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The Decomposition of Forecasting Error: The Wharton Model

5.1 INTRODUCTION

Purpose

In the preceding chapter we developed a procedure for decomposing econometric forecasting error. Here we show the forecasting error for Wharton forecasts from the third quarter of 1966 to the third quarter of 1969, decompose the observed forecasting error for each first quarter of forecast, and, finally, examine the sources of error in each multiperiod forecast. This analysis provides an insight into the reliability of econometric forecasts with the Wharton model, and spells out the exact reasons why each of the forecasts reviewed turned out the particular way it did. Thus, the lessons from past forecasting errors are made available for those who want to learn from past experience, or simply to find out what factors affect forecast performance.

Description of the Models

The three versions of the Wharton model used during the third quarter, 1966–third quarter, 1969 period were presented in Chapter 2.[1]

[1] The third quarter, 1966–fourth quarter, 1968 model is documented in full in Michael

In order to duplicate the Wharton forecasts we had to recover not only the exact model but also the lagged set of values, the guessed values of the exogenous variables, and the constant term adjustments used for the forecast. It was not always easy to recover the lagged values used, but with the aid of old copies of the *Survey of Current Business* we were able to closely reconstruct the lagged inputs. The reproduced forecasts were within a tolerance of 0.001 on GNP in all but a few cases.[2] As mentioned earlier, we performed all ex post forecasts by adding the change in the revised series for the exogenous variables to the lagged values available at the time of forecast. Our realized data set for the endogenous variables is also defined as adding the revised change in each series to the preliminary lagged values[3] used in the forecast program. (See Chapter 1, p. 16.)

The Wharton forecasters issue a set of different forecasts each quarter. These forecasts are conditional on various guesses about monetary and fiscal policy over the forecast period. However, one solution is always designated as the "control" solution—the solution containing their best guesses about future exogenous variables, the one published as their best forecast, and the one generally used in this section.

While we use the control solution in virtually all of the tables below, there are two major exceptions to this rule. First, the Wharton forecasters were wrong about the implementation of the 1968 surcharge. At first they thought it would be enacted in late 1967; later, that it would be in effect by April, 1968. As a result, the control solution forecasts made in the fourth quarter of 1967 and the first quarter of 1968 are far too low, having been based on the assumption that the surtax would be imposed at an earlier date than it actually was. In these cases, we have analyzed the results with the alternative no-surcharge solution. The second exception relates to an anticipated auto strike in early 1968 which never occurred. The Wharton forecasters had what they considered good reason to believe that there would be a severe strike at General Motors

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K. Evans and Lawrence R. Klein, *The Wharton Econometric Forecasting Model*, 2nd enlarged edition, Philadelphia, Wharton School of Finance and Commerce, University of Pennsylvania, 1968.

[2] The first quarter, 1969 forecast was particularly difficult because the program had been lost. Our duplicated forecast was within a tolerance of one billion on GNP.

[3] Sometimes the lagged values for the component values of aggregate variables were inconsistent with the values of these variables. In these cases we consulted old *Surveys of Current Business* to obtain a consistent preliminary lagged set of values.

during the first quarter of 1968. Accordingly, they built this assumption into their official year-end forecasts (made in the fourth quarter of 1967) which were released to *Business Week* and tabulated by the Federal Reserve Bank of Philadelphia. By mid-December it became clear that there would be no such auto strike, so the forecasts were revised again, and the revised version was circulated on December 18, 1967. This revised version is the one we have used for the fourth quarter, 1967 forecast, although it is not the one officially released earlier in the quarter. The true control solutions show an error in GNP in dollars for one year ahead that is an average of 6 billion dollars larger than these selected forecasts. Therefore, the *OR* average errors that are listed for the Wharton model understate the year-ahead error by 1.2 billion dollars for GNP, and understate the error for other variables by a substantial amount as well.[4]

Constant Adjustments, Ex Ante versus Ex Post

Tables showing forecast versus realizations for all of the ex post and ex ante forecasts analyzed in this chapter are presented below (pp. 186–197). They show ex post and ex ante forecasts for the four types of constant adjustments described above. Briefly, the *OR* forecast uses the same constant adjustments as those used by the forecasters. The *AR* forecast typically uses an adjustment equal to the average of the two structural equation residuals (*SER*s) immediately prior to the forecast. The *GG* constant adjustment is a geometrically decreasing adjustment, based on the last two *SER*s, that is weighted by the autocorrelation coefficient in the equation. The adjustment tapers off as the forecast gets longer; it diminishes much faster for equations where the coefficient of correlation for the residuals is very small than where it is large. The *NO* constant adjustment procedure shows how the model would have forecast had the equations been left unadjusted.[5]

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[4] The records for the original control solution for fourth quarter, 1967 and first quarter, 1968 could not be found. However, we did find the forecast values for some variables. The alternatives to the control solution values for *GNP* and *GNP58* that we use improved the ex ante average absolute forecasting error (*AAFE*) for one year ahead in the third quarter, 1966–third quarter, 1969 period by 19 per cent for nominal GNP, 2 per cent for real GNP, and 16 per cent for unemployment in our ex ante tables. The comparable values for the first, second, third, and fourth quarters ahead are, respectively: −2, −1, 1; 11, 5, 5; 8, 5, 4; and 10, 11, 4.

[5] One equation (equation 23) led to unemployment forecasts that were off by several

Naive model 1 (no change), naive model 2 (same change), and the autoregressive equation forecast are given in the tables as a standard of reference.[6] The only difference between the ex ante and the ex post Wharton forecasts lies in the values for the exogenous variables and for the parameters of the tax functions. The exogenous ex ante values are those used in the forecast, while the ex post values are the realized values on the preliminary data base. For tax functions, the coefficients were adjusted to reflect changes in the tax laws that were not foreseen in the ex ante forecasts.

Notes on Forecast versus Realization Tables

Some general observations can be made about the tables showing forecast versus realization before we decompose the error in individual forecasts. The tables presented here are for nominal GNP (*GNP*), real GNP (*GNP58*), and the unemployment rate (*UNRATE*). All other tables are in the appendix. The major components of GNP and each of their subcomponents precede the forecast error table for that component in the appendix tables (A 120–A 135). The next three tables in the appendix (A 136–A 138) show *PC* (the implicit price deflator for GNP), *PCB* (corporate profits before taxes), and *DI$* (disposable income in dollars). In each table, here and in the appendix, the ex ante forecast error is shown in the column to the right of the ex post error for the four constant adjustment methods that we considered.

It is interesting to note that the effect of substituting the realized (ex post) values of the exogenous values for their guessed values (ex ante) shifts the forecast values by about the same amount, no matter which method of constant adjustment is used. Thus, for example, in the third quarter of 1966, the forecast value of GNP (first row, table 5.1) is about 3.30 lower ex ante than ex post for all methods of constant adjustment (by 3.26 for *OR*, 3.28 for *AR*, 3.34 for *GG*, and 3.42 for *NO*). There is one important exception to this general finding: the unemployment rate

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percentage points when it was unadjusted. For this equation we used the adjustment $U_1 = (SER_{t-1} + SER_{t-2})/2 + (3)(i)$, where U is the adjustment and the *SER*s are structural equation residuals, t is the first quarter of forecast, and i is the forecasting span. We used this in all of the *NO*, *AR*, and *GG* constant adjustment runs. This type of adjustment was made by the Wharton forecasters in all of their forecasts with this equation. It mainly influences unemployment and has little effect on the rest of the model.

[6] See Chapter 1, p. 11 for an explanation of the equations used for these benchmark forecasts.

changes by over 2 percentage points from ex ante to ex post in *AR* forecasts, but by a much smaller amount for the other forecasts from the fourth quarter of 1966 to the fourth quarter of 1967. For example, in the fourth quarter, 1966, the ex ante unemployment forecast is lower than the ex post forecast by 0.18 for *OR*, 0.14 for *GG*, and 0.16 for *NO*, but it is 2.36 lower for *AR*. Benjamin Friedman points out that there are two possible roots to the unemployment equations for the Wharton-EFU model, and that the Gauss-Seidel method does not choose explicity between these two roots.[7] We speculate that for some reason the model was pushed from one root to the other when the ex post replaced the ex ante values for the exogenous variables in the *AR* forecast.

Another interesting observation from the tables is that the ex post forecasts do not clearly dominate the ex ante forecasts as we would expect a priori. From casual observation of the tables we can see that the *OR* adjusted forecasts are usually superior to the forecasts using other constant adjustment methods. These and other findings will be discussed and explained at the end of this chapter and in Chapter 7.

5.2 DECOMPOSITION OF FIRST QUARTER ERROR

We use three types of forecasts for our detailed error analysis: the *NO*, the *AR*, and the *OR*. The *NO* constant adjustment variant was chosen because it shows how the model would have behaved in the absence of constant adjustments. The *AR* procedure was used because it gives a strong adjustment for possible shifts in the equation. Furthermore, for analytical purposes the *AR* adjustment has the advantage of simplicity and thus provides a relatively easy comparison with the other cases. The *OR* forecasts will be decomposed because this adjustment reflects the forecaster's preference and includes factors that were known to the forecaster but were not explicit in the model.

In the decomposition of first quarter error that follows (Tables 5.4–5.16) we have applied the procedure described in Chapter 4. This is intended only as a method to obtain a first approximation of the origin of error. These procedures might be refined and extended in future work, but they appear to trace most of the error to its structural equation source in the forecasts under review. In the cases where the total error

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[7] Benjamin M. Friedman, "Econometric Simulation Difficulties," *Review of Economics and Statistics*, Vol. 53, No. 4, November 1971, pp. 381–384.

not decomposed by our procedure remains large we attempt to supply explanations for its possible sources.

The Third Quarter, 1966 Forecast as an Example

In order to document our implementation of the procedure described in Chapter 4, we present a detailed explanation of the decomposition of first quarter error for the third quarter of 1966, as shown in Table 5.4. The first section of this table represents aggregate consumption in current dollars (*C$*). For each type of constant adjustment, the first column shows the structural equation residual minus the constant adjustment (*SER* − *CON*), representing the direct effect of the error in the equation for the variable on the left on the total forecast error for that variable.

Here the consumption of nonautomobile durables in dollars (*CNA$*) serves as an example of the procedure we used to find the *SER* − *CON* values in the consumption sector. The equation for *CNA* is

$$CNA = 11.52 + 0.157\ Y - 0.0574\ KNA_{-1}.$$

We first calculated the value

$$SER_{66.3} = CNA_{66.3} - 11.52 - 0.157\ Y_{66.3} + 0.0574\ KNA_{66.2}$$

where the values on the right in the last equation are observed values of those variables in the third and second quarters of 1966. The observed values are defined on the realized data set as explained in Chapter 1 (page 16) above. The value of $SER_{66.3}$ was −4.03 billion in 1958 dollars. Thus, if all values of all of the other variables had been forecast perfectly, the equation would have been in error by 4.03.

However, this could only happen if either all of the other variables in this equation were predetermined, or if *CNA* were not fed back into the system and all of the other *SER* − *CON* values in the system were zero. Since *CNA* does appear elsewhere in the system, other endogenous variables would be in error even if all of the *SER* − *CON* values in the system were zero. Thus, a structural equation residual of 4.03 billion will set in motion a multiplier effect that will bring about an error larger than 4.03 in *CNA*, even if all of the other equations were adjusted by their *SER*. Therefore, in this case a negative error in the *CNA* equation would cause a negative error in GNP, which, in turn, would cause 1958 dollar

disposable income (*Y*) to be too low. This would cause *CNA* to be still lower, and the predicted *CNA* would be more than 4.03 too low, since *Y* is the only contemporaneous determinant of *CNA*. Then the error measured by *SER* is just the direct error in the equation before the simultaneous nature of the system is recognized and the appropriate multiplier is put into effect.

How much of the error in *CNA* is caused by both the reverberation of its error through the system and by the error in other equations which may reinforce or cancel this error may be determined as follows. First we find the error in *Y* (disposable income in 1958 dollars) by subtracting the observed value of *Y* from the value of *Y* forecast by the entire system of equations. This difference in the *NO* constant adjustment forecast for the third quarter of 1966 is −12.145. The effect of this difference on *CNA* will be to make the forecast of *CNA* −1.91 too low (0.157 [the coefficient of *Y* in the *CNA* equation] times − 12.145 [the error in *Y*]). Comparing the *NO* forecast of *CNA* with the observed value gives us the total error in *CNA*: −5.93—the sum of the *SER* error in the *CNA* equation of −4.03 and the contribution of the error in disposable income from the entire system of −1.91. Thus, if we had been calculating our error decomposition in constant dollars we would have shown −4.03 in the *SER* − *CON* column, −1.91 in the "other" column, and −5.93 in the total column of the origin-of-error table.

For the *OR* constant adjustment forecast the Wharton forecasters added a constant adjustment of 2.00 to the *CNA* equation. The calculation of *SER* − *CON* in this case was

$$SER - CON = CNA_{66.3} - 11.52 - 2.00 - 0.157\, Y_{66.3} + 0.574\, KNA_{66.2}.$$

Thus, the value of *SER* − *CON* was 2.00 less than the *SER* in the *NO* constant adjustment case, or 2.03. The error in the *OR* forecast of *Y* was 0.49. This caused an error of 0.08 in *CNA* (0.157 × 0.49). The difference between the *OR*-predicted *CNA* and the realized *CNA* was −1.95, which we now know was the sum of the direct error of −2.03 in the adjusted *CNA* equation and the +0.08 offsetting effect of the positive error in *Y*.

Our error analysis was carried out with current dollar values rather than constant dollar values. This made it necessary for us to convert our

SER − *CON* values into current dollar units by multiplying them by the *CNA* deflator (*PNA*), which happened to be 0.955 in the period in question. Hence the value of *SER* − *CON* for the *NO* constant adjustment column of Table 5.4 is −3.85 (−4.03 × 0.955).

The value of the "other" error column is somewhat more difficult to calculate. We might approximate it by adding the error caused by the faulty forecast of *PNA* in the *NO* forecast (−0.033 × 39.62 = −1.31, where −0.033 is the *PNA* error and 39.62 is the *CNA* value) to the −1.91 error resulting from the incorrect forecast of *Y* (i.e., −1.31 − 1.91 = −3.32). However, since we know the error in *CNA$* exactly from our forecast-versus-realization table, we can calculate the amount of error due to other causes by subtracting −3.85 from the total error of −7.42, giving us an error due to total system solution of −3.57. These are, in fact, the values that appear on the origin-of-error tables. *CNS$* and *CA$* are calculated in an exactly parallel manner, and the value for *C$* is the sum of the three components.

The values for the investment sector of the origin-of-error table have the same meaning as their consumption counterparts, but the method of calculation is different. All components of investment in plant and equipment in constant dollars (*IP*) are explained by predetermined variables (lagged variables or exogenous variables). Thus, the *SER* − *CON* values calculated for these equations, with their sign reversed, constitute the total forecasting error. The only remaining task is to convert constant dollar *IP* and its components into current dollars, by multiplying them by the implicit deflator for nonresidential fixed investment (*PK*). The errors for the dollar values of *IP* and its components are thus the sum of the error caused by *PK* error and the error originating in the equation itself. Therefore, when calculating the effect of the *PK* error on total error, we know that it is the only error not originating in the structural equation. This price error is then recorded in the "other" column on the decomposition-of-error tables. The *SER* − *CON* error can then be easily calculated by subtracting this error from the total error.

Since disposable personal income (*Y*) is the only explanatory variable in the housing equation that is simultaneously determined by the rest of the system, we calculate this error and then add it to the error caused by faulty prediction of the price of housing. This total is subtracted from the *IH$* (investment in residential housing) error to determine the *SER* − *CON* error in this equation.

Error decomposition for change in inventories involves some

problems that differ from those we have encountered so far. Since change in inventory is a variable that is the first difference between stock variables for inventories, the meaning of our data (defined as revised change plus the preliminary lagged value) is not clear. The lagged change in the stock was probably not given any attention by the Wharton forecasters, if, indeed, it was ever calculated. This lagged value of change in the stock sometimes bears little relation to the lagged change in inventories used as the lagged value of inventory change in the summary table. In many cases (the third quarter of 1966 especially) the only way we could get a consistent set of lagged values for our forecast versus realization was to calculate the jump-off change in inventory that was implied by the other lagged values in the investment sector. Given this difficulty in determining which lagged value to use, the final error we observed in the forecast-versus-realization tables is a sum of *SER − CON* error, the difference between the lagged preliminary value and the revised value of inventory change and the error induced by the rest of the system. If we simply compare the revised change in inventory and the forecast change in inventory, then the *SER − CON* error plus error from the rest of the system comprise the total error. However, this total error will be inconsistent with the total error we observe in investment and in GNP. Not only will it be inconsistent, but the *SER − CON* component will not reflect the contribution to the whole system of the error in the prediction of change in inventory. This is so because the revised change in inventory may bear little resemblance to the value that must be predicted for the entire forecast to be on track—namely, the preliminary value of change in inventory for the jump-off period plus the difference between the change in inventory for the jump-off period and the first forecast quarter in the revised series. Thus, the direct error contributed to the system by the change-in-inventory equation is the *SER − CON* error plus the error that is implied by the difference between the revised and the preliminary jump-off data. In order to find it we calculated the error induced by errors in the simultaneous explanatory variables in the inventory equations (*XM* and *PM*) and subtracted it from the total error for change in inventory shown on the forecast-versus-realization tables. We placed this remaining error in the *SER − CON* column on the origin-of-errors table, completing our breakdown of investment error. The values shown in the *I$* row are the sum of the components above, where the *IP$* row is a subtotal.

The net foreign balance (*NFB$*) sector did not present any special

problems. We simply calculated the *SER* error and scaled it by the appropriate price index. Since imports enter into GNP with a negative sign, the sign of the *SER* term did not have to be changed (as for the other variables). Thus, a positive value in the row for imports (*FI$*) indicates that the forecast level of imports was lower than the realized value. This sector completes our breakdown of error for the components of GNP.

Next comes our calculation of the direct structural equation error in the disposable income sector. This calculation is in essence the same as finding the error term for disposable income equations in the model presented in Chapter 4 (*V* value in equations 4.3 and 4.5). Thus, in order to find the direct effect of an error in disposable income (*V*) on GNP error, we multiply the sum of the *SER* − *CON* error for the components of disposable income by $\hat{\beta}$ (i.e., the sum of the coefficients of disposable income in *C*), which equals 0.637 for this model. The endogenous components of disposable income in dollars (*DI$*) are *WM*, *WN*, *PB*, *RI*, *DV*, *TR*, and *TP*, and are listed on the decomposition-of-error tables. Since the scaling coefficients for the *V* values were very difficult to obtain analytically in this case, we took a pragmatic approach to the problem by comparing simulations that differed only in having the constant of the particular equation adjusted. From these we determined the scale for that adjustment which would explain the observed change in *P* times *GNP58*, if we considered that the direct effect on consumption would be 0.637 times the adjustment, and if this effect on consumption would change the total GNP forecast by 1.75 times the direct effect (where 1.75 is the approximate multiplier for the aggregate demand variables in the system). The same scalers were used for all of the origin-of-error tables up to the first quarter, 1969, when a model with new coefficients was used. The direct effects of the components of disposable income were then added up, with personal taxes (*Tp*) taking a negative sign, to get the total direct effect of *SER* − *CON* error on disposable income. Finally, this value was multiplied by 0.637 ($\hat{\beta}$) to obtain the direct effect (before the multiplier) that this error would have on *GNP* (see equation 4.14, Chapter 4).

In the next section of our decomposition of first-quarter error, we relate the *SER* − *CON* error found above to the total error in *GNP*. Since our decomposition procedure has not sought to trace the errors in prices back to their structural equation source, we simply calculate the error in *GNP* due to price (see equation 4.27) and subtract it from the

total error in *GNP*. The error we do seek to explain is the error in *GNP58* scaled by the implicit price deflator for GNP. This figure is −12.52 for the no adjustment forecast, and appears in the third column of Table 5.4, on the "all GNP − price" line.

The first column shows the addition of the *SER − CON* error for *C$*, *I$*, *NFB$*, and 0.635 times *DI$*. This sum corresponds to the value in brackets in equation 4.14 (p. 141), with the error in the exogenous variables (δT and δG) set equal to zero, since this is an ex post forecast. If this were a simple linear model like the one presented in Chapter 4, according to equation 4.14 the total error could be found by multiplying the *SER − CON* sum in the first column by the multiplier of the system (export change multiplier). Thus, if the multiplier $[1/(1 - \beta(1 - \xi) - \gamma)]$ is 1.75, the *SER − CON* plus 0.75 times this error would equal the total error in the third column. However, the Wharton model is more complicated than the Chapter 4 example. In particular, the *SER*s in the individual equations for the components of GNP each enter into the system in a slightly different way. We found the effect of each of the *SER*s on *GNP58* by shocking each of the thirteen equations for the components of *GNP58* by 1 and then recording the change in *GNP58* from the control to the disturbed solution. These values were: *CNS*, 1.87; *CNA*, 2.47; *CA*, 2.59; *IPM*, 2.08; *IPR*, 1.99; *IPC*, 2.00; *IH*, 1.73; *IIM*, 1.87; *IIN*, 1.97; *FIF*, −1.72; *FIM*, −1.73; *FIC*, −1.74; and *FE*, 1.73. The amount of induced error shown on our decomposition tables is the sum of the *SER − CON*s in the appropriate column times the respective values above −1.

However, even with this modification we do not capture all of the observed error with our decomposition procedure. Thus, we cannot explain the entire difference between the sum of the *SER* error by the induced error row (−6.97 in this case versus the −5.31 we calculate as a residual). Thus, in the next row, labeled "error not decomposed," we report the difference between the error to be explained (−12.52) and the error we explain (−7.21 − 6.97 = −14.18)—1.65 in this case. A nonzero value in the "error not decomposed" line can come from any of the following sources: *SER*s in parts of the model that we do not consider, error in approximation due to our hand calculation methods, error due to approximation from using the same multiplier for each forecast even though they vary because we are dealing with a nonlinear model, and, finally, error that the model may generate by converging to

the "wrong" root—one source of error that our decomposition method may not capture.[8]

The reconciliation of the *SER – CON* error with the total *GNP$* error is carried out in an exactly parallel manner for the *AR* and *OR* constant adjustment forecasts. Since the error not decomposed in all of the third quarter, 1966 ex post forecasts is small relative to the total *GNP*, we assume that we have traced most of the error to its source (even though offsetting error in equations omitted in our analysis remains a possibility).

We can see from the error decomposition table under discussion that most of the error in our example occurred in the real sector, and was not due to an error in forecasting prices. We can now turn our attention to the *SER* error in various sectors of the model. The consumption sector shows individual *SER* errors for the components of consumption in the *NO* adjustment forecast that are much larger than the corresponding *SER – CON*s for the *AR* constant adjustment method. However, the errors in the *NO* forecast offset each other. This result could easily be explained if people maintained the total consumption rate of their sample period in the third quarter of 1966 but shifted from other types of consumption toward the purchase of *CNA$* (nonautomobile durables). In the *OR* forecast only *CNA$* was adjusted. This adjustment was in the right direction and improved the performance of the *CNA* equation, but it made the *C$* worse by removing the offset to error in the two other consumption equations. In the investment sector, the performance of the *NO* adjustment equations was remarkably accurate, while the adjusted equations showed about the same amount of error, but with a lesser tendency to error cancellation. The import equation was clearly off in the *NO* version, while the error in this equation was partially offset by constant adjustments in the constant adjustment versions.

The major difference between adjusted and unadjusted forecasts arises in the disposable income sector, and, more specifically, from error in the wage bill in manufacturing (*WM*) and in nonmanufacturing (*WN*). The underestimation of these two variables is a consistent characteristic of the Wharton model when it has no constant adjustment, and reappears in all of the forecasts with this model. The me-

[8] See Friedman, *Review of Economics and Statistics*, November 1971.

chanical adjustment (*AR*) removes a large amount of this error, but not all of it.

The wage bill of manufacturing employees (*WM*) is the product of the annual wage rate of manufacturing employees, an index of hours worked in the manufacturing sector, and the number of manufacturing employees. The cause of the error in *WM* was an underestimate by 1.5 million in the number of manufacturing employees (*NM*). The equation for *NM* shows a positive residual (underestimate of *NM*) for *NM* for the last seven quarters of the sample period (defined on the data set as 66.3 lags plus revised change). The residuals from first quarter, 1965 through second quarter, 1966 are 0.41, 0.84, 1.08, 1.25, 0.53, and 1.16. Thus, a residual correction was obviously warranted. The calculation for the wage bill in nonmanufacturing (*WN*) runs parallel to the *WM* calculation. However, in this case the number of nonmanufacturing employees (*NN*) equation was only off by 0.2 million without adjustment (off 0.34 in the *AR* forecast and 0.2 in the *OR* forecast), but the wage rate (*WRN*) equation had a positive residual. The record for this residual before 1965 showed a long string of positive residuals. Starting in 1965, it was −0.013, 0.041, 0.040, 0.156, 0.529, and 1.159. Again, the case for adjustment was obvious, and it is not surprising that the *OR SER − CON WN* error was −0.34 and the *AR* error, −1.90, while the *NO* error was −4.54. The other errors in the *DI$* do not seem unusually large and tend to cancel each other out.

In summary, then, the *NO* adjustment forecast was far too low, primarily because no adjustments were made for persistent errors in the equations for manufacturing employment (*NM*) and wages in nonmanufacturing (*WRN*). The *AR* forecast seems reasonably accurate, mainly because the underestimate in disposable income offset the error in the investment equations. The *OR* forecast was too high. Half of this error could be attributed to adjusting one of the consumption equations (*CNA$*) in a way that reduced offsetting error for the other two components.

The last section of the decomposition of first quarter error shows the effect on the forecasts of incorrect guesses in the exogenous variables. This is equivalent to allowing δT and δG (equation 4.14) to take on values that show the difference between the ex post and the ex ante values of these variables. The exogenous variables were divided into three sets: policy variables, exogenous prices, and other exogenous variables.

Simulations to determine the effect of each exogenous variable on *GNP* in the first quarter of forecast were produced by running a control solution and then rerunning the forecast with the value of one of the exogenous variables raised. The difference between the controlled and the disturbed solution, divided by the amount of the disturbance, yielded the coefficient we applied to the error in any exogenous variable to find the effect of its error on the forecast. Since the Wharton model is nonlinear, these coefficients would differ slightly, depending on the control solution used. We compensated for this indirectly, not directly. First, we used our coefficients to find the effect of the policy variables on *GNP*. Next, we calculated the effect of the exogenous prices on the price error and expressed this in billions of dollars by multiplying the exogenous price error by the component of GNP to which it applied (see equation 4.31, p. 146). We then calculated the effect of the other variables as a residual for the *NO* constant adjustment forecast. These results were checked against discrepancies in the exogenous variables to insure that we had not made any computational mistakes in moving from ex ante to ex post forecasts. Finally, we calculated any deviation between the *NO* ex ante and ex post forecasts and the measurement of the difference in the *AR* (0.14) and *OR* (0.16) forecasts. This completed our transition from the ex post to the ex ante forecasts.

The main reason the ex post forecast was higher than the ex ante forecast in the third quarter of 1966 was an underestimate of government defense spending—this was the period during which Vietnam spending was escalating faster than most economic forecasters realized. One would expect the effect of the different starting points on the difference between ex ante and ex post error to be large if there were significant nonlinearities in the model (see equation 4.22). The fact that the difference was only 0.14 less for *AR* and 0.16 less for *OR* than for *NO* shows indirectly that effects of nonlinearity were not significant for this model over the range of forecasts tested.

Fourth Quarter, 1966

In the decomposition of error for the fourth quarter, 1966 forecast (see Table 5.5), we note several interesting findings. In the consumption sector the constant adjustments improved the equation for the consump-

tion of automobiles, but it also eliminated a source of offsetting error. The inventory equation failed to capture the increase of about 8.5 billion dollars in the inventory accumulation rate (to 18.5 billion from about 10 billion in the previous quarter). The *AR* and *OR* adjustments improved the import equation (*FI$*s) substantially. The downward bias in the *NO*, *WM*, and *WN* equations was the major factor in making this *NO* forecast too low. The price error was negative for all three forecasts. All of the forecasts show small effects with the same sign that we have not captured in our decomposition procedure as presented in the "error not decomposed" line. The ex ante forecast was lower than the ex post forecast because of a slight underestimate of policy variables and of the growth in farm inventories and the index of world trade. The change from ex ante to ex post is almost identical for all methods of adjustment, despite the large shift from ex ante to ex post in the *AR* forecast.

