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Chapter 26

The President's Economic Report: A Forecasting Record

Keeping a scorecard on economists' forecasts is not an occupation calculated to please one's professional colleagues. If the forecasts turn out to be very different from one another, and obviously different from what will occur, some wiseacre is likely to remark that economists get rich by begging—to differ. If the forecasts turn out to be much alike, the same fellow will say if you've seen one economist's forecast you've seen 'em all. Nevertheless, forecasting records should be kept, exposed to public view, and analyzed. Only in this way can we learn to what degree they are dependable and how to improve their reliability.

For this reason in 1963 the National Bureau began to develop systematic records of forecasts and analyze the results. First we obtained a number of historical records and then, in 1968, began a quarterly survey of forecasters, in cooperation with the American Statistical Association. The survey not only provides current information on what some fifty economists who regularly produce forecasts are projecting for each of the next five quarters, but also summarizes the methods being used and the crucial assumptions underlying the forecasts. Hence it is a systematic record that had not been available previously.

One of the most widely scrutinized forecasts—not included in the above survey—is the one published each January in the *Economic Report of the President*. The practice of including explicit numerical forecasts in the *Report* began in 1961. Hence a record covering

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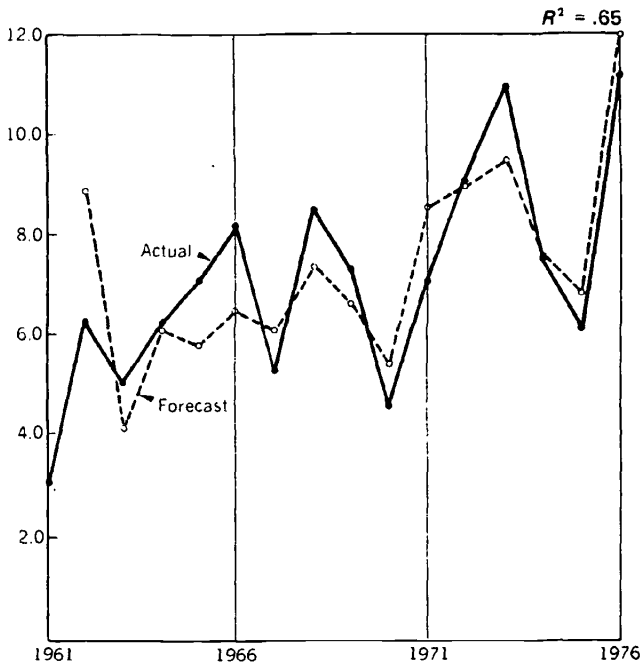
some fifteen years can be compiled and, since 1968, compared with the ASA-NBER survey of forecasters. How close to the mark did these forecasts come? Is the government's forecast more accurate or less accurate than the private forecasts? Is there evidence of bias? How do forecasts of price change compare with forecasts of real growth? Could one do as well simply by extrapolating last year's experience? Have the forecasts been getting better or worse?¹

Since the *Economic Report* forecasts have been limited, for the most part, to annual totals for the year ahead of gross national product in current and in constant prices and to the price level implied in current dollar GNP, we restrict our analysis to these three variables (the ASA-NBER survey covers other items too, such as unemployment, industrial production, housing starts, and so on). The most useful way to record and analyze these forecasts, I believe, is in terms of year-to-year percentage changes. Changes are harder to predict than levels, and percent changes are more comparable over time than dollar changes. By using them we also avoid some of the problems of revision in the level of the dollar figures and concentrate attention on what is of most interest—the rate of growth and the rate of inflation.

In measuring accuracy we compare the forecast percent change with the actual percent change recorded the following year (ignoring later revisions in the "actuals") and calculate the mean error without regard to sign and the correlation (r^2) between the forecast and actual changes. The mean error simply tells how big the discrepancy in percentage points was, on the average, between the forecast and the actual change, while the correlation indicates on a scale from 0 to 1 how closely related the forecast and actual changes were. If the correlation is close to 0, there is little evidence of forecasting ability, even if the mean error is quite small. Finally, as another test of forecasting accuracy, we compare the forecasts with those that might have been made by simple extrapolation—assuming that next year's percentage change will be the same as that of the previous year. This provides a standard measure of the relative difficulty of forecasting during one period compared with another or forecasting one variable compared with another and, as we shall see, is not always easy to beat.²

Figures 26-1 through 26-3 show the record of the forecasts from the *Economic Report* in comparison with the actual figures reported a year later. Clearly the two correspond to a considerable degree. The mean error for the whole period turns out to be almost the same—one percentage point—for current and constant dollar GNP and for the price deflator (Table 26-1, col. 1). That is to say, the government's economists have forecast the rate of nominal growth, of real

Figure 26-1. Actual and Forecast Percentage Change in GNP in Current Dollars, Economic Report of the President, 1961-1976.

