steeper drop in Medicare cost per case prior to 1997 reflects reductions in Medicare length of stay; the increase since then reflects moderation in these length-of-stay reductions.⁷ The addition of 2000 data on all-payer cost increases clearly does not suggest a significant up-tick in inflation of the magnitude consistent with the CMS projection.

**TABLE 2
ANNUAL RATE OF CHANGE IN MEDICARE COST PER CASE
AND ALL-PAYER COST PER CASE
AND MARKET BASKET
1985-2000**

Year	Change in Medicare Cost Per Case	Change in All-Payer Cost Per Adjusted Admission	Market Basket
1985	1.110	1.083	1.039
1986	1.096	1.089	1.039
1987	1.091	1.090	1.035
1988	1.090	1.093	1.047
1989	1.092	1.091	1.055
1990	1.082	1.078	1.045
1991	1.070	1.083	1.044
1992	1.046	1.081	1.032
1993	1.012	1.058	1.031

⁵ Ibid.

⁶ Medicare Payment Advisory Commission, *Report to The Congress: Medicare Payment Policy*, March 2002, pp. 60-61.

⁷ This was pointed out in the MedPAC Report, p. 60.

Year	Change in Medicare Cost Per Case	Change in All-Payer Cost Per Adjusted Admission	Market Basket
1994	0.989	1.016	1.026
1995	0.988	0.998	1.031
1996	0.970	1.002	1.024
1997	1.004	1.006	1.021
1998	1.024	1.020	1.029
1999	1.024	1.019	1.025
2000		1.025	1.036

Source: Table 1, above, and National Hospital Indicators Survey.

RECOMMENDATIONS

Accurately projecting hospital cost inflation is a difficult task. I can envision no model that can accurately predict turning points in hospital cost inflation, given available data. The method proposed by CMS, however, yields the most volatile projections of the four methods considered here. It projects a 2003 inflation rate that appears to be inconsistent with historical experience, with no underlying assumptions set forth to justify this inconsistency. Given the lack of data subsequent to 1999, and CMS's consequent reluctance to use the four-year lag approach (which most closely approximates CMS's usual method), I recommend CMS adopt the market basket projection (either FY 1992-based or FY-1997 based) as the inflation factor. Of the methods reviewed here, the market basket, which measures the changes in prices of inputs used by hospitals to provide services, is the most stable and tracks most closely with actual cost increase experience. Moreover, as part of its PPS rate-setting process, CMS already relies on market basket projections.

