Briefing Paper

Forecasting uncertainty; How accurate can we be?

R. J. CORKER

This Briefing Paper *is the second in our series of three papers concerning aspects of forecasting and model building. In last October's* Economic Outlook *we discussed the structure of econometric models and how they are used, in conjunction with our judgement, to produce macroeconomic forecasts. It was stressed in that paper that the equations we use in our economic models cannot describe economic behaviour precisely. There are unpredictable, random elements, which affect actual outcomes – in other words our equations are* stochastic. *In this paper we investigate the stochastic nature of the equations and the model more closely and we describe ways of quantifying the uncertainty of our published forecasts. We publish, for the first time, projected error bands about our central forecast. To a large extent we are attempting to answer the question, "How accurate* can *we be?". The related question "How accurate* have *we been?" will form the basis of the third article, to be published in June. The paper is divided into three parts. Part I is mainly expositional; Part II describes our methodology and Part III presents the empirical results.*

I SOURCES OF FORECAST ERROR

Before we discuss how we might quantify forecast uncertainty, it is instructive to catalogue the sources of error in a macroeconomic forecast produced by a large-scale computer model. (A brief summary of the key features of econometric models as described in the October 1982 *Briefing Paper* can be found opposite. The reader who is familiar with the operation of economic models should turn to Part II, where we discuss our methodology or to Part III where we present our empirical results.)

In considering the possible sources of errors in our forecasts it is convenient to distinguish between model and non-model errors.

Model errors

Model-generated forecast errors derive from two sources; equation misspecification and the stochastic nature of the model. Taking the first of these, errors in specification relate to our having an incorrect model. In other words our equations are an incorrect description of economic behaviour. For example, we may include explanatory variables which are irrelevant or exclude variables which have an important influence on the economic activity in question. We may have the right variables but expressed in the wrong form. Also we may wrongly specify the dynamics of economic behaviour. The search for correct behavioural relationships requires that we have the correct economic theory and that the theory is correctly expressed and estimated. This is not a simple problem. All models of the UK economy are inevitably misspecified to some extent and will remain so despite continued research efforts.

The misspecification errors are perhaps the most

In the October 1982 *Briefing Paper* we described the main features of an econometric model. We may briefly summarise these as follows:

An econometric model is made up of a set of mathematical equations. These equations represent relationships between macroeconomic quantities – e.g. inflation, total consumption, the money supply, etc. – and are of three types. The most important – and contentious – equations are those described as *"behavioural"* and which express our theoretical perception of how the economy behaves. Identities and technical relationships (the other types of equation) have less contentious origins.

A forecast is just a mathematical solution for the future values of economic quantities that is consistent with all the behavioural equations, technical relationships and identities in the model. The solution procedure is somewhat complicated since the equations are *simultaneous.* We need to know the forecast value of one variable before we can forecast another, but the forecast of the first variable again depends on the forecast of a third variable which may depend on the first and so on. A computer algorithm is needed to find the consistent solution path.

The model is also *dynamic* with current values of economic variables depending on past values of either themselves or other variables. Such a feature means that our model does not exhibit instant adjustment; for example, the price level will only respond to a change in the money supply gradually and after a delay.

Finally there is an important distinction between variables which we denote as *endogenous* and those designated as *exogenous.* Both types of variable will be found in behavioural equations helping to forecast other variables but the forecast of the exogenous variables is determined by a process outside the model structure. For example we decide at an early stage of the forecast the projected volume of government spending for the next five years. Hence there is no equation in the model to determine government spending, but government spending is used to forecast other variables such as government employment and the PSBR which are endogenous. The move to cash limits and the planning of public expenditure in cash terms means that we do have to reconsider our initial projections in the light of our forecasts of the public sector wage bill and the authorities' planning total.

serious kind since it is not possible to quantify their likely magnitude in advance. For this reason statements about forecast uncertainty are conditional on the absence of specification error. Stochastic errors arise because the equations in our model cannot be exact descriptions of economic activity and are necessarily simplifications of what we know to be more complex processes. We know that our equations do not precisely fit past observations and we do not expect them to predict outcomes precisely in the future. But any statement about the magnitude of the errors is based on the assumption that the equation is an unbiased representation of reality.

