

INTERNATIONAL ASPECTS OF FORECASTING ACCURACY

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INTRODUCTION

There are many reasons for studying the accuracy of economic forecasts', including the need to:

- identify the sources and thereby the causes of major mistakes, in order to learn from them:
- form a rational basis for assessing what kind of policy the accuracy of forecasts typically permits policy makers to make:
- be able to recognise in advance the occasions when there is a conjunction of the sort of circumstances that typically lead to large forecasting errors.

The first step, which **is** by no means as straightforward as it sounds, is to measure the size of forecasting error. The next step, which is even more difficult, is to identify the **causes** of these errors. This involves digging into behavioural relationships that were used in constructing the forecast, and hence can be carried out only where the forecast was constructed by a replicable process – which usually implies a formal macroeconomic model. And even there, judgement typically plays a key role, so that it is necessary also that a full record of judgemental over-rides, or add-factors, has been kept.

Conceptually what is involved, after first adjusting the forecasts for incorrect assumptions about exogenous variables, is breaking in, at some appropriate place, to the set of relationships that represent the economic system. By this means it is possible to trace the propagation of forecasting error from one economic variable and its associated equation to the next. This can be done for individual country forecasts using single-country models, and is an important part of the process of identifying the reasons for major forecasting errors.

Such a procedure will identify the main reasons for error in the domestic component of a country forecast. But a significant part of the demand for a typical country's output comes from abroad, so that in turn a significant part of the error in the forecast for any individual country may well originate in the assumption made about economic conditions abroad. But economic developments abroad are the subject of forecasts to which each country has access. Hence just as forecasting error can be viewed as being transmitted within an individual economy from one relationship to another, so too can part of the forecasting error for one country be viewed, at least conceptually, as having originated as a forecasting error for some

other country, which was then transmitted through the international trade and financial mechanisms.

This is the aspect of forecasting accuracy that is considered in this article, the OECD Secretariat's first attempt in that direction. The study is highly aggregative, concentrating just on year-ahead real GNP and year-ahead inflation. And it is essentially qualitative, rather than quantitative, it being virtually impossible, for reasons discussed, to supply reliable quantitative estimates of the various causes of error in world-wide economic forecasts.

The first Section considers various issues in measuring forecasting accuracy, and explains the procedure adopted in this article. Section II examines the forecasting record on this basis for the forecasts produced for OECD real GNP by the OECD Secretariat. Section III considers the accuracy of individual-country forecasts, both of the OECD Secretariat and national forecasters. Sections IV and V look at the cross-country patterns of forecasting errors, and suggest reasons for the most important of these. The record for inflation forecasts is considered in Section VI. The article ends with a Summary and Conclusions Section.

I. CONCEPTUAL ISSUES IN ASSESSING FORECASTING ACCURACY

In principle the measurement of forecasting accuracy would seem straightforward – simply compare what was forecast with what actually happened. But the issue is rather more complicated than that.

First, all forecasts rest on assumptions, which in practice may or may not be ratified. Hence there is an immediate distinction to be made between a "technical" test of forecasting accuracy and a "practical" test. As a technical test of forecasting accuracy, it is appropriate to "adjust a forecast for its assumptions", i.e. establish what the forecaster would have forecast had the elements exogenous to the forecast been as they actually were, rather than as they were assumed to be. However while this test may seem the fairest to the forecaster, it may not impress the user, who has to take decisions on the basis of the forecasts. It is of no practical comfort to a businessman or policy maker to be told that the forecasts he was using would have been correct if only certain key assumptions had been made correctly. At the limit, he may retort that he has to take decisions on the basis of what is considered most likely to happen, which means that he is paying the forecaster to get everything right. Care therefore has to be taken in setting up the right test of forecasting accuracy. Sometimes it will be the technical test, sometimes the practical, assumption-unadjusted, test and sometimes, unavoidably, a mixture of the two.