**Actual versus Projected Rate of Change in Cost:
Four Methods
1991-1999**

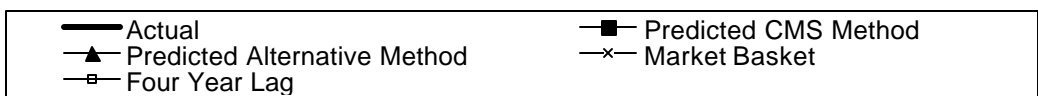
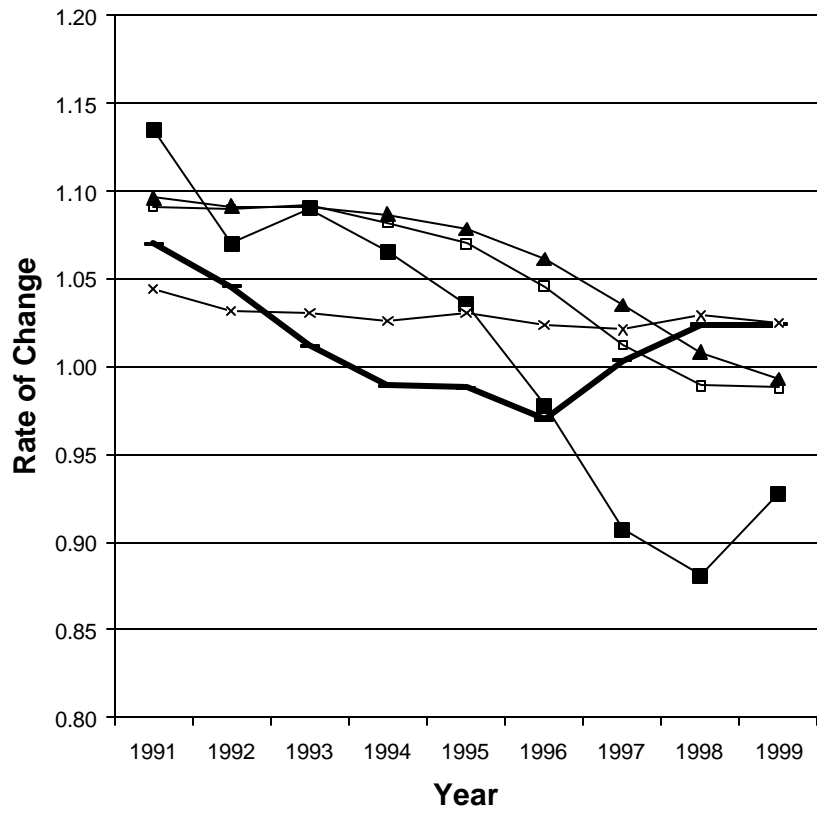
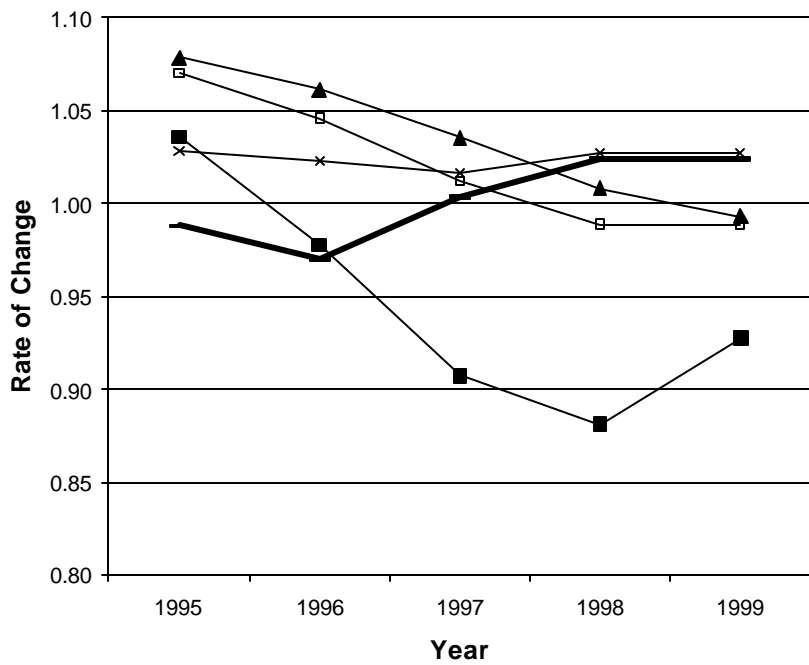


Figure 1

**Actual versus Projected Rate of Change in Cost:
Four Methods
1995-1999**



— Actual	—■— Predicted CMS Method
—▲— Predicted Alternative Method	—□— Four Year Lag
—x— 97 Market Basket	