We can illustrate these sources of model error by referring again to the equation for consumption of non-durables which we described in the previous *Briefing Paper*. (See below). The equation will almost certainly be misspecified. For example, there is no mention of the personal sector's wealth, or the level of unemployment, although both probably affect consumers' behaviour. Also we have only one measure of income whereas consumption will depend on how income is distributed between different groups of people. The term ϵ_t records our recognition that this is a stochastic equation. Our statistical techniques provide an estimate of the distribution (or pattern) of the stochastic errors.

Over the estimation period the average value of these errors is zero but, as we described in the previous *Briefing Paper*, we sometimes project non-zero error terms, which we call "constant adjustments".* It should be noted that these projections do not necessarily mean that we know precisely what the future value of the error term will be, rather we have some view of what its expected or average value will be in future periods. Thus for all our forecasts using behavioural equations there will be stochastic errors in the future and these contribute to the uncertainty of the forecast.

The fact that we choose non-zero values for some of the residual terms in the future implies something about the *prior certainty* we possess about the actual outcomes. We only impose the non-zero constant adjustment because we are more confident that this will improve the accuracy of the forecast. This confidence hinges on the forecaster's access to external information such as industrial surveys, monthly data, etc., which are not reflected in the equations of the model. Therefore, although we can measure the distribution of stochastic errors in the past, this distribution may not be an accurate representation of *our view* of the pattern of errors in the future. By drawing on our external information and judgement, we believe that for the short period of, say, up to four quarters into the future, the pattern of random errors will be more tightly clustered around our chosen constant adjustment than they have been in the past. So departures from the constant adjustment are *less likely to be as large* as the model equation suggests. Obviously as we forecast further into the future our confidence in external information diminishes and our expected distribution of future residuals is then best described by historical outcomes. Statements about the certainty we have in our forecast should reflect this judgemental confidence.

* For the present forecast, tables of constant adjustments can be found on pages 81-4

The consumption equation in the LBS model

$$
\begin{aligned}
\Delta \ln CND_t = & -0.0045 - 0.470\,\Delta \ln CND_{t-1} - 0.344\,\Delta \ln CND_{t-2} \\
& + 0.208\,\Delta \ln YD/_t + 0.151\,\Delta_2 \ln YD/_{t-2} - 0.096 \ln \frac{CND_{t-3}}{YD/_{t-4}} \\
& - 0.201\,\Delta \ln PC_t - 0.213\,(\Delta \ln PC_{t-1} - \Delta \ln PC_{t-2}) \\
& - 0.166\,\Delta \ln PC_{t-3} + \epsilon_t
\end{aligned}
$$

Key

CND = Non-durable consumption (1975 prices)
YD/ = Real disposable income
PC = Consumption price deflator

ln = Natural logarithm of variable
subscript t = Time period (in quarter years)
Δ = difference of variable, e.g. $\Delta \ln CND_t = \ln CND_t - \ln CND_{t-1}$
Δ_2 = two-period difference, e.g. $\Delta \ln YD/_t = \ln YD/_t - \ln YD/_{t-2}$
ϵ_t = (random) error term

For a description of this equation, see *Economic Outlook*, October 1982, p. 28.

Finally, the parameters or coefficients, such as the numbers –0.470 and –0.344 are also subject to uncertainty. Statistical techniques generate the expected value of these parameters but we cannot be certain, even if the equation is correctly specified, that these numbers are correct. Uncertainty about the values of parameters provides another possible source of model error.

Non-model errors

Non-model errors can occur even if the model is correctly specified and is not subject to stochastic errors in estimated equations. One important source is errors in the published data. Largely this is a problem of scale. The official statisticians collect vast numbers of returns from firms, shops, banks etc., which they aggregate into single observations. This process will involve considerable measurement error and it would be impossible to calculate exactly the true value of GDP, for example, for a country as large as the UK (even if a satisfactory, unambiguous definition could be agreed upon). By itself, this means that our estimation of model equations are based on data that only approximate the true values of economic outturns.

A more serious problem, however, is that the data are often revised by the official statisticians, particularly when series are *seasonally adjusted.* Seasonal adjustment is a process of smoothing raw data to remove an underlying or systematic seasonal pattern. For example the level of unemployment is usually seasonally adjusted to take account of such factors as the end of the school year or holiday-related jobs. The techniques of seasonal adjustment are frequently updated and so, perhaps as long as 12-18 months after the first publication, official estimates are revised. The consequence is that the latest data we have are largely provisional. Since our equations are dynamic this means that these recent values are used to predict future values for other variables. Hence there is a possibility that forecast errors are made because we start with wrong historical values.