The two areas in which the assumptions cause particular problems for the assessment of the accuracy of single-country forecasts are government policy and developments abroad. Government policy affects the ex post accuracy of a projection in at least two ways. First, it is often not certain, even when policy statements give the appearance of being quite clear on the issue, what the stance of policy actually is. On the fiscal side it is not at all uncommon to find the underlying stance, as measured for example by the cyclically-adjusted budget position, ultimately differing by at least 1 per cent of GNP from what governments project and indeed intend it to be. And the stance of monetary policy is even harder to define, and hence measure. Secondly, fiscal and monetary policy can be changed after a projection has been made, affecting the outcome. For forecasts looking only one or two quarters ahead, the consequences may be relatively minor. But for forecasts with a twelve to eighteen months horizon, the policy assumption can be a quantitatively important reason for divergence between forecast and outcome.

Forecasters in the public sector, who make the sort of forecasts that are being examined in this article, can be considered responsible for errors that arise when they fail to quantify government policy accurately. On the other hand, given that the rules of the game are that official forecasts are made on the basis of the policy stance as stated by government, official forecasters should not be held responsible for errors that arise from subsequent policy changes. Forecasters catering to the private sector, on the other hand, customarily forecast on a "most likely outcome" basis, which typically encompasses the stance of policy not as the Government says it will be, but as the forecaster expects it to be. If the forecaster has any reason to expect that policy will be different from what the Government of the day says it will be; or even that the Government might change, bringing in different policies, he attempts to allow for this in his projection. In this case the forecaster's skill includes the ability to establish both what the stance of policy is, and how it will change. Hence as far as policy assumptions are concerned, the appropriate test of forecasting accuracy for the government forecaster may often be the technical, or policy-adjusted, test, whereas that for the business forecaster might more often be the practical, or policy-unadjusted, test.

The consequences of developments abroad also enter into any assessment of forecasting accuracy. The forecaster whose responsibility is limited to making a projection for a single economy is likely, when conducting a post mortem on the accuracy of his forecasts, to wish to adjust his projection, after the event, to establish what he would have projected had he assumed that the rest of the world would evolve as it actually did, rather than as he assumed it would. He does this because, typically, he does not regard it as legitimate to be blamed for errors that derive from an area for which he is not responsible. On the other hand the user of the forecast, whether in the government or the private sector, is again unlikely to be mollified by the argument that the forecast would have been better, if only a better assumption had been made about developments abroad. Policy makers and private

sector users need, for most purposes, an assessment of what is going to happen abroad. Hence in respect of developments abroad the practical, unadjusted assessment would seem the better test, both for national government forecasts and for business forecasts.

Exchange rate assumptions are at times an important source of error in single-country forecasts. Forecasters in the public sector typically do not predict exchange rates because the government does not wish to give the market any prejudgement of its intervention policy. In the case of private forecasts exchange rates are sometimes endogenous, but in fact the difficulties in predicting exchange rates make those projections more akin to assumptions than to proper forecasts. It is therefore essential after the event to adjust single-country forecasts for exchange rate assumptions, and it is in this vein that the OECD Secretariat has at times published in OECD *Economic Outlook*, along with the conditional forecasts made under the technical assumption of unchanged exchange rates, the simulated effects of exchange rate changes.

Correction for the exchange rate assumption does not normally, however, have to be made for the OECD area as a whole. Exchange rate changes that tend to affect one economy or a group of economies in one direction usually have broadly opposite effects on other economies, with little resulting effect for the OECD region as a whole. Nonetheless if exchange rate changes are so large as to induce significant policy reactions in individual countries or affect the import propensity of the non-OECD region, these should be taken into account as important changes in exogenous factors even for global forecasts.

A third dimension enters when the forecast being assessed was constructed to assist the international co-ordination of policy making. This is essentially the international counterpart of the domestic policy-making process. Like national policy discussions, international consultations, such as those which take place in the Economic Policy Committee of the OECD, and at equivalent meetings in the IMF and the EEC, need as a starting point for their discussions internationally-consistent country by country projections of what is most likely to happen if countries, individually and collectively, continue with present policies. With such projections as a starting point, discussion can then proceed to consider how developments might look instead if a country or group of countries were to change their policies.

