FORECASTS 1982

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Forecasters are displaying a surprising degree of unanimity on the economic outlook for 1982. Based in part on the scheduled reduction of marginal income tax rates, 13 of 14 forecasters surveyed in early January anticipated strong growth of production and trade after the first quarter of the year. Moreover, all see lower inflation rates during the year. Even if such relatively optimistic predictions are realized, however, the economy would only partially recover the output losses of recent years.

Tables I and II display median values of the forecasts surveyed. Highlights from the tables are discussed below as they relate to the economy's recent performance, the accuracy of last year's forecasts,

Table I

RESULTS FOR 1981 AND TYPICAL FORECASTS FOR 1982

	Unit or Base	Preliminary 1981*	Forecast 1982**	Percentage Change: Preliminary 1981/1980	Percentage Change: Forecast 1982/1981
Gross national product	$ billions	2,922.2	3,150	11.3	7.8
Personal consumption expenditures	$ billions	1,858.1	2,027	11.1	9.1
Durables	$ billions	232.0	251	9.5	8.1
Nondurables	$ billions	743.4	795	10.0	7.0
Services	$ billions	882.7	982	12.4	11.2
Gross private domestic investment	$ billions	450.6	469	14.0	4.0
Fixed investment:					
Nonresidential	$ billions	327.1	351	10.5	7.3
Residential	$ billions	105.3	109	0.1	3.6
Change in business inventories	$ billions	18.2	8	—	—
Net exports	$ billions	23.8	15	—	—
Government purchases	$ billions	589.6	639	10.3	8.4
Federal	$ billions	228.6	255	14.9	11.6
State and local	$ billions	361.1	384	7.5	6.3
Gross national product (1972 dollars)	$ billions	1,509.6	1,514	1.9	0.3
Corporate profits after taxes	$ billions	129.8	129	−1.7	−0.9
Private housing starts	thousands	1,086.6	1,195	−15.9	10.0
Domestic automobile sales	thousands	6,163.1	6,644	−5.9	7.8
Rate of unemployment	percent	7.6	8.4	—	—
Industrial production index	1967=100	150.9	151.8	2.7	0.6
Consumer price index	1967=100	272.4	294.2	10.4	8.0
Producer price index (finished goods)	1967=100	269.7	287.0	9.8	6.4
GNP implicit price deflator	1972=100	193.6	208.1	9.1	7.5

* Data available as of January 1982.

** These data are constructed using preliminary 1981 data and the median annual percentage change forecast for each category. Since the annual percentage change is calculated from yearly average values, it will not equal the average quarterly change that could be computed from Table II.

Table II

TYPICAL QUARTERLY CHANGES FORECAST FOR 1982

(Percentage Changes at Annual Rates Unless Otherwise Noted)

	Forecast 1982*			
	I	II	III	IV
Gross national product	5.1	10.1	12.2	12.0
Personal consumption expenditures	9.7	8.3	10.5	12.0
Durables	12.1	10.4	22.5	19.1
Nondurables	6.2	7.3	8.2	9.1
Services	10.3	10.9	10.6	11.4
Gross private domestic investment	−11.7	12.1	23.4	19.5
Fixed investment:				
Nonresidential	3.6	6.9	12.4	13.5
Residential	−1.3	38.8	43.9	36.2
Changes in business inventories**	−5.4	2.4	9.0	13.9
Government purchases	6.7	6.1	8.3	10.9
Federal	6.8	8.0	10.0	15.8
State and local	7.6	6.0	5.3	7.2
Net exports**	21.7	18.0	19.0	18.0
Gross national product (1972 dollars)	−1.0	2.7	4.9	4.8
Corporate profits after taxes	−2.3	18.3	29.5	22.3
Private housing starts	12.5	18.6	8.8	10.6
Domestic automobile sales	9.1	7.4	7.6	3.1
Rate of unemployment†	8.6	8.6	8.4	7.9
Industrial production index	−3.2	4.8	9.3	6.3
Consumer price index	6.4	7.3	7.8	8.0
Producer price index (finished goods)	7.4	6.7	8.3	8.5
GNP implicit price deflator	7.0	7.1	6.8	7.4

* Median quarterly percentage change forecast for each quarter for each category.

** Quarterly levels, billions of dollars, annual rates.

† Quarterly levels, percent.

and predicted actions by government agencies. Some difficulties of using economic forecasts are then discussed in the final section.