A second non-model error source is in our prediction of the likely paths of exogenous variables. These, it will be recalled, are not generated by the model but must be predicted independently beforehand. In our model most policy variables such as tax rates and the level of public expenditure are forecast exogenously.

Errors in exogenous variable forecasts can be broken down into two components in much the same way that model forecast errors have in the previous section. In one sense there is a stochastic component: government spending, world interest rates etc., can only be forecast to within a certain tolerance. It is possible, as we see later, to allow for this source of error when evaluating overall forecast uncertainty.

A second component, which is usually unquantifiable, is the probability that our underlying assumptions break down. To take an example, we know there will be a general election in the near future. The outcome of this election will determine the course of the economy in the short and medium term. It is much more difficult to allow for the possibility of fundamental changes of policy using the statistical techniques we are applying here. Thus our statements about uncertainty are dependent on the policy assumptions which are set out on pp. 6 to 10.

Just as we impose non-zero constant adjustments in which we have more confidence than historical estimation of behavioural equations might otherwise suggest, generally we are more confident about our immediate exogenous variable forecasts than our projections for the medium or longer term. For example, over the next twelve months we could view large random departures from our expected forecast for current government spending to be less likely than in subsequent periods. So for exogenous variables we also have a prior view of the distribution of the future stochastic components which may well differ from some historically measured pattern of deviations from past trends. Again we attempt to reflect these prior views in the measurement of future forecast certainty to which we now turn.

II QUANTIFYING FUTURE UNCERTAINTY

From the preceding discussion we have suggested that there are ways of quantifying at least part of a forecast's uncertainty. In this section we describe one way of doing this. Firstly, though, we describe a summary measure which is used to capture the size of uncertainty. This is usually referred to as the *standard error.*

Suppose we take all our forecasts made in the past and compare them with actual outcomes. The difference between actuals and predictions are then measurable forecasting errors. If our model is unbiased, on average those errors are zero although in certain cases they may be of substantial size. The standard error is calculated by squaring all these errors, adding all the squared errors together, dividing the sum by the number of forecasts and then taking the square root (see below).

Constructing the forecast standard error

Let A_t = actual value of the variable in period t
$P_{i,t}$ = i^{th} predicted value of the variables in period t
n = the number of predictions
s_t = the standard error at time t

Then,

$$s_t = \sqrt{\frac{\sum_{i=1}^{n} (P_{i,t}-A_t)^2}{n}}$$

As described in the text, each $P_{i,t}$ is generated by stochastic simulation to produce an artificial sample of predictions consistent with the idea that each forecast has an unpredictable random component. A_t is chosen to be the base forecast value since actual values are obviously unknown in the future.

The advantage of this seemingly complicated measure is that it has certain statistical properties that we can use to our advantage in the following way. If we can predict the size of the standard error for each variable in the future, then, by making some not too onerous mathematical assumptions*, we can make probability statements about the certainty of the forecast. In particular if the assumptions we make about the quality of our model and about government policy are correct then there is only a one-in-twenty chance that the actual outcome will lie outside a band ±2 standard errors either side of the central forecast. The forecast uncertainty can therefore be quantified if we can in some way measure future standard errors of variables.

Stochastic simulations

Our aim in this paper is to quantify *some* elements of the uncertainty and future errors of our forecasts. We shall particularly concentrate on the errors that arise from the stochastic nature of the behavioural equations and from the uncertainty of our forecasts of exogenous variables. Even though this is a limited exercise it is an extremely complex one. Our model is highly interdependent. Therefore errors in one part of the forecast will generate errors in another part of the forecast. For example, errors in forecasting real personal disposable income (which is itself generated by several separate equations) will cause errors in forecasting consumption even if the equation for consumption is exactly correct. Our forecast for GDP depends on the interaction between a large number of behavioural equations and exogenous forecasts. It is virtually impossible to calculate the standard error of the forecast of GDP or of the other key variables in our forecast analytically. Instead we use the technique of *stochastic simulations*.

