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Authors	R. W. Hafer
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FORECASTING ECONOMIC ACTIVITY:
COMPARING THE ACCURACY OF SURVEY
AND TIME SERIES PREDICTIONS

R. W. Hafer*

Federal Reserve Bank of St. Louis

85-012

*Research Officer, Federal Reserve Bank of St. Louis.
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Forecasting Economic Activity: Comparing the Accuracy of Survey and Time Series Predictions

by R. W. HAFER

Forecasts of future economic activity are an important input into many different policymaking decisions. Not only do they form a crucial underpinning to decisions about the conduct of monetary policy, but they also may play an important role in the production decisions of private firms. Consequently, discovering the model that provides the best forecasts is not a trivial matter among forecast users. As Klein has noted,

> "The user has to look ahead and act now on the basis of the forecast available; this is the intrinsic reason for the importance of the forecast. It is the reason that the user invariably asks the forecaster, first of all, 'what is your track record?' For a meaningful answer, the respondent must have been making pure forecasts and determining their validation record by comparing forecast with actual values. They are facts of life."1/

In this paper, we will compare the accuracy of forecasts derived from a quarterly survey conducted jointly by the American Statistical Association and the National Bureau of Economic Research with those derived from relatively simple time series models developed for each variable. The economic series used in this paper include the rate of inflation based on the GNP deflator, the growth of nominal GNP and the rate of unemployment. The sample period is 1968 through 1984, based on the availability of the survey forecasts.

The techniques used in this paper have become somewhat familiar in studies such as this one. First we investigate the biasedness properties of the survey forecast for the three economic series. This is followed by a comparison of the forecasting accuracy of the survey responses to the time series model. Finally, to determine the marginal information content of each forecasting approach, we use the linear combination procedures discussed by Granger and Ramanathan (1984). But first, a description of the ASA-NBER survey is called for.

II. THE SURVEY DATA

Since late 1968, the American Statistical Association and the National Bureau of Economic Research (hereafter ASA-NBER) have jointly conducted a quarterly survey to gather forecasts of macroeconomic variables from professional forecasters.[2/] These forecasts are compiled and the median forecast is reported for each series in the NBER Reporter, along with some analysis. Although an extensive literature exists wherein the relative usefulness of survey forecast series have been analyzed, such studies of the ASA-NBER survey are relatively few.[3/]

The usefulness of the ASA-NBER survey is that it is conducted on a quarterly basis, rather than the semi-annual format of the popular Livingston survey. In conducting the survey, a sample of professional forecasters are asked in the middle month of each quarter their forecast for the current quarter as well as several quarters hence. In order to provide some consistency, each respondent is supplied with the most recent value for the series to be forecasted, generally the preliminary or first-reported value for the preceding quarter. This establishes a relatively uniform base from which the forecasts are made.

The forecasts used in this study are the median forecasts for the current quarter generated from each survey.[4/] For our purposes, we take the forecasted level of, say, the implicit GNP deflator for the current quarter and calculate the compounded annual rate of change based on the preliminary figure for the previous quarter. This is done for the deflator and nominal GNP forecasts but not for the unemployment variable. With regard to the latter, we examine the level forecasts.

III. THE TIME SERIES MODELS

To provide a benchmark to which the accuracy of the survey forecasts can be compared, univariate time series models for each of the economic variables are constructed. In order to make the time series forecasts comparable with the survey forecasts, the following procedure is followed: First, a time series model is estimated for the period 1954/I through 1968/III. Based on this model, a one-step-ahead, ex ante forecast is made for 1968/IV, the initial forecast from the survey. The time series model is then updated to include the actual value of the forecasted variable for 1968/IV, the model is re-estimated, and a forecast is generated for 1969/I. This process of estimating, forecast, update and re-estimate, etc., is followed throughout the sample until the final forecast is made for 1984/IV.

Before generating the time series forecasts, appropriate models must be specified. Following standard procedures for determining the appropriate model specification, a time series representation for each series was found for the 1954/I to 1968/III sample period. In each instance, the models are relatively low order, simple time series models. For example, the model for the inflation rate was found to be (absolute value of t-statistics in parentheses):

$$(1)\quad (1 - B)\,\dot{P}_t = (1 - \underset{(6.88)}{0.676}\,B)\,a_t$$

$$SE = 1.85 \qquad \chi^2(11) = 7.92$$

where $\dot{P}_t$ is the inflation rate, and B represents the back shift operator $B^i X_t = X_t - X_{t-i}$. The model for inflation is an integrated first order moving average, or IMA(1). Equation 1 shows that the estimated moving average parameter is significant at the 1 percent level of confidence (t=6.88). Moreover, the χ^2-statistic reported indicates that we cannot reject the hypothesis of white noise residuals at any reasonable level of significance. Thus, equation 1 is the model used to forecast inflation.