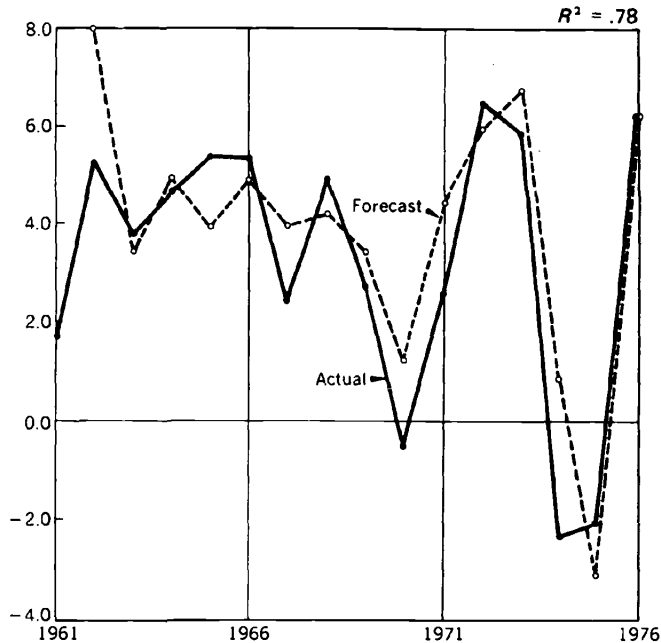


Source: Table 26-3.

growth, and of inflation for the year ahead all with an average margin of one percentage point during the past fifteen years.

Figures 26-1 and 26-2 also clearly show that there has been some improvement during the period in the fidelity with which the forecasts have tracked the actual changes in current and constant dollar GNP. At the same time, the swings in the rates of growth have become wider, which presumably adds to the difficulty of forecasting. The summary measures in Table 26-1, which divide the period roughly in half, show that the mean error in forecasts of GNP in current dollars dropped from 1.3 percent in the first seven years (1962-1968) to 0.8 percent in the last eight (1969-1976).³ This was more of an accomplishment than it appears at first sight, because between the same two periods the errors made by simple extrapolation of the previous year's change were increasing, reflecting the wider swings in the rates of change. The forecast errors dropped from about two-thirds of the extrapolative errors to about one-third. Also,

Figure 26-2. Actual and Forecast Percentage Change in GNP in Constant Dollars, Economic Report of the President, 1961-1975.



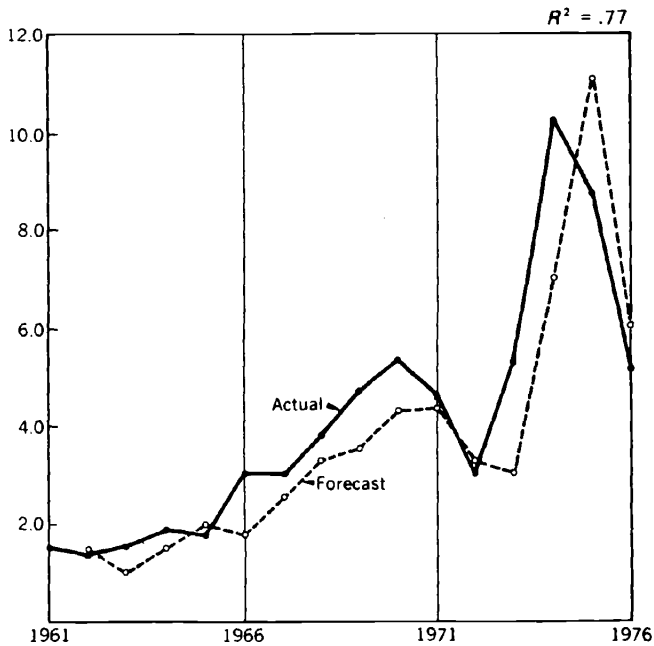
Source: Table 26-3.

the correlation between forecast and actual changes became very much higher.