Stochastic simulations are produced by programming the computer to generate a large number of forecasts. Each forecast uses the estimated structure of the model but in each case where stochastic errors can occur it chooses random numbers according to the rules (or probability distributions) which we estimate generated the errors observed in the past. (As we explain in the next section, in some cases we alter the probability distributions for the future.) In the equation for non-durable consumption, for example, stochastic errors can arise in each of the coefficients on the right hand side or through the residual term, ϵ_t. There will also be an equation elsewhere in the model for the consumer price index which will in turn have its own stochastic elements – in particular a residual term and a dependence on exogenously determined tax rates. In the past we have observed, or at least can estimate, the size of the standard error of all these sources. For example, the standard error of the residual of non-durable consumption is 0.6 per cent of its average value in the past and that for consumer prices is 0.4 per cent. So the random numbers chosen are scaled by these standard errors. The scaling is such that 68 per cent of the random numbers for the non-durable consumption residuals lie within a range ±0.6 per cent of the base forecast value (i.e. the chosen value of any future constant adjustment) and 95 per cent will lie in the band ±1.2 per cent either side of the base forecast in each future period. The stochastic simulations of the model will provide a range of forecasts for all the endogenous variables in the model. We can then estimate the standard error of these forecasts and use them as a measure (in the limited sense already emphasised) of the uncertainty of our forecasts.

We have only found it practicable to generate stochastic simulations based on two sources of random error: the residual error in estimated equations and the error in forecasting exogenous variables. We have not included the errors that can be generated from the stochastic nature of the estimates of the parameters or coefficients of the equations.

Allowance for judgement

A further possibility is to take account of the judgemental skill of the forecaster when we evaluate forecast uncertainty (see Corker, Ellis and Holly, "Uncertainty and Forecasting Precision", CEF Discussion Paper No. 98). One of the conclusions of the first *Briefing Paper* in this series was that a forecaster's judgement is a legitimate addition to the forecasting procedure. The forecaster typically has some additional information which he wishes to incorporate in the forecast through imposing a constant adjustment. In some cases this means that the forecaster will be less uncertain about the future than perhaps the stochastic experiments suggest – at least for, say, six to twelve months into the future. To capture this feature we have thus devised a scheme for rescaling the measured standard errors of constant adjustments and exogenous variables in the immediate future when we conduct stochastic simulations on the model.

For constant adjustments imposed in the immediate future our prior view is that sizeable deviations from these values are less likely than in the more distant future. We therefore scale down the standard errors of constant adjustments in the short run relative to those in the longer run. Similarly we allow the standard errors of exogenous forecasts to grow with time once again to reflect our prior views.

Hence the forecast standard error bands we publish in this edition of *Economic Outlook* take into account three factors: the stochastic nature of model equations, the stochastic nature of exogenous variable forecasts and the certainty content of forecasters' judgement. The quantification of the latter is somewhat subjective, but we believe that the results give a better estimate of the true margin of error than if we simply ignore the problem.

* Namely stationarity, normality and linearity.

Interpretation of the standard error bands

We emphasise that the standard errors we present are *conditional* measures of uncertainty. They are conditional on

a) A correctly specified model.
b) The policy assumptions which have been used.
c) No fundamental change in the structure of the economy.

A way of extending the scope of the uncertainty measures to overcome condition (b) would be to produce an alternative forecast based on an alternative set of assumptions about economic policy*. The forecast standard errors would then be recomputed for this second 'scenario'. The alternative forecast would thus have associated confidence bands. For the *conditional* standard errors presented there is a 95 per cent chance that the actual outcome will lie within ±2 standard errors of the central forecast. There is a 68 per cent probability that the outcome will lie in a ±1 standard error band.

III UNCERTAINTY AND THE CURRENT FORECAST

In Table 1 we present the results of the stochastic experiments which quantify the uncertainty of the forecast contained in this *Economic Outlook*. We concentrate on just a few key variables, reporting annual totals or averages for the next three years.

Considering all the variables together we observe certain common features. The standard errors all become larger the further into the future we are forecasting. Intuitively this is what we would expect. The confidence we have in our 1983 forecast is higher than that for 1984 and 1985. Increasing standard error bands with time is not, however, a feature we would observe for all variables indefinitely. A mathematical property of our model ensures that for many variables the forecast standard errors eventually settle down to constants. By 1985 several variables have reached this upper limit – the public sector borrowing requirement being a notable exception. For example this limit would appear to be about 1.5 percentage points for the growth rate of GDP, slightly lower for consumption and about 3 per cent for fixed investment. As we have repeatedly stressed, this interpretation is conditional on our having the correct model and there being *no fundamental shocks* to world events or domestic economic policy. If indeed we do have the correct model and domestic and world economic institutions do not change fundamentally in character then there seems no reason why forecast uncertainty should increase simply with the passage of time. It is because we do give increasing weight to the possibility of *political and structural change* that subjectively we are increasingly less confident about outturns the further into the future we look. Thus our intuitive assessment of uncertainty is not entirely consistent with the measure presented here. The former includes diminishing confidence in the continued economic status quo whereas the latter is conditional on the continuation of the status quo. In this sense the standard errors presented here represent the minimum irreducible amount of precision that can be attached to our forecasts.