The model estimated for the growth of nominal GNP ($\dot{GNP}$) was found to be a first-order autoregressive process (AR(1)), or;

$$(2)\quad (1 - \underset{(3.50)}{0.422}\,B)\,\dot{GNP}_t = \underset{(6.89)}{6.20} + a_t$$

$$SE = 4.06 \qquad \chi^2(10) = 12.14$$

The estimated autoregressive coefficient is significant at a high level and the χ^2-statistic again does not permit us to reject the hypothesis of white noise residuals. Moreover, this model includes a significant constant term. As with equation 1, equation 2 is used to generate forecasts of nominal GNP growth across the 1968/IV to 1984/IV period.

The last model is that for the unemployment rate. Based on the analysis of this time series, we found that an integrated, second-order autoregressive model (AR(2)) fit the data for the 1954/I to 1968/III period. The estimation results of this model are:

$$(3) \quad (1 - \underset{(5.98)}{0.750}\, B + \underset{(2.77)}{0.348}\, B^2)(1 - B)\, U_t = a_t$$

$$SE = 0.32 \qquad \chi^2(10) = 6.80$$

As with the previous models, the estimated coefficients are highly significant and, as shown by the χ^2-statistic, produce white noise residuals. Consequently, equation 3 is used to forecast the unemployment rate.

Before turning to a comparison of the alternative forecast results, it should be pointed out that although the models discussed above are used for all of the forecasts, the process of updating and re-estimating allows the coefficient estimates to change through time. In order to insure that the models do not become inadequate during part of the forecast period, each estimation was checked using coefficient significance and overall model adequacy (as determined by χ^2-statistic) as our guide. For each series, the models chosen could not be rejected for any of the sample periods.

To illustrate the adequacy of the models over time, we report the results from a full-period estimation, 1954/I-1984/IV. The outcome for the inflation rate is;

$$(4)\quad (1 - B)\,\dot{P}_t = (1 - \underset{(5.55)}{0.450}\,B)\,a_t$$

$$SE = 1.61 \qquad \chi^2(11) = 10.83$$

for the growth of nominal GNP;

$$(5)\quad (1 - \underset{(4.43)}{0.373}\,B)\,\dot{GNP}_t = \underset{(12.24)}{7.87} + a_t$$

$$SE = 4.52 \qquad \chi^2(10) = 12.94$$

and, for the unemployment rate;

$$(6)\quad (1 - \underset{(8.29)}{0.737}\,B + \underset{(2.49)}{0.221}\,B^2)\,(1 - B)\,U_t = a_t$$

$$SE = 0.33 \qquad \chi^2(10) = 10.94$$

Comparing the full-period results to those reported earlier indicates that, although the coefficient estimates have changed over time, the coefficients remain statistically significant and, based on the χ^2-statistics, the hypothesis of white noise residuals cannot be rejected at any reasonable level. Thus, based on these results, it would appear that the time series models developed for each economic variable provide a useful benchmark to which the ASA-NBER survey forecasts can be compared.

IV. COMPARING THE FORECASTS

The main purpose of this section is to compare the accuracy of the survey and time series forecasts for the three variables tested. Indeed, some researchers have argued that if the survey forecasts are not at least as accurate as those derived from a univariate time series model, then they may not be considered "rational."[5/] In this vein, the survey forecasts also should exhibit the characteristic of unbiasedness, which is to say that the observed forecast error should be random. Before turning to our forecasting accuracy comparisons, it is useful to explore the unbiasedness aspects of the survey forecasts.

Bias Tests

The characteristic of unbiasedness can be demonstrated mathematically by the expression

$$(7)\quad X_t = {}_{t-1}X_t^E + \varepsilon_t$$

where X_t is the actual value of variable X in period t, ${}_{t-1}X_t^E$ is the expectation held in period t-1 for the value of X in period t, and ε_t is a random error term with mean zero and variance σ_ε^2.

To empirically test for unbiasedness, we estimate the regression

$$(8) \quad X_t = \alpha_0 + \beta_1 \, {}_{t-1}X_t^E + \varepsilon_t$$

where α_0 and β_1 are parameters to be estimated. Using equation 8, unbiasedness of the survey forecasts is not rejected if we find that $\hat{\alpha}_0 = 0$ and $\hat{\beta}_1 = 1.0$. Moreover, the estimated residuals from estimating equation 8 (the ε_t) should not evidence serial correlation if the forecasts are unbiased.

Equation 8 was estimated using the actual and survey forecast values for the inflation rate, nominal GNP growth and the unemployment rate for the sample period 1968/IV to 1984/IV. Because this period encompasses a wide variety of economic experiences, we also estimate equation 8 for three different subperiods: 1968/I - 1974/IV, 1975/I - 1979/IV and 1980/I - 1984/IV. The summary evidence of estimating equation 8 for each data series is presented in Table 1.