The median forecast sees a cyclical recovery beginning in 1982. Real GNP is projected to grow at a 4.1 percent rate in the last three quarters, following a 1.0 percent decline in the first quarter. Tax rate reductions are expected to boost total personal consumption expenditures by 10.1 percent, with consumer spending for durable goods expected to rise at a 15.9 percent rate over the year.[1] While some recovery is forecast for residential construction, the predicted 28 percent growth for 1982 is actually quite modest in light of that industry's depressed condition in late 1981. Nonresidential fixed investment is anticipated to grow by 9 percent over the year, only slightly ahead of inflation, while state and local government spending at the end of 1982 is projected to be only 6.5 percent above the late 1981 level.

The anticipated pattern of GNP growth, however, is reminiscent of the forecast for 1981. At that time, there were no forecasts (in the 17 surveyed) of even a 0.5 percent GNP growth rate in the first quarter. Indeed, the median forecast was for zero growth, in contrast to the 8.6 percent rate of growth that did occur. And not only were there no forecasts

[1] Growth rates "over the year" are from the fourth quarter of the preceding year to the fourth quarter of the year being forecast. They will thus differ from changes in the yearly average values presented in Table I.

for the recession that began in the summer, but the median forecast was for 3.6 percent real growth during the final six months. Thus while the median forecast correctly predicted positive real growth for the year as a whole, both the small magnitude and the quarterly pattern were surprises for the forecasters.

Should the median forecast for 1982 be realized, the economy in many respects will remain well below its potential. If industrial production, for example, were to grow at the predicted 4.2 percent rate, it would end the year below its value in January 1979. And housing starts, at 1.45 million units forecast, would not approach the 2 million unit level that was last attained in November 1978. Also, the unemployment rate of 7.9 percent projected for the last quarter of 1982 is well above the "natural rate" (often estimated in the neighborhood of 6 percent, a figure last seen in December 1979). More examples could be provided, but the main point should be clear: after three years of virtual stagnation, the anticipated economic growth in 1982 is but a small step toward full recovery.

Further disinflation is predicted for 1982. The GNP deflator and the consumer price index are forecast to rise by 7.1 percent and 7.4 percent during 1982, respectively, compared with increases of 8.6 percent and 8.9 percent in 1981. Both rose more slowly than anticipated in 1981; median forecasts were for 9.1 percent growth by the deflator and 10.7 percent by the CPI. Those overestimates were consistent with the tendency of forecasters to underpredict changes in inflation rates, as they did in such recent episodes as the 1973-74 acceleration of prices, the 1976 decline of inflation, and the sustained increase in inflation from 1977 to 1980. If that tendency toward underprediction recurs, inflation should decline more than the forecast 1.5 percent.

Several factors are noted by forecasters with respect to the inflation outlook. For one, the Federal Reserve allowed monetary growth to be unexpectedly low in 1981 (no forecaster in the survey anticipated a shift-adjusted growth rate as low as the actual 2.1 percent) and the Fed is expected to keep monetary growth relatively low in 1982. Some forecasters also mentioned the low degree of resource utilization, most notably high unemployment as a factor moderating wage growth. Favorable trends in energy and food markets are also foreseen. However, the projected increase in aggregate demand in the last half of 1982 is reflected in an inflation forecast for the last half that is well above the first two quarters.

More details of the median forecast are contained in Tables I and II. In addition, this Bank publishes the booklet *Business Forecasts 1982,* which is a compilation of business forecasts with names and details of the various estimates. As such, it contains considerably more information than this brief summary. Readers may find, however, that at some point they receive more forecast information than they are able to readily use. It may not be easy to decide what information is relevant and then to integrate that information with other knowledge so as to improve anticipations of future economic conditions. A perspective for studying forecasts may therefore be of help; for that reason, one is outlined below.

EVALUATING ECONOMIC FORECASTS

When confronted with economic forecasts, potential users often react in opposite ways, either taking them too seriously or ignoring them altogether. The view taken here is that neither extreme is tenable. For while it is true that it is virtually impossible to forecast the future with complete accuracy, it is also true that even a forecaster whose record shows obvious errors may still provide projections containing useful information. That said, however, it should be noted that the task of extracting useful information from forecasts is far from trivial. These issues are explored below.