The general reasons why we find increasing standard errors at least for the next three years are two-fold. Firstly the model, as explained earlier, is dynamic. For this reason the uncertainty in one period feeds through to the next with a cumulative effect. Secondly the possession of additional non-model information allows us to be more certain about the near future than the model by itself might otherwise suggest. As explained, this is the reason why we impose constant adjustments to amend the pure model forecast. In our stochastic experiments we have allowed for this improved confidence in the way we have scaled the standard errors of residuals and exogenous variables. This auxiliary information extends into 1983 for many variables.

It should be recognised that, in February 1983, we only know the full 1982 outcomes for a limited number of variables (interest rates and exchange rates are obvious examples). Indeed many of the last available data (mostly for 1982 Q3) are provisional and could well be revised. For example we know from the 1981 Labour Force Survey that estimates of employment have been revised upwards by 800,000. This implies that the CSO will also be revising upwards the level of output (see Focus, p. 16). So our forecast of standard errors reflects the uncertainty about the past.

Much of our non-model information relates to this so-called "ragged-edge" data period. For example we often have up-to-date data on retail sales which is a useful indicator of consumers' expenditure or we have the latest total unemployment figure but no disaggregated figures for employment in different sectors. Or we may possess two months' data for the most recent quarter for certain variables. We can use all such information to make more accurate estimates of the unknown recent past. Even so, our assessment of 1982 is uncertain and this uncertainty carries forward to 1983 and subsequent years.

We now turn to a discussion of the standard errors of particular variables. The components of demand which are reported are consumption, fixed investment, exports and imports which, together with stockbuilding and government expenditure (not reported), constitute expenditure on GDP at market prices. The standard errors for the annual growth rate of GDP increase each year to a maximum of approximately 1.5 per cent, implying for the *level* of GDP the band shown in Chart 1. On the basis of current information we are forecasting a growth of 1.8 per cent in GDP in 1983. But because of the uncertainty attached to forecasting there is a 95 per cent chance that the growth in GDP will lie in a range from – 0.6 per cent to 4.2 per cent. So although our forecast for GDP in 1983 implies that there will

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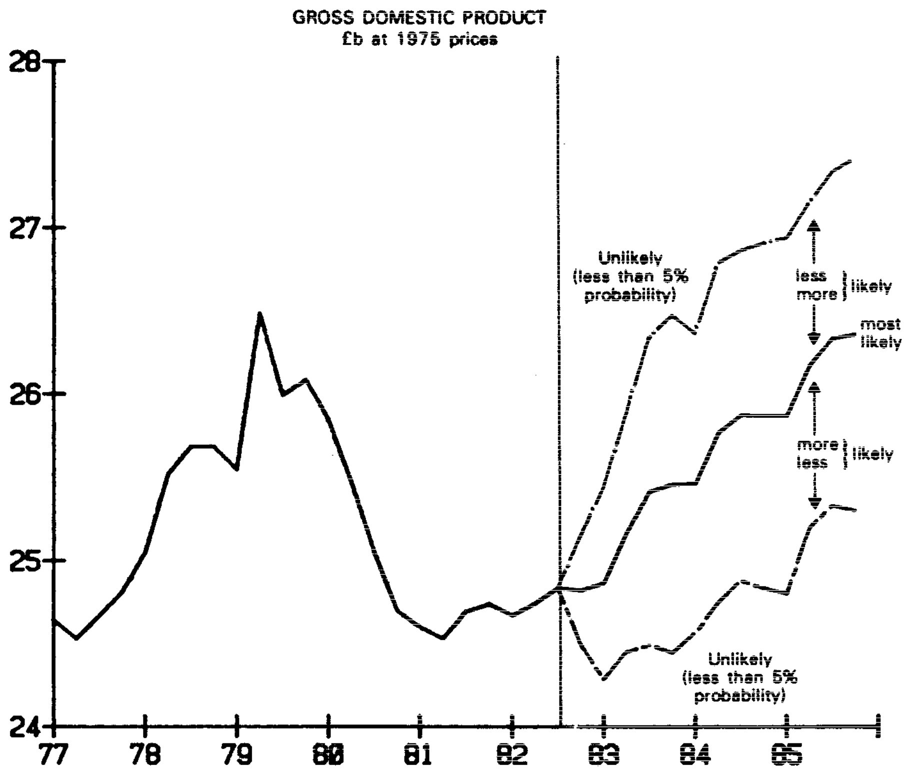
* As we do in the section on the medium term (p.19).