Turning first to the full-period outcome, the reported F-statistics indicate that the hypothesis of unbiasedness is rejected at the 3 percent level for the survey's GNP growth forecasts. Although the hypothesis is not rejected at standard levels for both the inflation and unemployment forecasts, the significance levels of the calculated F-statistics are at or close to the 10 percent level. Moreover, for each of these two series, the hypothesis of autocorrelated errors cannot be rejected at the 5 percent significance level. Thus, based on the criteria established above, it appears that none of the survey forecasts are unbiased across the 1968-84 period.

Because this period is one of significant economic change, the subperiod evidence is useful to check the temporal stability of these relationships. The subperiod results, also reported in Table 1, indicate that the survey forecasts' unbiasedness changed throughout the forecast period. For example, during the first period, unbiasedness is rejected for each series. Although the F-statistic reported for the unemployment rate forecast is low enough that we cannot reject the joint hypothesis that $\hat{\alpha}_0 = 0$ and $\hat{\beta}_1 = 1.0$, we find that the Durbin-Watson statistic is quite small, indicating significant serial correlation.

When we examine the evidence from the 1975-79 period, unbiasedness is rejected only for the unemployment rate forecasts, again because of significant serial correlation. During this period, the calculate F-statistics are all quite small. Similarly, the F-tests do not reject unbiasedness for each series during the 1980-84 sample. Again, however, there is significant evidence of non-random error terms for the inflation and unemployment rate forecasts.

The evidence in Table 1, to summarize, indicates that the survey forecasts do not, in general, meet the criterion of unbiasedness. The hypothesis is rejected for the unemployment rate forecasts invariably because of serially correlated errors. For the inflation forecasts, only the 1975-79 period yields unbiased forecasts. In comparison, it appears that only the GNP growth forecasts meet the criteria, but only for the 1975-79 and 1980-84 subperiods.

Forecast Accuracy Results

Using the survey forecasts and those derived from the time series models discussed earlier, forecast errors were calculated for each time series. The quarterly forecast errors of each economic variable using each forecast procedure are plotted in Charts 1 - 3.

Chart 1 presents the two inflation forecast error series in 1968-84. As seen in the chart, the survey forecast errors tended to be consistently positive during the early 1970s, a period of rising inflation rates. The time-series model forecasts, on the other hand, fluctuated between positive and negative values during this period, although they, too, tended to remain positive during 1973 and 1974.

The forecast errors for nominal GNP growth, shown in Chart 2, have fluctuated significantly for both forecast procedures, with the time series predictions showing the largest deviations from zero. Although the size of the forecast errors for each approach is relatively large, they do fluctuate around zero, suggesting a relatively low average error.

Finally, the unemployment rate forecast errors are plotted in Chart 3. For the most part, each forecast yields relatively small errors. As a visual inspection of Chart 3 indicates, however, the time-series forecasts do not appear to be as large as often as those from the survey.

To more efficiently analyze the relative accuracy of the forecasts, the forecast errors from each procedure are compared using standard summary statistics; mean error (ME), mean absolute error (MAE), the root-mean-square error (RMSE) and the Theil forecast decomposition statistics.

Table 2 presents the forecasting accuracy comparisons for the inflation rate. As with the unbiasedness tests, the comparisons are made for the full 1968-84 period and several subperiods. Based on the MAE and RMSE statistics, the survey forecasts are more accurate than the time series predictions for all periods except 1968-74. During that period, there is virtually no difference between the two. Based on the ME, the time series model is more accurate during the 1968-74 period, a result due primarily to the fact that, as shown in Chart 1, the survey forecasts tended to under predict inflation during that time. This fact also is revealed by the Theil bias statistic, which shows that 67 percent of the survey forecast error in the 1968-74 period is due to one-sided mistakes. In contrast, the degree of bias for the time series forecasts during that period is 16 percent. Thus, based on the evidence in Table 2, it appears that the survey forecasts are as accurate or better than those derived from a time series model.

Comparing the accuracy of the relevant GNP growth forecasts, presented in Table 2, reveals a superiority of the survey forecasts, using the MAE and RMSE criteria. For example, the MAE of the survey forecast generally is 1 percentage point lower than that from the time series model. Also, based on the subperiod results, the RMSE of the time series forecasts average over 40 percent greater than the comparable statistic from the survey forecasts. Moreover, only during the 1980-84 subperiod do we find the time series model yielding a better outcome than that of the survey with a ME statistic of -0.44 relative to the -0.70 reported for the survey forecast. Similar to the outcome reported for the inflation forecast comparison, it appears that the survey forecasts are more accurate than the time series forecasts, over any part of the 1968-84 period.

Our final comparison involves forecasts of the unemployment rate. In contrast to the results for inflation and GNP growth, the statistics reported in Table 4 indicate that the time series forecasts are more accurate than the survey's. Except for the ME statistic for the 1975-79 period, the survey forecast errors are larger than those from the time series model. Although the differences are not large for the most part, this result suggests that the survey forecast does not efficiently utilize the information contained in the historical unemployment rate series. Indeed, this outcome may explain the consistent result of serially correlated residuals in the tests for unbiasedness, reported in Table 2.