At first glance it is easy to overvalue forecasts. Since they are normally stated as point estimates and are often advocated with a good deal of authority, a natural inclination is to treat these numbers as having the same precision as others that are often encountered. A little experience, however, demonstrates that forecasts can be very imprecise. Table III, for example, presents median forecasts and actual outcomes for representative variables from recent editions of this Bank's annual *Business Forecasts* publication. The average magnitude of the forecast error in each case is a sizeable fraction of the variable that was forecast.

When predictions fail to approximate actual outcomes, some observers proceed to summarily reject all forecasts. As *The Wall Street Journal* [5] recently put it, "[W]e see no reason to defer to them [econometric models] on anything so complicated as an economy. . . . [W]e are not going to take economic predictions about the day after tomorrow as more than food for reflection." Similarly, as the chief executive of one large company said about economists' predictions [1], "I go out of my way to ignore them."

Although the temptation to ignore forecasts may be strong, it is another matter to propose a better

Table III

MEDIAN FORECASTS

	Real GNP (Percent Change)			Inflation Rate (GNP Deflator)			Treasury Bill Rate		
	Actual	Predicted	Error	Actual	Predicted	Error	Actual	Predicted	Error
1971	4.7	3.8	1.0	4.7	3.6	1.1			
1972	7.0	5.6	1.4	4.3	3.2	1.1			
1973	4.3	6.0	1.7	7.0	3.3	3.7			
1974	−2.7	1.2	3.9	10.1	5.5	4.6	7.3	6.0	1.3
1975	2.2	−0.6	2.8	7.7	7.1	0.6	5.7	7.1	1.4
1976	4.4	6.0	1.6	4.7	5.4	0.7	4.7	7.1	2.4
1977	5.8	5.0	0.8	6.1	5.7	0.4	6.1	5.8	0.4
1978	5.3	4.2	1.2	8.5	5.9	2.6	8.7	6.5	2.1
1979	1.7	1.5	0.2	8.1	7.1	1.0	11.8	8.1	3.7
1980	−0.3	−0.8	0.4	9.8	8.2	1.6	13.7	8.6	5.1
1981 (preliminary)	0.7	2.4	1.7	8.6	9.1	0.5	11.8	10.8	1.0
Average Error			1.5			1.6			2.2
Root-Mean-Square Error			1.8			2.1			2.6

Predictions are from **Business Forecasts**, published annually by the Federal Reserve Bank of Richmond. The error is the absolute value of the difference between predicted and actual values (although calculations use several decimal places, rounded values are presented in the table). The root-mean-square error is the square root of the average squared error. Real growth and inflation are from the fourth quarter of the previous year to the fourth quarter of the stated year. The Treasury bill rate is the average value in the fourth quarter.

strategy for making decisions in an uncertain world. Individual households, firms, and government bureaus must act on the basis of their anticipations of future quantities to be exchanged and future prices for transactions in commodity, labor, and financial markets. Each individual decision-maker could, of course, form such anticipations in a haphazard, unsystematic manner. But many individuals have found that systematic study can improve the quality of forecasts. In forecasting, as in most productive activities, there are potential gains from specialization and exchange. That a $100 million forecasting industry has developed and prospered should therefore not be surprising, past errors for every individual forecaster notwithstanding.

In fact, the large number of forecasters and the quantity of data that each generates can make it difficult for potential consumers of forecasts to condense the information flow to a usable volume and then employ that information to make better decisions. An obvious strategy is to identify a particular forecaster that has been especially accurate in the past and hope that his future results are as good. This, however, is not as easy as it sounds. On the contrary, identifying a superior forecaster is itself a formidable task.

Difficulties in Identifying a Superior Forecaster

One difficulty is that users will seldom agree on the exact criteria for ranking forecasters. Different users, of course, require forecasts of different variables. And superiority in forecasting one variable does not necessarily carry over to other variables. Even users interested in one particular variable may find different error measures most relevant to their own needs. For example, one user might prefer a low average error, whereas another might prefer a low probability of an especially large error. Still another might prefer a low probability of "turning point" errors. (A turning point is the time at which a growing variable begins to decline or vice versa.)

Even if there were agreement on a particular error measure for a particular variable, it is not clear that current data could support a meaningful ranking. One problem is that different forecasters have excelled at different times in the past. In addition, there is little agreement on what constitutes a statistically significant difference in forecasting records (that is, what can be judged with a certain degree of confidence to be real performance differentials rather than mere chance). Stephen McNees [8, 9] has studied in depth the problem of identifying superior forecasts and presents valuable data for the interested reader.