probably be positive growth, there is a distinct possibility that growth could be negative.

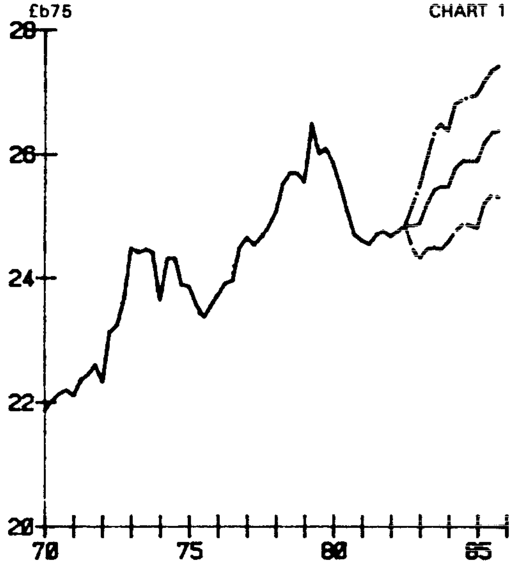
It is very important at this stage to emphasize that it is *not equally* as likely that GDP will fall in 1983 as it will rise. Conditional on the model and the information we have at present the *most likely* outcome is what we have forecast. The further we move away from the mid-range of the band shown in Chart 1 overleaf, the *less likely* the outcome (see below).

Looking at the components one notices that exports, imports and investment are all more difficult to forecast accurately (i.e. have larger standard errors) than GDP whereas consumption can be predicted with more precision. The reason for this is largely that the consumption function is a well researched area of economics and consumption decisions tend to be reasonably predictable stable relationships. Export, import and investment decisions are more difficult to



The meaning of forecast error bands

The above chart reproduces on a larger scale the forecast and standard error bands for Gross Domestic Product shown in Chart 1. Data was available at the time the forecast was completed, up to the third quarter of 1982. Beyond this period, the chart forks three ways. The central line is our published forecast. This is our best estimate of the future evolution of GDP, i.e. the path we think GDP is *most likely* to follow if our underlying assumptions are correct. We regard outcomes away from the central path as progressively less likely, although still a possibility. The two broken lines (±2 standard errors) mark a boundary outside which we consider outcomes to be unlikely. There is only a one-in-twenty chance that outcomes will lie in these regions. Clearly the ±2 standard error boundary is a subjective choice. Less cautious people might consider that a one-in-ten or one-in-five chance is sufficiently small to demark unlikely outcomes. In these cases the upper and lower bounds would be much closer to the central forecast. It should be stressed that in the 'less likely' region, the possibility of outcomes away from the central forecast does not diminish proportionally with the size of such deviations. If the broken lines are viewed as contours on a map then further lines could be drawn symmetrically about the central forecast. Such lines, if each represented a ten per cent decrease in probability, would be clustered much more densely around the central forecast than in outlying regions.



GROSS DOMESTIC PRODUCT

capture mathematically and also tend to be more volatile data series.

The next three variables in Table 1 are all price variables. The first of these, average annual consumer price inflation (Chart 2), has a steadily growing standard error over the next three years. Our expected outcome for consumer price inflation in 1983 is thus the centre of the range 4.2 per cent to 7.4 per cent. By 1985 the range is 3.3 per cent to 11.7 per cent which although larger than that for 1983 still seems narrow when one considers the erratic movements of prices over the last decade. The narrowness of the range is, however, largely a consequence of our 'consistent policy' assumptions. A new government committed to reflation or even a U-turn by the current government could well force the actual outcome through the top of the forecast range.