First Quarter, 1967

A look at Table 5.6 shows that, in the *AR* and *OR* consumption sector, all consumption equations were improved over their unadjusted counterparts, while the performance of the sector was not improved over the *NO* adjustment performance. The equation for investment in plant and equipment performed much better when it was not adjusted (as in *OR* and *NO*) than when it was adjusted in the *AR* forecast. None of the forecasts captured the drop in the rate of inventory accumulation. The downward bias in the *NO* adjustment equations for the manufacturing (*WM*) and nonmanufacturing (*WN*) wage bill persisted in the quarter, but in this case the negative error here largely offset positive error in the model's other equations. There was a much greater negative price error in the *AR* and *NO* than in the *OR* forecast, and the error not decomposed was also large for the *NO* and *AR* forecast. It is difficult to determine whether the nondecomposed error was due to feedback from errors in the price equations. The ex ante forecast was much lower than the ex post forecasts, due chiefly to an underestimate of three billion dollars in government spending.

Second Quarter, 1967

Table 5.7 indicates that the *AR* and *OR* adjustments improve all of the equations in the consumption sector, but not the total performance.

In the investment sector we see, once again, the failure of the inventory equation to capture the leveling off in inventory accumulation that occurred in the first half of 1967. The persistent downward bias in the *WM* and *WN* equations can be seen in the *NO* adjustment forecast. The four billion dollar negative effect on the forecast due to nonpolicy exogenous variables is attributable to the negative effect of incorrect estimates of farm investment, farm inventories, and productivity trends and output originating in the farm sector.

Third Quarter, 1967

As can be seen from Table 5.8, the consumption equations with the *AR* adjustment are on track in this quarter. The *NO* consumption sector has a higher error than *AR* and *OR*, but not in proportion with the much larger individual equation errors. The *AR* and *OR* adjustments improve the equation for investment in regulated and mining industries (*IPR$*), but the *AR* adjustment is very detrimental to the housing investment equation (*IH$*). The persistent error in the *NO* adjustment disposable income forecast again makes this forecast too low. The error not decomposed is relatively small here, and has a persistently negative sign across methods of constant adjustment. The positive effect of the policy variables on the difference between the ex post and the ex ante forecast is almost entirely due to a three billion dollar overestimate of government spending by the Wharton forecasters.

Fourth Quarter, 1967

The forecast for this quarter (see Table 5.9) shows that the individual equations in the consumption sector were far off track, but that the errors tended to offset each other. For the components of consumption the *AR* and *OR* adjustments reduced individual equation error while retaining much canceling error. In the income sector the usual underestimate of *WM* and *WN* for the *NO* forecast can be seen. The *AR* and *OR* adjustments for *IPR* (regulated and mining investment in plant and equipment) and *FI* (imports) improved these equations. The size of the error that is not decomposed for the *OR* case is very puzzling. We have not been able to trace it to any of the *OR* adjustments to specific equations omitted from our decomposition procedure. It is possible, of

course, that an intractable calculating error is to blame, since all of these tables were calculated by hand (even though the calculation was checked many times).

First Quarter, 1968

The adjusted consumption equations show fairly small errors for this forecast (see Table 5.10). However, the *NO* adjustment equations show large errors, with a tendency to cancel each other. Here the *OR* equations for consumption (*C*) were better than the *AR* type largely because the *AR* adjustment for nondurables and services (*CNS*) was too large. The *OR* adjustments to the equations in the investment in plant and equipment sector (*IP*) improved the performance of those equations. The equation that was clearly the cause of the unsatisfactory ex post forecast is the inventory equation, which predicted a rise in the rate of inventory accumulation rather than the decline that actually took place. The large ex post error was reduced by errors in the exogenous variables. Almost the entire policy variable error was due to a $2 billion underestimate of government spending, while the 7 billion negative effect of the other exogenous variables was mainly caused by an underestimate of farm inventory accumulation and of the index of world trade.

Second Quarter, 1968

The decomposition table (5.11) for the second quarter, 1968 shows that there was significant offsetting error in the consumption equations. Here the *AR* and *OR* adjustments improved the individual equations and did not reduce the canceling error. The adjustments to regulated and mining industry investment in plant and equipment (*IPR*) and to plant and equipment investment by commercial and other industries (*IPC*) make two large positive errors for the *AR* forecast and cause the *IPR* error to change sign for the *OR* equations, while only slightly reducing the *OR IPC* error. The adjustments to the import equations (*FI*) improve the forecasts for that sector greatly. The usual negative errors in *WN* and *WM* persist in the *NO* forecast, but have the opposite signs in the adjusted forecasts. There is a large error not decomposed in all of the forecasts. This indicates that there was a large error in one of the sectors that does not come under our purview in this decomposition procedure. The errors in

the exogenous variables increase forecast error for these forecasts, but not by much.

Third Quarter, 1968

Here the underestimate of consumption is very large (see Table 5.12). This is true of the unadjusted as well as the adjusted equations. Since this error occurs in the same quarter as the introduction of the surtax, one could argue that people did not respond to the reduced growth in their disposable income because they attributed it to a temporary tax that would not significantly influence their permanent income. The import equation (*FI*) was substantially improved by the *AR* and *OR* constant adjustment. The transition between the ex ante and ex post forecasts is interesting. The effect of a $2 billion overestimate of government spending caused a large positive effect from the policy variables, while the effects of underestimates of farm inventories and the index of world trade, and of the omission of a positive value for a strike dummy, more than offset this overestimate.

Fourth Quarter, 1968

In this quarter the equation for consumption of nondurables and services (*CNS*) gives too high a prediction. (See Table 5.13.) Most of this error (7.72) is eliminated by either *AR* (−5.03) or *OR* (−6.18) constant adjustment. A similar pattern of *SERs* emerges for the consumption of nonauto durables (*CNA*), but here the *SERs* have a negative sign. The total consumption *SER* was better for *AR* than *NO* because the reductions in *SER* were great and the effect of canceling error was not eliminated. In the *OR* case, on the other hand, canceling error was reduced. As a result, the much lower *SER* for the *C* components resulting from the *OR* adjustment was not proportionately reflected in the total *SER* for the *C* sector. The smaller *SER* − *CON* error in the investment sector for the *AR* and *OR* forecast, as compared to the *NO* forecast, is due to the improved performance of the equation for regulated and mining industry investment in plant and equipment (*IPR*). The import (*FI*) and export (*FE*) equations show large errors for this forecast, which are somewhat offset by adjustment. The usual underestimates for *WM* and *WN* persist. The errors in the guessed values of the exogenous varia-

bles were small; therefore, the ex ante forecast is not much different from the ex post forecast.

First Quarter, 1969

This forecast was made with a newly estimated model.[9] In the error decomposition tables for this model (Tables 5.14–5.15) we calculate the induced error by multiplying the sum of the *SER – CON* error for *GNP – PRICE* by the average export multiplier of 1.55, minus 1. This forecast repeats the usual pattern in the consumption sector, where the *OR SER – CON* for *C* is not reduced in proportion to the large reduction in individual equation error by constant adjustment. However, the *AR* adjustments to components do reduce the total error a great deal. As in the fourth quarter, 1968 forecast, the *IPR* equation is greatly improved by constant adjustment. Evidently this equation is now off track despite the newly estimated coefficients. Perhaps the long period of tight money and economic expansion has led to investment in regulated industries beyond the level expectable on the basis of past responses to interest rates and sales growth. The equation adjustments capture some of the persistent error in this equation. The export and import equations have large but offsetting errors. This is undoubtably due to the dock strike during this quarter. The wage bill equations (which determine *WM* and *WN*) do not show the usual error in the *NO* adjustment forecast because the equations have been reestimated and are now on track. However, it is not clear whether the newly estimated equations have a better performance than the old equations for the *OR* adjustments. The multipliers for the errors are smaller in this model because new coefficients were estimated. Thus, the amount of induced error is smaller in proportion to the total of the *SER – CON* error than in the old model. The error not decomposed is large in the *AR* case, and positive for all methods of forecasting. The errors in the guessed values of the exogenous variables tend to offset some of the model error. The positive error is due mainly to overestimates of government spending and farm inventory accumulation, while the negative exogenous price effect is mainly caused by an underestimate of the price index for government purchases.

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[9] See Chapter 2, p. 25.

Second Quarter, 1969

This forecast (see Table 5.15) shows a large negative error for the *NO* forecasts, despite the new (first quarter, 1969) equations that put *WM* and *WN* on track. All of the demand equations appear to underestimate the amount of spending, and the price equations do not capture the extent of the inflation. It is interesting to note that the *AR* adjustments help to bring the demand equations on track but do not help the price equations. Since the price equations are first difference equations and since no *AR* adjustment is made on first difference equations, this result is not surprising. The *OR* adjustments put every sector much more on track than in the other forecasts without eliminating canceling error between sectors. This, of course, is behind the low first quarter *OR* error. The ex post and ex ante forecasts are similar because of the offsetting errors in the exogenous variables: an overestimate of government spending, offset by an underestimate of inventory investment in defense (this offset to the wrong guess in *G* may simply represent a speedup of deliveries of defense goods) and an underestimate of the change in the price deflator for government purchases.

Third Quarter, 1969

Table 5.16 presents the relevant equations for the quarter under review. The large underprediction of GNP in the *NO* forecast can again be traced to the large negative *SER* effect in all of the demand sectors except the foreign sector. The investment equations are particularly unsatisfactory. The *AR* adjustments now raise the forecast values, leading to an overprediction of consumption, but this positive error tends to offset negative errors elsewhere. The *OR* adjustments improve all of the sectors of demand. The pattern of error offset in the exogenous variables is the same as in the previous quarter.

5.3 FOUR-QUARTER FORECASTS

The decompositions discussed above (for the first quarters of forecast made in the quarterly forecasts of the 3-year period beginning with the third quarter of 1966) concern the error that occurred when the lagged values were known and did not have to be predicted. Together

with the tables showing the effect of errors in inputs (the effect of errors in the predicted lags), they can serve as a basis for dissecting the error in each of the multiperiod forecasts. These cover the four-quarter forecasts made from the third quarter, 1966 to the fourth quarter, 1968, the three-quarter forecast made in the first quarter, 1969, and the two-quarter forecast made in the second quarter of 1969.

The Third Quarter, 1966 Forecast

Here we present a set of charts for each forecast made in the third quarter of 1966, showing the *NO*, *AR*, and *OR* ex post forecasts for nine variables, as well as the actual path taken by the variable that was predicted. (See Chart 5.1, p. 257.) Furthermore, they include the naive 1 "forecast"—the value in the jump-off period—as a benchmark. All variables are shown for four quarters of forecast, as indicated on the abscissa. The scales of the charts, which can be read on the Y axis, differ.

In the upper left hand corner we show nominal GNP (*GNP*). The consumption and investment components of *GNP* are shown immediately below, and the net foreign balance (*NFB$*) appears in the upper right hand corner. The diagram for constant dollar GNP (*GNP58*) is just to the right of the *GNP* diagram, so that the error in nominal GNP due to inaccuracy in the prediction of real GNP can be easily seen. The chart for disposable income (*DI$*) is placed just to the right of the consumption figure to show the relationship between consumption and disposable income error. Finally, the components of investment (*I$*) are presented in the three charts in the lower right hand corner, just to the right of the *I$* chart.

These charts show clearly that the *OR* and *AR* forecast of *GNP58* in the third quarter of 1966 started too high and continued too high throughout the year. Particularly noticeable is the failure of the ex post forecast to predict the downturn in the rate of inventory accumulation in the first half of 1967 and the downturn in residential housing investment in the fourth quarter, 1966 and the first quarter, 1967. In order to analyze this error, we need to know how much of the error after the first quarter of forecast can be attributed to the prior incorrect predictions of the endogenous variables used as inputs for the later periods of the multiperiod forecast. For this information we turn to the table for effect of error in inputs—Table 5.17.

The first section (columns one and two) of this table are for the *NO* adjustment forecast, with the second column showing the forecast error in the quarter of forecast indicated. Hence, in Table 5.17 the error shown under the second quarter of forecast was the error in the third quarter, 1966 prediction of the fourth quarter of 1966. The first column of this table shows the difference between this error and the error made in the first quarter of forecast of the fourth quarter, 1966 forecast. Thus, the first quarter error for the latter's *NO* forecast can be obtained by subtracting the first column from the second column in this table. Since the chief difference between these forecasts is that the third quarter, 1966 prediction for the second quarter of forecast utilizes predicted values for the lagged endogenous values while the fourth quarter, 1966 prediction for the first quarter of forecast is based on realized values, the change in error can be attributed mainly to the effect of errors in predicted lags (see equations 4.42 and 4.43, p. 150). The only complicating factor in this case is the difference in the basic data sets. Each data set is constructed on the basis of the preliminary lagged values available before the first quarter of forecast (see Chapter 1, p. 16). However, since our comparisons here are comparisons of error in predicting the realized changes on the revised data set, the presence of different preliminary values in the data sets influences the results only indirectly.

The interpretation of the *AR* and *OR* sections is parallel to the *NO* section, with one exception. The constant adjustments for the second quarter of the third quarter, 1966 *AR* and *OR* forecasts may not be the same as these adjustments for the first quarter of the fourth quarter, 1966 forecasts. Thus, the first column in the *AR* and *OR* sections includes the effects of any change in constant adjustments along with the effects of the incorrect predictions of the lagged endogenous variables.

The effect of lags for *AR* and *OR* was to make the consumption prediction too high. This occurred even though the consumption equations themselves were found to be fairly accurate in first quarter decompositions for these later quarters (see Tables 5.5–5.7). The same effect caused the fixed investment forecast (*IP$*) to be too high in 1967. The housing investment (*IH$*) figure was too high for *AR* and *OR* due to both incorrect lagged values and the positive adjustments to the housing equation in the third quarter, 1966 forecast, while there were negative adjustments in the first quarter, 1967 and the second quarter, 1967 *AR*

and *OR* forecasts (Tables 5.6, 5.7). The changes in inventory (*D I/$*) equations were too high in the *AR* and *OR* forecasts because high *SER*s in the inventory equations in 1967 were not offset by constant adjustments. There was, in addition, a slight contribution from incorrect lags. All of these overpredictions led to extremely large overforecasts for *GNP* and *GNP58* in the first half of 1967. The *NO* adjustment forecast shows the wrong pattern of movement for GNP, with high growth in the first half of 1967, when the economy was relatively constant. However, since disposable income (*DI$*) is underestimated because of the persistent error in the wage equations, the entire forecast—since it starts too low and ends too high—has a smaller average error than the *AR* and *OR* forecasts, which are too high throughout.

By comparing the consumption (*C$*) and disposable income (*DI$*) diagrams, we can see how the incorrect disposable income figure contributes to the underestimate of *C$* in the *NO* forecast despite positive *C$ SER*s for all but the second quarter, 1967 forecast. Another interesting feature of the Wharton model should be noted here. The initial underestimate of disposable income in the *NO* forecast has a slight tendency to wash out after several quarters. This occurs because an underestimate of the wage bill leads to an increase in corporate profits (appendix, p. A13, equation V. 7), which is deducted from national income in determining personal income (equation V. 11, p. A13). However, dividends (*DV*) expand disposable income. Since dividends increase in a lagged response to an increase in corporate profits (equation V. 5, appendix p. A12), the delayed feedback from an underestimate of the wage bill will result in a partially offsetting increase in the dividend component of disposable income after a few quarters.

The errors contributed by the incorrect values of the exogenous variables for all types of adjustment are shown in the last column of Table 5.17. The ex ante forecast error can be determined by adding this column to columns two, four, or six, since the ex ante-ex post difference is virtually the same, regardless of the type of constant adjustment used. This similarity was checked for all variables shown, for all four quarters of forecast, and for every forecast involved. In conjunction with the total ex post error column, the last column shows that the *AR* and *OR* ex ante forecasts were much better than the ex post predictions for the third quarter of 1966. One can speculate that the underestimate of inventory accumulation for the first half of 1967 may have been related to high deliveries of defense goods. Thus, the inventory error is not entirely

dissociated from the offsetting underestimate of government spending in the ex ante forecast. This underestimate of spending was the main reason why the ex ante forecast was lower (and thus more accurate) than the ex post forecast.[10]

The Fourth Quarter, 1966 Forecast

We have seen above that the *OR* and *AR* estimates of the fourth quarter, 1966 forecast for first quarter *GNP58* were fairly accurate (Table 5.5 and Chart 5.2). Thus, the failure of the model to pick up the steep decline in the rate of inventory accumulation (*DII$*) in the first half of 1967 and the drop in residential housing construction (*IH$*) in the first quarter of 1967 did not result in as inadequate a forecast as the one for the third quarter of 1966, which had added these errors to a first quarter forecast that was already too high at the start. For the second quarter estimate of the fourth quarter, 1966 *AR* and *OR* forecasts, the predicted lags improved the *GNP* and *GNP58* forecast over the prediction for the first quarter, mainly due to the offset of the positive *SER* errors in the inventory equations by the errors in the predicted lags. The lags added to the errors in *GNP* and *GNP58* in the *AR* and *OR* predictions for the third and fourth quarters of forecast, particularly in the investment sector, where the predicted lags increased the size of the positive error.

The *NO* forecast has a low year-ahead error for *GNP58*, but an analysis of the forecast shows that this is the result of large offsetting errors (see Chart 5.2). The lags seem to improve the forecast somewhat. They tend to raise investment (and consumption, for the fourth quarter) through the delayed effect of the overestimate in corporate profits (*PCB*) mentioned above.

The ex ante *OR* forecast was better than the *OR* ex post forecast (add columns six and seven in Table 5.18 to get the ex ante values). Here the underestimates in exogenous variables were mostly in variables other than government spending, caused by the tax parameters, the price of world trade, the index of world trade, and farm inventories.

The First Quarter, 1967 Forecast

The drop in the rate of inventory accumulation was not captured by the model. The incorrect lags contributed strongly to this failure for the

[10] This point was first made by Michael K. Evans.

second quarter prediction, although one-third of the apparent 6.3 billion added by the predicted lags in the *OR* forecast (Table 5.19) was due to a 2 billion net shift in the *OR* constant adjustment (Tables 5.6 and 5.7). By the second half of 1967, the economy was expanding again, but now the *AR* and *OR* forecasts, which had missed the slowdown in the first half, showed slower growth than the economy. This means that the *OR* forecast contained a negative error in the last half year that offset the first half's positive error. By the fourth quarter the error in the predicted lags was contributing to this fortuitous underestimate of *GNP* and *GNP58*. The *NO* forecast of *GNP58* shows a lower start than the *OR* and *AR* forecast, but ends up as the highest of the three predictions (Chart 5.3). The predicted lags were responsible for raising the *NO* forecast above the other two (Chart 5.3).

The ex ante *OR* forecast of constant and current dollar GNP was lower than the ex post forecast. This improved the first half of the forecast but damaged the last half. Most of the discrepancy was caused by an underestimate of government spending.

The Second Quarter, 1967 Forecast

The ex post *OR* forecast of the second quarter, 1967 was too high throughout, but especially high for the fourth quarter of forecast. For that quarter the forecast correctly predicted an upswing in consumer spending, but also predicted an upswing in investment, which, in fact, declined. This caused a severe overestimate of *GNP* and *GNP58* in the first quarter of 1968. The error in the inventory prediction for that quarter was mainly due to a 9 billion *SER* in the inventory equations and not to incorrect lags (see Table 5.10). The *AR* forecast was much the same as the *OR* forecast, and the *NO* forecast of GNP followed the same pattern. However, the apparent accuracy of the latter was largely due to offsetting errors in consumption and the net foreign balance (*NFB$*).

The *OR* ex ante forecast of GNP was more accurate than the ex post forecast for the first quarter of 1968. The difference was mainly due to underestimates of the index of world trade, the government wage bill, and farm inventory accumulation. For the second quarter, errors in the exogenous variables improved the *OR GNP58* forecast, but for the third quarter forecast, they hurt it.

The Third Quarter, 1967 Forecast

This *OR GNP* forecast is almost perfect, with the exception of a small error in the second quarter. However, the last two quarters are correctly predicted because the *GNP58* forecast is too high, while the projection for the GNP deflator (*P*) is too low. The errors in the predicted lags improve the *OR GNP* forecast significantly in the third quarter of forecast. This occurs for almost all variables in the consumption and investment sectors, where the effect of lags is to reduce the *C$* and *I$* forecast (Table 5.21) while the *SER*s are positive (Table 5.10). The pattern of the predicted net foreign balance (*NFB$*) for *OR*, *AR*, and *NO* runs opposite to the actual pattern (Chart 5.5). The peak in the series is reached at the trough in the actual series. The *NO* forecast repeats the pattern of starting too low and then growing faster than the actual series.

The first two quarters of the ex ante forecast are higher than the ex post forecast, mainly because government expenditures were overestimated (Table 5.21). However, by the third quarter of forecast, underestimates of farm inventory, the world trade index, and exogenous prices of government purchases more than offset the overestimate in real government expenditures. The *GNP* year-ahead forecast error was virtually unaffected by the wrong ex ante guesses for the exogenous variables.

The Fourth Quarter, 1967 Forecast

The growth of *GNP* was very rapid in this period, while the growth of *GNP58* was moderately high. All of the forecasts show a growth in the economy that is ahead of actual growth, until the fourth quarter of the forecast (or the third quarter, 1968), when they show a false turning point. This last quarter was the quarter in which the surtax was instituted, and personal consumption expenditures did not change in response to the surtax-induced reduction at the growth rate of disposable income the consumption equations had predicted they would. This led to negative *SER*s in all of the consumption equations (Table 5.12). The errors in predicted lags were the major cause of the *OR* error in the third quarter of forecast. They caused a very large positive error in the inventory (*DI$*) predictions, despite negative *SER*s in these equations (Table 5.5). The *AR* and *OR* forecasts are very similar, except for the residen-

tial housing equation, the constant adjustment of which was 1.7 larger in *OR* than in *AR*. The *NO* forecast was very substantially improved by the errors in the predicted lags (Table 5.22).

The ex ante *OR* forecast of *GNP* and *GNP58* was more accurate than the ex post prediction for the second and third quarters. The large negative effect of the exogenous errors in these quarters of forecast was due to ex ante underestimates of the index of world trade, the price of government purchases, and farm inventories. These underestimates were somewhat offset in the last quarter by the surtax change, which is not included in the ex ante forecast we are using here.

The First Quarter, 1968 Forecast

This forecast again shows the false turning point for the third quarter of 1968 projected by the model (Chart 5.7). The *OR* and *AR* consumption equations carry negative adjustments into the fourth quarter of 1968 even though for the first quarter forecast these equations were given large positive adjustments in the fourth quarter of 1968 because their inadequacies had been recognized. The contribution of the lags to the negative error in the fourth quarter goes beyond this difference to include a negative contribution to the housing and inventory accumulation equations. The *AR* and *OR* forecasts show much the same pattern for the entire forecast; the *NO* forecast is much too low throughout.

The ex ante *OR* forecast is better than the ex post forecast for the second quarter, mainly because an underestimate of government spending offsets a positive error in the model. In the later quarters the underestimate of the tax revenue (due to an ex ante forecast without the surcharge) is offset by underestimates of the index of world trade and farm inventory accumulation.

The Second Quarter, 1968 Forecast

Just as in the two preceding forecasts, the false turning point in *GNP58* appears in the forecast once again. The *AR* and *OR* forecasts have a negative adjustment of about one billion to the consumption equations, which accentuates the large negative *SER*s in these equations for the third quarter of 1968. The apparent contribution of the lags to the error is overstated here (Chart 5.8) because the later *AR*

and *OR* forecasts include adjustments to the constant terms in the consumption equations to offset the large negative *SER*s that appeared in that quarter. These adjustments to *AR* and *OR* were, respectively, −0.6 and +2.5 for the third quarter, +3.4 and +4.5 for the fourth, and +6.7 and +3.4 for the first quarter of 1969 (Tables 5.12–5.14). The lagged values for the first quarter, 1969 require special interpretation because a reestimated model was used in 1969 (see Chapter 2, p. 25). Thus, the values in our tables on errors in lagged input reflect the values we would like to measure only roughly. The forecast accuracy diagrams (Chart 5.8) also show that the *OR* and *AR* as well as the *NO* forecasts underestimate investment for the fourth quarter, 1968 and the first quarter, 1969. The errors in lags contributed only a small proportion of this error.

The performance of the ex ante forecast was much the same as that of the ex post forecast. The second quarter, 1968 forecast we used (the control solution) included the surtax. Thus, the main difference between the ex ante and ex post forecasts was the underestimate in the former of the change in exogenous prices.

The Third Quarter, 1968 Forecast

Here again the forecast shows a false turning point for the first quarter of 1969 in the *AR* and *OR GNP58* forecasts. In addition, the *AR* and *OR* forecasts are low throughout, leading to a ten billion error for the year-ahead *OR* forecast of *GNP58*. The errors in the predicted lags appear to make an important contribution to the total error. Although the amount of the error attributable to the lags in the first quarter, 1969 prediction may be distorted due to the change in the model, it looks substantial in the table on error in lagged input (Table 5.25), where 19 out of the 21 billion underprediction of *GNP* is shown as resulting from errors in the predictions of the lags. The underprediction of investment in this forecast again suggests that the influences on investment of the change in monetary policy in the third quarter of 1968 is not appropriately reflected in the model. The *OR* housing construction (*IH$*) would be too low if it were not for the 2.6 billion adjustment to the constant term in that equation. The *NO* forecast shows very rapid growth in the first quarter, 1969. The inventory (*DII$*) prediction seems to be a big contributing factor. Here the role of errors in lags appears to be small.

The ex ante *GNP* forecast is a little lower than the ex post forecast.

while the ex ante forecast of *GNP58* is higher than the ex post forecast for the third and fourth quarters of forecast. This is accounted for by the underestimate of exogenous prices in the ex ante forecast.

The Fourth Quarter, 1968 Forecast

The *OR* forecast shows an incorrectly predicted downturn for the first quarter of 1969 (just as the preceding forecast did) for *GNP58*. This result appears to be largely due to incorrect lags (Table 5.26), assuming the comparison with the 1969 model does not distort the comparison too badly. The *AR* forecast parallels the *OR* forecast, the difference between the two apparently resulting from the extra ten billion constant adjustments to the wage bill equations in the *OR* forecast. The *NO* forecast, as usual, starts lower and grows faster. The large spurt in the inventory prediction for the second quarter, 1969 appears to be due to the cessation of the depressing effect of errors in lags after the first quarter.

The error in the ex ante forecast is much smaller than that in the ex post prediction of *GNP58*, but only slightly smaller for *GNP*. This was caused by a large overestimate of real government spending, coupled with a large underestimate of the growth rate in the government price deflator.

The First Quarter, 1969 Forecast (Three Quarters)

This three-quarter forecast was made with a model that was close to the model described in Chapter 2 (p. 25). The *OR GNP* and *GNP58* forecasts started below the actual value but became quite accurate for the later quarters. The predicted lags improved the third-quarter-ahead forecasts for these two variables. The rapid increase in inventory predicted for the second quarter of 1969 by the *OR* forecast contrasts with the drop projected in the *NO* forecast. This difference must originate in the −3.3 adjustment made in the constant term of the *DII$* equation in the first quarter of the forecast.

The ex ante *GNP* forecast is lower than the ex post prediction by a substantial margin, but only slightly so in the *GNP58* forecast. As with the fourth quarter, 1968 forecast, the explanation lies in an underprediction of the growth in the deflator for government services and an overprediction of government spending.

The Second Quarter, 1969 Forecast (Two Quarters)

In the *OR* forecast only slight effects are attributable to the lagged values. The *AR* forecast is much inferior to the *OR* forecast, since large negative adjustments in the fixed investment (*IP$*), housing investment (*IH$*), and wage bill equations in the first quarter caused large errors due to lags in the second quarter. Despite the newly estimated model, the *NO* forecast has astonishingly large errors. The 24 billion of negative *SER*s in the second quarter of 1969 explains the 32 billion underestimate of *GNP* due to incorrect lags, while the 24 billion of negative *SER*s in the third quarter of 1969 explains the rest of the record 75 billion underestimate in the second quarter. The ex ante forecast of *GNP* was only slightly higher than the ex post forecast, with the *GNP58* showing a greater difference. This was caused by an overestimate of government spending and an underestimate of the increase in the government price deflator, just as we observed in the two previous forecasts.

