14 Comparisons of the Forecasting Results of this Study with the Results of Other Models and Techniques

14.1 *Introduction*

In this chapter the results that have been achieved above will be compared with the results that have been achieved by other models and techniques. It is very difficult to make such comparisons because of different assumptions and time periods involved, and the comparisons below must be considered to be quite informal. Because of its informal nature, this chapter will be brief. The results in this chapter are merely meant to give a rough indication of how the present model compares with other models and techniques. In Section 14.2 the forecasting results of this study will be compared with the results achieved by noneconometric techniques, and in Section 14.3 the results will be compared with the results achieved by the Wharton and OBE models.

14.2 Comparisons with Noneconometric Techniques

Zarnowitz [48] has examined the forecasting records of a number of economic forecasters. The forecasts examined were primarily forecasts by groups of business economists, and it did not appear that these forecasts were generated by econometric models.[1] The forecasts were generally annual forecasts made at the end of the calendar year. The period examined was 1953–1963.

Zarnowitz reports a mean absolute error of between 6.9 and 14.4 billion dollars for the annual forecasts of money GNP for the 1953–1963 period.[2] The annual results presented at the end of Chapter 13 for the 1966–1969 period compare favorably with this error range, although the periods considered differ. In general, however, the present model appears capable of forecasting the yearly level or change of GNP with an average error of less than 6.9 billion dollars.

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[1] "As far as one can see, very little use has been made so far of formal econometric models in forecasts of business activity." Zarnowitz [48], p. 10.

[2] Zarnowitz [48], Table 1, p. 13.

The Federal Reserve Bank of Philadelphia tabulates a large number of noneconometric forecasts made at the end of the calendar year for the year ahead. As reported in Evans, Haitovsky, and Treyz (Evans et al.) [14], the GNP root mean square error of the average of these forecasts for the 1959–1968 period was 8.1 billion dollars. Again, the results presented above appear to compare favorably with this figure.

Since this study is primarily concerned with quarterly forecasts, no further discussion of the annual results will be made. There does not appear to be any convenient tabulation of quarterly forecasts of noneconometric forecasters, and so the discussion in the rest of this chapter will concentrate on forecasts from econometric models.

14.3 Comparisons with the Wharton and OBE Models

Evans et al. [14] have concluded a rather thorough examination of the Wharton and OBE models, and their results can be compared with the results achieved in this study. As mentioned in Chapter 1, Evans et al. conclude that neither the Wharton nor the OBE model tracks the economy well when simulated in a mechanical way. This is true even for the within-sample forecasts based on actual values of the exogenous variables. In Table 14–1 the results of the within-sample forecasts of the present model, the Wharton model, and the OBE model are compared. The root mean square errors of the one-through five-quarter-ahead forecasts of money GNP and real GNP are presented in the table for the three models. The errors for the present model are based on the within-sample forecasts presented in Table 11–6. The errors were computed for the 602–694 period excluding the three quarters that were omitted from the sample period because of the automobile strike. The results for the Wharton model were taken from Tables III.1 and III.4 of Evans et al. There are two versions of the Wharton model, one that uses expectational variables and one that does not, and the results for both versions are presented in Table 14–1. The version that includes expectational variables is used only for computing one- and two-quarter-ahead forecasts. The Wharton model was estimated for the 481–644 period, and the errors presented in the table were computed for the 531–644 period. The results for the OBE model in Table 14–1 were taken from Tables III.13 and III.16 of Evans et al. The OBE model was estimated through 664, and the errors presented in Table 14–1 were computed for the 553–664 period.[3]

[3] Some of the forecasts actually extended by mistake into 1967. See Evans et al. [14], footnote 10, p. 72.

Table 14–1. Root Mean Square Errors of the Within-Sample Forecasts of the Present Model, the Wharton Model, and the OBE Model.

Length of Forecast	Present Model (602–694)	Wharton Model A (531–644)	Wharton Model (531–644)	OBE Model (553–664)
GNP_t				
One-quarter-ahead	2.86	5.11	6.75	4.62
Two quarters-ahead	4.32	5.70	8.20	6.48
Three-quarters-ahead	4.46		7.70	7.62
Four-quarters-ahead	4.11		8.17	8.06
Five-quarters-ahead	3.71		8.19	8.41
$GNPR_t$				
One-quarter-ahead	2.81	4.90	6.53	3.67
Two-quarters-ahead	4.25	5.20	7.54	5.06
Three-quarters-ahead	4.31		7.55	5.97
Four-quarters-ahead	3.77		8.96	6.44
Five-quarters-ahead	3.27		10.63	6.78

Notes: Wharton model A uses expectational variables.
The basic prediction period for each model is in parentheses.