The evidence based on a direct comparison of the survey and time series forecasting accuracy indicates that, for inflation and nominal GNP growth, the survey forecasts were as accurate or more so than those of the univariate time series models. This is not true, however, for the unemployment rate forecasts. In contrast to the other outcomes, our results indicate that the time series model yields more accurate forecasts of the unemployment rate than do the survey responses.

V. COMBINATIONS

The evidence presented thus far suggests that, except for forecasts of the unemployment rate, the survey forecasts generally are more accurate than the time series models. Does this mean that given the survey forecasts we have no need for those from the time series model? The answer is, without further evidence, no. The reason for this is because forecasts from different sources may provide useful marginal information that, when combined with another forecast, yields a forecast superior to each component. In large measure, this notion forms the rationale for collecting survey predictions: because each respondent (presumably) uses information in different ways, combining the various individual forecasts into one should produce an information rich forecast that would not be generated by any one individual.

To determine if, in fact, there is any statistically important marginal information contained in time series forecasts that may improve upon the survey forecasts, and vice-versa, we use the procedure suggested by Granger and Ramanathan.[6/] This test amounts estimating the regression

$$(9) \quad X_t = \alpha_0 + \beta_1 XA_t^E + \beta_2 XB_t^E + \varepsilon_t$$

where X_t is the actual value of the forecasted series in period t, XA^E and XB^E are forecasts of X from sources A and B, α, β_1 and β_2 are estimated parameters and ε_t is a random error term.

The usefulness of estimating equation 9 is that the significance of β_1 and/or β_2 helps to identify the forecasts that provide marginally useful information. For example, if β_1 is statistically significant but β_2 is not, this suggests that the information contained in forecast series B already is incorporated into forecast series A. If β_1 and β_2 are significant, this signifies that each forecast provides information useful in predicting X; therefore, a linear combination of forecasts A and B will yield a forecast superior to the individual predictions. Lastly, if β_1 and β_2 are not significant, this implies that each forecast contains information inherent in the other. Thus, no gain is made in forming some weighted combination of the two forecasts.

Equation 9 was estimated using the survey and time series forecasts for each economic variable. Again we use the 1968-84 period and the subperiods to investigate the stability of the results. The outcome of these combination equation estimates is reported in Table 5.

The full period results for the inflation rate forecasts indicate that there is no useful marginal information in the time series forecasts that improve upon the survey: the estimated coefficient on the time series forecast is not different from zero at any reasonable level of significance. In contrast, both forecast series are found to be useful in predicting nominal GNP growth. The statistical significance of both coefficients indicates that there is information in each that, relative to the separate forecasts, would yield a lower average forecast error. Surprisingly, the full period evidence shows that the survey forecasts is redundant given the time series model's forecast of the unemployment rate.

The subperiod results show that these estimates vary through time. For example, it appears that the joint significance of the nominal GNP growth forecasts for the full period stems solely from the 1968-74 period. Only there do we find each forecast to provide significant information to the other. During the 1975-79 and 1980-81 periods, only the estimated coefficient on the survey forecast is significantly different from zero. This again supports the notion that the survey forecast yields more accurate forecasts than the time series model in forecasting GNP. Indeed, a similar conclusion can be reached with regard to the inflation forecasts: during no period does the estimated coefficient on the time series forecast achieve significance at any reasonable level.

Again in contrast to the inflation and GNP growth results, the evidence in Table 5 supports previous findings on the relative superiority of the time series forecasts of the unemployment rate. During each subperiod, we find that only the coefficient on the time series forecast is significantly different from zero at the 5 percent level. Thus, as indicated by the forecasting accuracy results, the survey forecasts of the unemployment rate are not as accurate as those from the time series.

VI. SUMMARY

Our purpose in this paper was to examine the relative accuracy of two often used forecasting procedures: the survey and the time-series model. In this paper, our survey measure is derived from the ASA-NBER quarterly survey of professional forecasters. Comparing the median forecast from the survey to that from a time series model for the inflation rate and nominal GNP growth indicated that, in general, the survey yielded more accurate predictions. Moreover, except for the 1968-74 period using the GNP growth forecasts, evidence presented suggests that the time series forecasts contain no additional information not already accounted for in the survey forecasts. In contrast to these results, the evidence consistently showed that the unemployment rate forecasts from the time series model were more accurate than the survey forecast. This result was corroborated by the fact that the survey forecast was found to be insignificant, given the time series prediction.

On the basis of our results, it would appear that, except for the unemployment rate, the survey forecasts out perform those from the time series models. A disturbing aspect of our evidence is the finding that the notion of unbiased forecasts was rejected often. As noted by Zarnowitz (1983), however, such an outcome may be due to the use of aggregated forecasts, resulting in a biased estimation.

A clear avenue for further research is to extend the forecast horizon and compare the accuracy of the procedures. Together with the results presented here, such information would provide a useful basis upon which forecast users may decide which is the best model.