5.4 DECOMPOSITION OF FIRST PERIOD AND MULTIPERIOD ERROR: GENERALIZATIONS

Our decomposition of forecast error allows us to trace the error to its source for the Wharton forecasts from the third quarter of 1966 through the third quarter of 1969. This period is long relative to the time during which we can expect very similar models to be used, but short relative to the number of observations we would like to have for confidently making generalizations based on our observations. However, some patterns worth reviewing do emerge from our decompositions.

The adjustments to the consumption sector, whether they are *AR* or *OR*, tend to reduce the error in the individual equations in that sector. However, they also reduce offsetting error. The total direct (*SER*) error for consumption (*C$*) in the *NO* adjustment forecast is 22 per cent of the sum of the absolute value of the components of consumption error. The comparable figures for *AR* and *OR* are, respectively, 58 per cent and 43 per cent. Thus, while the individual equations in the consumption sector are improved by constant adjustments, the aggregate direct error of the consumption sector is not reduced proportionally because constant adjustment causes systematic reduction in offsetting error.

The *NO* adjustment forecasts suffer from underestimation of the

wage bill in the first quarter of forecast in every forecast we considered. The *AR* and *OR* adjustments lead to a smaller error for these equations. The remaining error after *AR* and *OR* adjustment contains no noticeable positive or negative bias.

The consumption equations show large negative *SERs* in the third quarter of 1968, when the surtax was instituted. This error caused a false turning point prediction for *GNP58* in the forecasts prior to the third quarter, 1968 forecast. Afterwards, the negative bias in these equations was eliminated by the *OR* and *AR* adjustments, but it remained in the *NO* adjustment forecasts.

Where values for the exogenous variables are changed from ex ante to ex post, the forecast for each variable, for each succeeding period, is changed by an amount independent of the type of constant adjustment that has been made on the model (for all variables except the *AR* unemployment forecast). The ex ante *OR* and *AR* forecasts have a smaller year-ahead average absolute forecasting error (*AAFE*) for *GNP58* than the corresponding ex post forecasts. Thus, the errors in the exogenous variables are not reflected in higher forecast error.

The pattern as well as the level of each forecast is influenced by the type of constant adjustment used. In particular, the *NO* adjustment forecast of *GNP58* tends to rise more rapidly than the *AR* and *OR* forecasts. One reason for this is the fact that the *NO* forecast's consistent underestimate of the wage bill in the first quarter leads to an overestimate of corporate profit (*PCB*) (see appendix, p. A137), which then feeds back into the demand equations in later quarters of forecast.[11]

The *AR* and *OR* forecasts are usually fairly close. This means that the *AR* adjustment may be a good approximation of the basis on which many of the *OR* adjustments were made. Since the ex post average absolute year-ahead forecast error is larger for *AR* than for *OR* forecasts of *GNP* (13.78 versus 8.68, see Table 5.1) and of *GNP58* (9.89 versus 7.98, see Table 5.2), the *OR* adjustments may have introduced important exogenous information that was not included in the explicit exogenous variable set of the model.

In our error decomposition we have not explicitly analyzed errors for certain variables. One such variable is unemployment, which is deter-

[11] The *AAFE* for the *NO* forecast in the period covered was 9.9 for the first quarter, 7.6 for the second, 12.1 for the third, and 14.7 for the fourth. See appendix, p. A 137 for individual errors.

mined as a residual in an identity. The prediction for this variable is very unsatisfactory in the Wharton model (one-year-ahead *AAFE* ex post *OR* 0.62 versus 0.15 for the no change forecast). An all-inclusive error decomposition procedure would be feasible for all variables in the model if the appropriate computer programs and the computer time were available to this end. While this may be a goal for a future study, we have been able to locate some of the major causes of the first quarter error via hand calculations based on available information.

To conclude, the text of this chapter only points out the highlights of the basic findings shown in the tables and diagrams of our study. The next chapter, which decomposes the OBE forecast error, compares the OBE and Wharton predictions, while the last chapter presents a specific evaluation of the forecasts that emanated from Wharton and OBE.

GLOSSARY OF SYMBOLS FOR THE WHARTON TABLES

Note: Figures are in billions of dollars unless otherwise noted.

C$	Total consumption expenditures
CA$	Purchases of autos and parts
CNA$	Purchase of consumer durables, excluding autos and parts
CNS$	Purchase of consumer nondurables and services
DI$	Personal disposable income
DII$	Change in inventories
DV	Dividends
FE$	Exports
FI$	Imports
I	Gross investment
IP$	Investment in plant and equipment
IH$	Investment in nonfarm residential construction
IPC$	Plant and equipment investment in commercial and other industries
IPF$	Farm investment in plant and equipment
IPM$	Manufacturing investment in plant and equipment
IPR$	Regulated and mining investment in plant and equipment
NFB	Net foreign balance
PB	Nonfarm unincorporated business income
RI	Rent and net interest paid by individuals
TP	Personal tax and nontax payments
UNRATE	Unemployment rate, per cent
WM	Wage bill of manufacturing employees
WN	Wage bill of nonmanufacturing, nonfarm private employees

TABLE

GNP in Current Dollars, Forecasts

Date of Forecast	OR		AR		GG	
	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error
	First Quarter of Forecast					
3rd Q 1966	6.98	3.71	2.77	−0.51	−5.15	−8.49
4th Q 1966	1.12	−1.51	−5.75	−8.33	−13.19	−15.75
1st Q 1967	13.23	6.68	8.08	1.72	1.42	−4.90
2nd Q 1967	7.17	2.50	2.00	−2.50	−0.05	−4.54
3rd Q 1967	−0.94	2.51	−8.77	−5.18	−8.42	−4.98
4th Q 1967	−3.59	0.90	0.03	4.69	−1.82	2.62
1st Q 1968	13.94	2.26	13.51	1.92	−0.22	−11.74
2nd Q 1968	−2.85	−4.08	−9.53	−10.73	−0.10	−1.28
3rd Q 1968	−2.99	−8.01	−8.54	−13.45	−1.34	−6.25
4th Q 1968	−3.53	−2.79	−21.23	−20.48	−16.33	−15.57
1st Q 1969	−10.37	−6.40	−26.29	−22.31	−28.11	−24.12
2nd Q 1969	−1.93	−2.18	−26.06	−26.27	−20.62	−20.81
3rd Q 1969	−8.88	−5.12	−10.59	−6.87	−7.23	−3.49
AAFE	5.97	3.75	11.02	9.62	8.00	9.59
	Second Quarter of Forecast					
3rd Q 1966	9.22	2.40	4.97	−1.91	−7.97	−15.04
4th Q 1966	9.35	4.06	2.51	−2.68	−11.45	−16.67
1st Q 1967	15.42	7.88	13.85	6.60	1.19	−5.97
2nd Q 1967	9.97	5.62	−4.90	−8.91	−8.08	−12.15
3rd Q 1967	−5.18	7.92	−21.52	−8.28	−19.17	−6.24
4th Q 1967	13.20	7.94	8.74	3.79	5.09	−0.07
1st Q 1968	10.78	−3.83	9.73	−4.93	−12.59	−26.86
2nd Q 1968	−11.98	−12.04	−27.31	−27.31	−24.60	−24.60
3rd Q 1968	−6.16	−11.60	−21.00	−26.23	−18.91	−24.05
4th Q 1968	−15.32	−14.43	−37.81	−36.88	−42.88	−41.95
1st Q 1969	−3.96	−8.96	−34.17	−39.22	−39.85	−44.94
2nd Q 1969	−10.01	−7.10	−42.84	−39.93	−39.67	−36.76
AAFE	10.05	7.82	19.12	17.23	19.29	21.28

5.1
versus Realization for Wharton

NO					
Ex Post Error	Ex Ante Error	Naive 1 Error	Autoregr. Error	Naive 2 Error	Realized Data
		First Quarter of Forecast			
−14.64	−18.06	−12.60	−3.37	1.20	744.90
−24.20	−26.78	−14.80	−6.49	−2.20	759.40
−6.05	−12.16	−3.50	7.35	11.30	763.00
−6.05	−10.39	−9.30	−4.64	−5.80	773.60
−15.83	−12.44	−16.90	−8.36	−7.60	792.50
−14.63	−10.25	−15.70	−0.31	1.20	805.80
−21.16	−32.57	−19.20	−6.45	−3.50	826.80
−36.35	−37.37	−23.40	−10.07	−4.20	850.70
−32.63	−37.24	−17.70	−1.65	5.70	869.30
−50.02	−49.20	−16.10	−3.32	1.60	886.90
−41.64	−37.70	−16.20	−6.25	−0.10	903.60
−48.63	−48.89	−16.10	−4.35	0.10	919.40
−43.28	−39.59	−18.00	−6.53	−1.90	943.10
27.32	28.67	15.35	5.32	3.57	
		Second Quarter of Forecast			
−17.13	−24.34	−27.40	−11.70	0.20	759.70
−20.27	−25.43	−18.30	−2.69	6.90	762.90
−5.77	−12.69	−12.80	6.73	16.80	772.30
−12.53	−16.45	−26.20	−15.54	−19.20	790.50
−25.93	−13.00	−32.60	−13.26	−14.00	808.20
−6.93	−12.09	−34.90	−6.94	−1.10	825.00
−31.68	−45.68	−42.60	−20.05	−11.20	850.20
−56.37	−56.10	−41.10	−17.23	−2.70	868.40
−45.30	−50.08	−33.80	−5.88	13.00	885.40
−69.50	−68.47	−32.30	−11.40	3.10	903.10
−55.91	−61.05	−32.30	−14.03	−0.10	919.70
−75.74	−72.87	−34.10	−13.26	−1.70	937.40
35.26	38.19	30.70	11.56	7.51	

Date of Forecast	OR		AR		GG	
	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error
	Third Quarter of Forecast					
3rd Q 1966	21.72	7.25	19.80	5.23	7.91	−6.87
4th Q 1966	10.51	6.19	6.91	2.46	−6.34	−10.52
1st Q 1967	0.66	−3.95	4.87	−0.21	−6.27	−10.68
2nd Q 1967	4.03	2.98	−12.63	−13.60	−12.94	−13.62
3rd Q 1967	−0.56	−3.38	−16.23	−18.93	−11.11	−13.53
4th Q 1967	17.74	4.09	4.32	−9.25	1.95	−11.10
1st Q 1968	−8.15	−9.46	−11.18	−12.87	−30.81	−32.33
2nd Q 1968	−19.61	−22.07	−39.66	−42.03	−43.24	−45.50
3rd Q 1968	−19.16	−21.86	−31.94	−34.61	−34.12	−36.78
4th Q 1968	−18.92	−19.90	−42.40	−43.21	−53.55	−54.30
1st Q 1969	−7.06	−12.89	−38.63	−44.34	−47.80	−53.57
AAFE	11.65	10.37	20.79	20.62	23.28	26.26
	Fourth Quarter of Forecast					
3rd Q 1966	28.80	7.94	25.77	4.73	14.59	−6.39
4th Q 1966	1.84	−0.20	1.15	−0.83	−10.37	−12.34
1st Q 1967	−7.91	−11.02	−3.36	−7.76	−11.19	−14.35
2nd Q 1967	16.75	2.91	−4.20	−17.52	0.17	−12.70
3rd Q 1967	−0.16	−12.67	−18.05	−30.07	−8.97	−20.64
4th Q 1967	−3.26	−9.56	−17.39	−24.50	−17.54	−23.65
1st Q 1968	−20.80	−18.49	−23.37	−22.13	−40.56	−39.08
2nd Q 1968	−17.40	−25.08	−40.52	−48.14	−42.48	−49.93
3rd Q 1968	−21.27	−26.69	−38.30	−43.70	−37.76	−43.15
4th Q 1968	−23.74	−11.60	−51.46	−39.26	−59.94	−47.94
AAFE	14.20	12.62	22.36	23.87	24.36	27.08
	Forecast One Year Ahead					
3rd Q 1966	16.68	5.33	13.33	1.89	2.35	−9.20
4th Q 1966	5.71	2.14	1.20	−2.35	−10.34	−13.82
1st Q 1967	5.35	−0.10	5.86	0.08	−3.71	−8.98
2nd Q 1967	9.48	3.50	−4.93	−10.63	−5.22	−10.75
3rd Q 1967	−1.71	−1.41	−16.15	−15.61	−11.92	−11.35
4th Q 1967	6.02	0.84	−1.08	−6.32	−3.08	−8.05
1st Q 1968	−1.06	−7.38	−2.83	−9.50	−21.05	−27.05
2nd Q 1968	−12.96	−15.82	−29.25	−32.05	−27.60	−30.33
3rd Q 1968	−12.40	−17.04	−24.95	−29.50	−23.03	−27.56
4th Q 1968	−15.38	−12.18	−38.23	−34.96	−43.18	−39.94
AAFE	8.68	6.58	13.78	14.29	15.15	18.75

(Concluded)

NO					
Ex Post Error	Ex Ante Error	Naive 1 Error	Autoregr. Error	Naive 2 Error	Realized Data
		Third Quarter of Forecast			
4.56	−10.33	−30.90	−9.05	10.50	763.20
−7.10	−11.10	−27.60	−5.51	10.20	772.20
−6.47	−10.73	−29.70	−1.67	14.70	789.20
−11.79	−12.36	−41.90	−22.02	−31.40	806.20
−11.51	−13.81	−51.80	−22.72	−23.90	827.40
−2.08	−15.13	−58.30	−20.65	−7.60	848.40
−37.02	−38.37	−60.30	−29.41	−13.20	867.90
−52.17	−54.28	−57.20	−24.89	0.40	884.50
−40.13	−42.77	−50.00	−14.51	20.20	901.60
−57.71	−58.36	−48.40	−20.31	4.70	919.20
−59.16	−65.06	−50.30	−25.07	−2.00	937.70
26.34	30.21	46.04	17.80	12.62	
		Fourth Quarter of Forecast			
13.23	−7.80	−40.20	−11.70	15.00	772.50
−9.46	−11.28	−44.50	−13.60	5.90	789.10
−8.98	−12.05	−45.40	−8.50	13.80	804.90
2.51	−10.23	−61.10	−31.26	−47.10	825.40
−8.42	−19.96	−75.20	−36.03	−38.00	850.80
−18.89	−25.19	−76.00	−29.99	−8.40	866.10
−43.28	−41.82	−76.40	−36.75	−13.60	884.00
−45.52	−53.01	−73.40	−33.03	3.40	900.70
−39.18	−44.64	−66.10	−23.34	27.50	917.70
−60.25	−48.34	−66.40	−31.18	4.40	937.20
24.98	27.44	62.47	25.54	17.72	
		Forecast One Year Ahead			
−3.50	−15.13	−27.78	−8.95	6.72	760.08
−15.26	−18.64	−26.30	−7.07	5.20	770.08
−6.82	−11.91	−22.85	0.97	14.15	782.35
−6.96	−12.36	−34.62	−18.36	−25.87	798.92
−15.42	−14.80	−44.13	−20.09	−20.88	819.72
−10.63	−15.67	−46.22	−14.47	−3.97	836.32
−33.29	−39.61	−49.63	−23.16	−10.38	857.22
−47.60	−50.19	−48.77	−21.30	−0.77	876.07
−39.31	−43.69	−41.90	−11.34	16.60	893.50
−59.37	−56.09	−40.80	−16.35	3.45	911.60
23.82	27.81	38.30	14.23	10.81	

TABLE

GNP in Constant Dollars, Forecasts

Date of Forecast	OR		AR		GG	
	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error
	First Quarter of Forecast					
3rd Q 1966	5.97	4.30	2.80	1.11	−3.44	−5.15
4th Q 1966	2.53	−2.04	−2.19	−6.62	−8.11	−12.56
1st Q 1967	11.58	4.54	9.14	2.34	3.62	−3.29
2nd Q 1967	5.31	1.08	2.10	−1.93	0.79	−3.38
3rd Q 1967	1.60	6.25	−5.51	−0.66	−4.41	0.24
4th Q 1967	−3.99	0.80	1.01	6.14	0.07	4.87
1st Q 1968	10.53	1.10	11.08	1.74	0.52	−8.88
2nd Q 1968	−1.35	−2.41	−4.53	−5.58	3.23	2.18
3rd Q 1968	−4.19	−6.55	−6.01	−8.36	−0.05	−2.38
4th Q 1968	−2.41	−0.77	−14.36	−12.70	−10.62	−8.96
1st Q 1969	−7.20	−2.77	−10.13	−5.65	−11.46	−6.95
2nd Q 1969	−1.91	−0.44	−13.59	−12.11	−9.28	−7.79
3rd Q 1969	−7.30	−3.55	−6.90	−3.17	−4.68	−0.93
AAFE	5.07	2.82	6.88	5.24	4.64	5.20
	Second Quarter of Forecast					
3rd Q 1966	11.48	4.21	9.49	2.16	1.09	−6.37
4th Q 1966	10.55	2.55	8.48	0.55	−1.37	−9.33
1st Q 1967	12.17	5.19	16.15	9.37	7.18	0.35
2nd Q 1967	8.63	6.53	−0.84	−2.77	−1.69	−3.73
3rd Q 1967	−1.07	12.80	−14.38	−0.30	−9.98	3.91
4th Q 1967	11.74	9.10	11.20	8.78	10.37	7.68
1st Q 1968	10.26	−1.23	10.29	−1.21	−3.61	−15.04
2nd Q 1968	−10.15	−8.12	−17.96	−15.91	−15.16	−13.10
3rd Q 1968	−6.11	−7.31	−11.65	−12.81	−9.09	−10.22
4th Q 1968	−10.89	−6.86	−22.19	−18.13	−26.35	−22.27
1st Q 1969	−1.39	−2.93	−14.16	−15.66	−18.88	−20.39
2nd Q 1969	−6.59	−1.66	−20.53	−15.53	−18.10	−13.10
AAFE	8.42	5.71	13.12	8.60	10.24	10.46

5.2
versus Realization for Wharton

NO					
Ex Post Error	Ex Ante Error	Naive I Error	Autoregr. Error	Naive 2 Error	Realized Data
		First Quarter of Forecast			
−10.90	−12.66	−5.20	−1.67	0.70	648.70
−17.11	−21.60	−7.90	−4.74	−2.70	657.20
−2.59	−9.39	1.60	7.61	9.50	655.40
−4.21	−8.32	−4.00	−2.72	−5.60	661.20
−10.69	−6.06	−7.50	−3.52	−3.50	672.10
−10.75	−5.98	−5.50	3.15	2.00	677.10
−16.48	−25.86	−9.80	−4.77	−4.30	689.20
−25.40	−26.37	−12.50	−5.21	−2.70	702.20
−24.73	−26.98	−7.00	1.51	5.50	709.30
−38.23	−36.53	−5.70	0.47	1.30	717.70
−24.27	−19.79	−4.60	−1.13	1.10	723.00
−32.80	−31.33	−3.60	0.43	1.00	727.10
−32.72	−28.99	−3.90	−0.03	−0.30	731.20
19.30	19.99	6.07	2.84	3.10	
		Second Quarter of Forecast			
−4.29	−11.87	−13.10	−7.17	−1.30	656.60
−6.33	−14.26	−6.30	0.72	4.10	655.60
3.05	−3.63	−2.40	8.33	13.40	659.40
−3.92	−5.87	−11.50	−7.48	−14.70	668.70
−14.03	−0.09	−13.00	−1.96	−5.00	677.60
2.14	−0.63	−15.30	−0.19	−0.30	686.90
−15.82	−27.15	−22.30	−12.15	−11.30	701.70
−34.76	−32.54	−19.50	−6.06	0.10	709.20
−24.84	−25.84	−12.70	2.67	12.30	715.00
−43.37	−39.23	−10.30	−0.44	3.70	722.30
−33.46	−34.97	−8.20	−1.21	3.20	726.60
−47.61	−42.58	−7.50	0.59	1.70	731.00
19.47	19.89	11.85	4.08	5.93	

Date of Forecast	OR Ex Post Error	OR Ex Ante Error	AR Ex Post Error	AR Ex Ante Error	GG Ex Post Error	GG Ex Ante Error
			Third Quarter of Forecast			
3rd Q 1966	24.14	9.39	24.54	9.71	18.88	3.87
4th Q 1966	12.20	5.09	14.28	6.90	6.85	−0.21
1st Q 1967	1.39	−2.18	11.02	6.96	4.85	1.39
2nd Q 1967	4.76	7.96	−4.57	−1.49	−1.83	1.55
3rd Q 1967	5.21	5.95	−6.33	−5.71	1.62	2.46
4th Q 1967	16.93	8.65	11.10	2.55	12.58	4.39
1st Q 1968	−6.52	−4.85	−7.67	−6.28	−16.84	−15.28
2nd Q 1968	−14.51	−13.66	−23.69	−22.82	−23.64	−22.73
3rd Q 1968	−15.12	−11.99	−16.67	−13.57	−15.41	−12.31
4th Q 1968	−12.94	−6.57	−21.95	−15.45	−28.98	−22.47
1st Q 1969	−2.53	−3.22	−11.62	−12.25	−19.68	−20.30
AAFE	10.57	7.23	13.95	9.43	13.75	9.73
			Fourth Quarter of Forecast			
3rd Q 1966	30.79	10.71	30.35	10.14	26.73	6.47
4th Q 1966	6.90	2.81	12.58	8.22	7.78	3.70
1st Q 1967	−3.07	−3.03	7.38	6.29	5.09	5.10
2nd Q 1967	17.27	10.55	6.36	−0.46	14.02	7.68
3rd Q 1967	8.86	2.83	−3.79	−9.83	8.41	2.68
4th Q 1967	−1.94	0.60	−6.79	−5.14	−2.71	−0.17
1st Q 1968	−13.24	−9.48	−13.19	−10.08	−18.16	−14.89
2nd Q 1968	−11.11	−11.31	−19.97	−20.21	−15.77	−15.93
3rd Q 1968	−15.05	−10.89	−18.58	−14.49	−12.61	−8.56
4th Q 1968	−14.16	4.88	−23.60	−4.35	−26.09	−6.82
AAFE	12.24	6.71	14.26	8.93	13.74	7.21
			Forecast One Year Ahead			
3rd Q 1966	18.10	7.16	16.80	5.78	10.82	−0.30
4th Q 1966	8.05	2.10	8.29	2.26	1.29	−4.60
1st Q 1967	5.52	1.13	10.92	6.24	5.19	0.89
2nd Q 1967	8.99	6.53	0.76	−1.66	2.82	0.53
3rd Q 1967	3.65	6.96	−7.50	−4.13	−1.09	2.32
4th Q 1967	5.69	4.79	4.13	3.08	5.08	4.19
1st Q 1968	0.26	−3.61	0.13	−3.96	−9.52	−13.52
2nd Q 1968	−9.28	−8.88	−16.54	−16.13	−12.83	−12.40
3rd Q 1968	−10.11	−9.18	−13.23	−12.31	−9.29	−8.37
4th Q 1968	−10.10	−2.33	−20.53	−12.66	−23.01	−15.13
AAFE	7.98	5.27	9.89	6.83	8.10	6.23

(Concluded)

NO					
Ex Post Error	Ex Ante Error	Naive I Error	Autoregr. Error	Naive 2 Error	Realized Data
		Third Quarter of Forecast			
18.60	3.49	−11.50	−2.18	6.20	655.00
9.11	2.17	−10.30	0.09	5.30	659.60
6.71	3.37	−9.90	5.74	13.80	666.90
0.82	4.32	−17.00	−6.70	−21.80	674.20
3.35	4.24	−22.80	−6.31	−10.80	687.40
11.46	3.21	−27.80	−6.67	−5.30	699.40
−17.86	−16.15	−29.30	−14.36	−12.80	708.70
−23.41	−22.41	−25.20	−6.39	4.20	714.90
−13.52	−10.43	−17.30	2.18	20.20	719.60
−26.22	−19.68	−13.90	−0.39	7.10	725.90
−29.67	−30.30	−12.10	−1.37	5.00	730.50
14.62	10.89	17.92	4.76	10.23	
		Fourth Quarter of Forecast			
27.78	7.46	−15.50	−2.64	8.10	659.00
10.87	6.89	−17.80	−2.01	3.00	667.10
8.57	8.65	−15.40	5.75	16.20	672.40
17.32	11.11	−26.80	−10.77	−33.20	684.00
10.65	4.96	−35.30	−12.44	−19.30	699.90
−1.99	0.40	−34.80	−9.20	−4.80	706.40
−16.96	−13.64	−35.00	−14.20	−13.00	714.40
−11.61	−11.86	−29.80	−6.35	9.40	719.50
−7.96	−4.01	−20.90	2.08	29.10	723.20
−21.25	−2.02	−17.80	−0.59	10.20	729.80
13.50	7.10	24.91	6.60	14.63	
		Forecast One Year Ahead			
7.80	−3.39	−11.32	−3.42	3.43	654.82
−0.87	−6.70	−10.57	−1.48	2.43	659.87
3.94	−0.25	−6.53	6.86	13.22	663.53
2.50	0.31	−14.83	−6.92	−18.82	672.03
−2.68	0.76	−19.65	−6.06	−9.65	684.25
0.22	−0.75	−20.85	−3.23	−2.10	692.45
−16.78	−20.70	−24.10	−11.37	−10.35	703.50
−23.80	−23.29	−21.75	−6.00	2.75	711.45
−17.76	−16.82	−14.47	2.11	16.78	716.77
−32.27	−24.37	−11.92	−0.23	5.58	723.92
10.87	9.74	15.60	4.77	8.51	

TABLE

Unemployment in Per Cent. Forecasts

Date of Forecast	OR		AR		GG	
	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error	Ex Post Error	Ex Ante Error
	First Quarter of Forecast					
3rd Q 1966	−0.19	−0.05	1.39	1.53	0.29	0.45
4th Q 1966	0.18	0.32	3.30	0.94	1.33	1.46
1st Q 1967	−0.11	0.38	0.97	−0.89	−0.35	0.15
2nd Q 1967	0.18	0.16	2.54	0.37	1.14	1.13
3rd Q 1967	−0.11	−0.30	2.35	0.06	1.15	0.94
4th Q 1967	0.29	0.24	1.67	−0.81	0.29	0.25
1st Q 1968	−0.90	0.03	2.22	3.14	0.64	1.60
2nd Q 1968	−0.33	−0.13	0.74	0.94	0.21	0.41
3rd Q 1968	−0.07	0.65	0.37	1.09	0.22	0.94
4th Q 1968	0.61	0.40	2.49	2.28	2.26	2.04
1st Q 1969	1.15	0.07	2.79	1.65	2.62	1.49
2nd Q 1969	0.21	0.18	2.63	2.61	1.85	1.82
3rd Q 1969	−0.02	0.01	0.33	0.37	−0.34	−0.31
AAFE	0.34	0.23	1.83	1.29	0.98	1.00
	Second Quarter of Forecast					
3rd Q 1966	−0.56	−0.05	1.19	1.70	0.56	1.09
4th Q 1966	0.44	0.73	3.59	1.46	2.14	2.45
1st Q 1967	0.32	0.05	1.27	−1.19	0.64	0.38
2nd Q 1967	−0.37	−0.48	2.52	0.32	1.42	1.30
3rd Q 1967	−0.08	−0.74	3.18	0.46	2.16	1.44
4th Q 1967	−0.69	−0.28	1.16	−0.74	0.20	0.64
1st Q 1968	−1.32	−0.21	1.65	2.82	0.92	2.12
2nd Q 1968	−0.35	0.19	1.25	1.80	1.33	1.87
3rd Q 1968	0.38	0.96	1.31	1.90	1.37	1.95
4th Q 1968	1.88	0.87	4.05	3.01	4.19	3.14
1st Q 1969	0.33	0.04	2.90	2.48	2.85	2.44
2nd Q 1969	0.26	0.28	3.02	3.04	2.28	2.30
AAFE	0.59	0.41	2.26	1.75	1.68	1.77