The errors for the different models presented in Table 14–1 are comparable in the sense that they are all based on within-sample forecasts that were computed using actual values of the exogenous variables. They are not comparable in the sense that they are based on different sample periods. Nevertheless, the results should give a basic indication of how good the models are in tracking the economy.

The results in Table 14–1 indicate that the present model is better at tracking the economy than the other two. With respect to the Wharton model, the errors generally differ by about a factor of two; and with respect to the OBE model, the errors generally differ between a factor of about one and one-half and two. It should be noted that various mechanical constant-adjustment techniques that Evans et al. tried did not in general improve the forecasting results of the Wharton and OBE models. The results of the Wharton and OBE model are thus unimpressive, as Evans et al. acknowledge; but this inability to track the economy well within the sample period does not appear to carry over to the present model.

In Tables 14–2 and 14–3 the outside-sample forecasts of the present model, the Wharton model, and the OBE model are compared. The results presented in the tables for the Wharton and OBE models were obtained from the Evans et al. study, Tables IV.1a, IV.1P, IV.4A, IV.4P, IV.11, IV.12, IV.13, and

Table 14–2. Comparisons of the Outside-Sample Forecasts of Money GNP from the Present Model, the Wharton Model, and the OBE Model.

The Period Forecast	Actual Change	The Present Model: Extrapolated exog. Values Forecasted Change	Error	The Present Model: Actual exog. Values Forecasted Change	Error	The Wharton Model: *Ex Ante* Forecasted Change	Error	The Wharton Model: Actual exog. Values Forecasted Change	Error	The OBE Model: *Ex Ante* Forecasted Change	Error	The OBE Model: Actual exog. Values Forecasted Change	Error
661	19.5	18.2	−1.3	19.1	−.4	10.4	−9.1	−2.0	−21.5				
662	13.8	16.3	2.5	15.9	2.1	12.7	−1.1	12.0	−1.8				
663	12.6	18.9	6.3	18.0	5.4	13.1	.5	24.1	11.5				
664	14.8	15.9	1.1	13.3	−1.5	12.1	2.7	19.2	4.4				
671	3.5	22.5	19.0	17.2	13.7	7.4	3.9	19.9	16.4				
MAE			6.04		5.34		3.46		11.12				
662	13.8	15.5	1.7	15.5	1.7	15.0	1.2	−4.1	−17.9				
663	12.6	16.9	4.3	17.3	4.7	14.0	1.4	11.9	−.7				
664	14.8	15.1	.3	12.8	−2.0	14.0	−.8	24.0	9.2				
671	3.5	22.6	19.1	16.8	13.3	12.9	9.4	20.9	17.4				
672	9.3	21.8	12.5	14.4	5.1	7.2	−2.1	17.0	7.7				
MAE			7.58		5.36		2.98		10.6				
663	12.6	10.1	−2.5	10.3	−2.3	16.8	4.2	−4.1	−16.7				
664	14.8	12.3	−2.5	11.1	−3.7	13.5	−1.3	14.8	0				
671	3.5	21.3	17.8	16.1	12.6	8.4	4.9	25.2	21.7				
672	9.3	21.6	12.3	14.8	5.5	9.9	.6	16.2	6.9				
673	16.9	18.5	1.6	18.3	1.4	10.6	−6.3	11.4	−5.5				
MAE			7.34		5.10		3.46		10.2				