The reported precision of average earnings in manufacturing is similar quantitatively to that for price inflation. The same qualitative remarks about the continuation of anti-inflation policy also apply to this variable.

The third price variable reported is the trade-weighted exchange rate – the price of sterling. The standard error, as a proportion of the forecast value, is fairly large, (e.g. two standard errors in 1985 is 18 per cent of the expected value and implies a range 0.65 to 0.93). The exchange rate has proved notoriously difficult to forecast in the past largely because the speed of adjustment in exchange markets can be extremely fast and is dependent on fairly unpredictable speculative expectations. The 'fundamental' determinants of a long-run equilibrium exchange rate may be reasonably certain, but large sustained movements away from equilibrium are quite common. Most forecasters would, therefore, view even

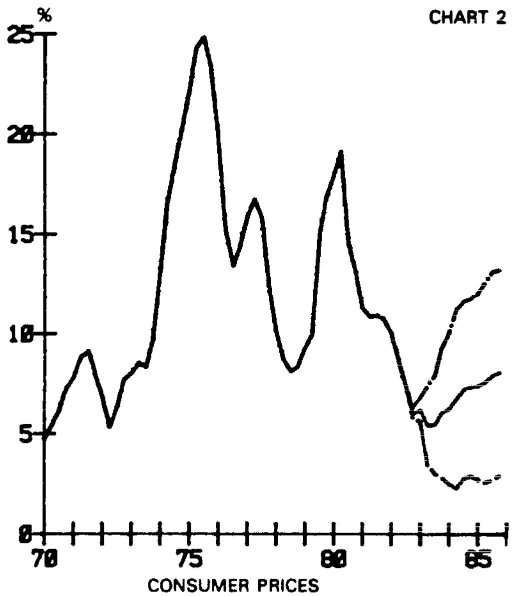
Table 1
Forecast Standard Errors

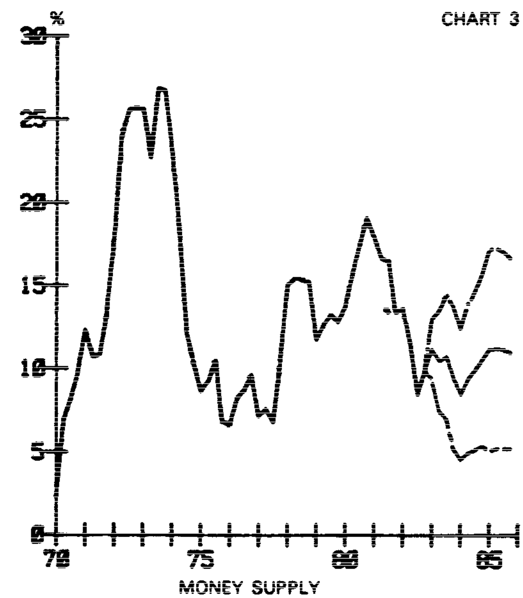
	1983	1984	1985
GDP and Demand Components at 1975 prices (annual % changes)			
GDP (output measure)			
forecast	1.8	2.0	2.0
standard error	1.2	1.3	1.5
Consumers' expenditure			
forecast	2.3	1.5	2.3
standard error	0.8	1.1	1.3
Fixed Investment			
forecast	3.3	4.0	1.5
standard error	2.4	2.8	3.2
Exports			
forecast	1.7	1.5	2.4
standard error	1.5	2.0	2.3
Imports			
forecast	4.6	2.0	1.8
standard error	1.5	2.2	2.6
Earnings, Prices, Money & Exchange Rate			
Consumer prices (index 1975 = 100) annual % change			
forecast	5.8	7.0	7.5
standard error	0.8	1.8	2.1
Average earnings in manufacturing			
forecast	8.1	7.2	8.3
standard error	0.7	1.4	2.1
Sterling exchange rate trade weighted, index 1975 = 1.0			
forecast	0.81	0.80	0.79
standard error	0.04	0.06	0.07
Money Supply (£M3) end year 4-qtr change			
forecast	9.6	10.0	9.8
standard error	2.1	2.6	2.9
Key Balances			
Public Sector Borrowing Requirement £ billion, financial years			
forecast	9.2	8.4	7.4
standard error	1.6	3.4	5.9
Balance of Payments £ billion			
forecast	1.5	0.0	-0.1
standard error	1.4	3.3	5.1
UK unemployment, excl. school leavers millions			
forecast	3.14	3.17	3.13
standard error	0.18	0.22	0.25