Figure 2

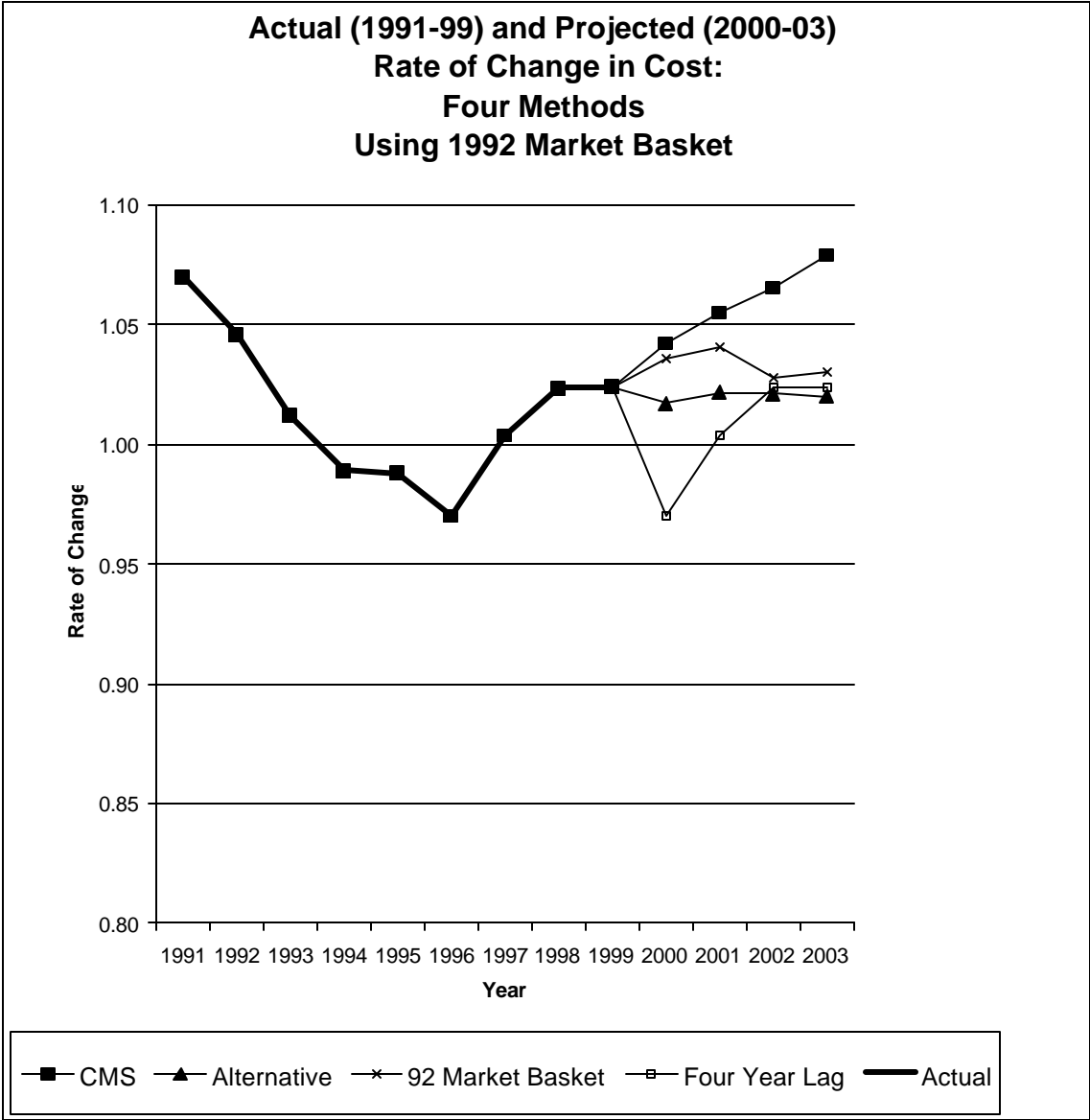


Figure 3

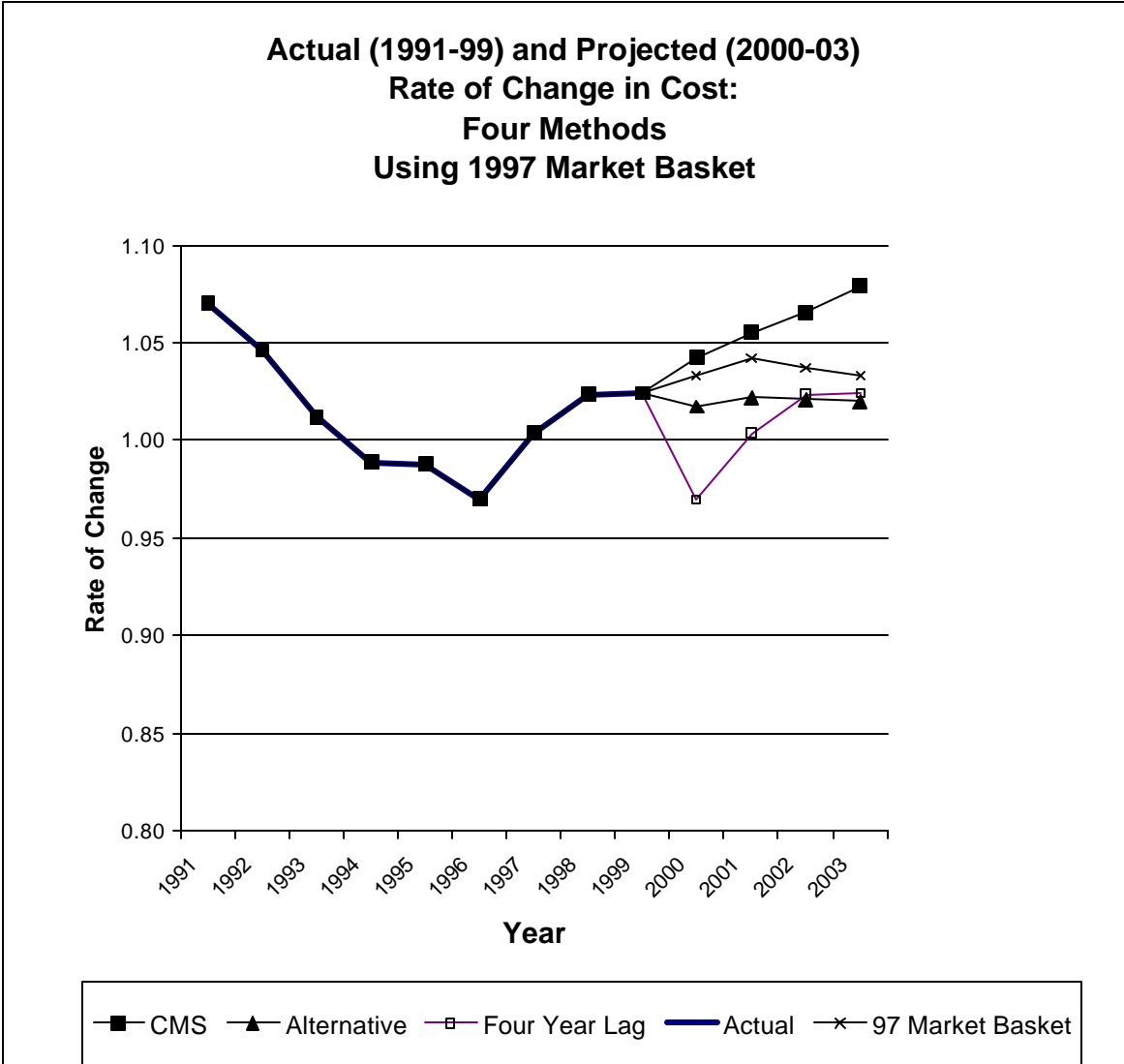


Figure 4

**Rate of Change in Medicare
and All Payer Cost per Case and Market Basket
1985-2000**

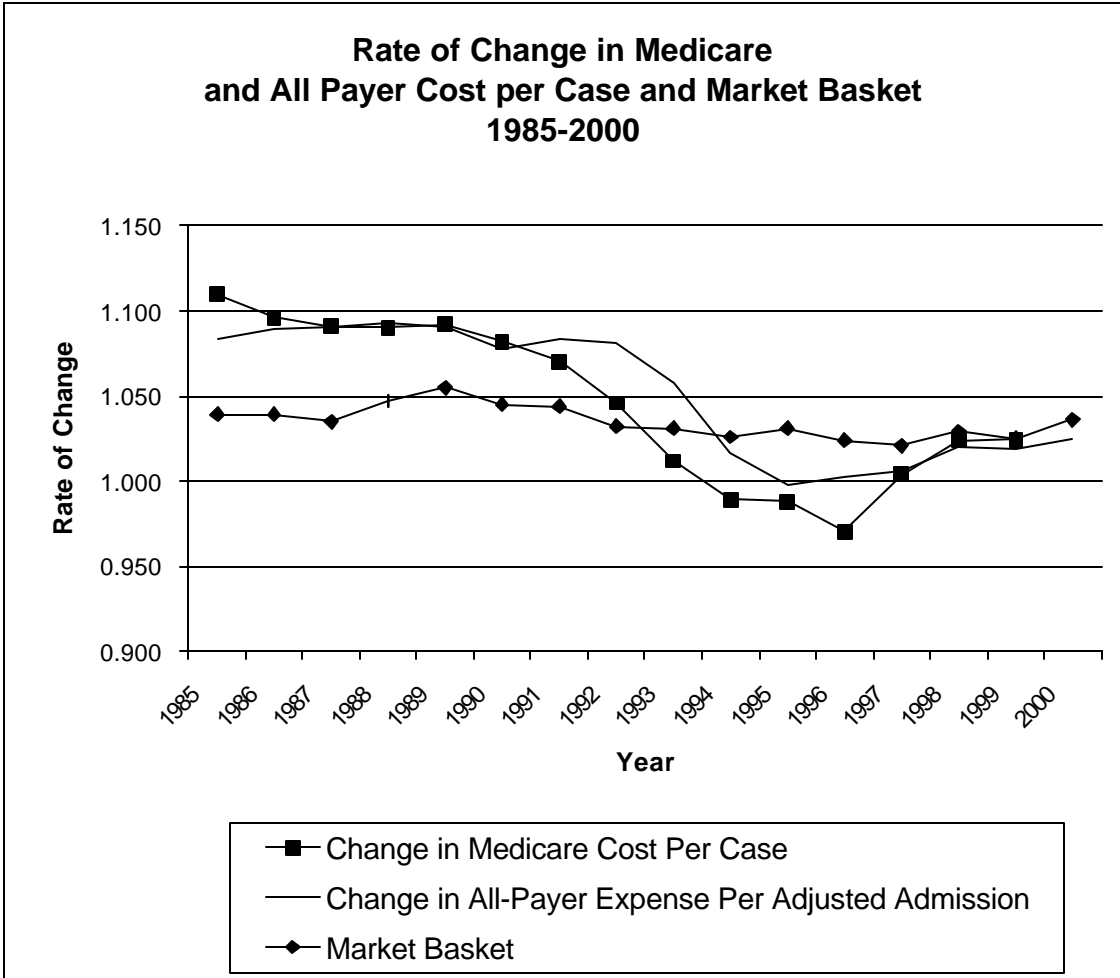


Figure 5

APPENDIX

REGRESSION RESULTS

TABLE A1
REGRESSION OF ACTUAL RATE OF CHANGE IN COST PER CASE
AGAINST PREDICTIONS USING CMS METHOD
1991-1999

Dependent Variable: ACTUAL
 Method: Least Squares
 Date: 06/19/02 Time: 13:50
 Sample: 1991 1999
 Included observations: 9

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PREDICTED_CMS_M	0.109763	0.123693	0.887386	0.4043
E				
C	0.903220	0.125377	7.204030	0.0002
R-squared	0.101118	Mean dependent var		1.014089
Adjusted R-squared	-0.027293	S.D. dependent var		0.031013
S.E. of regression	0.031433	Akaike info criterion		-3.888781
Sum squared resid	0.006916	Schwarz criterion		-3.844953
Log likelihood	19.49952	F-statistic		0.787453
Durbin-Watson stat	0.636460	Prob(F-statistic)		0.404328

TABLE A2