For real GNP the average size of the forecasting errors did not decline between the two periods, but the errors of simple extrapolation became much larger (the swings in real growth rates increased much more than the swings in nominal growth rates). Hence, relative to the extrapolation standard, the forecasts of real GNP improved just as much as the forecasts of nominal GNP. The correlation of forecast with actual changes also improved substantially.

The government's record for price forecasting is very different, despite the fact that the average error and the correlation for the entire period are virtually the same as for real and nominal GNP. A glance at Figure 26-3 reveals a clear tendency for the forecasts of the inflation rate to lag a year behind the actual rates. As a result, the price forecasts were no better than the extrapolative standard in the first half of the period and only moderately better in the last half. The extrapolation automatically lags a year behind the actual

Figure 26-3. Actual and Forecast Percentage Change, GNP Implicit Price Deflator, Economic Report of the President, 1961-1976.



Source: Table 26-3.

changes. Furthermore, the correlation between forecast and actual price changes deteriorated, though not as much as it did for the extrapolation. Of course, the swings in the rate of inflation increased enormously in the 1970s.

It appears, then, that at least in the early part of the period, the rate of inflation had a far greater tendency to persist from year to year than did the rate of change in real GNP. It appears, too, that this tendency has influenced forecasts of the rate of inflation. This influence is demonstrated more directly in Figure 26-4, which compares the errors in the forecasts with the errors in extrapolation. For real and nominal GNP there is little or no relation; the forecast errors simply hew much closer to the zero line than do the extrapolation errors. But for prices there is a close relation—the forecast errors move very much like the extrapolation errors. In price forecasting, forecasters have to a large extent followed the extrapolating route. Indeed, the *Economic Report* has often stated its expectation regarding prices in terms of extending the recent trend.

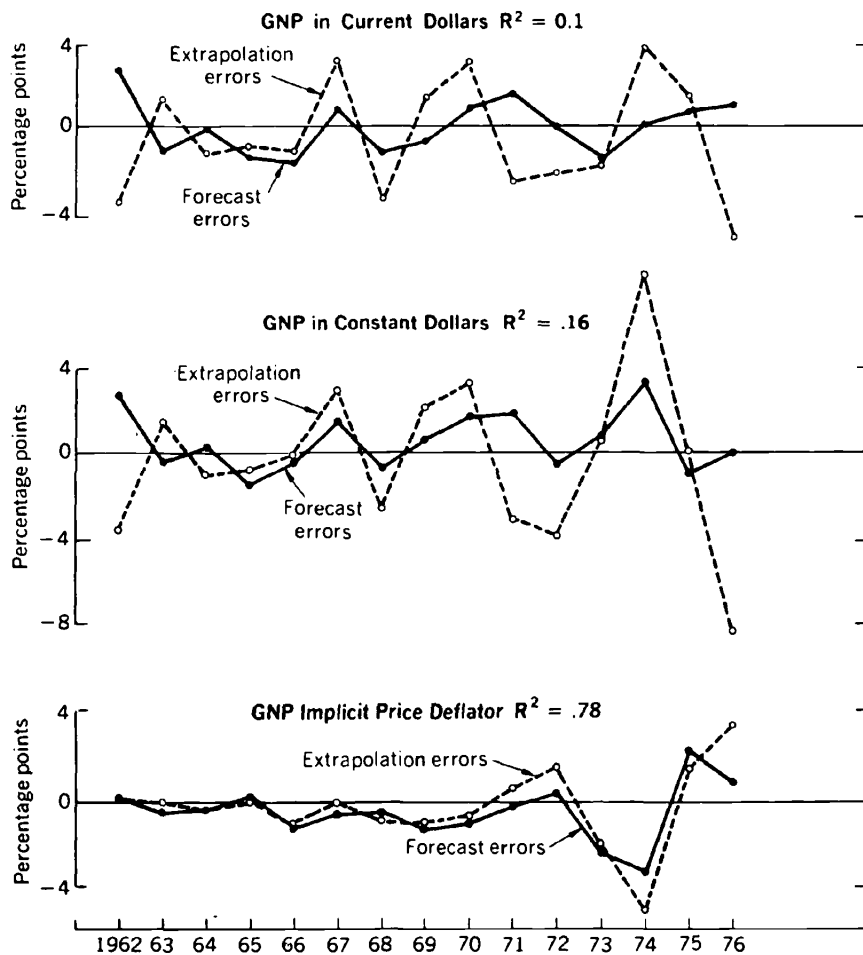
Table 26-1. Measures of Error in Forecasts of Year-to-Year Percentage Changes in GNP and Prices.