Reducing User Uncertainty Another approach is to adopt the philosophy that the primary purpose of a forecast is to reduce the user's uncertainty. This approach explicitly recognizes that not only are users never completely uninformed about past trends, but also that they can never be perfectly certain about future events. Accordingly, the first step in employing this approach is to examine a user's initial knowledge and specify his initial uncertainty. The next step is to then use available forecasts to reduce that uncertainty. Henri Theil [10] has examined both problems and presents a discussion of these issues with several specific, detailed examples.

Taking the easier problem first, a user's existing knowledge about future movements of one particular variable can be described by the best point estimate he could make together with an estimate of that forecast's precision.[2] ("Precision" is defined as the reciprocal of the standard deviation of the *ex ante* distribution of forecast errors; thus that definition and the informal meaning coincide, in the sense that the greater the precision of a forecast, the greater the likelihood that the realization will be within a given distance of the forecast.) Thus when comparing forecasts, the one that could best lower uncertainty would be the one that had the highest probable precision accompanying the point estimate. Equivalently, a forecast could be presented as an interval centered on a point estimate together with a statement of the probability of the realization lying outside that interval. Presented this way, less uncertainty would be represented as a narrower predicted interval.

Characterizing Uncertainty: An Illustration As an example of how uncertainty could be characterized in a particular case, suppose that before consulting a forecaster, a user's best estimate of inflation over the next four quarters would be the inflation rate experienced over the preceding four quarters for which data are available. Using the root-mean-squared (RMS) error (that is, the square root of the average squared error) from a sample of previous forecasts as an estimate of the standard deviation of the current forecast error,[3] the precision of that method is shown in Table IV.

Table IV

ESTIMATED PRECISION OF SEVERAL FORECASTING METHODS

	RMS Error, Percent	Precision
Method of forecasting inflation		
Extrapolation of past inflation rate	2.7	0.37
Median forecast	2.1	0.47
Lagged money growth rate	1.3	0.74
Method of forecasting real GNP growth		
Always predicting trend rate (3.4%)	2.8	0.35
Median forecast	1.8	0.53

Forecasts are for percentage increases, fourth quarter to fourth quarter, 1971 to 1981.

As Table IV indicates, simple extrapolation of past inflation provided relatively imprecise forecasts. Table IV also shows that one could have done better, since the median forecast[4] (reported in Table III) would have provided forecasts that were about 30 percent more precise. But extrapolation may not be the best technique at a user's disposal and thus may be too easy a comparison. As Robert Hetzel [6] has noted, inflation can be easily forecast by using

[2] It may be objected that many people do not have the information to make such a forecast. However, it is not necessary to have much information in order to make judgments on relative likelihoods, which can be equivalent to a subjective probability distribution (see, for example, Morris DeGroot [3]). Hence it is likely that a cursory inspection of newspapers or television news would permit at least a very imprecise forecast.

[3] It should be noted that the RMS error of a small sample of forecasts gives a fairly crude estimate of future precision. In order to make rigorous probability statements it would be necessary that forecast errors be independent, identically distributed random variables with zero mean. These stringent assumptions are clearly not fulfilled by existing forecasts. First, one presumes that forecasters learn from experience and improve their models over time, thus contradicting the underlying assumption of an unchanging distribution of forecast errors. But any uncorrected flaws in forecasting procedures can cause forecast errors to recur over time, violating an assumed independence of successive forecasts. Also, the assumed zero mean may also be questionable. However, while the historical RMS error cannot be used to generate rigorous probability statements about the reliability of current forecasts of future conditions, in the author's view it does provide a useful starting point, especially in the absence of better information from forecasters themselves on probable future precision.

[4] The optimal method of combining information from several forecasters is an interesting, unresolved puzzle. The median forecast is used in this article primarily for its simplicity.

lagged growth of the money supply (M1). By estimating inflation over an interval as equal to money growth two years earlier, one can construct a record of simulated inflation forecasts[5] that performed relatively well. As shown in Table IV, from 1971 to 1981 the simple money growth prediction would have increased forecast precision by about 50 percent relative to the median forecast.[6]

Another example is shown in Table IV. If a user's best estimate of real GNP growth had been the historical trend rate of growth, then the median forecast would have raised that user's forecast precision by about 56 percent.