FOOTNOTES

1/ Klein (1984), p. 2.

2/ For a useful discussion of the survey, see Zarnowitz (1969) and Su and Su (1975).

3/ A small sample of the articles examining the well-known Livingston survey series includes the pioneering work of Turnovsky (1970) and Carlson (1977) and, more recently, Pearce (1979), Jacobs and Jones (1980), and Fama and Gibbons (1984). Some recent studies of the ASA-NBER forecasts include Zarnowitz (1983, 1984), Hafer and Hein (1985) and Hafer (1985).

4/ Zarnowitz (1983) argues that a more appropriate forecast is one generated from a consistent set of respondents, rather than the median of all respondents from each survey. In his study, Zarnowitz uses the forecasts from respondents who have participated in at least 12 surveys. It may be argued, however, that the choice of minimum survey responses is at arbitrary and, therefore, that little may be gained by omitting the informational value of some forecasts. For a similar discussion of the possible problems associated with use of aggregated individual survey responses, see Urich and Wachtel (1984).

5/ See Pearce (1979) for a discussion of this point.

6/ Examples of other studies that have combined alternative forecasts to test for marginal information include Nelson (1972, 1984) and, more recently, Hafer and Hein and Heyne and Hafer (1985). The idea of combining different forecasts was suggested originally in Bates and Granger (1969).

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Table 1
Bias Test Results

Variable	F-statistic (MS)[1/]	DW [2/]
	1968/IV-1984/IV	
Inflation	2.15 (0.12)	1.50*
GNP Growth	3.82 (0.03)	2.29
Unemployment	2.39 (0.10)	0.86*
	1968/IV-1974/IV	
Inflation	25.11 (0.00)	2.19
GNP Growth	3.43 (0.05)	2.51
Unemployment	1.60 (0.22)	0.77*
	1975/IV-1979/IV	
Inflation	0.02 (0.98)	1.57
GNP Growth	0.72 (0.50)	2.13
Unemployment	0.73 (0.49)	0.72*
	1980/IV-1984/IV	
Inflation	2.15 (0.15)	2.88*
GNP Growth	2.06 (0.16)	2.71
Unemployment	1.80 (0.19)	0.85*

Notes: 1/ The reported F-statistic is used to test the joint hypothesis that $\hat{\alpha}_0 = 0$ and $\hat{\beta}_1 = 1.0$ in equation 8. MS is the marginal significance level.

2/ DW represents the Durbin-Watson test statistic. Significant (5 percent level) autocorrelation is denoted by an (*).

Table 2
Inflation Forecast Results

	MEAN ERROR	MEAN ABSOLUTE ERROR	ROOT-MEAN SQUARE ERROR	THEIL STATISTICS		
				BIAS	VARIANCE	COVARIANCE
			1968/IV-1984/IV			
Survey	-0.37	1.22	1.48	0.06	0.07	0.86
ARIMA	-0.01	1.37	1.82	0.00	0.04	0.96
			1968/IV-1974/IV			
Survey	-1.25	1.34	1.53	0.67	0.06	0.27
ARIMA	-0.63	1.32	1.54	0.16	0.32	0.52
			1975/I-1979/IV			
Survey	0.06	1.16	1.48	0.00	0.20	0.80
ARIMA	0.32	1.28	2.07	0.02	0.00	0.98
			1980/I-1984/IV			
Survey	0.29	1.14	1.40	0.04	0.33	0.61
ARIMA	0.42	1.52	1.86	0.05	0.04	0.91

Table 3
GNP Growth Forecast Results

	MEAN ERROR	MEAN ABSOLUTE ERROR	ROOT-MEAN SQUARE ERROR	THEIL STATISTICS BIAS	VARIANCE	COVARIANCE
			1968/IV-1984/IV			
Survey	-0.95	2.74	3.55	0.07	0.34	0.59
ARIMA	-1.38	3.78	4.94	0.08	0.32	0.60
			1968/IV-1974/IV			
Survey	-1.08	2.08	2.73	0.16	0.34	0.51
ARIMA	-1.27	3.08	4.32	0.09	0.28	0.64
			1975/I-1979/IV			
Survey	-1.04	3.04	3.84	0.07	0.24	0.68
ARIMA	-2.46	4.04	5.26	0.22	0.25	0.53
			1980/I-1984/IV			
Survey	-0.70	3.25	4.12	0.03	0.57	0.40
ARIMA	-0.44	4.38	5.34	0.01	0.39	0.60