Period Covered	Mean Absolute Error (percent)			Correlation (r^2), Forecast and Actual Change		
	Economic Report (January)	ASA-NBER Survey (November)	Simple Extrapolation (February)	Economic Report (January)	ASA-NBER Survey (November)	Simple Extrapolation (February)
1962-1968	1.3	n.a.	n.a.	0.19	n.a.	n.a.
1969-1976	0.8	1.0	0.6	0.83	0.76	0.89
1962-1976	1.0	n.a.	n.a.	0.65	n.a.	n.a.
	<u>GNP in Current Dollars</u>					
1962-1968	1.0	n.a.	2.0	0.20	n.a.	0.22 ^a
1969-1976	1.2	1.0	2.6	0.86	0.94	0
1962-1976	1.1	n.a.	2.3	0.78	n.a.	0.01
	<u>GNP in Constant Dollars</u>					
1962-1968	1.0	n.a.	1.7	0.20	n.a.	0.22 ^a
1969-1976	1.2	1.0	3.7	0.86	0.94	0
1962-1976	1.1	n.a.	2.8	0.78	n.a.	0.01
	<u>GNP Implicit Price Deflator</u>					
1962-1968	0.5	n.a.	0.4	0.75	n.a.	0.71
1969-1976	1.4	1.3	2.0	0.58	0.53	0.17
1962-1976	1.0	n.a.	1.3	0.77	n.a.	0.54
	<u>GNP Implicit Price Deflator: Change in Rate</u>					
1963-1969	0.6	n.a.	0.5	0.03 ^a	n.a.	0
1970-1976	1.7	1.6	2.2	0.39	0.34	0
1963-1976	1.1	n.a.	1.3	0.36	n.a.	0

^a R is negative.

Source: Table 26-3.

Figure 26-4. Forecasting Errors Compared with Simple Extrapolation.



Source: Table 26-3.

Because of the high degree of persistence in the rate of inflation, it is of interest to know how well the *change* in the rate has been forecast. Here of course, simple extrapolation does not do well. It assumes that there is no change in the rate from whatever it was last year. Whenever the rate changes, the simple extrapolation will be wrong by the amount of the change. In recent years, when the changes have been large, the extrapolation errors have been large, too. This is also true of the *Economic Report* forecasts. Nevertheless, in recent years the mean error in the forecasts of the change in the

inflation rate has been somewhat smaller than in extrapolations that say that the rate will remain the same, and the forecast changes show a moderate correlation with the actual changes (See the bottom section of Table 26-1). Forecasters have done more than just extrapolate the previous year's rate, but they still have a long way to go.

Figure 26-4 suggests a further observation: the errors in forecasting real GNP and the price deflator have tended to be offsetting, especially in the last half of the period. When the forecasts of real growth were too high, the forecasts of the rate of inflation were too low, and vice versa. The forecasts of GNP in current dollars benefited from these offsetting errors and turned out to be more accurate than one would have expected had the forecasts of real growth and inflation been arrived at independently. The situation resembles one in which the forecasters could forecast the change in nominal GNP quite well, but could not do well at splitting it into the real change and the price change. Most forecasters would, I think, agree that this is the case.

Turning now to the comparison with the private forecasts as represented in the ASA-NBER survey,⁴ we use the median forecast from both the survey taken in November or early December, before the President's *Economic Report* is published, and that taken in February, shortly after the *Report* is published. The mean errors in the November survey forecasts are virtually the same as in the *Report* forecasts, and the forecasts themselves are very highly correlated.⁵ One could say, therefore, that the November survey gives a very good prediction of what the forecasts in the *Report* are going to be and just as good a prediction for the year ahead as that in the *Report*.