664	14.8	9.8	−5.0	10.8	−4.0	13.3	−1.5	−.6	−15.4				
671	3.5	15.4	11.9	13.9	10.4	9.1	5.6	14.6	11.1				
672	9.3	18.3	9.0	12.5	3.2	11.4	2.1	19.7	10.4				
673	16.9	17.7	.8	16.5	−.4	10.5	−6.4	13.0	−3.9				
674	15.7	16.8	1.1	17.0	1.3	13.6	−2.1	15.4	−.3				
MAE			5.56		3.86		3.54		8.22				
671	3.5	7.5	4.0	8.5	5.0	10.2	6.7	−7.3	−10.8				
672	9.3	10.9	1.6	7.8	−1.5	10.5	1.2	11.7	2.4				
673	16.9	11.0	−5.9	11.3	−5.6	5.0	−11.9	15.7	−1.2				
674	15.7	12.3	−3.4	14.8	−.9	8.7	−7.0	16.3	−1.4				
681	19.2	13.5	−5.7	19.4	.2	22.5	3.3	32.9	13.7				
MAE			4.12		2.64		6.02		5.90				
672	9.3	11.4	2.1	9.0	−.3	11.8	2.5	−3.7	−13.0	11.1	1.8	16.7	7.4
673	16.9	15.1	−1.8	13.0	−3.9	20.0	3.1	10.7	−6.2	14.7	−2.2	15.9	−1.0
674	15.7	17.7	2.0	17.7	2.0	13.1	−2.6	18.9	3.2	18.1	2.4	18.2	2.5
681	19.2	16.7	−2.5	21.3	2.1	19.1	−.1	37.3	18.1			17.6	−1.6
682	23.4	17.9	5.5	18.1	5.3	10.8	−12.6	26.8	3.4				
MAE			2.78		2.72		4.18		8.78		2.13		3.12
			1.97 (3 obs.)		2.08 (4 obs.)								
673	16.9	19.0	2.1	17.5	.6	19.4	2.5	−.8	−17.7	19.0	2.1	11.0	−5.9
674	15.7	18.4	2.7	17.5	1.8	21.1	5.4	7.7	−8.0	20.1	4.4	14.0	−1.7
681	19.2	17.3	−1.9	21.0	1.8	7.9	−11.3	40.3	21.1	21.1	1.9	17.9	−1.3
682	23.4	17.5	−5.9	18.2	−5.2	14.1	−9.3	32.0	8.6	19.0	−4.4	19.8	−3.6
683	17.7	16.9	−.8	18.3	.6	14.6	−3.1	.6	−17.1				
MAE			2.68		2.0		6.32		14.5		3.20		3.13
			3.15 (4 obs.)		2.35 (4 obs.)								

Table 14–2 (cont.)

The Period Forecast	Change	The Present Model: Extrapolated exog. Values Forecasted Change	Error	The Present Model: Actual exog. Values Forecasted Change	Error	The Wharton Model: *Ex Ante* Forecasted Change	Error	The Wharton Model: Actual exog. Values Forecasted Change	Error	The OBE Model: *Ex Ante* Forecasted Change	Error	The OBE Model: Actual exog. Values Forecasted Change	Error
674	15.7	14.2	−1.5	14.0	−1.7	16.6	.9	−9.7	−25.4	13.6	−2.1	13.9	−1.8
681	19.2	19.5	.3	23.1	3.9	26.2	7.0	27.2	8.0	23.2	4.0	19.9	.7
682	23.4	18.0	−5.4	19.3	−4.1	19.6	−3.8	34.3	10.9	17.7	−5.7	18.0	−5.4
683	17.7	16.8	−.9	19.3	1.6	4.0	−13.7	4.6	−13.1	12.3	−5.4	15.8	−1.9
684	16.1	14.3	−1.8	13.6	−2.5	10.8	−5.3	11.5	−4.6				
MAE			1.98		2.76		6.14		12.40		4.30		2.45
			2.03 (4 obs.)		2.83 (4 obs.)								
681	19.2	18.0	−1.2	20.3	1.1	21.5	2.3	3.3	−15.9	19.2	0	21.5	2.3
682	23.4	17.9	−5.5	19.7	−3.7	17.3	−6.1	15.4	−8.0	7.9	−15.5	13.6	−9.8
683	17.7	15.0	−2.7	18.2	.5	12.0	−5.7	11.9	−5.8	10.8	−6.9	13.1	−4.6
684	16.1	14.4	−1.7	13.2	−2.9	7.1	−9.0	14.3	−1.8	8.4	−7.7	3.0	−13.1
691	16.2	14.2	−2.0	17.5	1.3								
MAE			2.78 (4 obs.)		2.05 (4 obs.)		5.78		7.88		7.53		7.45
682	23.4	24.7	1.3	26.7	3.3	19.3	−4.1	.2	−23.2	21.1	−2.3	18.3	−5.1
683	17.7	13.0	−4.7	15.3	−2.4	9.8	−7.9	−2.6	−20.3	13.7	−4.0	14.9	−2.8
684	16.1	14.8	−1.3	13.1	−3.0	6.0	−10.1	21.3	5.2	8.0	−8.1	10.5	−5.6
691	16.2	14.0	−2.2	16.7	.5								
692	16.1	13.6	−2.5	14.4	−1.7								
MAE			2.43 (3 obs.)		2.90 (3 obs.)		7.37		16.23		4.80		4.50