Table 4
Unemployment Rate Forecast Results

	MEAN ERROR	MEAN ABSOLUTE ERROR	ROOT-MEAN SQUARE ERROR	THEIL STATISTICS BIAS	THEIL STATISTICS VARIANCE	THEIL STATISTICS COVARIANCE
			1968/IV-1984/IV			
Survey	-0.06	0.32	0.46	0.02	0.01	0.97
ARIMA	-0.03	0.27	0.35	0.01	0.02	0.97
			1968/IV-1974/IV			
Survey	-1.12	0.24	0.35	0.11	0.01	0.88
ARIMA	-0.08	0.23	0.29	0.07	0.00	0.93
			1975/I-1979/IV			
Survey	0.04	0.31	0.48	0.00	0.01	0.99
ARIMA	0.04	0.27	0.35	0.01	0.02	0.97
			1980/I-1984/IV			
Survey	-0.06	0.43	0.54	0.01	0.04	0.95
ARIMA	-0.03	0.33	0.41	0.01	0.06	0.97

Chart 1
INFLATION FORECAST ERRORS

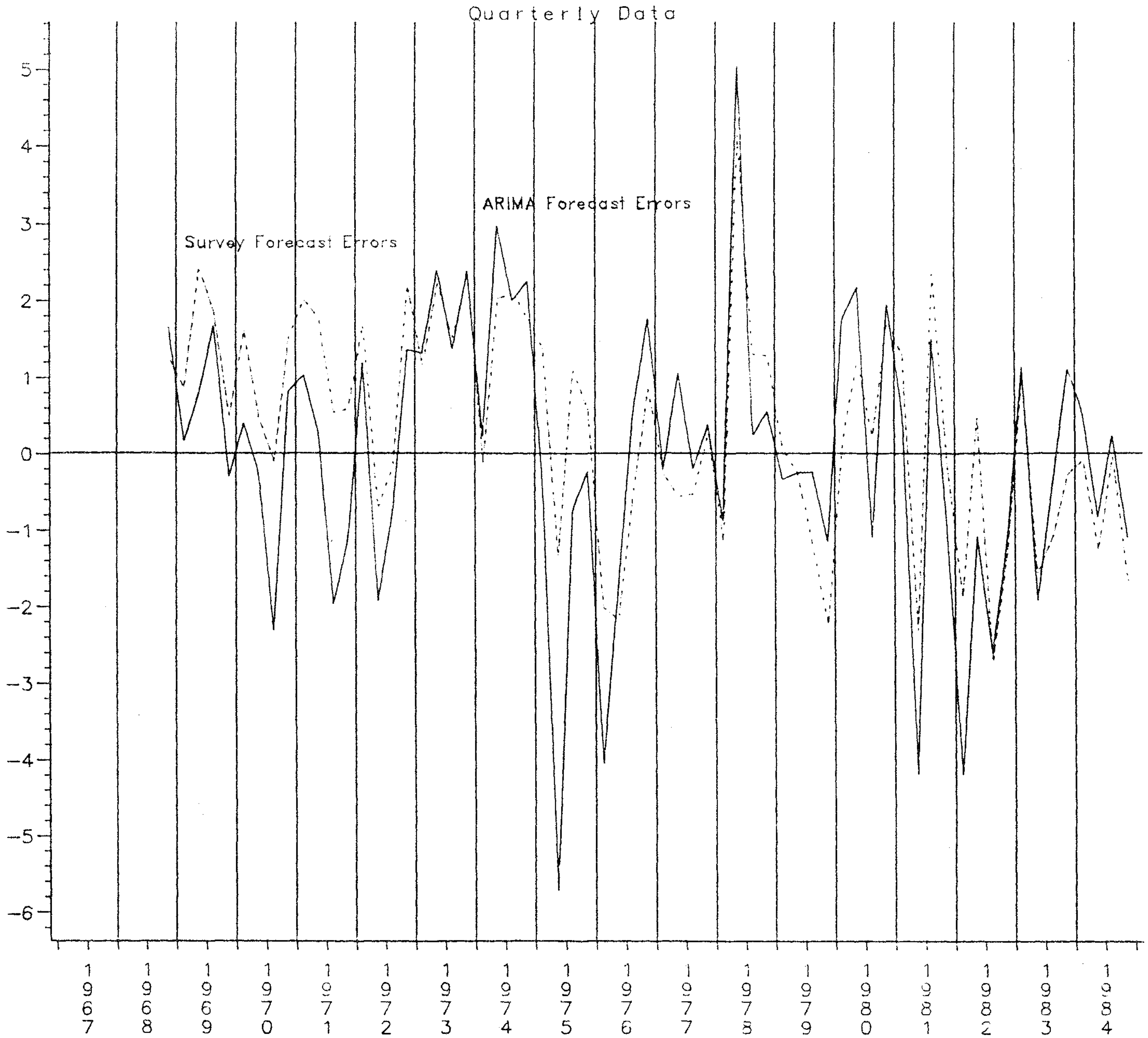

Chart 2
GNP GROWTH FORECAST ERRORS

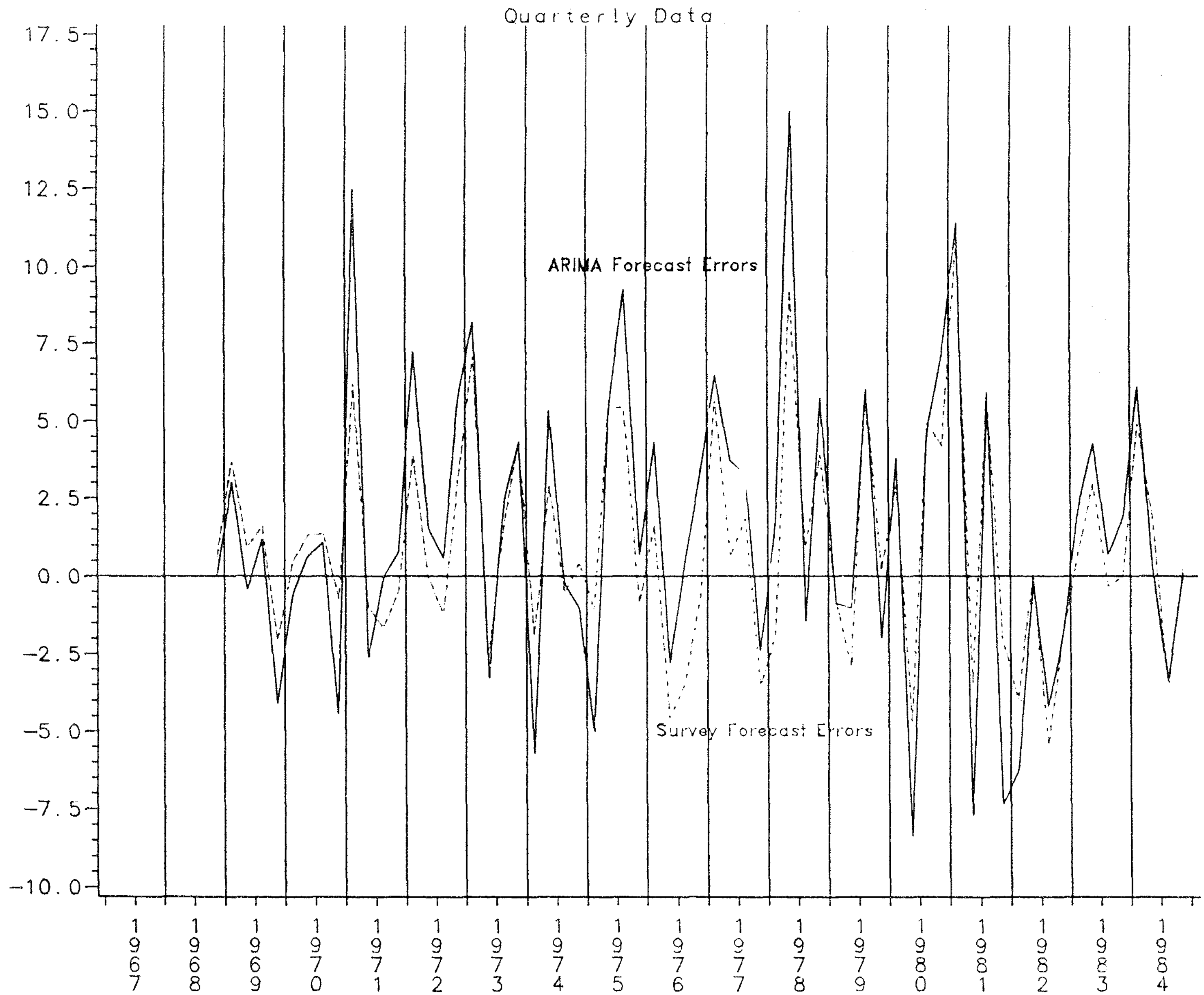

Chart 3
UNEMPLOYMENT FORECAST ERRORS