The February survey forecasts, not unexpectedly, are even more closely correlated than the November survey forecasts with the *Report* forecasts (see note 5). But the accuracy record is, on the whole, slightly better than that of the *Report*. In other words, the February survey forecasts come closer to the recently published *Report* forecasts but also a little closer to the final outcome. In general, however, the survey forecasts display many of the same characteristics as the *Report* forecasts and vice versa.⁶

On the matter of bias, two things can be said on the basis of the record. One is that both private and government forecasts have erred on the side of optimism more often than not. Real growth was overestimated by the *Report* in five of the last eight years and underestimated twice; in 1976 the forecast hit the target precisely. The November survey forecasts overestimated six times; underestimated twice. The February survey turned in four overestimates, three underestimates, and one bull's eye. On prices, too, optimism has pre-

vailed. The *Report* underestimated the rate of inflation five times and overestimated it three times; the November survey did likewise. The February survey was similar, underestimating inflation five times, overestimating it twice, and hitting the target once.

The second point is that the government's forecasts have been somewhat more optimistic than the private ones on real growth but to a lesser extent on inflation. The *Report* forecasts of real growth were higher than the November survey in six of the last eight years and higher than the February survey every single year. On the other hand, its forecasts of the inflation rate compared to the November survey were higher five times, lower twice, and the same once and, compared to the February survey, were higher four times, lower twice, and the same twice. As a result of the *Report's* tendency to make higher forecasts of both real output and prices, its forecasts of nominal GNP exceeded both the November and the February surveys for seven out of the eight years.

As a further result of these differences—since both government and private forecasts were too optimistic on real growth and the former more optimistic than the latter—the government overestimated real growth most of the time. But on inflation, since the government's forecasts were higher than the private forecasts, which were too low, the government came closer to the target most of the time. The upshot is that for nominal GNP there is little to choose between the government and private forecasts. The average errors, taking the direction of error into account (unlike Table 26-1, where direction is ignored), are given in Table 26-2 for 1969-1976. Perhaps the most important point is that these differences are all less than one percentage point. Bias is not a dominant feature of the record of either government or private forecasts.

Finally, it should be noted that in all the above comparisons we have used the average (median) forecast from the ASA-NBER survey. In forecasting, as in other games of chance, there is safety in numbers. Over a period of time, the average forecast by a group of forecasters tends to be more accurate than the individual forecasts of

Table 26-2. Average Forecast Errors, 1969-1976.

	<i>Report</i>	<i>November Survey</i>	<i>February Survey</i>
GNP in Current Dollars	0.2	-0.3	-0.3
GNP in Constant Dollars	0.8	0.7	0.4
Implicit Price Deflator	-0.5	-0.9	-0.7

Source: Table 26-3.

Table 26-3. Prediction and Performance, 1961-1976.

	Percentage Change from Preceding Year				Error (percent)			
	Forecast, Economic Report (January) (1)	Forecast, ASA-NBER Survey		Actual (4)	Economic Report (January) (5)	Forecast ASA-NBER Survey		Simple Extra- polation (8)
		(November) (2)	(February) (3)			(November) (6)	(February) (7)	
		<u>GNP in Current Dollars</u>						
1961	—	—	—	3.3	—	—	—	—
1962	9.4	—	—	6.7	2.7	—	—	-3.4
1963	4.4	—	—	5.4	-1.0	—	—	1.3
1964	6.5	—	—	6.6	-0.1	—	—	-1.2
1965	6.1	—	—	7.5	-1.4	—	—	-0.9
1966	6.9	—	—	8.6	-1.7	—	—	-1.1
1967	6.4	—	—	5.6	0.8	—	—	3.0
1968	7.8	—	—	9.0	-1.2	—	—	-3.4
1969	7.0	6.6	7.0	7.7	-0.7	-1.1	-0.7	1.3
1970	5.7	5.4	5.4	4.9	0.8	0.5	0.5	2.8
1971	9.0	6.8	7.1	7.5	1.5	-0.7	-0.4	-2.6
1972	9.5	8.9	8.9	9.7	-0.2	-0.8	-0.8	-2.2
1973	10.0	9.6	9.8	11.5	-1.5	-1.9	-1.7	-1.8
1974	8.0	7.1	7.7	7.9	0.1	-0.8	-0.2	3.6
1975	7.2	8.1	6.6	6.5	0.7	1.6	0.1	1.4
1976	12.5	12.4	12.4	11.6	0.9	0.8	0.8	-5.1