683	17.7	17.0	−.7	18.4	.7	9.7	−8.0	−22.7	−40.4	9.8	−7.9	3.1	−14.6
684	16.1	15.1	−1.0	13.3	−2.8	12.5	−3.6	7.9	−8.2	8.1	−8.0	2.0	−14.1
691	16.2	14.7	−1.5	18.2	2.0								
692	16.1	14.3	−1.8	14.9	−1.2								
693	18.0	17.4	−.6	18.0	0								
MAE			.85 (2 obs.)		1.75 (2 obs.)		5.80		24.30		7.95		14.35
684	16.1	18.8	2.7	18.9	2.8	13.3	−2.8	−26.4	−42.5	13.2	−2.9	5.8	−10.3
691	16.2	13.8	−2.4	18.9	2.7								
692	16.1	12.1	−4.0	14.0	−2.1								
693	18.0	15.4	−2.6	17.8	−.2								
694	9.4	10.8	1.4	9.2	−.2								
MAE			2.7 (1 obs.)		2.8 (1 obs.)		2.8		42.5		2.9		10.3

Table 14–3. Comparisons of the Outside-Sample Forecasts of Real GNP from the Present Model, the Wharton Model, and the OBE Model.

The Period Forecast	Actual Change	The Present Model: Extrapolated exog. Values Forecasted Change	Error	The Present Model: Actual exog. Values Forecasted Change	Error	The Wharton Model: *Ex Ante* Forecasted Change	Error	The Wharton Model: Actual exog. Values Forecasted Change	Error	The OBE Model: *Ex Ante* Forecasted Change	Error	The OBE Model: Actual exog. Values Forecasted Change	Error
661	12.5	11.3	−1.2	12.1	−.4	6.5	−6.0	−7.4	−19.9				
662	5.9	9.1	3.2	8.7	2.8	7.7	1.8	8.6	2.7				
663	5.2	8.5	3.3	9.3	4.1	8.4	3.2	17.4	12.2				
664	7.9	7.5	−.4	5.1	−2.8	7.5	−.4	15.9	8.0				
671	−1.6	11.6	13.2	6.9	8.5	3.7	5.3	14.9	16.5				
MAE			4.26		3.72		3.34		11.86				
662	5.9	8.5	2.6	8.5	2.6	6.7	.8	−7.6	−13.5				
663	5.2	8.5	3.3	8.9	3.7	7.1	1.9	7.2	2.0				
664	7.9	6.9	−1.0	4.8	−3.1	8.7	.8	21.2	13.3				
671	−1.6	11.6	13.2	6.7	8.3	6.8	8.4	15.5	17.1				
672	4.0	10.3	6.3	4.3	.3	2.6	−1.4	11.8	7.8				
MAE			5.28		3.60		2.66		10.74				
663	5.2	2.6	−2.6	2.7	−2.5	8.8	3.6	−9.0	−14.2				
664	7.9	4.7	−3.2	3.7	−4.2	7.8	− .1	14.2	6.3				
671	−1.6	6.2	7.8	6.6	8.2	3.6	5.2	20.1	21.7				
672	4.0	10.7	6.7	5.2	1.2	5.3	1.3	10.9	6.9				
673	7.5	7.1	− .4	7.6	.1	5.7	−1.8	6.1	−1.4				
MAE			4.14		3.24		2.40		10.10				