These examples show that receipt of a forecast can considerably lower uncertainty relative to an alternative such as extrapolation or use of the historical trend. But individuals may employ other methods that have such a degree of prospective accuracy that a typical forecast would not reduce uncertainty. Thus the examples illustrate the importance of careful examination of existing information before attempting to determine the value of economic forecasts.[7]

Providing Estimates of Forecast Precision Although forecast precision was estimated in Table IV by looking only at recent forecasts and the actual outcomes, other information could also be useful. To illustrate, note that the economic environment can change so as to alter the predictability of economic events. Forecasters of interest rates, for example, have found their task more difficult since the October 1979 change in Federal Reserve operating procedures. Thus a statement on the anticipated precision of interest rate forecasts might well give more weight to post-October 1979 data than would a mechanical calculation of RMS errors over a longer time-span. Individual forecasters, with detailed knowledge of the strengths and weaknesses of their own methods, would arguably be in the best position to make such subjectively adjusted estimates of future precision. Therefore it is possible to imagine forecasters providing both point estimates and estimates of the precision of their forecasts.

If forecasters were to estimate both future values and their forecasts' precision, then forecasts would for the first time be verifiable. Point estimates by themselves are not verifiable since practically every forecast is wrong (that is, the realized value is not equal to the forecast value). But since an estimate of precision would also imply a confidence interval attached to a forecast,[8] evaluating a forecaster's record would be straightforward. For example, if 50 percent of actual values fell outside a particular forecaster's published 95 percent confidence intervals over a reasonably long time, further forecasts would be highly suspect.

If estimates of precision would indeed be useful, why do not forecasters generally provide such estimates?[9] There are at least two relevant considerations. First, while proper verification of a forecaster's product would require a reasonably long sample period, consumers might choose among forecasting services on the basis of a fairly small number of forecasts. Thus a good forecaster could lose customers if his forecasts were off-target simply due to a run of bad luck. Secondly, it was noted above that a comparison of past forecasts with realized values is only a starting point for assessing the probable accuracy of current forecasts. A more complete method for estimating a forecast's probable precision has been used by Ray Fair [4]. The price of additional completeness is a set of more complex procedures which, although feasible, would certainly increase the cost of providing forecasts. Consequently, reasonable

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[5] Since this technique was proposed partly on the basis of its performance over a segment of the sample period, it cannot be regarded as a true **ex ante** forecast.

[6] Due to a suspicion that taking the median of a changing, unscientifically selected collection of forecasts might itself lead to poor results, the record of a single major forecaster was also examined. That suspicion was not confirmed as that forecaster made slightly less precise inflation forecasts than the median forecast presented.

[7] This article has viewed forecasts as unconditional statements regarding future conditions. However, some forecasts are presented as statements of the future provided that a specific condition is fulfilled. An example of such a conditional forecast would be a projected inflation rate between 5 and 7 percent if M1 grew between 3 and 5 percent. While a reliable conditional forecast could be especially useful for some decision-makers, the reliability of existing conditional forecasts has not been proven. Perhaps the most obvious use of conditional forecasts is in formulating national economic policy. It turns out, however, that such forecasts have often proved highly misleading. Robert Lucas [7] has explained why conventional methods cannot provide reliable conditional forecasts for government policymakers.

[8] Assuming that **ex ante** forecast errors are unbiased and identically normally distributed, there would be a 95 percent probability that the difference between realized and actual values would be no larger than 1.96 times the reciprocal of a forecast's true precision.

[9] Some forecasters do provide a limited amount of information relating to precision. Such estimates are typically for a small number of variables, few time periods, and are not prominently displayed. The large majority of forecasters, however, do not make even such a limited effort.

estimates of the demand for routine but careful analysis of forecast precision may well indicate that introduction of such a costly and risky product is not currently justified.

Conclusion The foregoing discussion provides an approach to using economic forecasts that evaluates a forecast by the extent to which it can reduce users' uncertainty about future economic conditions. While a thorough examination of the subject is beyond the scope of this article, an example was given that illustrates how estimates of a forecast's value will critically depend upon the knowledge held by a user prior to receipt of a forecast. In addition, the importance of a forecast's prospective precision was emphasized. Besides its value in reducing an individual forecast consumer's uncertainty, such an estimate of precision would make forecasts verifiable. Although final judgment on the value of forecasts is not attempted in this paper, it is hoped that some readers will have a new perspective on evaluating forecasts for their own purposes.

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