5.3
versus Realization for Wharton

NO					
Ex Post Error	Ex Ante Error	Naive I Error	Autoregr. Error	Naive 2 Error	Realized Data
		First Quarter of Forecast			
1.18	1.33	0.03	0.12	0.06	3.87
1.95	2.09	0.13	0.27	0.10	3.77
0.70	1.22	−0.03	−0.01	−0.16	3.83
2.01	1.99	−0.13	0.12	−0.10	3.93
2.62	2.41	−0.10	0.31	0.03	3.93
2.35	2.30	0.00	−0.05	0.10	3.93
2.98	3.97	0.33	0.40	0.33	3.57
3.41	3.61	0.00	0.10	−0.33	3.60
2.40	3.13	0.00	0.09	0.00	3.60
4.29	4.06	0.20	0.40	0.20	3.40
3.26	2.10	0.07	0.04	−0.13	3.33
3.49	3.46	−0.14	0.10	−0.21	3.47
1.76	1.79	−0.23	0.17	−0.09	3.70
2.50	2.58	0.11	0.17	0.15	
		Second Quarter of Forecast			
1.28	1.83	0.16	0.48	0.22	3.74
2.71	3.03	0.10	0.45	0.04	3.80
1.47	1.21	−0.16	0.10	−0.42	3.96
2.03	1.89	−0.23	0.52	−0.17	4.03
3.35	2.61	−0.10	0.45	0.16	3.93
1.87	2.33	0.33	0.30	0.53	3.60
2.92	4.16	0.33	0.76	0.33	3.57
4.11	4.64	0.00	0.26	−0.66	3.60
3.34	3.95	0.20	0.55	0.20	3.40
6.27	5.18	0.27	0.70	0.27	3.33
4.10	3.66	−0.07	0.18	−0.47	3.47
4.91	4.92	−0.37	0.35	−0.51	3.70
3.20	3.29	0.20	0.42	'0.34	

Date of Forecast	OR Ex Post Error	OR Ex Ante Error	AR Ex Post Error	AR Ex Ante Error	GG Ex Post Error	GG Ex Ante Error
			Third Quarter of Forecast			
3rd Q 1966	−0.71	0.07	1.05	1.86	0.31	1.15
4th Q 1966	0.95	0.38	3.89	0.96	2.29	1.72
1st Q 1967	0.72	0.11	1.34	−1.25	0.69	0.09
2nd Q 1967	0.10	−0.21	2.89	0.56	1.64	1.29
3rd Q 1967	−0.44	−0.28	2.85	1.04	1.70	1.84
4th Q 1967	−1.51	−0.34	0.51	−0.40	−0.34	0.87
1st Q 1968	−0.73	0.13	2.15	3.18	1.42	2.39
2nd Q 1968	0.51	1.06	2.27	2.85	2.88	3.45
3rd Q 1968	1.75	1.35	2.47	2.09	2.77	2.37
4th Q 1968	2.03	0.87	4.10	2.86	4.59	3.33
1st Q 1969	0.17	0.25	2.31	2.25	2.50	2.45
AAFE	0.88	0.46	2.35	1.76	1.93	1.91
			Fourth Quarter of Forecast			
3rd Q 1966	−0.63	−0.02	1.26	1.96	0.39	1.10
4th Q 1966	0.88	−0.02	3.66	0.42	1.78	0.87
1st Q 1967	1.01	−0.02	1.73	−1.08	0.81	−0.22
2nd Q 1967	−0.40	−0.10	2.27	0.61	0.59	0.88
3rd Q 1967	−1.37	−0.34	1.93	1.05	0.53	1.56
4th Q 1967	−0.39	0.76	1.10	0.38	0.26	1.47
1st Q 1968	0.38	0.87	3.04	3.80	2.08	2.79
2nd Q 1968	0.97	1.17	2.67	2.92	3.12	3.36
3rd Q 1968	1.79	1.31	2.70	2.23	2.69	2.22
4th Q 1968	1.72	0.36	3.84	2.35	4.01	2.46
AAFE	0.96	0.50	2.42	1.69	1.63	1.70
			Forecast One Year Ahead			
3rd Q 1966	−0.52	−0.01	1.22	1.76	0.39	0.95
4th Q 1966	0.61	0.35	3.61	0.95	1.89	1.63
1st Q 1967	0.48	0.13	1.33	−1.10	0.45	0.10
2nd Q 1967	−0.13	−0.16	2.55	0.46	1.19	1.15
3rd Q 1967	−0.50	−0.42	2.58	0.65	1.39	1.45
4th Q 1967	−0.58	0.10	1.11	−0.39	0.10	0.81
1st Q 1968	−0.64	0.20	2.27	3.23	1.27	2.23
2nd Q 1968	0.20	0.57	1.73	2.13	1.88	2.27
3rd Q 1968	0.96	1.07	1.71	1.83	1.76	1.87
4th Q 1968	1.56	0.63	3.62	2.63	3.76	2.74
AAFE	0.62	0.37	2.18	1.52	1.41	1.52

(Concluded)

NO					
Ex Post Error	Ex Ante Error	Naive I Error	Autoregr. Error	Naive 2 Error	Realized Data
		Third Quarter of Forecast			
0.45	1.32	0.13	0.68	0.22	3.77
2.15	1.57	−0.03	0.63	−0.12	3.93
0.82	0.19	−0.26	0.50	−0.65	4.06
1.64	1.27	−0.23	0.69	−0.14	4.03
2.11	2.24	0.23	0.88	0.62	3.60
0.37	1.63	0.33	0.65	0.63	3.60
2.16	3.17	0.33	1.01	0.33	3.57
3.53	4.12	0.20	0.74	−0.79	3.40
3.02	2.64	0.27	0.88	0.27	3.33
4.82	3.52	0.13	0.93	0.13	3.47
3.36	3.27	−0.30	0.43	−0.90	3.70
2.22	2.27	0.23	0.73	0.44	
		Fourth Quarter of Forecast			
0.29	1.02	0.00	0.83	0.12	3.90
1.45	0.52	−0.13	0.95	−0.25	4.03
0.60	−0.45	−0.26	0.67	−0.78	4.06
0.36	0.64	0.10	1.09	0.22	3.70
0.64	1.66	0.23	1.16	0.75	3.60
0.49	1.78	0.33	0.92	0.73	3.60
2.30	3.06	0.53	1.40	0.53	3.37
2. 5	3.23	0.27	1.05	−1.05	3.33
2.37	1.91	0.13	1.08	0.13	3.47
3.75	2.18	−0.10	1.09	−0.10	3.70
1.53	1.65	0.21	1.02	0.47	
		Forecast One Year Ahead			
0.80	1.38	0.08	0.53	0.16	3.82
2.06	1.80	0.02	0.57	−0.06	3.88
0.90	0.54	−0.18	0.31	−0.50	3.98
1.51	1.45	−0.12	0.61	−0.05	3.92
2.18	2.23	0.07	0.70	0.39	3.77
1.27	2.01	0.25	0.45	0.50	3.68
2.59	3.59	0.38	0.89	0.38	3.52
3.50	3.90	0.12	0.53	−0.71	3.48
2.78	2.91	0.15	0.65	0.15	3.45
4.78	3.74	0.13	0.78	0.13	3.47
2.24	2.36	0.15	0.60	0.31	

TABLE 5.4

Decomposition of First Quarter Error, 3rd Quarter, 1966

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	2.48	−6.05	−3.57	0.78	−0.22	+0.56	2.48	0.23	2.71
CNA$	−3.85	−3.57	−7.42	−0.66	−0.46	−1.12	−1.94	−0.11	−2.05
CA$	1.36	−2.72	−1.36	0.62	−0.92	−0.30	1.36	0.11	1.47
C$	−0.01	−12.34	−12.34	0.74	−1.60	−0.86	1.90	0.23	2.13
IPM$	−1.65	0.14	−1.51	−0.68	0.11	0.79	−0.17	0.15	−0.02
IPR$	−0.98	0.10	−0.88	0.01	0.07	0.08	0.50	0.11	0.61
IPC$	1.67	0.13	1.80	−1.36	0.11	−1.25	−1.10	0.14	−0.96
IPF$	0.08	0.04	0.12	0.09	0.04	0.13	0.08	0.05	0.13
IP$	−0.88	0.41	−0.46	−0.58	0.33	−0.25	−0.65	0.45	−0.24
IH$	−0.89	−0.66	−1.55	2.00	−0.11	1.89	+1.52	−0.08	1.44
DII$	1.85	−7.26	−5.41	1.88	−2.28	−0.40	0.88	0.51	1.39
I$	0.08	−7.51	−7.43	3.30	−2.06	+1.24	1.75	0.88	2.59
FE$	−0.29	0.34	+0.05	−0.35	0.49	+0.14	−0.29	0.53	+0.24
FI$	3.21	−8.39	+5.18	1.38	0.96	+2.34	1.47	0.65	+2.12
NF8$	2.92	2.31	5.23	1.03	1.45	2.48	1.18	1.18	2.36

WM	−13.38	−5.80	−19.18	−4.43	−1.71	−6.14	−3.00	2.58	−0.42
WN	−4.09	2.52	−1.57	−1.97	5.86	3.89	−0.50	2.12	1.62
PB	0.44	−0.77	−0.33	−0.07	0.19	0.12	−0.49	0.38	−0.11
PI	−0.07	−0.02	−0.09	−0.07	−0.22	−0.29	−0.07	−0.02	−0.09
DV	0.53	0.01	0.54	0.80	0.28	1.08	1.04	0.48	1.52
TR	−0.76	1.19	0.43	−0.76	1.59	0.83	−0.76	−0.45	−1.21
TP	1.32	3.54	4.86	1.32	0.53	1.85	1.32	−0.07	1.25
Total DI SER	−16.01	0.67	−15.34	−5.18	6.52	1.34	−2.46	5.02	2.56
.637 × DI SER	−10.20			−3.30			−1.57		
All GNP − price	−7.21	−5.31	−12.52	1.77	1.56	3.23	3.26	3.61	6.87
(Induced error)		(−6.97)			(−1.37)			(2.16)	
(Error not decomposed)			(1.65)			(2.93)			(1.45)
Price error			−2.12			−0.46			0.11
Ex post GNP$			−14.64			2.77			6.98
Policy var.			−4.49			−4.49			−4.49
Exog. price			−0.75			−0.75			−0.75
Other exog.			1.82			1.82			1.82
Nonlinear			0			0.14			0.16
Ex ante GNP$			−18.06			−0.51			3.72

TABLE 5.5

Decomposition of First Quarter Error, 4th Quarter, 1966

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	+6.30	−7.77	−7.77	−5.12	−1.32	3.80	+5.14	−0.42	4.72
CNA$	−5.59	−3.34	−8.93	−0.59	−0.12	−0.71	−1.69	0.66	−1.03
CA$	+0.90	−2.99	−1.89	−0.70	−1.44	−2.14	−0.08	0.61	0.53
C$	1.61	−13.90	−12.29	+3.83	−2.86	0.95	3.37	0.89	4.22
IPM$	−1.04	−0.05	−1.09	0.62	0	0.62	0.06	0.05	0.11
IPR$	−2.44	−0.04	−2.48	−0.27	0	−0.27	−0.79	0.04	−0.75
IPC$	2.46	−0.05	2.41	0.06	0	0.06	2.45	0.05	2.50
IPF$	0.03	−0.01	0.02	0.02	0	0.02	0.03	0.01	0.04
IP$	−0.99	−0.15	−1.14	0.44	0	0.44	1.76	0.14	1.90
IH$	3.63	−0.40	3.23	4.19	0.09	4.28	3.64	0.30	3.94
DII$	−8.62	−9.83	−18.45	−8.75	−2.26	−11.01	−8.40	0.10	−8.30
I$	−6.06	−9.94	−16.36	−4.16	−2.21	−6.28	−3.00	0.54	−2.46
FE$	0.02	−0.12	−0.10	0.46	−0.84	−0.38	0.02	0.16	0.18
FI$	2.69	2.03	4.72	−0.59	0.74	0.15	−0.34	−0.31	−0.65
NFB$	2.71	1.91	4.62	−0.13	−0.12	−0.25	−0.32	−0.15	−0.47

WM	−7.36	−13.10	−20.46	−2.67	−2.42	−5.09	5.61	−2.23	3.38
WN	−5.76	−0.05	−5.81	0.04	−2.58	−2.54	−2.17	−1.43	−3.60
PB	0.44	−1.37	−0.93	0.13	−0.30	−0.17	−0.49	0	−0.49
PI	−0.13	−0.03	−0.16	−0.37	−0.07	−0.44	−0.13	−0.03	−0.16
DV	0.76	−0.11	0.65	0.78	0.17	0.95	0.76	0.34	1.10
TR	−1.57	1.86	0.29	−1.57	3.72	2.15	−1.57	−0.31	−1.88
TP	3.49	4.22	+7.71	3.49	1.18	+4.67	3.49	0	3.49
Total DI SER	−10.13	−8.58	−18.71	−0.17	−0.30	−0.47	5.50	−3.66	1.84
.637 × DI SER	−6.45		−19.78	−0.11			3.50		2.92
All GNP − price	−8.19	−11.59	−18.78	−0.57	−1.96	−2.53	3.55	−0.63	2.92
(Induced error)		(−10.45)			(−2.23)			(0.87)	
(Error not decomposed)		(1.14)			(0.27)			(1.50)	
Price error			−4.42			−3.22			−1.80
Ex post GNP$			−24.20			−5.75			1.12
Policy var.			−1.42			−1.42			−1.42
Exog. price			0.84			0.84			0.84
Other exog.			−2.00			−2.00			−2.00
Nonlinear			0			0			−0.06
Ex ante GNP$			−26.78			−8.33			−1.52

TABLE 5.6
Decomposition of First Quarter Error, 1st Quarter, 1967

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	2.73	−6.14	−3.41	−0.82	0.49	−0.33	+0.40	1.17	1.57
CNA$	−4.92	−2.92	−7.84	+0.58	0.20	0.78	−0.94	1.07	0.13
CA$	3.86	−2.18	1.68	2.44	−0.16	2.28	+2.87	0.67	3.54
C$	1.67	−11.24	−9.56	2.20	0.53	2.73	2.33	2.91	5.24
IPM$	−0.76	0.04	−0.72	0.67	0.05	0.72	0.34	0.11	0.45
IPR$	−1.34	0.03	−1.31	0.50	0.05	0.55	0.29	0.10	0.39
IPC$	0.14	0.04	0.18	−1.55	0.06	−1.49	0.16	0.12	0.28
IPF$	0.06	0.01	−0.05	−0.06	0.01	−0.05	−0.06	0.03	−0.03
IP$	−2.02	0.12	−1.90	−0.45	0.18	−0.27	0.72	0.36	1.08
IH$	3.83	−0.33	3.50	1.60	0.17	1.77	0.25	0.18	0.43
DII$	3.45	−5.01	−1.56	3.44	0.85	4.29	4.42	3.25	7.67
I$	5.26	−5.26	0	4.59	1.20	5.79	5.39	3.79	9.18
FE$	−0.67	−0.17	−0.84	−1.28	−0.01	−1.29	−0.67	0.11	−6.56
FI$	2.29	1.37	3.66	−0.03	0.23	0.20	−0.37	−0.91	−1.28
NFB$	1.62	1.20	2.82	−1.31	0.22	−1.09	−1.04	−0.80	−1.84

WM	−16.63	−2.88	−19.51	−7.33	4.39	−2.94	−0.06	4.37	4.31
WN	−5.05	3.76	−1.29	1.82	2.40	4.22	−1.46	1.10	−0.36
PB	−0.37	−0.43	−0.80	−0.79	0.36	−0.43	−0.80	0.67	−0.13
PI	−0.12	−0.03	−0.15	−0.10	−0.02	−0.12	−0.12	−0.03	−0.15
DV	−0.31	0.66	0.35	−0.81	0.27	−0.54	−0.31	0.80	0.49
TR	−0.56	0.63	0.07	−0.56	1.10	0.54	−0.56	−0.36	−0.92
TP	2.83	3.49	6.32	2.83	0.08	2.91	2.83	−0.56	2.27
Total DI SER	−20.21	5.20	−15.01	−4.94	8.58	3.64	−0.48	5.99	5.51
.637 × DI SER	−12.17			−3.15			−0.31		
All GNP − price	−4.32	1.28	−3.04	2.33	8.30	10.63	6.37	7.09	13.46
(Induced error)		(−1.94)			(4.77)			(7.67)	
(Error not decomposed)		(3.22)			(3.53)			(0.58)	
Price error			−3.01			−2.55			−0.23
Ex post GNP$			−6.05			8.08			13.23
Policy var.			−7.56			−7.56			−7.56
Exog. price			0.82			0.82			0.82
Other exog.			0.62			0.62			0.62
Nonlinear			0			−0.24			−0.42
Ex ante GNP$			−12.17			1.72			6.69

TABLE 5.7

Decomposition of First Quarter Error, 2nd Quarter, 1967

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	2.77	−4.99	−2.22	−0.83	0.47	−0.36	+0.43	0.50	0.93
CNA$	−5.34	−2.20	−7.54	−0.36	0.58	0.22	−1.46	0.91	−0.55
CA$	1.97	−2.59	−0.62	−1.03	−1.08	−2.11	0	0.23	0.23
C$	−0.60	−9.78	−10.38	−2.22	−0.03	−2.25	−1.03	1.64	0.61
IPM$	0.15	0.10	0.25	0.79	0.11	0.90	0.69	0.14	0.83
IPR$	−2.84	0.07	−2.77	−0.59	0.10	−0.49	−1.57	0.12	−1.45
IPC$	1.73	0.11	1.84	0.62	0.13	0.75	1.63	0.15	1.78
IPF$	−0.03	0.03	0	−0.02	0.03	0.01	−0.02	0.04	0.02
IP$	−0.98	0.30	−0.68	0.79	0.38	1.17	0.73	0.46	1.19
IH$	1.13	−0.31	0.82	−2.19	0.11	−2.08	−0.64	0.08	−0.56
DII$	5.12	−4.95	0.17	5.11	0.01	5.12	4.29	2.11	6.40
I$	5.27	−4.96	0.31	3.71	0.50	4.21	4.38	2.65	7.03
FE$	0.64	−0.17	0.47	0.43	0.36	0.79	0.54	0.06	0.60
FI$	2.17	0.98	3.15	−1.14	0.01	−1.13	1.90	−3.36	−1.46
NFB$	2.81	0.81	3.62	−0.71	0.37	−0.34	2.44	−3.30	−0.86

WM	−9.06	−6.33	−15.39	−0.45	0.94	0.49	−0.76	2.61	1.86
WN	−6.07	4.31	−1.76	1.45	−0.52	0.93	−0.72	2.47	2.05
PB	−0.25	−0.41	−0.66	−0.43	−0.37	−0.80	−0.67	0.31	−0.36
PI	−0.10	−0.02	−0.12	−0.16	0.32	0.16	−0.01	−0.02	−0.12
DV	−0.53	0.46	−0.07	+0.57	−1.53	−0.96	0.53	−0.80	−0.27
TR	−0.24	2.28	2.04	−0.24	3.12	2.88	−0.24	0.04	−0.20
TP	0.71	2.89	3.60	0.71	0.06	0.77	0.71	−0.47	0.24
Total DI SER	−15.54	3.18	−12.36	1.45	2.02	3.47	−0.95	4.14	3.19
.637 × DI SER	−9.90			0.92			−0.61		
All GNP − price	−2.42	−2.51	−4.93	1.70	0.75	2.45	5.18	1.04	6.22
(Induced error)		(−3.04)			(1.30)			(3.87)	
(Error not decomposed)		(0.53)			(−0.55)			(2.83)	
Price error			−1.12			−0.45			0.95
Ex post GNP$			−6.05			2.00			7.17
Policy var.			−0.85			−0.85			−0.85
Exog. price			0.69			0.69			0.69
Other exog.			−4.19			−4.19			−4.19
Nonlinear			0			−0.16			−0.31
Ex ante GNP$			−10.40			−2.51			2.51

TABLE 5.8

Decomposition of First Quarter Error, 3rd Quarter, 1967

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	4.58	−9.00	−4.42	−0.01	−3.28	−3.29	2.47	−1.95	0.52
CNA$	−5.46	−3.38	−8.84	−0.23	−0.35	−0.58	−0.62	0.18	−0.44
CA$	3.98	−3.84	0.14	0.74	0.74	−3.22	1.13	0.10	1.23
C$	3.10	−16.22	−13.12	0.50	−6.85	−6.35	2.98	−1.67	1.31
IPM$	1.62	−0.01	1.61	1.17	0.01	1.18	1.17	−0.01	1.16
IPR$	−2.00	−0.01	−2.01	−0.77	0.01	−0.76	−0.30	0	−0.30
IPC$	0.23	−0.02	0.21	0.32	0.02	0.34	−0.45	−0.02	−0.47
IPF$	0.08	0	0.08	0.09	0	0.09	0.08	0	0.08
IP$	−0.07	−0.04	−0.11	0.81	0.04	0.85	0.50	−0.03	0.47
IH$	−0.65	−0.59	−1.24	−4.03	−0.13	−4.16	−1.25	−0.02	−1.27
DII$	1.65	−6.10	−4.45	1.66	−0.58	1.08	0.58	−0.59	−0.01
I$	0.93	−6.73	−5.80	−1.56	−0.67	−2.23	−0.17	−0.64	−0.81
FE$	0.17	−0.17	0	−0.24	−0.02	−0.26	0.17	−0.04	0.13
FI$	1.53	1.41	2.94	0.69	−0.76	−0.07	−1.07	−0.64	−1.71
NFB$	1.70	1.24	2.94	0.45	−0.78	−0.33	−0.90	−0.67	−1.57

WM	−9.76	−6.20	−15.96	−0.70	1.03	0.32	2.83	0.73	3.56
WN	−7.66	−6.39	−14.05	0.13	−10.08	−9.95	−4.07	−0.98	−5.05
PB	0.16	−0.93	−0.77	−0.20	−0.56	−0.76	−0.35	−0.11	−0.46
PI	0.17	0.03	0.20	0.14	0.03	0.17	0.17	0.03	0.20
DV	−0.92	0.18	−0.74	−0.26	−0.31	−0.57	−0.49	−0.45	−0.94
TR	0.36	3.24	3.60	0.36	3.10	3.46	0.36	−0.07	0.29
TP	−1.01	5.02	4.01	−1.01	1.73	0.72	−1.01	0.44	−0.57
Total DI SER	−18.66	−5.05	−23.71	−1.55	−5.06	−6.61	−2.56	−0.41	−2.97
.637 × DI SER	−11.88			−0.99			−1.63		
All GNP − price	−6.16	−6.46	−12.62	−1.60	−4.92	−6.52	0.28	−1.59	1.87
(Induced error)		(−4.41)			(−0.26)			(1.21)	
(Error not decomposed)		(−2.05)			(−4.65)			(0.38)	
Price error			−3.21			−2.25			−2.81
Ex post GNP$			−15.83			−8.77			−0.94
Policy var.			6.42			6.42			6.42
Exog. price			−1.97			−1.97			−1.97
Other exog.			−1.06			−1.06			−1.06
Nonlinear			0			0.20			0.06
Ex ante GNP$			−12.44			−5.18			2.51

TABLE 5.9

Decomposition of First Quarter Error, 4th Quarter, 1967

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	7.93	−7.86	0.07	2.16	−0.49	1.67	5.81	−2.41	3.40
CNA$	−6.47	−3.86	−10.33	−0.89	−0.10	−0.99	−1.61	−0.97	−2.58
CA$	1.38	−3.39	−2.01	−2.33	−0.48	−2.81	−3.42	−1.10	−4.52
C$	2.84	−15.11	−12.27	−1.06	−1.07	−2.13	0.78	−4.48	−3.70
IPM$	0.19	0.07	0.26	0.73	0.10	0.83	−0.26	0.14	−0.12
IPR$	−4.02	0.05	−3.97	−1.40	0.09	−1.31	−2.30	0.12	−2.18
IPC$	0.09	0.08	0.17	−0.35	0.11	−0.24	−0.58	0.15	−0.43
IPF$	0.11	0.02	0.13	0.11	0.03	0.14	0.11	0.04	0.15
IP$	−3.63	0.22	−3.41	−0.89	0.32	−0.57	−3.03	0.44	−2.59
IH$	−1.61	−0.50	−2.11	−2.48	0.12	−2.36	−0.80	−0.06	−0.86
DII$	5.27	−8.33	−3.06	5.20	−2.30	2.90	6.50	−4.94	1.56
I$	0.03	−8.61	−8.58	1.83	−1.86	−0.03	2.67	−4.56	−1.89
FE$	0.97	−0.24	0.73	0.35	−0.07	0.28	0.97	−0.08	0.89
FI$	3.78	1.38	5.16	1.45	0.13	1.58	0.30	0.49	0.79
NFB$	4.75	1.14	5.89	1.80	0.06	1.86	1.27	0.41	1.68

WM	−7.70	−13.58	−21.28	0.32	−3.78	−3.46	4.92	−10.80	−5.88
WN	−11.33	5.55	−5.78	−3.56	5.61	2.05	−3.23	5.96	2.73
PB	0.95	−0.74	0.21	0.70	0.10	0.80	0.44	−0.16	0.28
PI	0.23	0.05	0.28	0.10	0.01	0.11	0.23	0.05	0.28
DV	0.26	0.33	0.59	1.33	−0.04	1.29	0.68	−0.21	0.47
TR	−0.09	2.72	2.63	−0.09	2.08	1.99	−0.09	0.25	0.16
TP	−0.55	−3.05	−3.60	−0.55	1.26	0.71	−0.55	0.79	0.24
Total DI SER	−18.23	−8.72	−26.95	−1.75	5.24	3.49	2.40	−4.12	−1.72
.637 × DI SER	−11.61			−1.12			1.53		
All GNP − price	−3.99	−8.85	−12.84	1.45	−0.29	1.16	4.75	−8.82	−4.07
(Induced error)		(−5.77)			(−0.76)			(2.97)	
(Error not decomposed)		(−3.08)			(0.47)			(−11.79)	
Price error			−1.79			−1.13			0.48
Ex post GNP$			−14.63			0.03			−3.59
Policy var.			4.61			4.61			4.61
Exog. price			−0.55			−0.55			0.55
Other exog.			0.31			0.31			0.31
Nonlinear			0			0.30			0.12
Ex ante GNP$			−10.26			4.70			0.90

TABLE 5.10

Decomposition of First Quarter Error, 1st Quarter, 1968

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	4.42	−12.14	−7.72	−2.87	0.31	−2.56	−0.58	−1.17	−1.75
CNA$	−5.16	−5.34	−10.50	0.27	1.27	1.54	1.10	0.54	1.64
CA$	1.59	−5.05	−3.46	0.10	−0.21	−0.11	−0.71	0.87	0.16
C$	0.85	−22.53	−21.68	−2.50	1.37	−1.13	−0.19	0.24	0.05
IPM$	0.46	0.13	0.59	−0.12	0.14	0.02	0.48	0.19	0.67
IPR$	−4.63	0.10	−4.53	−2.16	0.13	−2.03	−1.16	0.17	−0.99
IPC$	−1.80	0.15	−1.65	−2.33	0.17	−2.16	−1.77	0.20	−1.57
IPF$	0.01	0.04	0.05	0.01	0.04	0.05	0.01	0.06	0.07
IP$	−5.97	0.42	−5.55	−4.60	0.48	−4.12	−2.44	0.62	−1.82
IH$	−0.33	−0.67	−1.00	0.91	0.44	1.35	−0.73	0.40	2.13
DII$	9.29	−10.53	−1.24	9.32	0.66	9.98	11.21	−0.34	10.87
I$	2.99	−10.78	−7.79	5.63	1.58	7.21	10.50	0.68	11.18
FE$	0.76	−0.07	0.69	1.34	0.37	1.71	0.76	0.32	1.08
FI$	2.85	4.93	7.78	3.12	2.77	5.89	−1.14	2.94	1.80
NFB$	3.61	4.86	8.47	4.46	3.14	7.60	−0.38	3.26	2.88