664	7.9	2.7	−5.2	3.6	−4.3	5.9	−2.0	−1.9	−9.8				
671	−1.6	6.2	7.8	4.8	6.4	2.9	4.5	12.9	14.5				
672	4.0	8.4	4.4	3.5	− .5	6.6	2.6	14.8	10.8				
673	7.5	7.0	−.5	6.3	−1.2	5.2	−2.3	7.2	−.3				
674	5.5	4.6	−.9	5.2	−.3	8.1	2.6	8.9	3.4				
MAE			3.76		2.54		2.80		7.76				
671	−1.6	−.6	1.0	.3	1.9	2.9	4.5	−9.5	−7.9				
672	4.0	2.3	−1.7	−.3	−4.3	4.7	.7	10.4	6.4				
673	7.5	2.0	−5.5	2.4	−5.1	.1	−7.4	10.5	3.0				
674	5.5	1.6	−3.9	4.0	−1.5	4.7	−.8	9.7	4.2				
681	9.8	3.6	−6.2	8.9	−.9	15.3	5.5	25.6	15.8				
MAE			3.66		2.74		3.78		7.46				
672	4.0	3.6	−.4	1.5	−2.5	5.1	1.1	−6.1	−10.1	3.9	−.1	22.4	18.4
673	7.5	6.3	−1.2	4.6	−2.9	12.9	5.4	8.9	1.4	7.0	−.5	4.3	−3.2
674	5.5	7.0	1.5	7.2	1.7	7.0	1.5	12.5	7.0	9.8	4.3	7.6	2.1
681	9.8	6.9	−2.9	11.1	1.3	12.4	2.6	29.6	19.8			8.4	−1.4
682	12.5	8.0	−4.5	8.4	−4.1	5.0	−7.5	19.3	6.8				
MAE			2.10		2.50		3.62		9.02		1.63		6.28
			1.03	(3 obs.)	2.10	(4 obs.)							
673	7.5	9.8	2.3	8.6	1.1	13.7	6.2	−4.3	−11.8	10.8	3.3	6.4	−1.1
674	5.5	7.7	2.2	7.0	1.5	2.1	−3.4	5.0	−.5	10.5	5.0	8.8	3.3
681	9.8	7.5	−2.3	10.9	1.1	12.9	3.1	32.9	23.1	12.4	2.6	13.0	3.2
682	12.5	7.7	−4.8	8.4	−4.1	9.4	−3.1	23.6	11.1	9.9	−2.6	12.5	0
683	7.0	5.8	−1.2	7.1	.1	8.8	1.8	−7.2	−14.2				
MAE			2.56		1.58		3.52		12.14		3.38		1.90
			2.90	(4 obs.)	1.95	(4 obs.)							

Table 14–3 (cont.)

The Period Forecast	Actual Change	The Present Model: Extrapolated exog. Values, Forecasted Change	Error	The Present Model: Actual exog. Values, Forecasted Change	Error	The Wharton Model: *Ex Ante*, Forecasted Change	Error	The Wharton Model: Actual exog. Values, Forecasted Change	Error	The OBE Model: *Ex Ante*, Forecasted Change	Error	The OBE Model: Actual exog. Values, Forecasted Change	Error
674	5.5	4.2	−1.3	4.1	−1.4	6.3	.8	−13.4	−18.9	5.0	−.5	7.3	1.8
681	9.8	9.7	−.1	12.7	2.9	18.1	8.3	23.9	14.1	14.9	5.1	14.5	4.7
682	12.5	8.4	−4.1	9.4	−3.1	12.0	−.5	26.7	14.2	10.0	−2.5	12.0	−.5
683	7.0	6.0	−1.0	8.0	1.0	−1.0	−8.0	−4.0	−11.0	4.1	−2.9	8.9	1.9
684	5.7	4.9	−.8	4.2	−1.5	4.2	−1.5	8.4	2.7				
MAE			1.46		1.98		3.82		12.18		2.75		2.23
			1.63	(4 obs.)	2.10 (4 obs.)								
681	9.8	8.4	−1.4	10.3	.5	10.9	1.1	−1.0	−10.8	10.1	.3	11.1	1.3
682	12.5	8.4	−4.1	9.8	−2.7	10.2	−2.3	13.7	1.2	1.8	10.7	6.6	−5.9
683	7.0	4.7	−2.3	7.2	.2	3.4	−3.6	3.9	−3.1	3.1	−3.9	8.0	1.0
684	5.7	5.2	−.5	4.0	−1.7	1.0	−4.7	10.1	4.4	2.2	−3.5	2.0	−3.7
691	4.6	5.0	−.4	7.4	2.8								
MAE			2.07 (4 obs.)		1.28 (4 obs.)		3.18		4.88		4.60		2.98
682	12.5	14.1	1.6	15.7	3.2	10.1	−2.4	−2.2	−14.7	11.3	−1.2	8.8	−3.7
683	7.0	2.8	−4.2	4.6	−2.4	1.3	−5.7	−5.4	−12.4	4.8	−2.2	2.3	−4.7
684	5.7	5.3	−.4	3.8	−1.9	.1	−5.6	17.2	11.5	1.6	−4.1	−.3	−6.0
691	4.6	4.5	−.1	6.6	2.0								
692	3.6	4.0	.4	4.4	.8								
MAE			2.07 (3 obs.)		2.50 (3 obs.)		4.57		12.87		2.50		4.80