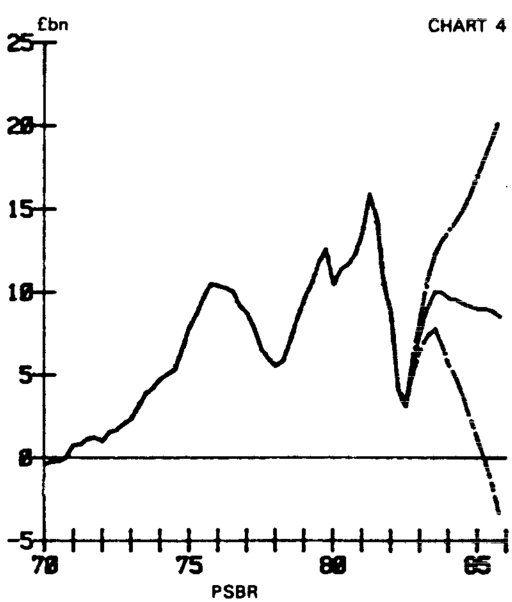
the reported uncertainty band as uncomfortably narrow. More than any other variable the exchange rate depends on market perceptions of the government's policy stance, and the narrowness of our error bands (as for prices and wages, but to a far greater degree) is conditional on the policy assumptions.

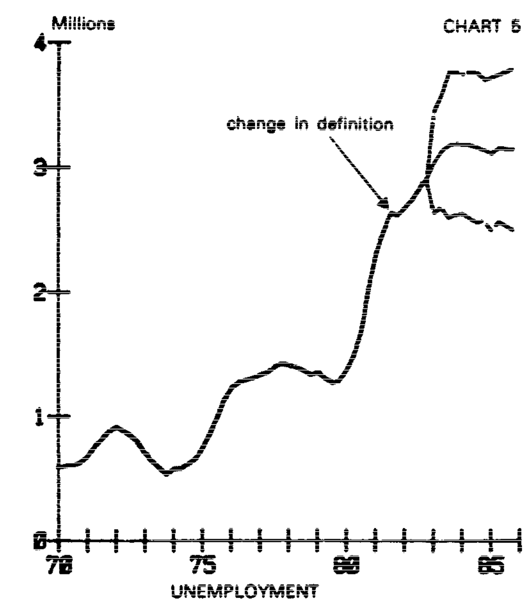
The next variable on the table shows the precision with which we can predict money supply growth (Chart 3). It also gives some indication of the ease with which the money supply can be controlled. Target bands much tighter than the ±2 standard error range reported here would seem to us fairly ambitious.

This point is reinforced when we look at the precision of our forecasts of the public sector borrowing requirement (Chart 4) which by 1985 ranges (±2 standard errors) from –£4.4bn to £19.2bn. This is largely because the PSBR is calculated at the end of a long chain of economic transactions and is particularly sensitive, as a balance, to small changes in both government revenue and spending. This lack of precision underlies the difficulty in forecasting the room for manoeuvre of the Chancellor in the next









Budget.

The same is true for the forecast of the current account of the balance of payments. Although the net balance is forecast to be only a small number, small changes in any of the components – exports, imports, volume and prices – can cause large changes in the outcome. This is reflected in the relatively large standard errors.

The final variable in the table is UK unemployment (Chart 5) which has a surprisingly low standard error given the size of movements in the unemployment rate over the last few years. Our reported bands say that our model predicts almost certainly no significant change in unemployment from the 3 million level over the next three years.

It is clear from Charts 1-5 that the uncertainty we attach to our current forecast is qualitatively very different for different variables. For some variables our estimated precision is fairly uniform over the forecast period (e.g. Chart 5) whereas for others uncertainty grows quite rapidly (e.g. Chart 4 and to a lesser extent Chart 2). The explanations we have offered in the text are partly technical and partly economic. In particular our chosen measure of economic uncertainty relies heavily on unchanged economic policy. If indeed policy is as we assume then the standard errors presented here are a reasonable assessment of how accurate we can be as economic forecasters. However our simulations of the medium term outlook under different policy assumptions (see p.19) illustrate how great is the influence of policy on economic prospects. When "policy uncertainty" is taken into account the margins of error attached to our forecast are far greater than shown in Charts 1-5.

Economic Outlook, Vol. 7, No. 5, February 1983, pp. 33-41