WM	−16.00	−12.03	−28.03	2.01	1.59	3.60	1.29	0.32	1.61
WN	−9.66	1.95	−7.71	−3.72	7.08	3.36	−0.15	5.69	5.54
PB	0.31	−1.25	−0.94	0.18	0.83	1.01	−0.20	0.79	0.59
PI	0.27	0.05	0.32	0.10	0.02	0.12	0.27	0.05	0.32
DV	−0.57	0.10	−0.47	−0.23	−0.04	−0.27	−0.15	0.02	−0.13
TR	−0.55	3.47	2.92	−0.55	2.78	2.23	−0.55	−1.26	−1.81
TP	−0.78	−4.41	−5.19	−0.78	2.82	2.04	−0.78	2.84	2.06
Total DI SER	−26.98	−12.12	−39.10	−2.99	15.08	12.09	−0.27	8.45	
.637 × DI SER	−17.19			−1.91			−0.17		
All GNP − price	−9.74	−10.07	−19.81	5.68	7.58	13.26	9.76	2.84	12.60
(Induced error)		(−9.04)			(4.51)			(4.49)	
(Error not decomposed)		(−1.03)			(3.07)			(−1.64)	
Price error			−1.35			0.25			1.34
Ex post GNP$			−21.16			13.51			13.94
Policy var.			−3.68			−3.68			−3.68
Exog. price			−1.02			−1.02			−1.02
Other exog.			−6.72			−6.72			−6.72
Nonlinear			0			−0.16			−0.25
Ex ante GNP$			−32.58			1.98			2.27

TABLE 5.11

Decomposition of First Quarter Error, 2nd Quarter, 1968

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	6.93	−12.63	−5.70	0.63	−3.47	−2.84	3.31	−0.60	2.71
CNA$	−6.22	−6.54	−12.76	−0.50	−1.90	−2.40	−0.72	−0.82	−1.54
CA$	0.58	−4.79	−4.21	0.10	−0.14	−0.04	−2.40	1.25	−1.15
C$	1.29	−23.96	−22.67	0.23	−5.51	−5.28	0.19	−0.17	0.02
IPM$	0.11	−0.02	0.09	−1.52	+0.04	−1.48	0.72	0.08	0.80
IPR$	−1.99	−0.01	−2.00	2.34	0.04	2.38	2.14	0.07	2.21
IPC$	2.92	−0.03	2.89	6.14	0.05	6.19	1.78	0.08	1.86
IPF$	−0.03	0	−0.03	−0.03	0.01	−0.02	−0.03	0.02	−0.01
IP$	1.00	−0.06	0.94	6.93	0.14	7.07	4.62	0.25	4.87
IH$	−2.95	−1.22	−4.17	−2.32	−0.28	−2.60	−0.86	−0.08	−0.94
DII$	−2.51	−12.35	−14.86	−2.21	−2.28	−4.49	−2.61	−0.90	−3.51
I$	−4.46	−13.63	−18.09	2.40	−2.42	−0.02	1.15	−0.73	0.42
FE$	+1.90	−3.98	−2.08	−1.36	−3.60	−4.96	+1.90	−4.56	−2.66
FI$	4.16	2.27	6.43	0.64	0.52	1.16	−0.93	0.25	−0.68
NFB$	6.06	−1.71	4.35	−0.72	−3.08	−3.80	0.97	−4.31	−3.34

WM	−7.81	−18.84	−26.65	5.09	−6.11	−1.02	3.82	−3.92	−0.10
WN	−6.78	−9.09	−15.87	1.28	−7.97	−6.69	7.58	−5.81	1.77
PB	0.45	−1.70	−1.25	0.13	−0.12	0.01	−0.40	0.19	−0.21
PI	0.37	0.02	0.39	0.18	−0.02	0.16	0.37	0.02	0.39
DV	−0.05	−0.03	−0.08	−0.67	−0.17	−0.84	−0.05	−0.33	−0.38
TR	−0.58	3.51	2.93	−0.58	0.24	−0.34	−0.58	−1.07	−1.65
TP	0.54	−9.13	−8.59	0.54	−3.51	−2.97	0.54	−1.94	−1.40
Total DI SER	−13.86	−35.26	−49.12	5.97	−17.66	−11.69	11.28	−12.86	−1.58
.637 × DI SER	−8.83			3.80			7.19		
All GNP − price	−5.94	−24.88	−30.82	5.71	−11.25	−5.54	9.50	−11.19	−1.69
(Induced error)		(−7.74)			(5.41)			(5.77)	
(Error not decomposed)		(−17.14)			(−16.66)			(−16.96)	
Price error			−5.53			−3.99			−1.16
Ex post GNP$			−36.35			−9.53			−2.85
Policy var.			−1.06			−1.06			−1.06
Exog. price			0.38			0.38			0.38
Other exog.			−0.34			−0.34			−0.34
Nonlinear			0			−0.18			−0.21
Ex ante GNP$			−37.37			−10.73			−4.08

TABLE 5.12

Decomposition of First Quarter Error, 3rd Quarter, 1968

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	2.93	−10.80	−7.87	−2.88	−2.47	−5.35	−3.18	0.96	−2.22
CNA$	−7.32	−5.41	−12.73	−1.40	−1.21	−2.61	−0.70	0.37	−0.33
CA$	−3.72	−4.59	−8.31	−4.42	−0.59	−5.01	−2.69	0.52	−2.17
C$	−8.11	−20.80	−28.91	−8.70	−4.27	−12.97	−6.57	1.85	−4.72
IPM$	−1.16	0.12	−1.04	−3.03	0.16	−2.87	−0.55	0.20	−0.35
IPR$	−3.71	0.09	−3.62	0.60	0.15	0.75	0.43	0.17	0.60
IPC$	3.28	0.13	3.41	6.03	0.19	6.22	−0.82	0.21	−0.61
IPF$	−0.06	0.03	−0.03	−0.06	0.04	−0.02	−0.07	0.06	−0.01
IP$	−1.65	0.37	−1.28	3.54	0.54	4.08	−1.00	0.63	−0.37
IH$	−0.32	−1.18	−1.50	0.66	−0.36	0.30	2.34	−0.16	2.18
DII$	−0.05	−12.86	−12.91	−0.41	−3.11	−3.52	−1.42	−0.35	−1.77
I$	−2.02	−13.67	−15.69	3.79	−2.93	0.86	−0.08	0.12	0.04
FE$	+1.36	−0.27	1.09	−1.46	0.10	−1.36	−0.69	0.33	−0.36
FI$	5.95	5.84	11.79	1.65	4.20	5.85	−0.81	3.78	2.97
NFB$	7.31	5.57	12.88	0.19	4.30	4.49	−1.50	4.11	2.61

WM	−6.21	−24.75	−30.96	3.73	−11.71	−7.98	10.27	−9.07	1.20
WN	−10.00	−2.28	−12.28	−2.15	−1.80	−3.95	−6.62	2.35	−4.27
PB	0.70	−1.59	−0.89	0.32	−0.20	0.12	0.70	0.21	0.91
PI	0.47	−0.10	0.37	0.15	−0.15	0	0.47	−0.10	0.37
DV	−0.38	−0.74	−1.12	−0.44	−0.74	−1.18	−0.38	−0.83	−1.21
TR	−0.57	2.09	1.52	−0.57	−0.40	−0.97	−0.57	−0.96	−1.53
TP	0.09	−12.17	−12.08	0.09	−6.76	−6.67	0.09	−5.07	−4.98
Total DI SER	−15.90	−39.54	−55.44	1.13	−21.76	−20.63	3.96	−13.47	−9.51
.637 × DI SER	−10.30			0.72			2.52		
All GNP − price	−12.95	−17.41	−30.36	−4.00	−3.42	−7.42	−5.63	+0.44	−5.19
(Induced error)		(−18.55)			(−7.39)			(−7.80)	
(Error not decomposed)		(1.14)			(3.97)			(8.24)	
Price error			−2.27			−1.12			2.20
Ex post GNP$			−32.63			−8.54			−2.99
Policy var.			5.29			5.29			5.29
Exog. price			−1.74			−1.74			−1.74
Other exog.			−8.17			−7.17			−8.17
Nonlinear			0			−0.30			−0.41
Ex ante GNP$			−37.25			−13.46			−8.02

TABLE 5.13

Decomposition of First Quarter Error, 4th Quarter, 1968

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	7.72	−14.85	−7.13	2.69	−5.62	−2.93	1.54	0.97	2.51
CNA$	−7.11	−7.56	−14.67	−0.31	−3.10	−3.41	1.36	−0.73	0.63
CA$	−3.96	−6.78	−10.74	−2.37	−2.67	−5.04	−1.67	0.13	−1.54
C$	−3.35	−29.19	−32.54	0.01	−11.39	−11.38	1.23	0.37	1.60
IPM$	0.23	0.12	0.35	−1.64	0.09	−1.55	0.25	0.14	0.39
IPR$	−6.77	0.09	−6.68	−3.17	0.08	−3.09	−2.01	0.12	−1.89
IPC$	0.91	0.13	1.04	2.02	0.11	2.13	−1.44	0.15	−1.29
IPF$	−0.74	0.03	−0.71	−0.73	0.02	−0.71	−0.74	0.04	−0.70
IP$	−6.36	0.36	−6.00	−3.53	0.31	−3.22	−3.95	0.46	−3.49
IH$	−2.83	−1.05	−3.88	−1.29	−0.23	−1.52	−0.83	0.21	−0.62
DII$	−1.53	−16.97	−18.50	−2.17	−5.47	−7.64	−1.07	−0.91	−1.98
I$	−10.72	−17.66	−28.38	−6.99	−5.39	−12.38	−5.85	−0.24	−6.09
FE$	+5.18	−0.72	4.46	+3.47	−0.31	3.16	+4.05	−0.12	3.93
FI$	4.54	4.11	8.65	−0.33	1.89	1.56	−2.13	1.37	−0.76
NFB$	9.72	3.39	13.11	3.14	1.58	4.72	1.92	1.25	3.17

WM	−7.93	−30.74	−38.67	−0.92	−13.45	−14.37	6.36	−7.11	−0.75
WN	−12.56	−5.58	−18.14	−4.20	−5.00	−9.20	−1.99	−3.26	−5.25
PB	0.53	−2.74	−2.21	0.04	−1.18	−1.14	0.53	0.08	0.61
PI	0.37	−0.18	0.19	−0.04	−0.26	−0.30	0.37	−0.18	0.19
DV	−0.13	−0.91	−1.04	0.08	−0.82	−0.74	1.06	−0.57	0.49
TR	−0.74	5.19	4.45	−0.74	2.97	2.23	−0.74	0.64	−0.10
TP	1.11	−13.67	−12.56	1.11	−7.77	−6.66	1.11	−4.14	−3.03
Total DI SER	−19.35	−48.63	−67.98	−4.67	−25.51	−30.18	6.70	−14.54	−7.84
.637 × DI SER	−12.33			−2.98			4.27		
All GNP — price	−16.68	−30.19	−46.87	−6.82	−10.96	−17.78	1.57	−4.59	−3.02
(Induced error)		(−20.47)			(−6.91)			(1.28)	
(Error not decomposed)		(−9.72)			(−4.05)			(−5.87)	
Price error			−3.15			−3.45			−0.51
Ex post GNP$			−50.02			−21.23			−3.53
Policy var.			1.83			1.83			1.83
Exog. price			−0.89			−0.89			−0.89
Other exog.			−0.13			−0.13			−0.13
Nonlinear			0			−0.07			−0.08
Ex ante GNP$			−49.21			−20.49			−2.80

TABLE 5.14

Decomposition of First Quarter Error, 1st Quarter, 1969

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	3.38	−8.33	−4.95	1.54	−5.71	−4.17	−1.62	−0.06	−1.68
CNA$	−5.20	−3.68	−8.88	−1.43	−2.48	−3.91	−1.03	−1.06	−2.09
CA$	−5.56	−3.10	−8.66	−0.82	−1.94	−2.76	−1.37	−0.47	−1.84
C$	−7.38	−15.11	−22.49	−0.71	−10.13	−10.84	−4.02	−1.59	−5.61
IPM$	−1.78	−0.82	−2.60	−3.39	−0.89	−4.28	−0.51	−0.19	−0.70
IPR$	−6.34	−0.61	−6.95	−2.84	−0.80	−3.64	−1.11	−0.16	−1.27
IPC$	−2.99	−0.90	−3.89	−3.20	−1.04	−4.21	−1.67	−0.20	−1.87
IPF$	0.79	−0.23	0.56	0.77	−0.24	0.53	0.77	−0.05	0.72
IP$	−10.31	−2.56	−12.87	−8.66	−2.96	−11.62	−2.52	−0.60	−3.12
IH$	−6.42	−1.77	−8.19	−3.36	−1.54	−4.90	0.32	−0.51	−0.19
DII$	−0.64	−2.02	−2.66	−0.81	−0.26	−1.07	−3.93	1.62	−2.31
I$	−17.37	−6.35	−23.72	−12.83	−4.76	−17.59	−6.13	0.51	−5.62
FE$	7.22	−2.66	4.56	6.78	−2.68	4.10	7.50	−2.40	5.10
FI$	−4.56	4.52	−0.04	−6.06	4.04	−2.02	−7.46	3.15	−4.31
NFB$	2.66	1.86	4.52	0.72	1.36	2.08	0.04	0.75	0.79

WM	3.46	−18.77	−15.31	−0.58	−11.01	−11.59	4.88	−6.00	−1.12
WN	−4.51	−12.21	−16.72	−1.34	−8.09	−9.43	2.47	−8.66	−6.19
PB	0.70	−2.06	−1.36	0.15	−1.43	−1.28	0.11	−0.41	−0.30
PI	0.45	0.12	0.57	0.21	−0.05	0.16	0.45	0.05	0.50
DV	0.33	−1.14	−0.81	0.33	−1.05	−0.72	0.45	−0.67	−0.22
TR	−1.98	4.66	2.68	−1.98	4.08	2.10	−1.98	2.05	0.07
TP	−1.53	9.41	7.88	−1.53	7.37	5.84	−1.53	4.42	2.89
Total DI SER	−3.08	−19.99	−23.07	−4.74	−10.18	−14.92	4.85	−9.22	−4.37
.637 × DI SER	−2.01			−3.09			3.16		
All GNP − price	−24.10	−6.31	−30.41	−15.91	3.18	−12.73	−6.95	−2.11	−9.06
(Induced error)		(−13.26)			(−8.75)			(−3.82)	
(Error not decomposed)		(6.95)			(−11.93)			(1.71)	
Price error			−11.23			−13.56			−1.31
Ex post GNP$			−41.64			−26.29			−10.37
Policy var.			2.51			2.51			2.51
Exog. price			−2.14			−2.14			−2.14
Other exog.			3.56			3.56			3.56
Nonlinear			0			0.05			0.04
Ex ante GNP$			−37.71			−22.31			−6.40

TABLE 5.15

Decomposition of First Quarter Error, 2nd Quarter, 1969

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	+4.85	−10.08	−5.23	+0.92	−6.32	−5.40	+1.69	−0.95	0.74
CNA$	−6.47	−5.28	−11.75	−2.04	−3.50	−5.54	−1.23	−1.04	−2.27
CA$	−5.92	−3.90	−9.72	−0.59	−2.18	−2.77	−2.14	0.51	−1.63
C$	−7.44	−19.26	−26.70	−1.71	−12.00	−13.71	−1.68	−1.48	−3.16
IPM$	−2.54	−0.68	−3.22	−3.54	−0.58	−4.12	−1.12	+0.04	−1.08
IPR$	−6.80	−0.51	−7.31	−1.47	−0.52	−1.99	0.04	+0.04	0.08
IPC$	−3.08	−0.74	−3.82	−2.90	−0.68	−3.58	−1.60	+0.05	−1.55
IPF$	−0.24	−0.19	−0.43	−0.27	−0.15	−0.42	−0.23	+0.01	−0.22
IP$	−12.66	−2.12	−14.78	−8.17	−1.93	−10.10	−2.92	0.14	−2.78
IH$	−5.35	−1.98	−7.33	0.03	−1.52	−1.49	1.22	−0.23	0.99
DII$	0.12	−5.26	−5.14	0.03	−3.02	−2.99	0.19	0.30	0.49
I$	−17.89	−9.36	−27.25	−8.11	−6.47	−14.58	−1.51	0.21	−1.30
FE$	−1.47	0.65	−0.82	−6.40	0.77	−5.63	−1.47	1.09	−0.38
FI$	4.37	2.03	6.40	6.57	1.57	8.14	2.22	0.97	3.19
NFB$	2.90	2.68	5.58	0.17	2.34	2.51	0.75	2.06	2.81

WM	2.73	−25.50	−22.77	−0.85	−15.86	−16.71	3.53	−6.37	−2.84
WN	−6.44	−14.79	−21.23	−2.20	−8.43	−10.63	1.82	−5.94	−4.12
PB	0.56	−2.78	−2.22	−0.03	−1.70	−1.73	−0.03	−0.10	−1.13
PI	0.64	−1.48	−0.84	0.31	−1.71	−1.40	0.64	−1.48	−0.84
DV	0.21	−0.90	−0.69	0	−0.78	−0.78	0.33	−0.11	0.22
TR	−2.05	6.50	4.45	−2.05	5.44	3.39	−2.05	2.40	0.35
TP	0.58	9.32	9.90	0.58	6.18	6.76	0.58	1.70	2.28
Total DI SER	−3.37	−29.63	−33.40	−4.24	−16.86	−21.10	4.82	−9.90	−5.08
.637 × DI SER	−2.19			−2.76			3.14		
All GNP − price	−24.62	−16.91	−41.53	−12.41	−4.83	−17.24	0.70	−3.17	−2.47
(Induced error)		(−13.54)			(−6.83)			(0.39)	
(Error not decomposed)		(−3.37)			(2.00)			(−3.56)	
Price error			−7.10			−8.82			0.54
Ex post GNP$			−48.63			−26.06			−1.93
Policy var.			3.43			3.43			3.43
Exog. price			−1.28			−1.28			−1.28
Other exog.			−2.41			−2.41			−2.41
Nonlinear			0			0.05			0
Ex ante GNP$			−48.89			−26.27			−2.19

TABLE 5.16

Decomposition of First Quarter Error, 3rd Quarter, 1969

	NO			AR			OR		
	SER	Other	Forecast Error	SER – CON	Other	Forecast Error	SER – CON	Other	Forecast Error
CNS$	7.74	−6.21	1.53	3.54	−0.97	2.57	0.67	0.71	1.38
CNA$	−3.58	−5.03	−8.61	2.39	−2.48	−0.09	2.30	−1.08	1.22
CA$	−5.52	−4.11	−9.63	0.13	−1.38	−1.25	−0.83	−0.55	−1.38
C$	−1.36	−15.35	−16.71	6.06	−4.83	1.23	2.14	−0.92	1.22
IPM$	−0.78	−0.35	−1.13	−1.05	−0.08	−1.13	−0.14	−0.17	−0.31
IPR$	−6.80	−0.26	−7.06	−0.68	−0.07	−0.75	−0.50	−0.15	−0.65
IPC$	−3.74	−0.39	−4.13	−1.89	−0.09	−1.98	−2.38	−0.18	−2.56
IPF$	0.25	−0.10	0.15	0.22	−0.02	0.20	0.23	−0.05	0.18
IP$	−11.08	−1.10	−12.18	−3.41	−0.26	−3.67	−2.78	−0.56	−3.34
IH$	−4.49	−1.11	−5.60	1.94	−0.38	1.56	0.13	0.02	0.15
DII$	−4.09	−5.72	−9.81	−6.28	−1.00	−7.28	−3.83	−1.63	−5.46
I$	−19.66	−7.93	−27.59	−7.75	−1.64	−9.39	−6.48	−2.17	−8.65
FE$	−0.59	−1.75	−2.34	−3.63	−1.65	−5.28	−0.59	−1.62	−2.21
FI$	1.73	1.84	3.57	1.89	1.16	3.05	0.51	0.45	0.96
NFB$	1.14	0.09	1.23	−1.74	−0.49	−2.23	−0.08	−1.17	−1.25

WM	2.94	−17.69	−14.75	−0.16	−4.81	−4.97	0.95	−2.65	−1.70
WN	−9.59	−14.43	−24.02	−4.11	−5.25	−9.36	−2.00	−6.13	−8.13
PB	0.48	−2.63	−2.15	−0.15	−0.91	−1.06	0.01	−0.69	−0.68
PI	0.76	0.53	1.29	0.21	0.16	0.37	0.76	0.53	1.29
DV	−0.09	−0.35	−0.44	−0.36	−0.07	−0.43	−0.39	−0.28	−0.67
TR	−1.97	4.05	2.08	−1.97	2.28	0.31	−1.97	1.82	−0.15
TP	0.42	7.65	8.08	0.42	2.95	3.37	0.42	1.88	2.30
Total DI SER	−7.05	−22.87	−29.91	−6.12	−5.65	−11.77	−2.22	−5.52	−7.74
.637 × DI SER	−4.59			−3.98			1.45		
All GNP − price	−24.47	−17.80	−42.27	−7.41	−1.56	−8.97	−6.38	−3.11	−9.49
(Induced error)		(−13.46)			(−4.08)			(−3.51)	
(Error not decomposed)		(−4.34)			(2.52)			(0.40)	
Price error			−1.01			−1.62			0.61
Ex post GNP$			−43.28			−10.59			−8.88
Policy var.			3.83			3.83			3.83
Exog. price			−2.57			−2.57			−2.57
Other exog.			2.42			2.42			2.42
Nonlinear			0			0.03			0.08
Ex ante GNP$			−39.60			−6.88			−5.12

TABLE 5.17
Effects of Errors in Inputs for Wharton, 3rd Quarter, 1966

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	0.93	−0.54	0.58	4.38	2.01	6.72	−0.26
CNA$	2.43	−6.50	0.20	−0.50	−0.48	−1.50	−0.18
CA$	1.31	−0.58	2.38	0.24	1.26	1.78	−0.59
C$	4.66	−7.52	3.16	4.22	2.77	7.09	−1.03
IPM$	−2.38	−3.47	−0.18	0.44	0.77	0.88	0.10
IPR$	0.90	−1.58	−0.17	−0.44	0.90	0.15	0.05
IPC$	−1.23	1.18	0.21	0.27	−1.64	0.86	0.24
IPF$	0.12	0.14	0.17	0.19	0.17	0.21	−0.76
IP$	−2.60	−3.74	0.02	0.46	0.21	2.11	−0.37
IH$	−2.55	0.68	0.12	4.40	0.05	3.99	0.00
DII$	6.78	−11.67	4.85	−6.16	2.43	−5.87	−0.71
I$	1.65	−14.72	5.00	−1.30	2.69	0.22	−1.08
FE$	0.30	0.20	0.76	0.38	0.32	0.50	−0.42
FI$	−0.27	−4.99	−1.60	−1.74	−2.12	−1.48	−0.12
NFB$	0.47	5.09	2.26	2.02	2.34	1.88	−0.30
G$	0.27	−0.09	0.27	−0.09	0.27	−0.09	−4.79
GNP$	7.07	−17.13	10.72	4.97	8.10	9.22	−7.21
GNP58	12.82	−4.29	11.68	9.49	8.95	11.48	−7.58
P	−1.30	−1.90	−0.50	−0.90	−0.40	−0.60	0.00
PCB	0.45	5.65	2.86	5.90	5.48	6.43	−5.08
DI$	2.63	−14.66	1.29	1.23	−0.69	1.56	−1.54
UNRATE	−0.67	1.28	−2.11	1.19	−0.74	−0.56	0.55

	Third Quarter of Forecast						
CNS$	1.64	−1.77	2.65	2.32	2.96	4.53	−0.63
CNA$	2.55	−5.29	−0.67	0.11	−1.16	−1.03	−0.79
CA$	0.92	2.60	0.38	2.66	0.39	3.93	−0.73
C$	5.20	−4.36	2.45	5.18	2.29	7.53	−2.16
IPM$	−2.43	−3.15	0.15	0.87	0.89	1.34	0.32
IPR$	0.44	−0.87	−0.14	0.41	0.64	1.03	0.06
IPC$	2.21	2.39	2.63	1.14	1.34	1.62	−0.32
IPF$	0.13	0.08	0.20	0.15	0.20	0.17	0.14
IP$	0.34	−1.56	2.83	2.56	3.08	4.16	0.20
IH$	−2.53	0.97	2.98	4.75	3.91	4.34	−0.10
DII$	6.80	5.24	1.96	6.25	−2.99	4.68	−2.08
I$	4.82	4.85	7.97	13.76	4.21	13.38	−1.98
FE$	0.97	0.13	1.48	0.19	0.85	0.29	−0.30
FI$	−0.52	−4.18	−0.70	−0.90	−2.03	−0.75	−0.48
NFB$	1.39	4.21	2.08	0.99	2.78	0.94	0.18
G$	−0.10	−0.04	−0.10	−0.04	−0.10	−0.04	−10.94
GNP$	10.61	4.56	11.72	19.80	8.49	21.72	−14.89
GNP58	21.19	18.60	15.40	24.54	12.56	24.14	−15.10
P	−2.10	−2.50	−0.90	−1.30	−0.90	−0.90	0.00
PCB	3.46	20.59	10.72	18.59	9.46	18.69	−8.78
DI$	3.54	−11.38	−1.08	2.64	−4.14	1.50	−4.68
UNRATE	−0.25	0.45	0.08	1.05	−0.60	−0.71	0.87

(*Continued*)

TABLE 5.17 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Fourth Quarter of Forecast						
CNS$	2.09	−0.13	4.00	3.64	5.32	6.25	−1.45
CNA$	2.28	−5.26	−0.38	−0.16	−0.64	−1.19	−1.02
CA$	0.81	0.19	2.01	−0.10	0.97	1.20	−0.74
C$	5.18	−5.20	5.63	3.38	5.66	6.27	−3.21
IPM$	−1.37	−1.12	1.76	2.66	2.34	3.17	−0.28
IPR$	1.24	−1.53	0.27	−0.22	1.89	0.44	0.02
IPC$	2.64	4.48	2.09	2.84	1.46	3.24	−0.89
IPF$	0.05	0.05	0.12	0.13	0.14	0.16	0.03
IP$	2.55	1.87	4.24	5.41	5.82	7.01	−1.12
IH$	−0.13	0.69	6.08	4.00	4.22	3.66	−0.82
DII$	11.53	11.53	7.12	12.24	4.84	11.24	−3.72
I$	13.88	14.19	17.56	21.75	15.00	22.02	−5.65
FE$	0.45	0.92	0.05	0.84	0.32	0.92	−0.18
FI$	−0.32	−3.47	−1.07	0.06	−1.21	0.25	−0.43
NFB$	0.67	4.29	1.03	0.69	1.42	0.56	0.25
G$	0.05	−0.05	0.05	−0.05	0.05	−0.05	−12.42
GNP$	19.28	13.23	23.77	25.77	21.63	28.80	−21.03
GNP58	31.99	27.78	28.25	30.35	25.48	30.79	−20.32
P	−2.60	−2.80	−1.30	−1.40	−1.10	−1.00	0.00
PCB	11.49	23.72	20.05	21.24	18.61	22.17	−11.02
DI$	3.59	−8.76	0.46	3.92	−0.36	2.84	−6.73
UNRATE	−1.72	0.29	−1.28	1.26	−0.81	−0.63	0.70