GNP in Constant Dollars

1961	—	1.8	—	—	—	—
1962	8.0 ^a	5.3	2.7	—	—	-3.5
1963	3.5 ^a	3.8	-0.3	—	—	1.5
1964	5.0	4.7	0.3	—	—	-0.9
1965	4.0 ^a	5.4	-1.4	—	—	-0.7
1966	5.0	5.4	-0.4	—	—	0
1967	4.0	2.5	1.5	—	—	2.9
1968	4.3 ^a	5.0	-0.7	—	—	-2.5
1969	3.5	2.8	0.7	3.5	0.5	2.2
1970	1.3	-0.4	1.7	0.7	1.5	3.2
1971	4.5	2.7	1.8	2.7	0.1	-3.1
1972	6.0	5.7	-0.5	5.7	-1.0	-3.8
1973	6.8	6.1	0.8	6.1	0.2	0.6
1974	1.0	-2.2	3.2	0.6	3.3	8.1
1975	-3.0	-2.0	-1.0	-3.8	1.2	-0.2
1976	6.2	6.2	0	6.1	-0.3	-8.2

(Table 26-3. continued overleaf)

Table 26-3. continued

	Percentage Change from Preceding Year														
	Forecast, Economic Report (January) (1)		Forecast, ASA-NBER Survey (November) (2)		Forecast, ASA-NBER Survey (February) (3)		Actual (4)		Economic Report (January) (5)		Forecast, ASA-NBER Survey (November) (6)		Forecast, ASA-NBER Survey (February) (7)		Simple Extrapolation (8)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1961	—	—	—	1.5	—	—	—	—	—	—	—	—	—	—	—
1962	1.5 ^a	—	—	1.4	—	—	1.4	0.1	—	—	—	—	—	—	0.1
1963	1.0 ^a	—	—	1.5	—	—	1.5	-0.5	—	—	—	—	—	—	-0.1
1964	1.5	—	—	1.9	—	—	1.9	-0.4	—	—	—	—	—	—	-0.4
1965	2.0 ^a	—	—	1.8	—	—	1.8	0.2	—	—	—	—	—	—	0.1
1966	1.8	—	—	3.0	—	—	3.0	-1.2	—	—	—	—	—	—	-1.2
1967	2.5	—	—	3.0	—	—	3.0	-0.5	—	—	—	—	—	—	0
1968	3.3 ^a	—	—	3.8	—	—	3.8	-0.5	—	—	—	—	—	—	-0.8
1969	3.5	3.3	3.3	4.7	—	3.3	4.7	-1.2	—	-1.4	—	-1.4	-1.4	-1.4	-0.9
1970	4.3	4.7	4.7	5.3	—	4.7	5.3	-1.0	—	-0.6	—	-0.6	-0.6	-0.6	-0.6
1971	4.4	3.9	4.2	4.6	—	4.2	4.6	-0.2	—	-0.7	—	-0.7	-0.4	-0.7	0.7
1972	3.3	3.2	3.0	3.0	—	3.0	3.0	0.3	—	0.2	—	0.2	0	0	1.6
1973	3.0	3.3	3.4	5.3	—	3.4	5.3	-2.3	—	-2.0	—	-2.0	-1.9	-2.0	-2.3
1974	7.0	5.9	7.0	10.2	—	7.0	10.2	-3.2	—	-4.3	—	-4.3	-3.2	-4.3	-4.9
1975	11.0	9.1	9.9	8.7	—	9.9	8.7	2.3	—	0.4	—	0.4	1.2	0.4	1.5
1976	6.0	6.0	6.0	5.1	—	6.0	5.1	0.9	—	0.9	—	0.9	0.9	0.9	3.6

GNP Implicit Price Deflator

Notes to Table 26-3

^a Inferred from statements in the report. All other entries are based on figures (dollar levels, dollar changes, or percentage changes) given in the report. The inferred entries have been verified as approximately correct, though not in all cases precisely correct, by the Council of Economic Advisers.

Sources: Columns 1 and 4: *Economic Report of the President*, January 1962 through January 1976. The actual changes are based on the first official estimates given in the report following the year for which the forecast was made. Changes in constant dollar GNP and in the price deflator are based on estimates in 1954 dollars for 1960-1961 to 1964-1965, in 1958 dollars for 1965-1966 to 1973-1974, and in 1972 dollars thereafter.

Columns 2 and 3: Quarterly releases by the American Statistical Association and the National Bureau of Economic Research, "Business Outlook Survey." The figures are medians of the forecasts reported by about fifty economists in business, government, and academic institutions.