683	7.0	6.1	−.9	7.3	.3	.5	−6.5	−25.8	−32.8	.2	−6.8	−1.3	−8.3
684	5.7	5.5	−.2	3.9	−1.8	4.9	−.8	8.2	2.5	1.7	−4.0	−.1	−5.8
691	4.6	5.0	.4	7.8	3.2								
692	3.6	4.4	.8	4.8	1.2								
693	3.9	4.9	1.0	5.3	1.4								
MAE			.55 (2 obs.)		1.05 (2 obs.)		3.65		17.65		5.4		7.05
684	5.7	8.5	2.8	8.6	2.9	4.9	−.8	−26.3	−32.0	6.2	.5	2.9	−2.8
691	4.6	4.2	−.4	8.3	3.7								
692	3.6	2.5	−1.1	4.0	.4								
693	3.9	3.2	−.7	4.9	1.0								
694	−.8	1.5	2.3	−.1	.7								
MAE			2.8 (1 obs.)		2.9 (1 obs.)		.8		32.0		.5		2.8

IV.14. Two sets of forecasts are presented in Tables 14–2 and 14–3 for each model. For the present model, the forecasts in the first set are based on extrapolated values of the exogenous variables (the January et al. forecasts presented in Chapter 13), and the forecasts in the second set are based on actual values of the exogenous variables (the forecasts presented in Chapter 12). For the Wharton and OBE models, the forecasts in the first set are actual *ex ante* forecasts (i.e., forecasts that were actually made ahead of the forecast period by the people associated with the models), and the forecasts in the second set are *ex post* forecasts based on actual values of the exogenous variables. The *ex ante* forecasts presented in the two tables for the Wharton and OBE models are really not so much forecasts generated by the models as they are subjective forecasts made by the econometricians associated with the models. This point is emphasized by Evans et al. As mentioned in Chapter 1, in an actual forecasting situation the Wharton and OBE econometricians fine tune the models until the models are generating forecasts that appear reasonable to them. Nevertheless, these forecasts can be compared with the forecasts generated by the present model to see how the forecasting record of the present model compares with the record of the econometricians. The *ex post* forecasts presented in the tables for the Wharton and OBE models are forecasts that were generated from the models with no fine tuning (i.e. no constant adjustments) involved.

The forecasts in Tables 14–2 and 14–3 are all in terms of changes. Forecasts of money GNP are considered in Table 14–2 and forecasts of real GNP in Table 14–3. Each group of one- through five-quarter-ahead forecasts is examined separately in the tables. For the first group, the forecasts were made (or were considered to have been made) at the beginning of 661 for the 661–671 period; for the second group, the forecasts were made at the beginning of 662 for the 662–672 period; and so on through the 684–694 period. The error of each of the forecasts (predicted change minus actual change) is also presented in the tables, and the mean absolute error of each group of forecasts is presented.[4] For the OBE model, forecasts were not available before 672, and for both the Wharton and OBE models, forecasts were not available for 1969. In those cases in which more forecasts were available from the present model than from the Wharton and OBE models, the mean absolute errors that are presented in Tables 14–2 and 14–3 for the present

[4] It should be noted that the mean absolute errors presented in Tables 14–2 and 14–3 differ in concept from the mean absolute errors presented in the previous chapters. In Tables 14–2 and 14–3 the mean absolute errors are measuring the accuracy of one particular set of one- through five-quarter-ahead forecasts, whereas in previous chapters the mean absolute errors measured the accuracy of all one-quarter-ahead forecasts, then all two-quarter-ahead forecasts, and so on.

model were computed for the same period that was used to compute the mean absolute errors for the other models. With respect to the Wharton and OBE forecasts in Tables 14–2 and 14–3, it should be pointed out that Evans et al. adjusted the forecasts to be comparable with the July 1969 revised data. The forecasts from the present model are also, of course, comparable with the July 1969 revised data.