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.18

Effects of Errors in Inputs for Wharton, 4th Quarter, 1966

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
			Second Quarter of Forecast				
CNS$	−2.19	−5.60	0.61	0.28	−0.06	1.51	−0.42
CNA$	−0.55	−8.39	−1.56	−0.78	−1.15	−1.02	−0.93
CA$	1.33	0.35	−2.37	−0.09	−1.41	2.13	−0.46
C$	−3.98	−13.54	−3.22	−0.49	−2.53	2.71	−1.80
IPM$	−3.06	−3.78	−0.61	0.11	0.11	0.56	0.31
IPR$	−0.63	−1.94	−0.07	0.48	−0.34	0.05	0.06
IPC$	−0.27	−0.09	1.41	−0.08	2.60	2.88	−0.50
IPF$	−0.02	−0.07	0.03	−0.02	0.05	0.02	0.03
IP$	−3.99	−5.89	0.77	0.50	2.43	3.51	−0.10
IH$	−0.78	2.72	2.23	4.00	3.34	3.77	−0.08
DII$	−6.09	−7.65	−4.64	−0.35	−6.95	0.72	−1.17
I$	−10.66	−10.63	−1.45	4.34	−0.99	8.18	−1.35
FE$	0.43	−0.41	−0.41	0.64	−0.60	0.04	−0.69
FI$	−1.11	−4.77	0.43	0.23	−0.17	1.11	−0.56
NFB$	1.53	4.37	0.21	−0.88	0.77	−1.07	−0.12
G$	−0.43	−0.37	−0.43	−0.37	−0.43	−0.37	−1.88
GNP$	−14.22	−20.27	−5.57	2.51	−3.88	9.35	−5.16
GNP58	−3.74	−6.33	−0.66	8.48	−1.03	10.55	−7.93
P	−1.50	−1.90	−0.60	−1.00	−0.40	−0.40	0.01
PCB	−4.54	12.59	6.68	14.55	3.18	12.41	−1.26
DI$	−4.76	−19.68	−6.02	−2.30	−5.94	−0.30	−5.04
UNRATE	2.01	2.71	2.62	3.59	0.55	0.44	0.32

(*Continued*)

TABLE 5.18 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Third Quarter of Forecast						
CNS$	−1.65	−3.87	1.22	0.86	1.06	1.99	−0.60
CNA$	−0.32	−7.86	−1.43	−1.21	−0.82	−1.37	−0.74
CA$	−0.77	−1.39	−0.66	−2.77	−1.15	−0.92	0.19
C$	−2.74	−13.12	−0.87	−3.12	−0.90	−0.29	−1.15
IPM$	−2.84	−2.59	0.69	1.59	1.09	1.92	−0.04
IPR$	−0.07	−2.84	0.23	−0.26	0.72	−0.73	0.01
IPC$	−0.10	1.74	0.48	1.23	2.07	3.85	−0.65
IPF$	−0.14	−0.14	−0.06	−0.05	−0.02	0.00	0.03
IP$	−3.14	−3.82	1.33	2.50	3.85	5.04	−0.68
IH$	−0.50	0.32	3.71	1.63	1.97	1.41	−0.10
DII$	5.55	5.72	2.24	7.36	−0.36	6.04	−1.49
I$	1.99	2.30	7.39	11.58	5.56	12.58	−2.24
FE$	−0.07	0.40	−0.80	−0.01	0.09	0.69	−0.65
FI$	−0.59	−3.74	0.00	1.13	0.59	2.05	−0.26
NFB$	0.52	4.14	−0.80	−1.14	−0.49	−1.35	−0.39
G$	−0.32	−0.42	−0.32	−0.42	−0.32	−0.42	−0.22
GNP$	−1.05	−7.10	4.91	6.91	3.34	10.51	4.00
GNP58	13.32	9.11	12.18	14.28	6.89	12.20	−6.94
P	−2.40	−2.60	−1.30	−1.40	−0.60	−0.50	0.01
PCB	5.50	17.73	16.33	17.52	9.55	13.11	−0.47
DI$	−3.07	−15.42	−5.77	−2.31	−4.06	−0.86	−4.73
UNRATE	0.14	2.15	1.35	3.89	0.77	0.95	−0.58

	Fourth Quarter of Forecast						
CNS$	0.87	−3.55	4.03	0.74	0.91	1.43	−2.10
CNA$	1.19	−7.65	−0.93	−1.51	−1.28	−1.72	−0.87
CA$	−0.34	−0.20	0.55	−1.93	−1.71	−0.48	0.09
C$	2.01	−11.31	3.94	−2.60	−1.78	−0.67	−2.88
IPM$	−2.65	−1.04	1.76	2.94	1.90	3.06	−0.06
IPR$	−1.16	−3.17	0.20	−0.56	−0.82	−1.12	−0.04
IPC$	2.00	2.21	0.64	0.98	3.85	3.38	−0.57
IPF$	−0.19	−0.11	−0.10	−0.01	−0.02	0.06	0.36
IP$	−2.01	−2.12	2.49	3.34	4.90	5.37	−0.30
IH$	0.30	−0.94	3.51	−0.65	−0.22	−1.49	−0.72
DII$	5.66	1.21	2.09	3.17	1.06	1.05	−0.85
I$	4.05	−1.76	8.20	5.95	5.85	5.02	−1.88
FE$	0.21	0.21	−0.18	−0.44	0.11	0.24	0.20
FI$	−0.95	−3.89	1.21	1.28	0.54	2.25	−0.30
NFB$	1.14	4.09	−1.39	−1.72	−0.44	−2.01	0.51
G$	−0.44	−0.39	−0.44	−0.39	−0.44	−0.39	2.43
GNP$	6.37	−9.46	9.92	1.15	2.78	1.84	−1.82
GNP58	21.56	10.87	18.09	12.58	5.30	6.90	−3.98
P	−2.70	−3.20	−1.60	−1.90	−0.40	−0.80	0.00
PCB	6.24	16.74	20.35	16.24	15.70	10.95	2.88
DI$	7.95	−15.86	1.97	−4.74	−1.66	−4.74	−7.09
UNRATE	−1.17	1.45	1.31	3.66	0.99	0.88	0.93

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.19
Effects of Errors in Inputs for Wharton, 1st Quarter, 1967

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−1.26	−3.48	0.51	0.15	0.74	1.67	−0.70
CNA$	−0.08	−7.62	0.36	0.58	0.05	−0.50	−0.74
CA$	−0.26	−0.88	1.77	−0.34	−0.14	0.09	0.04
C$	−1.70	−12.08	2.54	0.29	0.55	1.16	−10.40
IPM$	−1.79	−1.54	0.68	1.58	1.32	2.15	−0.52
IPR$	0.50	−2.27	0.26	−0.23	1.06	−0.39	0.00
IPC$	−2.03	−0.19	−0.41	0.34	0.60	2.38	−0.65
IPF$	−0.13	−0.13	−0.09	−0.08	−0.05	−0.03	0.34
IP$	−3.44	−4.12	0.44	1.61	2.91	4.10	−0.83
IH$	0.26	1.08	1.60	−0.48	−0.67	−1.23	−0.15
DII$	5.74	5.91	8.19	13.31	6.38	12.78	−1.78
I$	2.44	2.75	10.13	14.32	8.53	15.55	−2.76
FE$	−0.79	−0.32	−1.54	−0.75	−0.48	0.12	0.16
FI$	0.00	−3.15	−0.38	0.75	0.68	2.14	−0.14
NF8$	−0.80	2.82	−1.16	−1.50	−1.16	−2.02	0.30
G$	0.13	0.03	0.13	0.03	0.13	0.03	−3.06
GNP$	0.28	−5.77	11.85	13.85	8.25	15.42	−6.92
X	7.26	3.05	14.05	16.15	6.86	12.17	−6.68
P	−1.20	−1.40	−0.60	−0.70	0.10	0.20	0.00
PCB	3.72	15.95	9.14	10.33	8.66	12.22	−5.33
DI$	−1.54	−13.89	1.68	5.14	0.56	3.76	−4.18
UNRATE	−0.54	1.47	−1.27	1.27	0.14	0.32	−0.26

	Third Quarter of Forecast						
CNS$	1.19	−3.23	2.35	−0.94	−0.64	−0.12	−1.30
CNA$	1.64	−7.20	0.65	0.07	−0.75	−1.19	−0.72
CA$	0.23	0.37	2.49	0.01	−1.27	−0.04	−0.32
C$	3.26	−10.06	5.68	−0.86	−2.46	−1.35	−2.34
IPM$	−2.06	−0.45	1.77	2.95	1.62	2.78	−0.58
IPR$	−0.69	−2.70	0.23	−0.53	−0.51	−0.81	−0.05
IPC$	−0.16	0.05	−0.34	0.00	1.85	1.38	−0.45
IPF$	−0.19	−0.11	−0.13	−0.04	−0.06	0.02	0.45
IP$	−3.10	−3.21	1.54	2.39	2.89	3.36	−0.64
IH$	−0.86	−2.10	0.51	−3.65	−2.55	−3.82	−0.23
DII$	10.25	5.80	7.32	8.40	4.39	4.38	−1.03
I$	6.20	0.39	9.28	7.03	4.64	3.81	−1.89
FE$	−0.65	−0.65	−1.02	−1.28	−0.58	−0.45	1.12
FI$	−0.22	−3.16	0.64	0.71	0.32	2.03	−0.21
NF8$	−0.44	2.51	−1.66	−1.99	−0.91	−2.48	1.33
G$	0.04	0.09	0.04	0.09	0.04	0.09	−1.35
GNP$	9.36	−6.47	13.64	4.87	1.60	0.66	−4.26
X	17.40	6.71	16.53	11.02	−0.21	1.39	−3.34
P	−1.60	−2.10	−0.90	−1.20	0.30	−0.10	−0.00
PC8	5.59	16.09	11.90	7.79	12.43	7.68	−2.10
DI$	9.96	−13.85	8.08	1.37	0.63	−2.45	−4.75
UNRATE	−1.80	0.82	−1.01	1.34	0.83	0.72	−0.62

(*Continued*)

TABLE 5.19 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Fourth Quarter of Forecast						
CNS$	−2.51	−2.44	−3.02	−1.35	−4.07	−0.67	−1.34
CNA$	1.86	−8.47	−0.89	−1.88	−0.42	−3.00	−0.35
CA$	0.60	−1.41	0.40	−2.41	2.03	−2.49	2.08
C$	0.04	−12.33	−3.40	−5.64	−2.34	−6.15	0.39
IPM$	−0.35	−0.09	2.18	3.01	2.40	2.28	−0.59
IPR$	−0.02	−3.99	−0.49	−1.80	−0.06	−2.24	−0.12
IPC$	0.85	1.02	0.32	0.08	1.61	1.18	−0.71
IPF$	−0.17	−0.04	−0.10	0.04	−0.05	0.10	−0.70
IP$	0.31	−3.10	1.90	1.33	3.92	1.33	−2.14
IH$	0.31	−1.80	−2.39	−4.75	−3.51	−4.37	−0.68
DII$	5.16	2.10	1.47	4.37	−0.95	0.61	0.15
I$	5.68	−2.91	0.86	0.83	−0.64	−2.54	−2.66
FE$	−0.59	0.14	−0.96	−0.68	−0.74	0.15	0.88
FI$	−0.29	−5.45	0.13	−1.45	0.82	0.03	0.20
NFB$	−0.30	5.69	−1.09	0.87	−1.56	0.22	0.68
G$	0.03	−0.13	0.03	−0.13	0.03	−0.13	−1.48
GNP$	5.65	−8.98	−3.39	−3.36	−4.32	−7.91	−3.07
X	19.32	8.57	6.37	7.38	0.92	−3.07	0.08
P	−2.40	−2.70	−1.50	−1.70	−0.70	−0.50	−0.01
PCB	6.05	16.29	8.18	6.46	10.28	6.84	−3.04
DI$	4.32	−15.52	−5.06	−3.07	−5.20	−7.50	−3.84
UNRATE	−1.75	0.60	0.06	1.73	0.72	1.01	−1.05

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.20
Effects of Errors in Inputs for Wharton, 2nd Quarter, 1967

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNA$	1.78	−2.64	2.14	−1.15	1.60	2.12	−2.72
CNA$	1.78	−7.06	0.56	−0.02	0.40	−0.04	−1.05
CA$	0.26	0.40	1.07	−1.41	0.36	1.59	−0.35
C$	4.11	−9.21	4.06	−2.48	2.66	3.77	−4.13
IPM$	−1.68	−0.07	0.63	1.81	2.28	3.44	−0.47
IPR$	−1.24	−3.25	−0.09	−0.85	−1.20	−1.50	−0.07
IPC$	−0.29	−0.08	−0.06	0.28	2.31	1.84	−0.69
IPF$	−0.07	0.01	−0.04	0.05	0.00	0.08	−0.36
IP$	−3.28	−3.39	0.44	1.29	3.38	3.85	−1.57
IH$	−1.16	−2.40	−1.10	−5.26	−0.96	−2.23	−0.27
DII$	3.50	−0.95	1.28	2.36	6.31	6.30	−1.75
I$	−0.94	−6.75	0.63	−1.62	8.74	7.91	−3.59
FE$	−0.06	−0.06	0.59	0.33	0.04	0.17	0.61
FI$	−0.24	−3.18	1.37	1.44	0.51	2.22	−0.27
NF8$	0.16	3.11	−0.79	−1.12	−0.48	−2.05	0.88
G$	−0.13	−0.08	−0.13	−0.08	−0.13	−0.08	2.92
GNP$	3.30	−12.53	3.87	−4.90	10.91	9.97	−3.92
X	6.77	−3.92	4.67	−0.84	7.03	8.63	−1.95
P	−0.70	−1.20	−0.30	−0.60	0.40	0.00	−0.00
PC8	−1.51	8.99	3.37	−0.74	9.26	4.51	−0.72
DI$	10.67	−13.14	7.56	0.85	7.68	4.60	−7.20
UNRATE	−0.59	2.03	0.17	2.52	−0.26	−0.37	−0.14

(*Continued*)

TABLE 5.20 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Third Quarter of Forecast						
CNS$	−1.33	−1.26	−3.00	−1.33	−0.76	2.64	−2.37
CNA$	2.38	−7.95	−0.80	−1.79	1.07	−1.51	−0.81
CA$	0.87	−1.14	−0.89	−3.70	3.80	−0.72	1.65
C$	2.12	−10.25	−4.47	−6.71	4.32	0.51	−1.52
IPM$	−0.01	0.25	1.30	2.13	4.67	4.55	−0.55
IPR$	−0.57	−4.54	−0.74	−2.05	−0.20	−2.38	−0.17
IPC$	0.66	0.83	0.64	0.40	2.82	2.39	−0.74
IPF$	−0.05	0.08	0.00	0.14	0.04	0.19	−0.95
IP$	0.03	−3.38	1.20	0.63	7.34	4.75	−2.41
IH$	−2.09	−4.20	−4.75	−7.11	−2.36	−3.22	−0.36
DII$	3.17	0.11	−4.01	−1.11	−0.44	1.12	0.44
I$	1.11	−7.48	−7.57	−7.60	4.54	2.64	−2.34
FE$	−0.03	0.70	0.76	1.04	−0.03	0.86	0.12
FI$	0.18	−4.98	1.19	−0.39	1.03	0.24	0.19
NFB$	−0.21	5.78	−0.43	1.53	−1.06	0.72	−0.08
G$	−0.18	−0.34	−0.18	−0.34	−0.18	−0.34	3.36
GNP$	2.84	−11.79	−12.66	−12.63	7.62	4.03	−0.57
X	11.57	0.82	−5.58	−4.57	8.75	4.76	3.50
P	−1.50	−1.80	−0.80	−1.00	−0.40	−0.20	−0.01
PCB	0.07	10.31	−0.44	−2.16	7.60	4.16	−0.59
DI$	6.53	−13.31	−5.09	−3.10	3.58	1.28	−5.99
UNRATE	−0.71	1.64	1.22	2.89	−0.19	0.10	−0.37

	Fourth Quarter of Forecast						
CNS$	3.88	−3.84	−2.74	−5.30	2.03	0.28	−4.68
CNA$	4.07	−6.43	−2.33	−0.79	−1.45	0.19	−1.59
CA$	4.23	0.77	−2.06	−2.17	1.01	1.17	−2.13
C$	12.28	−9.30	−7.02	−8.05	1.68	1.84	−8.40
IPM$	−0.68	−0.09	1.54	1.56	3.42	4.09	−0.44
IPR$	−1.51	−6.04	−1.51	−3.54	−2.78	−3.77	−0.17
IPC$	1.18	−0.47	0.29	−1.87	1.85	0.28	−0.23
IPF$	0.06	0.11	0.14	0.19	0.18	0.25	−0.96
IP$	−0.94	−6.49	0.46	−3.66	2.68	0.86	−1.80
IH$	−0.13	−1.13	−7.13	−5.78	−2.84	−0.71	−0.76
DII$	12.21	10.97	−0.55	9.43	1.29	12.16	−1.17
I$	10.95	3.14	−7.41	−0.22	0.95	12.10	−3.73
FE$	1.10	1.79	0.39	2.10	0.84	1.92	−1.15
FI$	0.92	−6.86	3.94	−1.95	0.93	−0.87	−0.50
NFB$	0.28	8.55	−3.44	3.96	0.01	2.69	−0.65
G$	−0.35	−0.39	−0.35	−0.39	−0.35	−0.39	0.04
GNP$	23.67	2.51	−17.71	−4.20	2.81	16.75	−12.74
X	33.80	17.32	−4.72	6.36	6.74	17.27	−6.21
P	−2.30	−2.50	−1.60	−1.60	−0.70	−0.50	−0.01
PCB	0.94	15.20	−1.72	0.71	4.96	7.40	−2.76
DI$	19.13	−9.79	−9.67	−1.88	1.81	5.67	−10.31
UNRATE	−2.62	0.36	0.05	2.27	0.50	−0.40	0.28

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.21
Effects of Errors in Inputs for Wharton, 3rd Quarter, 1967

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−5.22	−5.15	−6.43	−4.76	−3.32	0.08	2.03
CNA$	0.29	−10.04	−1.70	−2.69	0.30	−2.28	0.87
CA$	−0.10	−2.11	−2.44	−5.25	2.70	−1.82	3.17
C$	−5.13	−17.50	−10.65	−12.89	−0.41	−4.22	6.08
IPM$	−0.34	−0.08	0.30	1.13	1.35	1.23	0.06
IPR$	0.63	−3.34	−0.67	−1.98	0.76	−1.42	−0.08
IPC$	−2.11	−1.94	−0.37	−0.61	0.43	−0.00	−0.01
IPF$	0.01	0.14	0.03	0.17	0.02	0.17	−0.14
IP$	−1.82	−5.23	−0.72	−1.29	2.57	−0.02	−0.17
IH$	−1.12	−3.23	−3.79	−6.15	−1.56	−2.42	0.05
DII$	−3.20	−6.26	−7.17	−4.27	−1.33	0.23	2.28
I$	−6.14	−14.73	−11.70	−11.73	−0.33	−2.23	2.16
FE$	−0.18	0.55	0.05	0.33	−0.11	0.78	0.10
FI$	−0.25	−5.41	−0.85	−2.43	0.64	−0.15	0.70
NF8$	0.07	6.06	0.90	2.86	−0.75	1.03	−0.60
G$	0.00	−0.16	0.00	−0.16	0.00	−0.16	5.29
GNP$	−11.30	−25.93	−21.55	−21.52	−1.59	−5.18	12.93
GNP58	−3.28	−14.03	−15.39	−14.38	2.92	−1.07	13.94
P	−1.00	−1.30	−0.40	−0.60	−0.70	−0.50	−0.01
PC8	−2.50	7.74	−4.45	−6.17	0.17	−3.27	6.45
DI$	−7.83	−27.67	−15.38	−13.39	−4.64	−6.94	5.37
UNRATE	1.00	3.35	1.51	3.18	−0.37	−0.08	−0.74

	Third Quarter of Forecast						
CNS$	−1.02	−8.74	−7.62	−10.18	−3.05	−4.80	−1.88
CNA$	1.97	−8.53	−3.51	−1.97	−3.31	−1.67	−0.88
CA$	3.25	−0.21	−3.86	−3.97	−0.79	−0.63	−1.98
C$	4.00	−17.58	−15.20	−16.23	−7.35	−7.19	−4.74
IPM$	−1.56	−0.97	0.06	0.08	−0.26	0.41	0.58
IPR$	−0.47	−5.00	−1.56	−3.59	−1.93	−2.92	−0.01
IPC$	−1.88	−3.53	−0.90	−3.06	−1.02	−2.59	1.05
IPF$	0.11	0.16	0.17	0.22	0.15	0.22	−0.13
IP$	−3.79	−9.34	−2.24	−6.36	−3.05	−4.87	1.48
IH$	−0.72	−1.72	−6.01	−4.66	−2.32	−0.19	−0.20
D-II$	9.76	8.52	−4.58	5.40	−2.73	8.14	−0.69
I$	5.05	−2.76	−13.02	−5.83	−8.29	2.86	0.60
FE$	0.99	1.68	−0.35	1.36	0.83	1.91	−1.34
FI$	0.73	−7.05	1.52	−4.37	0.04	−1.76	−0.22
NFB$	0.36	8.63	−1.77	5.63	0.89	3.57	−1.11
G$	−0.16	−0.20	−0.16	−0.20	−0.14	−0.20	2.96
GNP$	9.65	−11.51	−29.74	−16.23	−14.50	−0.56	−2.31
GNP58	19.83	3.35	−17.41	−6.33	−5.32	5.21	0.89
P	−2.00	−2.20	−1.20	−1.20	−1.10	−0.90	−0.01
PCB	0.17	14.43	−5.12	−2.69	−2.26	0.18	2.99
DI$	3.55	−25.37	−22.35	−14.56	−12.65	−8.79	−4.96
UNRATE	−0.87	2.11	0.63	2.85	0.46	−0.44	0.13

(Continued)

TABLE 5.21 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Fourth Quarter of Forecast						
CNS$	−0.95	−6.65	−6.70	−9.54	−5.62	−2.91	−3.89
CNA$	4.26	−8.50	0.01	−2.39	−0.33	−1.87	−1.44
CA$	4.78	0.57	−3.41	−3.45	1.06	−0.09	−2.45
C$	8.00	−14.77	−10.20	−15.58	−4.99	−5.07	−7.79
IPM$	0.53	0.62	2.78	1.30	0.75	1.55	−0.43
IPR$	−1.33	−3.33	−4.31	−1.93	−3.43	−1.22	−0.08
IPC$	−2.43	0.46	−6.08	0.11	−1.40	0.46	−0.99
IPF$	0.14	0.11	0.20	0.18	0.20	0.19	−0.26
IP$	−3.08	−2.14	−7.41	−0.34	−3.89	0.98	−1.76
IH$	1.76	−2.41	−3.85	−6.45	−0.52	−1.46	−0.43
D-II$	18.90	4.04	5.59	0.60	7.72	4.21	−4.20
I$	17.47	−0.62	−5.80	−6.31	3.20	3.61	−6.39
FE$	1.64	−0.44	4.04	−0.92	2.39	−0.27	−1.59
FI$	−0.71	−7.14	−3.32	−4.48	−1.98	−1.30	−1.05
NF8$	2.15	6.70	7.16	3.56	4.17	1.03	−0.54
G$	−0.07	−0.12	−0.07	−0.12	−0.07	−0.12	3.18
GNP$	27.93	−8.42	−8.52	−18.05	2.69	−0.16	−11.54
GNP58	36.05	10.65	0.74	−3.79	10.21	8.86	−5.69
P	−2.00	−2.90	−1.30	−1.90	−1.30	−1.50	−0.01
PC8	4.66	14.02	−1.78	−4.71	3.06	−0.97	0.93
DI$	9.16	−22.79	−8.13	−13.88	−8.34	−7.13	−8.97
UNRATE	−2.77	0.64	1.19	1.93	−1.04	−1.37	1.03

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.22
Effects of Errors in Inputs for Wharton, 4th Quarter, 1967

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	3.42	−4.30	−0.52	−3.08	2.54	0.79	−0.86
CNA$	1.64	−8.86	−1.68	−0.14	−2.30	−0.66	−0.37
CA$	3.11	−0.35	−1.32	−1.43	0.41	0.57	−1.39
C$	8.08	−13.50	−3.61	−4.64	0.54	0.70	−2.61
IPM$	−2.12	−1.53	0.08	0.10	−1.55	−0.88	0.18
IPR$	−1.12	−5.65	−0.77	−2.80	−2.72	−3.71	−0.01
IPC$	−1.71	−3.36	0.16	−2.00	−1.15	−2.72	0.63
IPF$	0.10	0.15	0.14	0.19	0.14	0.21	0.34
IP$	−4.84	−10.39	−0.39	−4.51	−5.28	−7.10	1.14
IH$	0.19	−0.81	−2.23	−0.88	−0.69	1.44	−0.09
DII$	10.13	8.89	4.00	13.98	3.55	14.42	0.63
I$	5.29	−2.52	1.19	8.38	−2.60	8.55	1.68
FE$	1.09	1.78	−0.31	1.40	1.11	2.19	−3.06
FI$	0.65	−7.13	2.47	−3.42	0.22	−1.58	−0.30
NFB$	0.54	8.81	−2.68	4.72	0.99	3.67	−2.75
G$	−0.18	−0.22	−0.18	−0.22	−0.18	−0.22	−1.48
GNP$	14.23	−6.93	−4.77	8.74	−0.74	13.20	−5.16
GNP58	18.62	2.14	0.12	11.20	1.21	11.74	−2.78
P	−1.20	−1.40	−0.70	−0.70	−0.30	−0.10	−0.00
PCB	−1.41	12.85	0.12	2.55	−1.14	1.30	−0.02
DI$	10.50	−18.42	−5.30	2.49	−0.16	3.70	−1.78
UNRATE	−1.11	1.87	−1.06	1.16	0.21	−0.69	0.46

(*Continued*)

TABLE 5.22 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Third Quarter of Forecast						
CNS$	3.68	−2.02	0.23	−2.61	1.23	3.94	−1.67
CNA$	4.12	−8.64	1.57	−0.83	1.25	−0.29	−0.52
CA$	4.77	0.56	−1.33	−1.37	2.41	1.26	−1.88
C$	12.56	−10.21	0.47	−4.91	4.89	4.81	−4.08
IPM$	−0.24	−0.15	2.94	1.46	0.24	1.04	−0.48
IPR$	−2.08	−4.08	−3.50	−1.12	−4.20	−1.99	−0.07
IPC$	−2.22	0.67	−4.91	1.28	−0.23	1.63	−0.54
IPF$	0.13	0.10	0.19	0.17	0.20	0.19	0.33
IP$	−4.40	−3.46	−5.27	1.80	−4.00	0.87	−0.75
IH$	0.59	−3.58	−1.10	−3.70	0.50	−0.44	−0.14
DII$	23.03	8.17	13.06	8.07	15.16	11.65	−2.92
I$	19.11	1.02	6.57	6.06	11.55	11.96	−3.88
FE$	1.81	−0.27	4.14	−0.82	2.87	0.21	−3.32
FI$	−0.60	−7.03	−2.48	−3.64	−1.09	−0.41	−0.90
NFB$	2.21	6.76	6.43	2.83	3.75	0.61	−2.42
G$	−0.10	−0.15	−0.10	−0.15	−0.10	−0.15	−2.75
GNP$	34.27	−2.08	13.85	4.32	20.59	17.17	−13.05
GNP58	36.86	11.46	15.63	11.10	18.28	16.93	−8.25
P	−1.30	−2.20	−0.70	−1.30	−0.20	−0.40	−0.01
PCB	3.84	13.20	2.58	−0.35	4.15	0.12	−1.63
DI$	16.88	−15.07	7.91	2.16	7.48	8.69	−2.60
UNRATE	−3.04	0.37	−0.23	0.51	−1.18	−1.51	1.26

	Fourth Quarter of Forecast						
CNS$	−2.27	−10.14	−6.58	−11.93	−1.40	−3.62	1.04
CNA$	1.29	−11.44	−1.66	−4.27	−3.00	−3.33	0.76
CA$	3.18	−5.13	−2.47	−7.48	−3.23	−5.40	0.37
C$	2.11	−26.80	−10.82	−23.78	−7.73	−12.45	2.17
IPM$	0.89	−0.15	3.92	1.05	1.37	1.02	−1.04
IPR$	−0.41	−4.03	−1.82	−1.07	−2.45	−1.85	−0.25
IPC$	−1.03	2.38	−4.05	2.17	3.52	2.91	0.70
IPF$	0.09	0.06	0.17	0.15	0.19	0.18	0.52
IP$	−0.46	−1.74	−1.78	2.30	2.63	2.26	−1.47
IH$	−1.17	−2.67	−3.97	−3.67	−3.25	−1.07	−0.21
DII$	15.49	2.58	5.54	2.02	5.47	3.70	1.26
I$	13.76	−1.94	−0.30	0.54	4.75	4.78	−0.41
FE$	−1.79	−0.70	0.00	−1.36	0.24	−0.12	−4.88
FI$	1.56	−10.23	−1.04	−6.89	−1.25	−4.22	−0.03
NFB$	−3.35	9.63	1.03	5.62	1.49	4.20	−4.48
G$	−0.17	−0.08	−0.17	−0.08	−0.17	−0.08	−3.21
GNP$	13.74	−18.89	−8.85	−17.39	−0.27	−3.26	−6.30
GNP58	22.74	−1.99	−0.78	−6.79	2.25	−1.94	2.39
P	−2.00	−2.20	−1.20	−1.20	−0.50	0.00	−0.01
PCB	−5.60	10.99	−9.64	−4.08	−3.24	−4.22	−0.47
DI$	4.13	−27.14	−4.91	−12.19	−4.67	−4.22	5.96
UNRATE	−1.91	0.49	0.73	1.10	−0.32	−0.39	1.29