Columns 5, 6 and 7: Columns 1, 2, and 3 minus column 4.

Column 8: Actual change for preceding year minus actual change for current year (column 4).

the majority in the group. The opportunity for errors to cancel out in the average forecast is lacking in the individual forecasts. Some forecasters will be optimistic, others pessimistic. Consequently, in an extended contest between the average forecast and any individual forecast, the average is likely to win out. The forecasts in the *Economic Report* are like the individual forecasts in such a comparison, though there are some elements of a consensus about them. Thus, the fact that the *Report* forecasts compare closely in accuracy with the average forecasts in the survey is in itself a favorable result. Relatively few forecasters in the survey group would do as well.⁷ This, of course, is one of the advantages of conducting the survey and using it as a standard.

A POSTSCRIPT TO UPDATE THE FORECASTING RECORD OF THE PRESIDENT'S ECONOMIC REPORT, 1976-1982

The forecasting record discussed in this chapter ended in 1976. How well have forecasters done since then? The answer, spelled out in Table 26-4 is pretty much the same as before, except in 1982. In that year the error in the forecast of real GNP in the *Economic Report* was larger than in any previous year in the entire twenty-one-year record. The ASA-NBER survey forecasts for 1982 were substantially more accurate than the *Economic Report* forecasts, although they too erred on the optimistic side. The 1981-1982 recession was more severe and lasted longer than the forecasters anticipated.

The errors in the real GNP forecasts for 1982 carried over to GNP in current dollars, producing errors of record size there too. The forecasts of inflation, on the other hand, were close to average in accuracy. Inflation declined more than the forecasters expected, but the error was not unusually large. Nevertheless, since both inflation and real GNP were overestimated, the errors in the current dollar GNP forecasts were spectacular. This is true of both the *Economic Report* and the ASA-NBER survey.

Because of the extreme size of the 1982 errors, and also because final figures for 1982 are not yet available, they are excluded from the averages and correlations in the table. The conclusions reached on the basis of the data through 1976 are broadly supported by the results for the next five years, 1977-1981, namely:

1. The *Report* forecasts are about as accurate as the median forecasts from the ASA-NBER survey in the preceding November. Neither set of forecasts is biased toward optimism.

2. The forecasts of real and nominal GNP are far better than simple extrapolations of last year's rate of growth or decline.
3. The forecasts of the rate of inflation (GNP implicit price deflator) are not much if any better than simple extrapolations of last year's rate. In fact, the errors in the forecasts closely resemble those obtained by simple extrapolation, suggesting that forecasters are heavily influenced by last year's inflation rate in making their predictions.

Table 26-4. Prediction and Performance, 1977-1982.

	Percentage Change from Preceding Year				Error (%)			
	Forecast, ASA-NBER Survey		Actual (4)	Economic Report (January) (5)	Forecast, ASA-NBER Survey		Simple Extrapolation (8)	
	(November) (2)	(February) (3)			(November) (6)	(February) (7)		
	<u>GNP in Current Dollars</u>							
1977	11.0	10.8	10.6	10.8	0.2	0.0	-0.2	-0.8
1978	11.0	10.5	10.7	11.6	-0.6	-1.1	-0.9	-0.8
1979	9.8	10.2	10.8	11.3	-1.5	-1.1	-0.5	0.3
1980	8.0	7.2	9.1	8.8	-0.8	-1.6	0.3	2.5
1981	11.8	11.0	11.6	11.3	0.5	-0.3	0.3	-2.5
1982	10.2	8.7	7.3	4.4 ^a	5.8	4.3	2.9	-6.9
Mean absolute error								
1962-1968					1.3	n.a.	n.a.	2.0
1969-1976					0.8	1.0	0.6	2.6
1977-1981					0.7	0.8	0.4	1.4
Correlation (r^2), forecast and actual change								
1962-1968					.19	n.a.	n.a.	.02
1969-1976					.83	.76	.89	.00
1977-1982					.71	.87	.80	.09
	<u>GNP in Constant Dollars</u>							
1977	5.2	5.0	4.8	4.9	0.3	0.1	-0.1	1.3
1978	4.8	4.3	4.3	3.9	0.9	0.4	0.4	1.0
1979	2.2	2.4	2.6	2.3	-0.1	0.1	0.3	1.6
1980	-1.0	-1.3	0.0	-0.2	-0.8	-1.1	0.2	2.5
1981	1.4	1.2	1.5	2.0	-0.6	-0.8	-0.5	-2.2
1982	3.0	0.5	-0.4	-1.5 ^a	4.5	2.0	1.1	3.5