REGRESSION OF ACTUAL RATE OF CHANGE IN COST PER CASE
AGAINST PREDICTIONS USING SIMPLE THREE-YEAR MOVING
AVERAGE
1991-1999

Dependent Variable: ACTUAL
 Method: Least Squares
 Date: 06/19/02 Time: 13:51
 Sample: 1991 1999
 Included observations: 9

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PREDICTED_ALTERN	0.069096	0.299749	0.230513	0.8243
C	0.940827	0.318010	2.958480	0.0212
R-squared	0.007534	Mean dependent var		1.014089
Adjusted R-squared	-0.134247	S.D. dependent var		0.031013
S.E. of regression	0.033029	Akaike info criterion		-3.789740
Sum squared resid	0.007636	Schwarz criterion		-3.745912
Log likelihood	19.05383	F-statistic		0.053136
Durbin-Watson stat	0.556112	Prob(F-statistic)		0.824285

TABLE A3
REGRESSION OF ACTUAL RATE OF CHANGE IN COST PER CASE
AGAINST THE MARKET BASKET
1991-1999

Dependent Variable: ACTUAL
Method: Least Squares
Date: 06/19/02 Time: 13:52
Sample: 1991 1999
Included observations: 9

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MARKET_BASKET01	3.417531	1.192879	2.864944	0.0242