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.23
Effects of Errors in Inputs for Wharton, 1st Quarter, 1968

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−2.10	−7.80	0.87	−1.97	−2.83	−0.12	−2.23
CNA$	2.39	−10.37	3.52	1.12	2.87	1.33	−0.74
CA$	1.50	−2.71	0.03	−0.01	1.46	0.31	−2.06
C$	1.90	−20.87	4.53	−0.85	1.60	1.52	−5.03
IPM$	−1.21	−1.12	2.65	1.17	1.09	1.89	−0.39
IPR$	−1.18	−3.18	−2.70	−0.32	−1.47	0.74	−0.05
IPC$	−4.73	−1.84	−4.97	1.22	0.13	1.99	−0.83
IPF$	−0.01	−0.04	0.06	0.04	0.07	0.06	−0.12
IP$	−7.13	−6.19	−4.97	2.10	−0.20	4.67	−1.38
IH$	0.07	−4.10	1.20	−1.40	0.41	−0.53	−0.18
D-II$	7.85	−7.01	9.17	4.18	8.15	4.64	−2.56
I$	0.87	−17.22	5.46	4.95	8.45	8.86	−4.12
FE$	0.23	−1.85	4.48	−0.48	1.48	−1.18	−1.59
FI$	−1.93	−8.36	−5.04	−6.20	−2.37	−1.69	−0.74
NFB$	1.86	6.41	9.23	5.63	3.55	0.41	−0.85
G$	0.05	0.00	0.05	0.00	0.05	0.00	−4.00
GNP$	4.67	−31.68	19.26	9.76	13.63	10.78	−14.00
GNP58	9.58	−15.82	14.82	10.29	11.61	10.26	−11.33
P	−1.00	−1.90	0.20	−0.40	−0.10	−0.30	0.00
PCB	−3.95	5.41	1.60	−1.33	3.21	−0.82	−0.36
DI$	3.95	−28.00	14.33	8.58	3.79	5.00	−5.20
UNRATE	−0.49	2.92	0.91	1.65	−0.99	−1.32	1.24

	Third Quarter of Forecast						
CNS$	−6.90	−14.77	−5.83	−11.18	−5.78	−8.00	2.03
CNA$	0.70	−12.03	0.55	−2.06	−1.45	−1.78	1.22
CA$	1.37	−6.94	−1.13	−6.14	−3.74	−5.91	0.90
C$	−4.83	−33.74	−6.43	−19.39	−10.96	−15.68	4.13
IPM$	−0.70	−1.74	3.59	0.72	1.93	1.58	−0.68
IPR$	0.17	−3.45	−1.07	−0.32	0.18	0.78	−0.17
IPC$	−3.28	0.13	−4.11	2.11	3.71	3.10	−0.80
IPF$	−0.06	−0.09	0.04	0.02	0.06	0.05	0.09
IP$	−3.88	−5.16	−1.55	2.53	5.88	5.51	−1.55
IH$	−2.09	−3.59	−1.18	−0.88	−2.15	0.03	0.08
DII$	9.85	−3.06	1.66	−1.86	−0.09	−1.86	1.85
I$	3.97	−11.73	−0.97	−0.13	3.74	3.77	0.37
FE$	−3.49	−2.40	0.36	−1.00	−1.38	−1.74	−2.90
FI$	0.79	−11.00	−3.63	−9.48	−2.69	−5.66	0.30
NFB$	−4.38	8.60	3.90	8.49	1.20	3.91	−3.20
G$	−0.04	0.05	−0.04	0.05	−0.04	0.05	−2.66
GNP$	−4.39	−37.02	−2.64	−11.18	−5.16	−8.15	−1.35
GNP58	6.87	−17.86	−1.66	−7.67	−2.33	−6.52	1.71
P	−1.90	−2.10	−0.20	−0.20	−0.50	−0.00	−0.00
PCB	−10.59	6.00	−11.37	−5.81	−2.74	−3.72	2.92
DI$	−2.85	−34.12	2.42	−4.86	−8.52	−8.07	7.85
UNRATE	−0.24	2.16	1.78	2.15	−0.66	−0.73	1.01

(*Continued*)

TABLE 5.23 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Fourth Quarter of Forecast						
CNS$	−7.15	−14.28	−9.14	−12.07	−9.56	−7.05	2.53
CNA$	3.00	−11.67	1.19	−2.22	−2.29	−1.66	1.08
CA$	3.91	−6.83	−1.75	−6.79	−5.77	−7.31	0.92
C$	−0.24	−32.78	−9.69	−21.07	−17.62	−16.02	4.53
IPM$	−3.09	−2.74	0.62	−0.93	−0.30	0.09	0.23
IPR$	1.01	−5.67	0.54	−2.55	0.58	−1.31	−0.10
IPC$	−1.46	−0.42	−1.83	0.30	2.61	1.32	1.09
IPF$	0.61	−0.10	0.76	0.05	0.80	0.10	−0.37
IP$	−2.92	−8.92	0.09	−3.13	3.69	0.20	0.84
IH$	−1.33	−5.21	−1.98	−3.50	−2.90	−3.52	0.30
D-II$	11.05	−7.45	0.93	−6.71	−5.41	−7.39	1.75
I$	6.90	−21.50	−0.87	−13.26	−4.50	−10.62	2.89
FE$	−3.31	1.15	−0.68	2.48	−2.21	1.72	−2.98
FI$	−1.49	−10.14	−7.21	−8.77	−5.18	−4.42	0.07
NFB$	−1.81	11.19	6.53	11.15	2.97	6.04	−3.05
G$	−0.12	−0.19	−0.12	−0.19	−0.12	−0.19	−2.90
GNP$	6.74	−43.28	−2.14	−23.37	−17.27	−20.80	1.46
GNP58	21.27	−16.96	1.17	−13.19	−10.83	−13.24	3.32
P	−2.80	−3.20	−0.50	−1.00	−0.50	−0.60	−0.00
PCB	−7.01	6.04	−11.99	−7.59	−7.17	−7.09	5.78
DI$	4.93	−38.03	5.85	−11.11	−11.27	−13.16	7.82
UNRATE	−1.99	2.30	0.55	3.04	−0.23	0.38	0.76

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.24
Effects of Errors in Inputs for Wharton, 2nd Quarter, 1968

Variable[c]	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−7.10	−14.97	−6.89	−12.24	−0.49	−2.71	0.08
CNA$	−1.74	−14.47	−2.54	−5.15	−3.34	−3.67	0.15
CA$	0.64	−7.67	0.40	−4.61	−2.80	−4.97	−0.15
C$	−8.30	−37.21	−9.14	−22.10	−6.74	−11.46	0.08
IPM$	−2.18	−3.22	0.90	−1.97	0.97	0.62	−0.15
IPR$	1.21	−2.41	1.59	2.34	1.63	2.23	−0.05
IPC$	−3.61	−0.20	−0.06	6.16	3.18	2.57	−0.17
IPF$	−0.10	−0.13	−0.03	−0.02	−0.02	−0.03	0.34
IP$	−4.68	−5.96	2.40	6.48	5.77	5.40	−0.04
IH$	−2.61	−4.11	−2.51	−2.21	−2.55	−0.37	−0.05
DII$	−2.71	−15.62	−3.89	−7.41	−3.22	−4.99	1.19
I$	−9.98	−25.68	−3.97	−3.13	0.01	0.04	1.10
FE$	−4.11	−3.02	−4.55	−5.91	−2.85	−3.21	−0.81
FI$	2.35	−9.44	2.12	−3.73	0.43	−2.54	0.30
NFB$	−6.26	6.72	−6.46	−1.87	−3.08	−0.37	−1.11
G$	−0.09	0.00	−0.09	0.00	−0.09	0.00	0.18
GNP$	−23.74	−56.37	−18.77	−27.31	−8.99	−11.98	0.27
GNP58	−10.03	−34.76	−11.95	−17.96	−5.96	−10.15	2.22
P	−1.80	−2.00	−0.70	−0.70	−0.40	0.10	−0.00
PCB	−13.66	2.93	−10.73	−5.17	−3.88	−4.86	−2.13
DI$	−9.60	−40.87	−10.30	−17.58	−6.37	−5.92	0.95
UNRATE	1.71	4.11	0.88	1.25	−0.28	−0.35	0.53

(*Continued*)

TABLE 5.24 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Third Quarter of Forecast						
CNS$	−5.66	−12.79	−10.20	−13.13	−2.81	−0.30	−0.30
CNA$	1.41	−13.26	−1.92	−5.33	−4.25	−3.62	−0.01
CA$	4.25	−6.49	−0.37	−5.41	−4.01	−5.55	−0.29
C$	−0.10	−32.64	−12.60	−23.98	−11.18	−9.58	−0.59
IPM$	−4.91	−4.56	−1.63	−3.18	−0.67	−0.28	0.18
IPR$	1.87	−4.81	3.29	0.20	2.08	0.19	−0.07
IPC$	−0.98	0.06	3.02	5.15	3.54	2.25	−0.34
IPF$	−0.14	−0.85	−0.02	−0.73	0.00	−0.70	0.80
IP$	−4.17	−10.17	4.66	1.44	4.95	1.46	0.57
IH$	−4.02	−7.90	−4.58	−6.10	−3.52	−4.14	−0.09
DII$	8.12	−10.38	−3.45	−11.09	−7.03	−9.01	−0.40
I$	−0.05	−28.45	−3.36	−15.75	−5.56	−11.68	−0.08
FE$	−3.80	0.66	−5.91	−2.75	−3.65	0.28	−0.73
FI$	0.34	−8.31	−1.30	−2.86	−2.17	−1.41	0.01
NFB$	−3.83	9.17	−4.31	0.31	−1.18	1.89	−0.74
G$	−0.18	−0.25	−0.18	−0.25	−0.18	−0.25	−0.88
GNP$	−2.15	−52.17	−18.43	−39.66	−16.08	−19.61	−2.11
GNP58	14.82	−23.41	−9.33	−23.69	−12.10	−14.51	1.00
P	−2.90	−3.30	−1.00	−1.50	−0.10	−0.20	−0.05
PCB	−6.08	6.97	−10.42	−6.02	−3.97	−3.89	−3.03
DI$	3.11	−39.85	−6.91	−23.87	−8.34	−10.23	0.01
UNRATE	−0.76	3.53	−0.22	2.27	−0.10	0.51	0.59

	Fourth Quarter of Forecast						
CNS$	−8.30	−13.25	−11.53	−15.70	1.64	−0.04	−1.63
CNA$	−4.88	−13.76	−2.51	−6.42	−2.71	−4.80	0.11
CA$	3.19	−5.47	−2.57	−5.33	−3.82	−5.66	−0.12
C$	−10.10	−32.58	−16.71	−27.55	−5.00	−10.60	−1.64
IPM$	−3.70	−6.30	−1.14	−5.42	−1.61	−2.31	0.55
IPR$	−0.06	−7.01	1.72	−1.92	−0.55	−1.82	0.25
IPC$	4.80	0.91	8.81	4.57	3.99	2.12	−1.64
IPF$	−0.66	−0.10	0.49	0.04	−0.63	0.09	1.26
IP$	0.37	−12.50	8.89	−2.73	1.20	−1.92	0.41
IH$	1.80	−6.39	−0.31	−5.21	−3.16	−3.35	−3.53
DII$	−1.54	−4.20	−4.43	−5.50	−1.48	−3.79	0.33
I$	0.65	−23.10	4.17	−13.44	−3.42	−9.06	−2.79
FE$	1.36	5.92	−2.14	1.96	0.26	5.36	−1.84
FI$	−4.26	−4.22	−0.50	1.52	−1.18	3.13	−0.19
NFB$	5.81	10.33	−1.44	0.64	1.64	2.43	−1.65
G$	−0.35	−0.17	−0.35	−0.17	−0.35	−0.17	−1.41
GNP$	−3.88	−45.52	−14.23	−40.52	−7.03	−17.40	−7.49
GNP58	12.66	−11.61	−9.84	−19.97	−3.91	−11.11	−0.24
P	−2.80	−4.40	−0.30	−2.20	−0.30	−0.50	−0.01
PCB	15.10	9.97	−2.91	−5.06	3.67	0.67	−5.88
DI$	−10.00	−32.87	−5.44	−20.15	−2.82	−6.92	−0.79
UNRATE	−0.31	2.95	−0.12	2.67	−0.18	0.97	0.28

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.25
Effects of Errors in Inputs for Wharton, 3rd Quarter, 1968

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−1.78	−8.91	−3.98	−6.91	−3.52	−1.01	−1.62
CNA$	2.37	−12.30	0.17	−3.24	−1.14	−0.51	−0.22
CA$	2.56	−8.18	−0.96	−6.00	−2.36	−3.90	−0.49
C$	3.15	−29.39	−4.78	−16.16	−7.02	−5.42	−2.33
IPM$	−4.50	−4.15	−2.01	−3.56	−0.51	−0.12	−0.28
IPR$	0.66	−6.02	1.77	−1.32	0.50	−1.39	−0.09
IPC$	−1.35	−0.31	3.17	5.30	1.35	0.06	−0.32
IPF$	−0.06	−0.77	0.01	−0.70	0.02	−0.68	0.45
IP$	−5.25	−11.25	2.93	−0.29	1.36	−2.13	−0.24
IH$	−0.11	−3.99	−0.32	−1.84	2.22	1.60	−0.16
DII$	3.28	−15.22	−0.77	−8.41	−2.26	−4.24	−1.85
I$	−2.06	−30.46	1.85	−10.54	1.34	−4.78	−2.25
FE$	−0.06	4.40	−1.22	1.94	−0.70	3.23	−1.45
FI$	−2.53	−11.18	−3.23	−4.79	−2.59	−1.83	−0.32
NFB$	2.57	15.57	2.11	6.73	1.99	5.06	−1.13
G$	−0.05	−0.12	−0.05	−0.12	−0.05	−0.12	0.93
GNP$	4.72	−45.30	0.23	−21.00	−2.63	−6.16	−4.78
GNP58	13.39	−24.84	2.71	−11.65	−3.70	−6.11	−0.99
P	−1.60	−2.00	−0.30	−0.80	0.40	0.30	−0.01
PCB	−0.06	12.99	1.09	5.49	1.30	1.38	−5.14
DI$	6.10	−36.86	0.82	−16.14	−2.06	−3.95	−2.29
UNRATE	−0.95	3.34	−1.18	1.31	−0.23	0.38	0.60

	Third Quarter of Forecast						
CNS$	−5.88	−10.83	−7.60	−11.77	−3.85	−5.53	−2.11
CNA$	−4.27	−13.15	−1.57	−5.48	−1.27	−3.36	−0.13
CA$	1.02	−7.64	−4.54	−7.30	−3.98	−5.82	0.14
C$	−9.14	−31.62	−13.72	−24.56	−9.11	−14.71	−2.11
IPM$	−3.22	−5.82	−0.90	−5.18	−0.87	−1.57	−0.41
IPR$	−0.93	−7.88	0.69	−2.95	−1.69	−2.96	−0.16
IPC$	3.03	−0.86	7.72	3.48	0.28	−1.59	−0.33
IPF$	−0.58	−0.02	−0.45	0.08	−0.61	0.11	0.91
IP$	−1.71	−14.58	7.05	−4.57	−2.90	−6.02	0.01
IH$	1.65	−6.54	0.45	−4.45	0.65	0.46	−0.24
DII$	−0.39	−3.05	−3.86	−4.93	−1.31	−3.62	1.36
I$	−0.44	−24.19	3.65	−13.96	−3.55	−9.19	1.14
FE$	5.23	9.79	2.80	6.90	2.02	7.12	−2.65
FI$	−6.84	−6.80	−2.61	−0.59	−2.84	1.47	−0.37
NFB$	12.07	16.59	5.42	7.50	4.86	5.65	−2.28
G$	−0.19	−0.01	−0.19	−0.01	−0.19	−0.01	0.62
GNP$	1.51	−40.13	−5.65	−31.94	−8.79	−19.16	−2.64
GNP58	10.75	−13.52	−6.54	−16.67	−7.92	−15.12	3.09
P	−1.60	−3.20	0.40	−1.50	0.30	0.10	−0.01
PCB	20.32	15.19	5.19	3.04	2.93	−0.07	−5.10
DI$	−10.84	−33.71	−5.57	−20.28	−6.31	−10.41	−2.34
UNRATE	−0.24	3.02	−0.32	2.47	0.60	1.75	−0.39

(*Continued*)

TABLE 5.25 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Fourth Quarter of Forecast						
CNS$	−6.06	−11.29	−8.91	−14.31	−6.94	−6.20	−3.61
CNA$	−2.31	−14.06	−1.50	−7.04	−2.24	−4.51	−0.13
CA$	2.53	−7.19	−4.94	−7.71	−4.23	−5.86	0.06
C$	−5.85	−32.54	−15.35	−29.06	−13.41	−16.57	−3.69
IPM$	−3.51	−6.73	−2.44	−6.56	−2.07	−3.15	−0.33
IPR$	−0.08	−7.39	−0.39	−2.38	−2.46	−2.38	−0.24
IPC$	2.59	−1.23	5.33	1.75	−1.95	−3.50	−0.18
IPF$	0.41	−0.02	0.53	0.11	0.37	0.15	0.54
IP$	−0.59	−15.37	3.01	−7.09	−6.11	−8.89	−0.21
IH$	2.22	−5.11	−2.09	−3.58	0.38	1.37	−0.27
DII$	1.71	−3.43	−3.01	−6.00	−4.58	−4.09	0.98
I$	3.43	−23.93	−1.97	−16.68	−10.19	−11.61	0.49
FE$	3.17	2.35	4.61	−1.02	1.79	1.41	−3.65
FI$	−9.54	−15.94	−1.32	−9.46	−3.31	−6.50	−0.65
NF8$	12.71	18.29	5.93	8.44	5.12	7.92	−3.29
G$	0.05	−0.00	0.05	−0.00	0.05	−0.00	1.00
GNP$	9.45	−39.18	−12.24	−38.30	−19.34	−21.27	−5.49
GNP58	24.84	−7.96	−4.99	−18.58	−13.14	−15.05	3.96
P	−2.90	−4.00	−0.70	−2.00	−0.20	−0.20	−0.01
PCB	15.79	19.42	−2.39	5.65	−3.92	2.54	−8.14
DI$	−0.29	−34.89	−2.53	−24.85	−5.63	−11.92	−3.63
UNRATE	−1.12	2.37	0.07	2.70	1.58	1.79	−0.46

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.26

Effects of Errors in Inputs for Wharton, 4th Quarter, 1968

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−8.11	−13.06	−4.56	−8.73	0.30	−1.38	−0.75
CNA$	−7.30	−16.18	−1.97	−5.88	−0.48	−2.57	0.19
CA$	−2.63	−11.29	−3.83	−6.59	−1.72	−3.56	0.69
C$	−18.04	−40.52	−10.36	−21.20	−1.90	−7.50	0.13
IPM$	−1.89	−4.49	0.43	−3.85	−0.02	−0.72	−0.09
IPR$	−1.78	−8.73	−1.19	−4.83	−2.15	−3.42	−0.08
IPC$	−2.42	−6.31	2.85	−1.39	−0.69	−2.56	−0.04
IPF$	−0.55	0.01	−0.48	0.05	−0.63	0.09	0.81
IP$	−6.64	−19.51	1.61	−10.01	−3.48	−6.60	0.60
IH$	1.02	−7.17	0.40	−4.50	−2.25	−2.44	−0.09
DII$	−12.01	−14.67	−4.36	−5.43	1.56	−0.75	0.94
I$	−17.62	−41.37	−2.35	−19.96	−4.17	−9.81	1.45
FE$	4.55	9.11	3.85	7.95	3.24	8.34	−0.88
FI$	−5.36	−5.32	0.54	2.56	0.00	4.31	−0.10
NF8$	9.82	14.34	3.21	5.29	3.14	3.93	−0.78
G$	−0.12	0.06	−0.12	0.06	−0.12	0.06	0.24
GNP$	−27.86	−69.50	−11.52	−37.81	−4.95	−15.32	1.03
GNP58	−19.10	−43.37	−12.06	−22.19	−3.69	−10.89	4.15
P	−0.70	−2.30	0.40	−1.50	−0.10	−0.30	−0.01
PC8	9.12	3.99	1.63	−0.52	3.05	0.05	0.26
DI$	−23.76	−46.63	−8.09	−22.80	−4.45	−8.55	0.21
UNRATE	3.01	6.27	1.26	4.05	0.73	1.88	−1.09

(*Continued*)

TABLE 5.26 (*Concluded*)

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
			Third Quarter of Forecast				
CNS$	−7.39	−12.62	−5.76	−11.16	−2.47	−1.73	−2.10
CNA$	−4.45	−16.20	−1.87	−7.41	−1.96	−4.23	0.35
CA$	0.21	−9.51	−4.08	−6.85	−2.31	−3.94	0.75
C$	−11.63	−38.32	−11.71	−25.42	−6.73	−9.89	1.00
IPM$	−3.04	−6.26	−1.22	−5.34	−1.03	−2.11	−0.07
IPR$	−1.21	−8.52	−2.37	−4.36	−2.86	−2.78	−0.15
IPC$	−3.14	−6.96	0.49	−3.09	−3.06	−4.61	0.08
IPF$	0.42	−0.01	0.49	0.07	0.35	0.13	0.43
IP$	−6.98	−21.76	−2.62	−12.72	−6.59	−9.37	0.28
IH$	0.87	−6.46	−2.26	−3.75	−1.44	−0.45	−0.19
DII$	0.70	−4.44	−1.60	−4.59	−3.55	−3.06	1.16
I$	−5.32	−32.68	−6.37	−21.08	−11.48	−12.90	1.25
FE$	2.27	1.45	5.63	−0.00	1.88	1.50	−1.68
FI$	−7.52	−13.92	1.97	−6.17	−1.27	−4.46	0.09
NFB$	9.68	15.26	3.56	6.07	3.06	5.86	−1.78
G$	0.17	0.12	0.17	0.12	0.17	0.12	0.87
GNP$	−9.08	−57.71	−16.34	−42.40	−16.99	−18.92	−0.65
GNP58	6.58	−26.22	−8.36	−21.95	−11.03	−12.94	6.54
P	−2.50	−3.60	−0.80	−2.10	−0.40	−0.40	−0.01
PCB	8.49	12.12	−4.83	3.21	−3.49	2.97	−2.72
DI$	−8.81	−43.41	−4.70	−27.02	−4.85	−11.14	−0.32
UNRATE	1.33	4.82	1.47	4.10	1.82	2.03	−1.29

	Fourth Quarter of Forecast						
CNS$	−15.51	−13.98	−16.55	−13.98	−3.38	−2.00	2.88
CNA$	−5.22	−13.83	−5.55	−5.64	−3.65	−2.43	2.21
CA$	0.56	−9.07	−6.02	−7.27	−2.92	−4.30	2.46
C$	−20.27	−36.88	−28.23	−26.90	−10.06	−8.73	7.56
IPM$	−5.67	−6.80	−5.15	−6.28	−2.65	−2.96	−0.04
IPR$	−2.10	−9.16	−4.17	−4.92	−2.56	−3.21	−0.20
IPC$	−4.04	−8.17	−3.75	−5.73	−4.52	−7.08	0.32
IPF$	−0.09	0.06	−0.06	0.14	0.03	0.21	1.37
IP$	−11.89	−24.07	−13.12	−16.79	−9.70	−13.04	1.45
IH$	0.68	−4.92	−4.03	−2.47	0.59	0.74	0.16
DII$	2.73	−7.08	−0.60	−7.88	0.18	−5.28	3.25
I$	−8.49	−36.09	−17.76	−27.16	−8.94	−17.60	4.86
FE$	4.52	2.18	5.69	0.41	3.70	1.49	−2.01
FI$	−9.25	−12.82	−1.43	−4.48	−2.41	−3.37	0.38
NF8$	13.66	14.79	7.02	4.69	6.01	4.66	−2.39
G$	0.21	0.22	0.21	0.22	0.21	0.22	1.88
GNP$	−16.97	−60.25	−40.87	−51.46	−14.86	−23.74	11.91
GNP58	11.47	−21.25	−16.70	−23.60	−6.86	−14.16	19.24
P	−4.50	−4.60	−2.80	−3.00	−1.00	−0.80	−0.02
PC8	16.88	14.71	−0.27	4.02	6.45	4.48	1.66
DI$	−21.75	−51.56	−26.17	−37.85	−11.63	−19.26	13.54
UNRATE	1.99	3.75	3.51	3.84	1.74	1.72	−1.57

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.27
Effects of Errors in Inputs for Wharton, 1st Quarter, 1969

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−2.03	−7.26	−0.38	−5.78	−1.66	−0.92	−1.77
CNA$	0.92	−10.83	−0.37	−5.91	−0.70	−2.97	−0.10
CA$	0.29	−9.43	−0.56	−3.33	0.50	−1.13	−0.14
C$	−0.82	−27.51	−1.30	−15.01	−1.86	−5.02	−2.03
IPM$	−2.72	−5.94	−3.59	−7.71	−0.71	−1.79	0.24
IPR$	0.23	−7.08	−1.57	−3.56	−0.80	−0.72	0.09
IPC$	−5.38	−9.20	−3.22	−6.80	−2.65	−4.20	0.52
IPF$	0.88	0.45	0.86	0.44	0.97	0.75	0.48
IP$	−6.98	−21.76	−7.54	−17.64	−3.18	−5.96	1.33
IH$	−0.73	−8.06	−3.12	−4.61	−1.02	−0.03	0.01
DII$	−0.40	−5.54	1.87	−1.12	4.15	4.64	−4.21
I$	−8.02	−35.38	−8.68	−23.39	0.05	−1.37	−2.87
FE$	−2.30	−3.12	1.95	−3.68	−0.90	−1.28	−1.64
FI$	−3.68	−10.08	0.23	−7.91	−0.51	−3.70	−0.70
NFB$	1.38	6.96	1.72	4.23	−3.38	2.42	−0.94
G$	0.26	0.21	0.26	0.21	0.26	0.21	0.69
GNP$	−7.28	−55.91	−8.11	−34.17	−2.03	−3.96	−5.14
GNP58	−0.66	−33.66	−0.57	−14.16	0.52	−1.39	−1.51
P	−0.90	−2.00	−1.00	−2.30	−0.30	−0.30	−0.01
PCB	−5.22	−1.59	−3.80	4.24	−3.52	2.94	−4.56
DI$	1.20	−33.40	−1.10	−23.42	3.04	−3.25	−2.37
UNRATE	0.61	4.10	0.27	2.90	0.12	0.33	−0.45

	Third Quarter of Forecast						
CNS$	−9.83	−8.30	−9.52	−6.95	−2.18	−0.80	−2.17
CNA$	0.88	−7.73	−3.19	−3.28	−2.11	−0.89	0.15
CA$	0.84	−8.79	−1.98	−3.23	−0.21	−1.59	0.25
C$	−8.21	−24.82	−14.78	−13.45	−4.61	−3.28	−2.27
IPM$	−6.71	−7.84	−8.03	−9.16	−2.05	−2.36	0.19
IPR$	−1.08	−8.14	−3.73	−4.48	−0.61	−1.26	0.06
IPC$	−8.87	−13.00	−8.51	−10.49	−4.38	−6.94	0.43
IPF$	0.38	0.53	0.31	0.51	0.66	0.84	1.05
IP$	−16.28	−28.46	−19.96	−23.63	−6.38	−9.72	1.73
IH$	0.45	−5.15	−3.18	−1.62	1.44	1.59	0.06
D-II$	4.01	−5.80	5.26	−2.02	9.09	3.63	−6.42
I$	−11.83	−39.43	−17.89	−27.29	4.14	−4.52	−4.64
FE$	−0.76	−3.10	1.57	−3.71	0.78	−1.43	−2.00
FI$	−4.86	−8.43	−3.00	−6.05	−1.45	−2.41	−1.36
NFB$	4.10	5.23	4.57	2.24	2.23	0.88	−0.64
G$	0.26	0.27	0.26	0.27	0.26	0.27	1.64
GNP$	−15.88	−59.16	−28.04	−38.63	1.82	−7.06	−5.90
GNP58	3.05	−29.67	−4.72	−11.62	4.77	−2.53	−0.64
P	−2.80	−2.90	−3.00	−3.20	−0.70	−0.50	−0.01
PCB	2.84	0.67	2.71	7.00	9.87	7.90	−5.59
DI$	−8.85	−38.66	−18.17	−29.85	−2.57	−10.20	−1.50
UNRATE	1.60	3.36	1.98	2.31	0.19	0.17	−0.09

NOTE: For definition of symbols, see glossary preceding this section.