Comparing the Wharton model with the present model first, the one conclusion that is immediately clear is that the *ex post* forecasts from the Wharton model are extremely poor. Evans et al. tried a number of mechanical constant adjustment techniques for the Wharton *ex post* forecasts, but none of these resulted in any noticeable improvement in the results. These are the results which led Evans et al. to conclude that the Wharton model cannot be used in a mechanical way (i.e., without fine tuning) for forecasting purposes. With respect to the *ex ante* forecasts of the Wharton forecasters, the mean absolute errors are smaller than those of the present model for the first four groups of forecasts, but are larger for the remaining groups.[5] The large errors made by the present model in 671, and in some cases in 672, led to large mean absolute errors for those periods that included 671 and 672; and for these periods the Wharton forecasters did better on average. For the forecasts from the beginning of 671 on, however, the present model has done consistently better than the Wharton forecasters, and in most cases the difference in results is substantial.

The results in Tables 14–2 and 14–3 for the OBE model are better than the results for the Wharton model. In particular, the *ex post* forecasts are much better. Comparing the *ex post* forecasts of money GNP from the present model with those from the OBE model, the present model performs slightly better in terms of the mean absolute error criterion for the groups of forecasts beginning with 672 and 673, slightly worse for the group beginning with 674, and considerably better for the remaining four groups. For the real GNP forecasts, the present model performs considerably better for the group beginning with 672, about the same for the groups beginning with 673 and 674, noticeably better for the groups beginning with 681, 682, and 683, and about the same for the group beginning with 684. Comparing the first set of money GNP forecasts of the present model (the ones based on extrapolated values of the exogenous variables) with the *ex ante* money GNP forecasts of the OBE forecasters, the present model performs better in terms of the mean absolute error criterion for all groups of forecasts. For the groups beginning with 674, 681, 682, and 683 the differences are substantial; for the

[5] The one exception to this is the one-quarter-ahead forecast of real GNP for 684, where the Wharton forecast is more accurate.

other groups the differences are quite small. The OBE forecasters consistently underpredicted the change in money GNP for the last half of 1968. For the real GNP forecasts, the present model performs better for all groups except the one beginning with 684.

It was stressed above that the comparisons in this chapter are only informal comparisons. It should now be clear why this is so. In order to compare the forecasting ability of different models in a rigorous way, common ground rules should be set up and forecasts should be generated by each model under this common set of rules. In particular, rules should be set up regarding how often the models are to be reestimated and how the values of the exogenous variables are to be forecast. Since some models may be more closely tied to exogenous variables than others, actual values of all of the exogenous variables should not necessarily be used for the comparisons. Actual values of some of the exogenous variables, such as federal government expenditures, should perhaps be used, with extrapolated (or proxy) values being used for the others. The forecasts should also be free from nonmechanical constant-adjustment procedures.

It is clear that a common set of ground rules was not followed for the comparisons in this chapter. All of the forecasts were outside-sample forecasts, but the models were estimated using sample periods that ended in different quarters. (The Wharton sample period ended in 644, the OBE sample period in 664, and the present model sample period in quarters varying from 654 and 683.) Also, as mentioned above, the *ex ante* forecasts of the Wharton and OBE models are really closer to being forecasts made by the model builders than they are to forecasts made by the models. Nevertheless, given the much better within-sample results of the present model in Table 14–1 and the generally better outside-sample results in Tables 14–2 and 14–3, the Wharton and OBE models, especially the Wharton model, do not appear to be as accurate a forecasting tool as the model developed in this study.

Unfortunately, there do not appear to be any other models that have been analyzed to the degree necessary to make the kinds of comparisons made above for the Wharton and OBE models. The analysis must thus end here, although the results presented in Chapters 11, 12, and 13 above should be useful for future model builders in comparing the accuracy of their models. In particular, it would be useful to see how the results of large-scale structural models compare with the above results.