C	-2.503310	1.227761	-2.038924	0.0808
R-squared	0.539713	Mean dependent var		1.014089
Adjusted R-squared	0.473958	S.D. dependent var		0.031013
S.E. of regression	0.022493	Akaike info criterion		-4.558082
Sum squared resid	0.003542	Schwarz criterion		-4.514255
Log likelihood	22.51137	F-statistic		8.207901
Durbin-Watson stat	1.076074	Prob(F-statistic)		0.024166

TABLE A4
REGRESSION OF ACTUAL RATE OF CHANGE IN COST PER CASE
AGAINST THE FOUR-YEAR LAG
1991-1999

Dependent Variable: ACTUAL
Method: Least Squares
Date: 06/19/02 Time: 13:52
Sample: 1991 1999
Included observations: 9

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FOUR_YEAR	0.097541	0.263883	0.369635	0.7226
C	0.911563	0.277587	3.283885	0.0134
R-squared	0.019145	Mean dependent var		1.014089
Adjusted R-squared	-0.120977	S.D. dependent var		0.031013
S.E. of regression	0.032835	Akaike info criterion		-3.801508
Sum squared resid	0.007547	Schwarz criterion		-3.757680
Log likelihood	19.10679	F-statistic		0.136630
Durbin-Watson stat	0.573569	Prob(F-statistic)		0.722583