TABLE 5.28
Effects of Errors in Inputs for Wharton, 2nd Quarter, 1969

Variable	No Constant Adjustments		AR Constant Adjustments		OR Constant Ajustments		Ex Ante minus Ex Post
	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	Effect of Errors in Lagged Inputs	Total Ex Post Error	
	Second Quarter of Forecast						
CNS$	−10.93	−9.45	−11.24	−8.67	−0.38	1.00	0.04
CNA$	−1.59	−10.20	−3.89	−3.98	−1.66	−0.44	0.79
CA$	−1.79	−11.33	−2.71	−3.96	−0.84	−2.22	0.35
C$	−14.37	−30.98	−17.95	−16.62	−2.99	−1.66	1.18
IPM$	−5.60	−6.73	−6.03	−7.16	−1.73	−2.04	0.25
IPR$	−1.67	−8.73	−2.37	−5.12	0.13	−0.52	0.08
IPC$	−8.05	−12.18	−6.83	−8.81	−2.98	−5.54	0.38
IPF$	−0.62	−0.47	−0.62	−8.42	−0.34	−0.16	0.60
IP$	−15.93	−28.11	−15.85	−19.52	−4.92	−8.26	1.31
IH$	−0.97	−6.57	−2.01	−0.45	1.91	2.06	0.22
DII$	−4.57	−14.38	0.07	−7.21	1.88	−3.58	−2.10
I$	−21.58	−49.18	−17.90	−27.30	−1.23	−9.89	−0.58
FE$	1.45	−0.89	−0.88	−6.16	2.44	0.23	−0.60
FI$	−2.11	−5.65	−4.54	−7.59	−0.72	−1.68	−0.30
NFB$	3.56	4.69	3.66	1.33	3.16	1.81	−0.30
G$	0.03	0.04	0.03	0.04	0.03	0.04	2.56
GNP$	−32.46	−75.74	−32.25	−42.84	−1.13	−10.01	2.86
GNP58	−14.89	−47.61	−13.63	−20.53	0.71	−6.59	5.04
P	−2.00	−2.10	−2.10	−2.30	−0.40	−0.20	0.01
PCB	2.05	−0.12	4.12	8.41	9.36	7.39	5.77
DI$	−21.90	−51.71	−24.53	−36.21	−7.34	−14.97	4.40
UNRATE	3.15	4.91	2.69	3.02	0.28	0.26	0.02

NOTE: For definition of symbols, see glossary preceding this section.

CHART 5.1

Wharton Ex Post Forecasts: 3rd Quarter, 1966

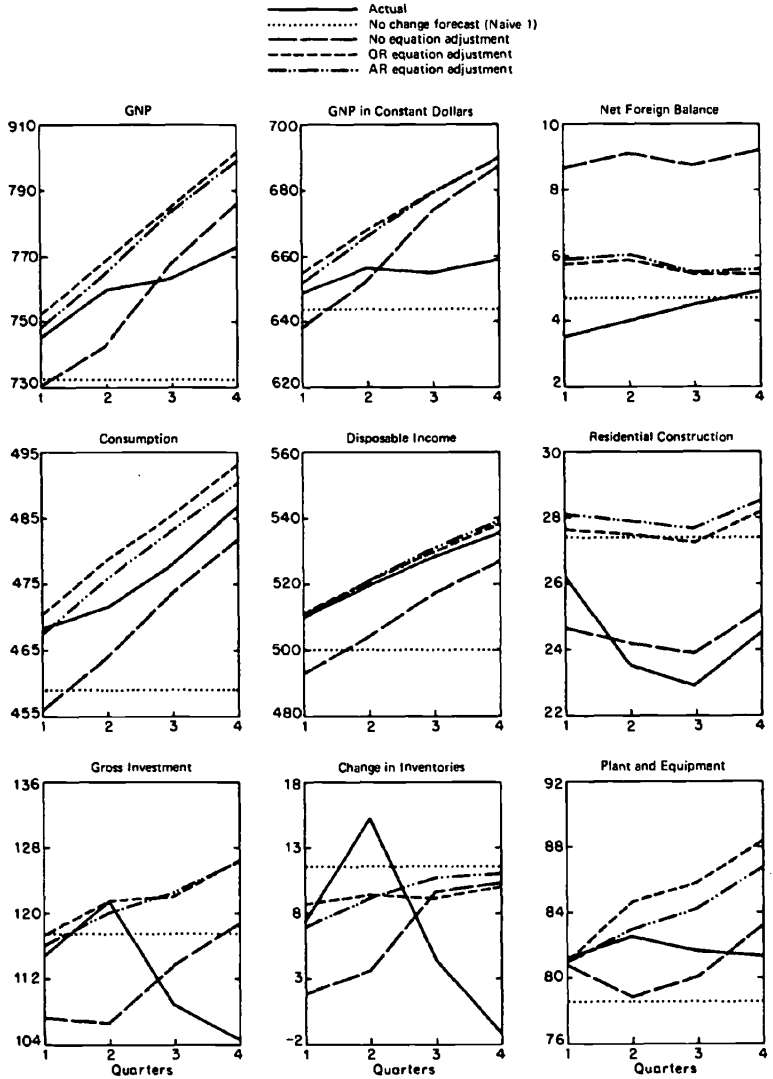

CHART 5.2

Wharton Ex Post Forecasts: 4th Quarter, 1966

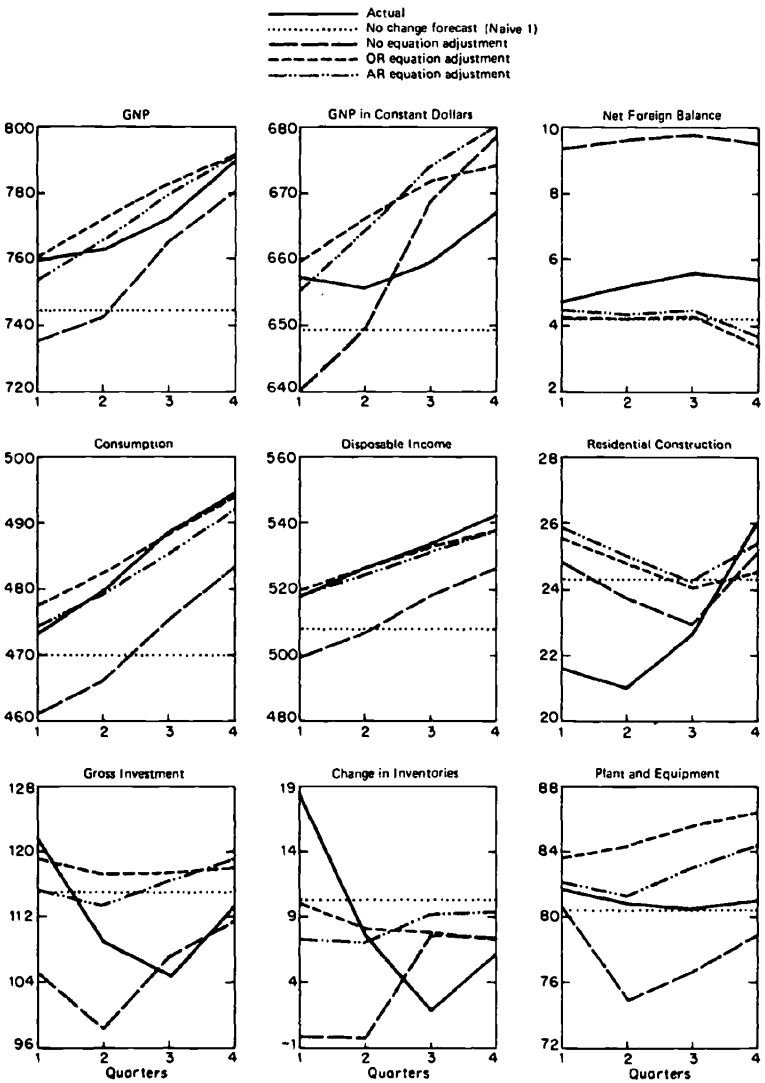

CHART 5.3

Wharton Ex Post Forecasts: 1st Quarter, 1967

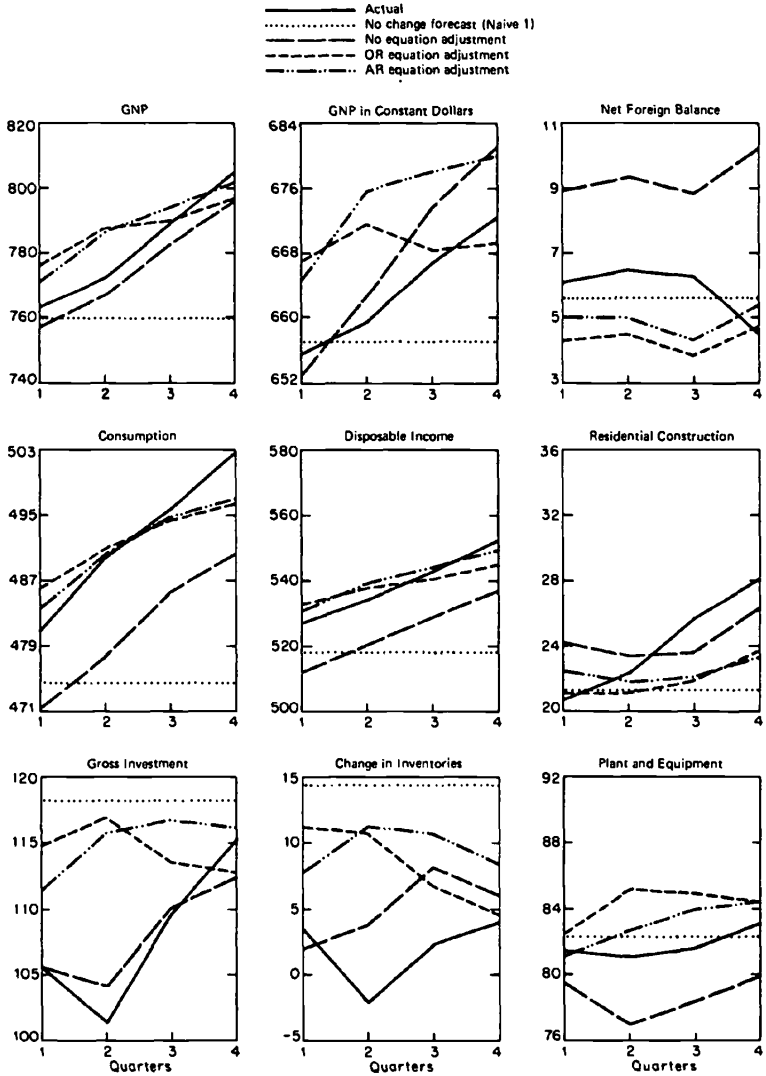

CHART 5.4

Wharton Ex Post Forecasts: 2nd Quarter, 1967

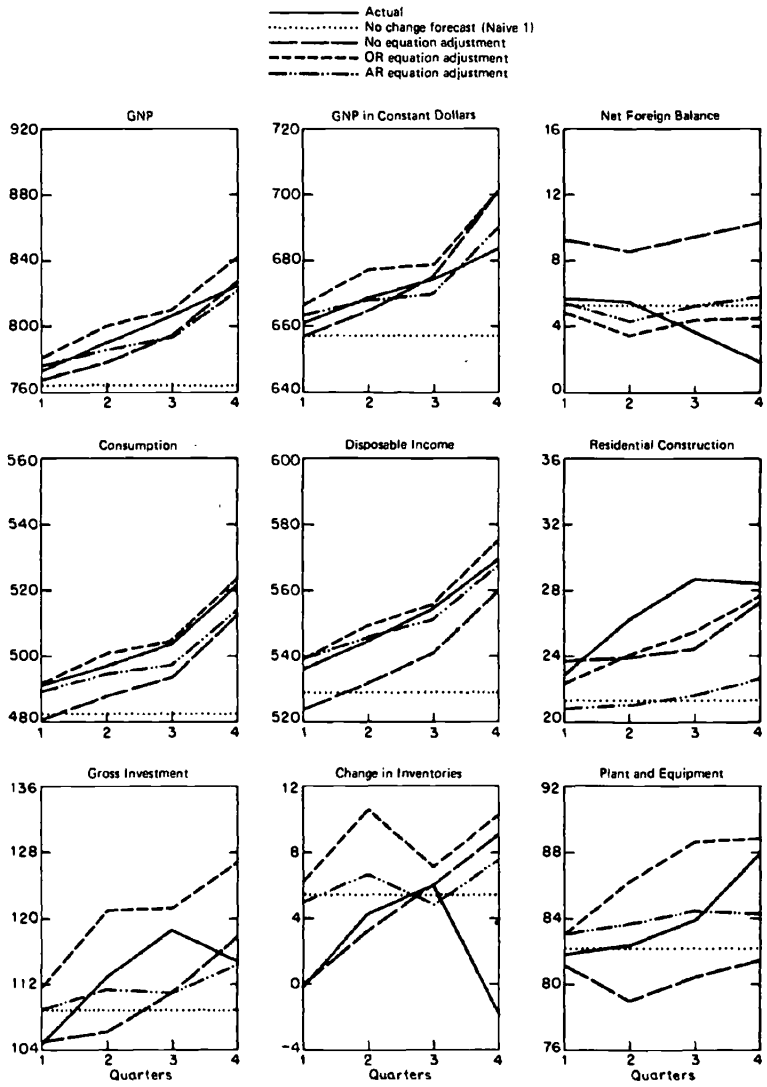

CHART 5.5

Wharton Ex Post Forecasts: 3rd Quarter, 1967

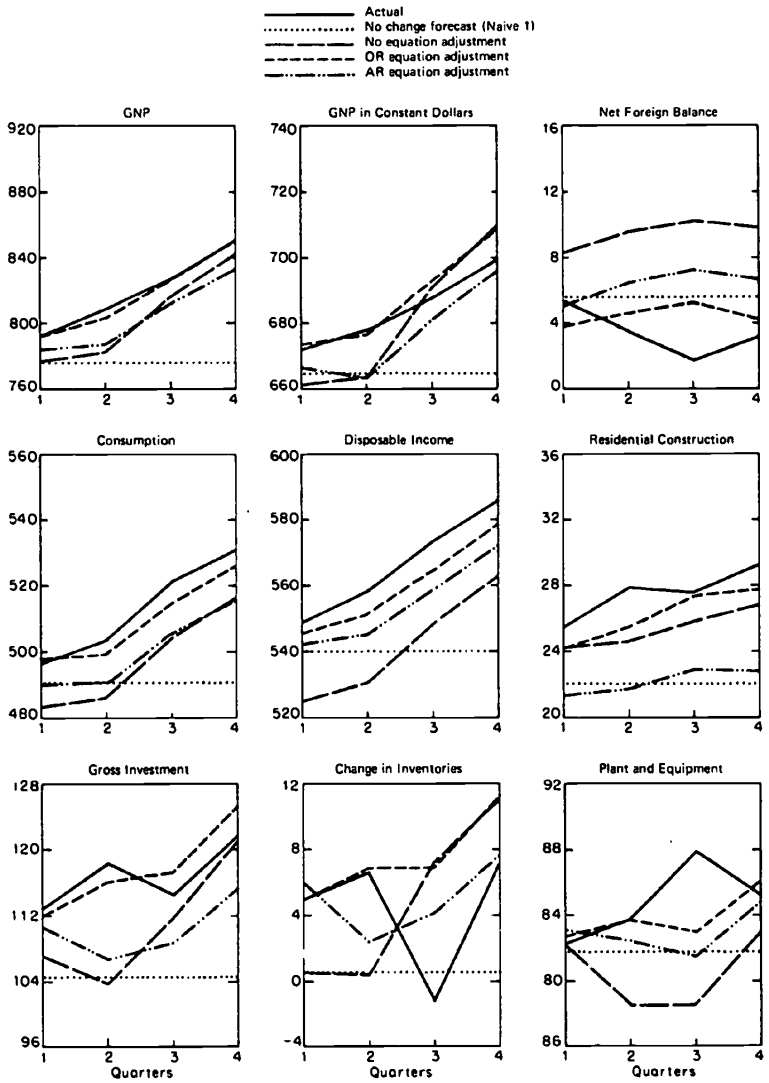

CHART 5.6

Wharton Ex Post Forecasts: 4th Quarter, 1967

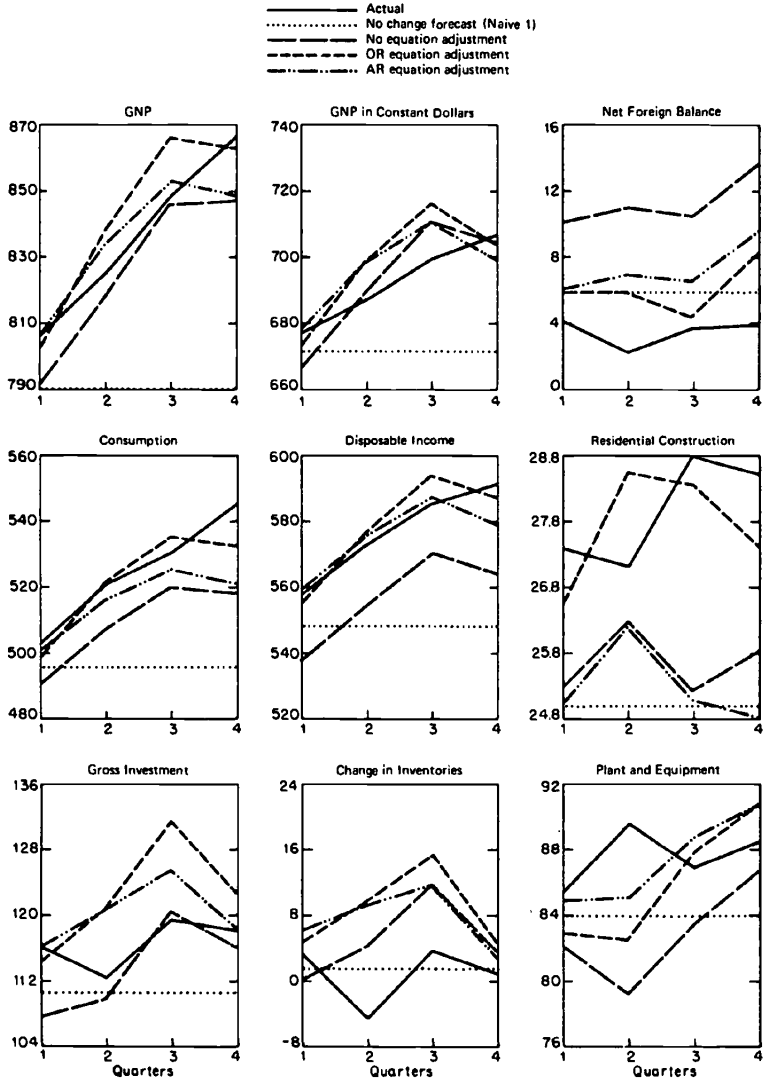

CHART 5.7

Wharton Ex Post Forecasts: 1st Quarter, 1968

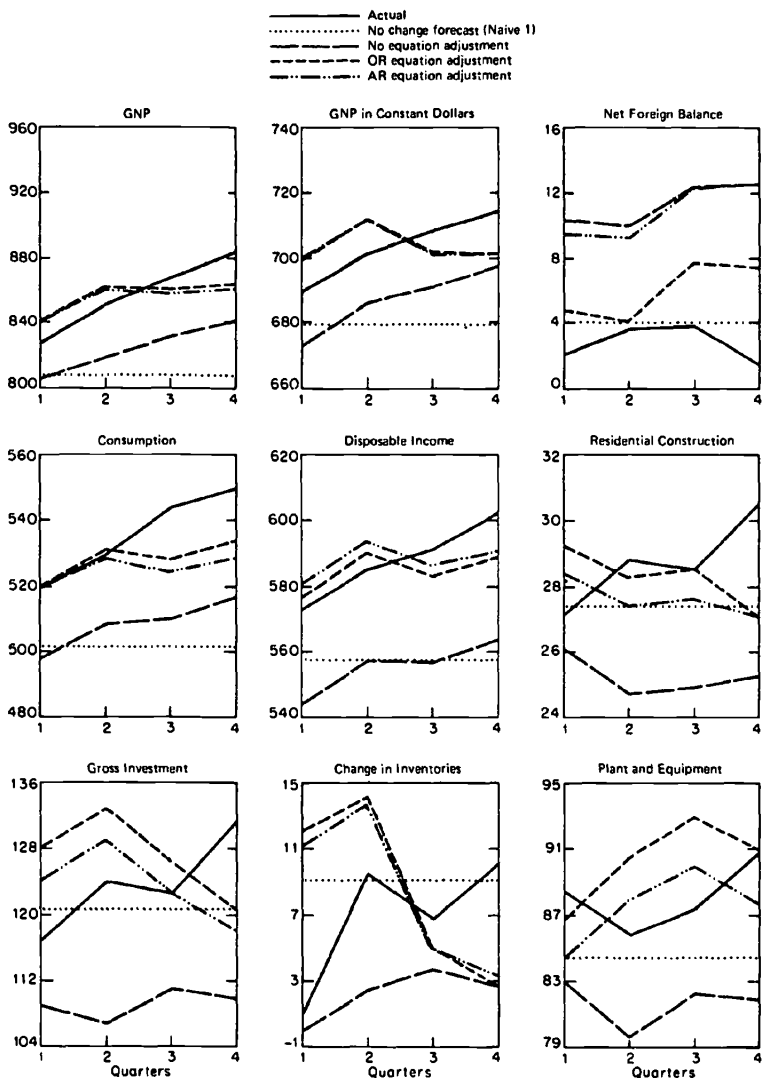

CHART 5.8

Wharton Ex Post Forecasts: 2nd Quarter, 1968

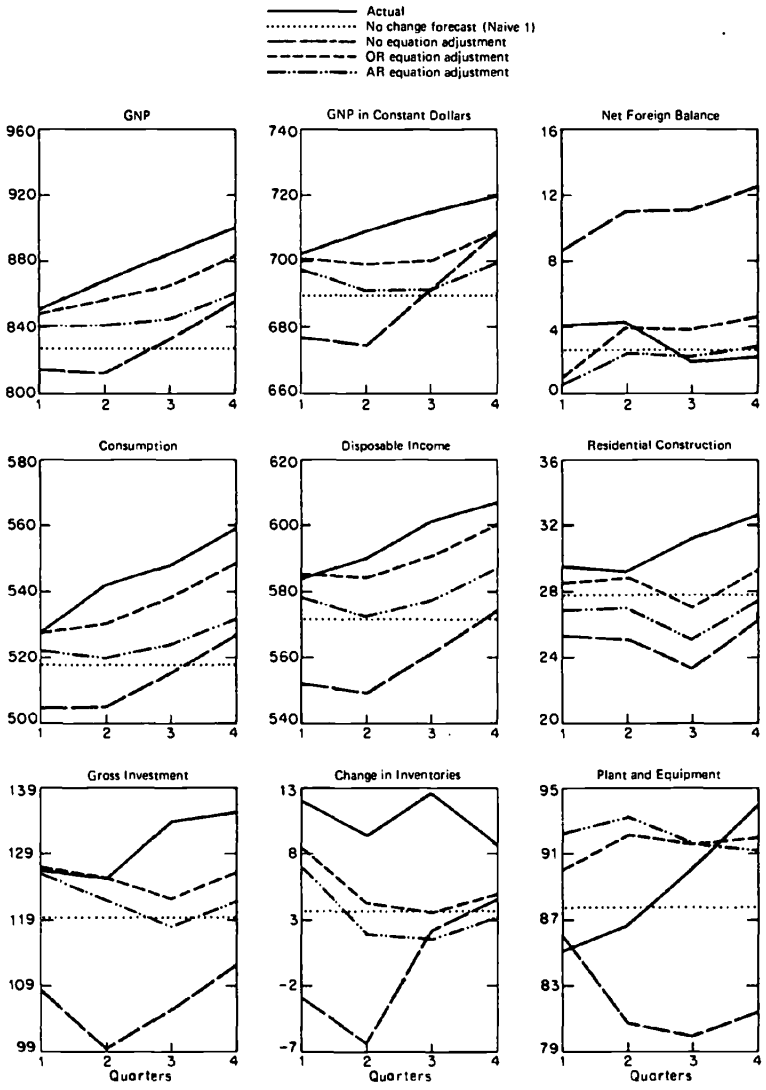

CHART 5.9

Wharton Ex Post Forecasts: 3rd Quarter. 1968

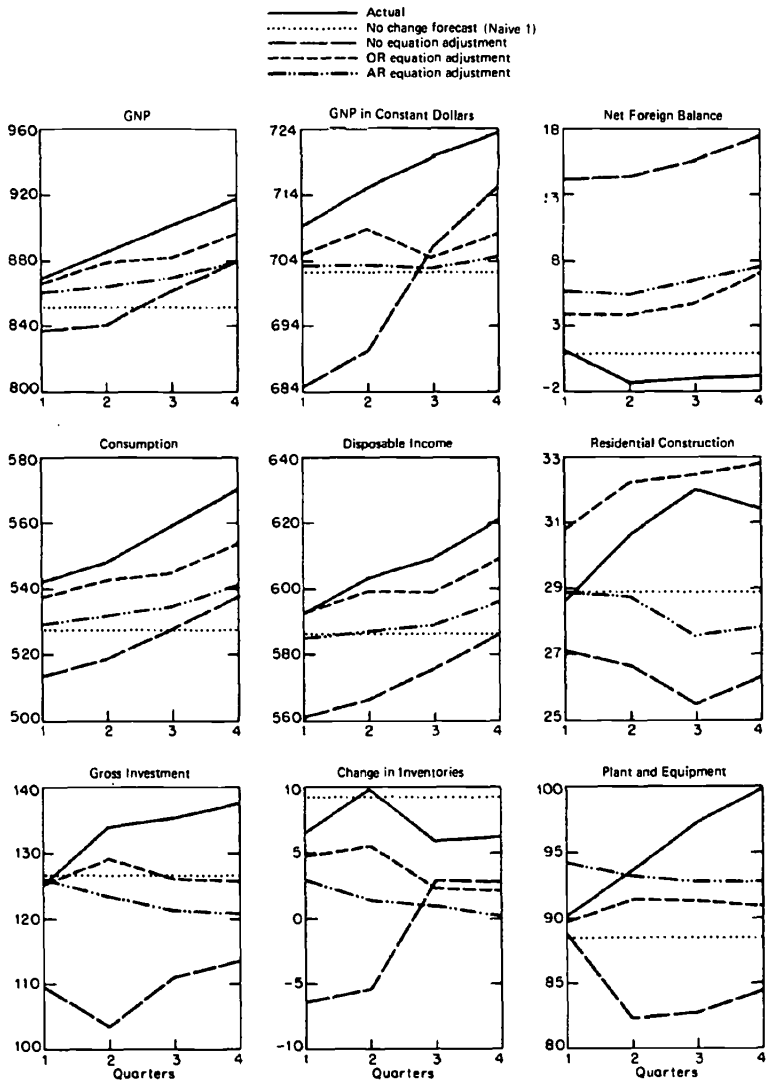

CHART 5.10

Wharton Ex Post Forecasts: 4th Quarter, 1968