Mean absolute error									
1962-1968					1.0	n.a.	n.a.	1.7	n.a.
1969-1976					1.2	1.0	0.8	3.7	0.3
1977-1981					0.5	0.5	0.3	1.7	0.3
Correlation (r^2), forecast and actual change									
1962-1968					.20	n.a.	n.a.	.22	n.a.
1969-1976					.86	.94	.86	.00	.86
1977-1981					.98	.98	.97	.49	.97
<u>GNP Implicit Price Deflator</u>									
1977	5.5	5.4	5.6	5.4	-0.1	-0.2	-0.2	-0.5	-0.2
1978	6.0	5.9	7.4	5.9	-1.4	-1.5	-1.5	-1.8	-1.5
1979	7.4	7.4	8.8	7.9	-1.4	-1.4	-0.9	-1.4	-0.9
1980	9.0	8.8	9.0	9.1	0	-0.2	0.1	-0.2	0.1
1981	10.2	9.5	9.1	9.7	1.1	0.4	0.6	-0.1	0.6
1982	7.2	7.9	6.0 ^a	7.4	1.2	1.9	1.4	3.1	1.4
Mean absolute error									
1962-1968					0.5	n.a.	n.a.	0.4	n.a.
1969-1976					1.4	1.3	1.2	2.0	1.2
1977-1981					0.8	0.7	0.7	0.8	0.7
Correlation (r^2), forecast and actual change									
1962-1968					.75	n.a.	n.a.	.71	n.a.
1969-1976					.58	.53	.65	.17	.65
1977-1982					.72	.78	.82	.83	.82

^a Estimates based on average of second and third quarter, 1982, as of October 1982.
 Sources: Columns 1 and 4: *Economic Report of the President*, January 1977 through January 1982. The actual changes are based on the first official estimates given in the report following the year for which the forecast was made. Changes in constant dollar GNP and in the price deflator are based on estimates in 1972 dollars. In recent years the forecasts have usually been given in terms of changes from fourth quarter to fourth quarter, and we have converted them to annual changes by linear interpolation. Where forecasts were in terms of ranges, we use the midpoint of the range.
 Columns 2 and 3: Quarterly releases by the American Statistical Association and the National Bureau of Economic Research, "Business Outlook Survey." The figures are medians of the forecasts reported by about fifty economists in business, government, and academic institutions.
 Columns 5, 6, and 7: Columns 1, 2, and 3 minus column 4.
 Column 8: Actual change for preceding year minus actual change for current year (column 4).

NOTES TO CHAPTER 26

1. For some earlier studies on these questions, see the references, below.
2. This method of extrapolation is not necessarily the best. Victor Zarnowitz [7, 8], Jacob Mincer [3], and others have experimented with more effective methods, providing a higher standard against which to measure actual forecasts. One method uses an average rate of growth over a longer period than merely the preceding year. Another uses the most recent quarterly information of GNP available and extrapolates from there.
3. Fellner [1] finds a similar improvement in the forecasting record of the *Economic Report* during approximately the same period.
4. A few government forecasters participate in the survey, but constitute only about 10 percent of the sample.
5. The R^2 for forecasts in the November survey and the *Report* are 0.85, 0.93, and 0.97 for nominal GNP, real GNP, and price deflator, respectively, 1969–1976. For the February survey and the *Report*, the corresponding R^2 are 0.92, 0.97, and 0.98.
6. For an earlier comparison of this kind see Zarnowitz [8]. For 1962–1968 the mean absolute error in the average forecast percent change in current dollar GNP, covering a large number of forecasters, was 1.3 percent. This is exactly the same as for the *Economic Report* (see Table 26-1). Hence, private forecasters have evidently improved their performance since 1968 about as much as the government has. Zarnowitz's record of private forecasts for 1953–1963 shows still larger mean errors, suggesting that a trend toward improving accuracy may have persisted for twenty-five years or so.
7. For a striking illustration of this see Zarnowitz [7]. Using forecasts of GNP in current dollars over spans of four quarters, 1956–1963, he showed that only five forecasters in a group of forty-seven had a smaller average error during the period than that of the average forecast for the group.

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