Quarterly Data

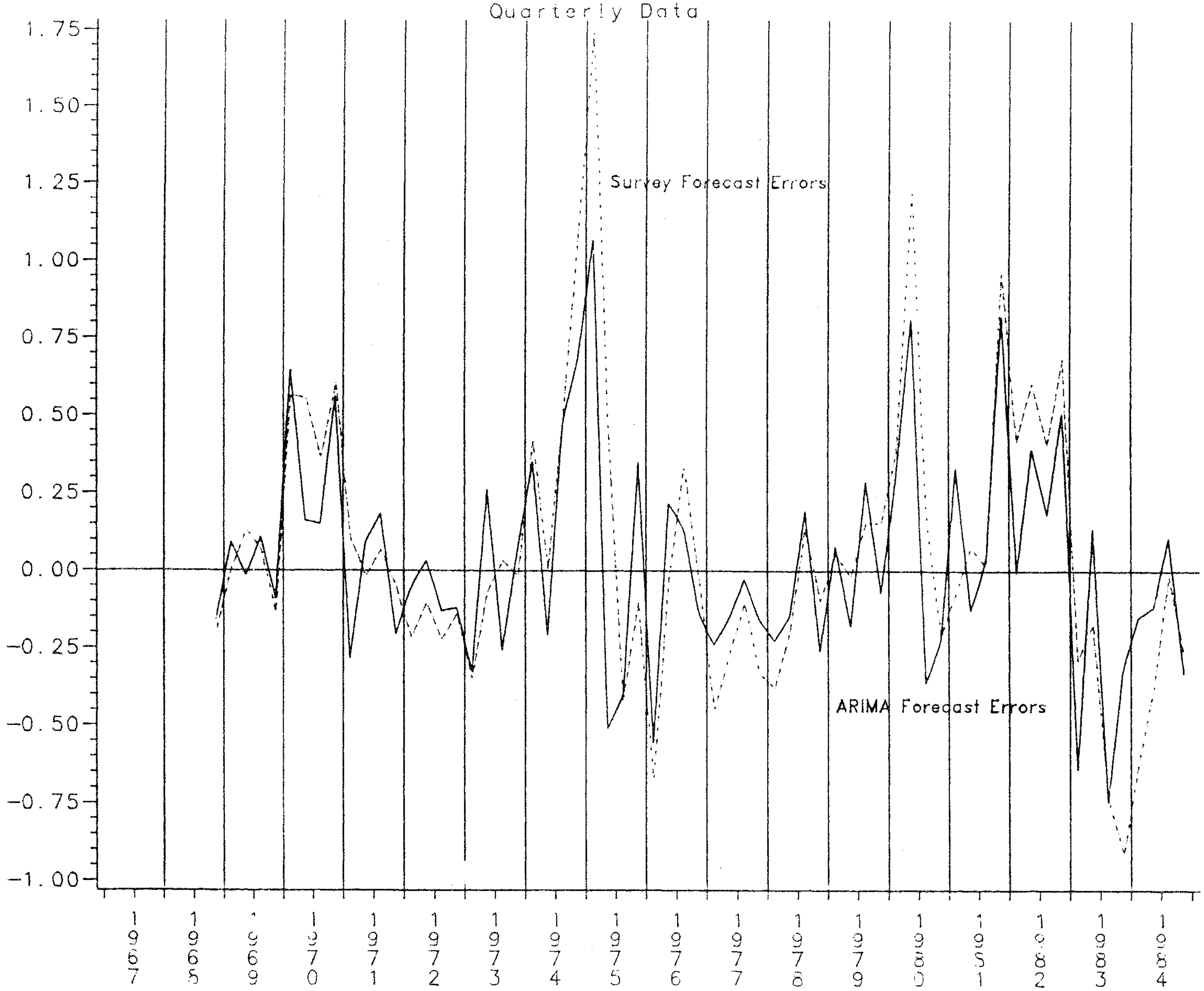

Table 5
Forecast Combination Results

Dependent variable	Estimated coefficient on: Constant	Survey	ARIMA	Summary statistics[2/] $\bar{R}^2$	SE	DW
		1968/IV-1984/IV				
Inflation	0.524	0.990	0.014	0.661	1.463	1.49
	(0.90)	(5.80)	(0.09)			
GNP Growth	1.728	1.495	-0.618	0.528	3.278	1.86
	(0.96)	(8.26)	(2.48)			
Unemployment	0.355	-0.106	1.056	0.961	0.348	2.20
	(2.14)	(0.66)	(6.57)			
		1968/IV-1974/IV				
Inflation	1.403	1.328	-0.319	0.854	0.892	2.17
	(1.70)	(5.86)	(1.05)			
GNP Growth	3.385	1.576	-0.906	0.694	2.156	1.94
	(1.54)	(7.52)	(2.98)			
Unemployment	0.281	0.035	0.924	0.900	0.298	1.80
	(0.85)	(0.11)	(2.91)			
		1975/I-1979/IV				
Inflation	-0.073	1.016	-0.014	0.385	1.609	1.55
	(0.04)	(2.81)	(0.05)			
GNP Growth	3.893	1.150	-0.498	0.274	3.915	1.86
	(0.86)	(2.97)	(0.93)			
Unemployment	0.760	-0.161	1.047	0.879	0.359	2.16
	(1.36)	(0.61)	(4.07			
		1980/I-1984/IV				
Inflation	-2.011	1.554	-0.282	0.816	1.328	2.89
	(2.17)	(4.45)	(0.96)			
GNP Growth	-2.336	1.998	-0.595	0.519	3.869	2.28
	(0.63)	(4.48)	(1.20)			
Unemployment	1.063	-0.199	1.074	0.893	0.408	2.29
	(1.82)	(0.66)	(3.54)			

Notes: 1/ Absolute value of t-statistics appear in parentheses. SURVEY refers to the ASA-NBER survey forecast; ARIMA are those forecasts derived from the time-series models discussed in the text.

2/ $\bar{R}^2$ represents the coefficient of determination adjusted for degrees of freedom; SE is the regression standard error; and DW is the Durbin-Watson test statistic.