In assessing the accuracy of the single-country forecasts produced for this purpose by the international organisations it would seem legitimate, as with the forecasts produced by national administrations, to adjust them for the effects of post-forecast changes in policy, because these were explicitly excluded from the forecast at the express request of the policy makers. And it is appropriate to take the consequences of such changes in policy into *all* the country forecasts, by making due allowances for the transmission of policy effects from one country to another through trade and financial linkages. But it is not appropriate to adjust single-country

forecasts for other errors originating in the foreign sector because trade is unequivocally *endogenous* to the forecasts of the international organisations.

These considerations suggest that, in assessing the accuracy of forecasts made to assist the process of economic policy making, it is appropriate, regardless of whether the forecast was made by a national administration or an international organisation, to adjust the forecast for its policy assumptions. But it may in general not be appropriate, for either type of forecast, to make any other adjustment.

In practice, however, it can prove impossible to adjust a forecast even for just its policy assumptions. Certainly, it cannot be attempted in this article, because for the earlier years of OECD forecasts there is no record of the analytic framework used in constructing the forecasts, only partial historical data, and little in the way of a quantitative record of policy assumptions underlying the forecasts². Hence while it is intended to try to improve the situation for the future, for the past there is no alternative but to adopt the simpler, though less appropriate, test of forecasting accuracy, which is simply to compare what was forecast with what actually happened.

II. THE BASIC RECORD: OECD FORECASTS FOR YEAR-AHEAD REAL OECD GNP

One broad measure of the OECD Secretariat's forecasting record is the accuracy with which it has forecast year-ahead real GNP growth for the OECD economy as a whole. This gives an idea of how well understood were the basic forces acting on the economy, the channels through which they operated, and the lags with which they took effect³. These figures are given in Table 1. There are a number of points to be made about them. First, as noted in Section I, the simple difference between forecast and outcome may not represent the true "error" to the extent that the forecasts were made on the basis of policy assumptions which were not borne out in practice.

The second point is that although forecasts for the OECD area as a whole might, on a *priori* grounds, be expected to benefit from a law-of-large-numbers type of compensating errors, international linkages would have the effect of magnifying OECD area-wide forecast errors, by transmitting the forecasting error from the originating country to its trading partners. Stronger (weaker) than expected GNP growth in one country will lead, through allowance for the trade linkages, to stronger (weaker) than expected growth in other countries. The effect will be quantitatively the most important in respect of the United States, for which a 1 per cent change in GNP probably changes the GNP of the rest of the OECD area by $\frac{1}{4}$ of a percentage point, and for Germany, where a 1 percentage point change in GNP changes GNP in the

rest of Europe (but not North America or Japan) by perhaps $\frac{1}{4}$ of a percentage point also. Moreover, the sentiment of forecasters working together, in an international Secretariat or wherever, and thereby influencing one another, might also be expected to work mainly in one direction or the other on any given occasion.

These caveats having been made, the fact is that year-ahead forecasts of real OECD GNP were generally within a percentage point of the outcome (Table 1). The exceptions during the total of 17 years were, but for the obviously-special year of 1974, the under-predictions of 1968 ($-1\frac{1}{4}$ points) and of 1976 (also $-1\frac{1}{4}$ points) and the over-predictions of 1971 ($1\frac{1}{2}$ points), 1975 ($1\frac{3}{4}$ points) and 1982 ($1\frac{1}{2}$ points). There were a number of good individual years: hitting 1973 without error must rank as an achievement, as must the 5-year run from 1976.

The data on forecasts and actuals are plotted in the upper panel of Chart 1; the forecasts broadly tracked the year-to-year changes in real GNP growth, as well as picking up the general downward trend since the mid 1960s. Also apparent is a

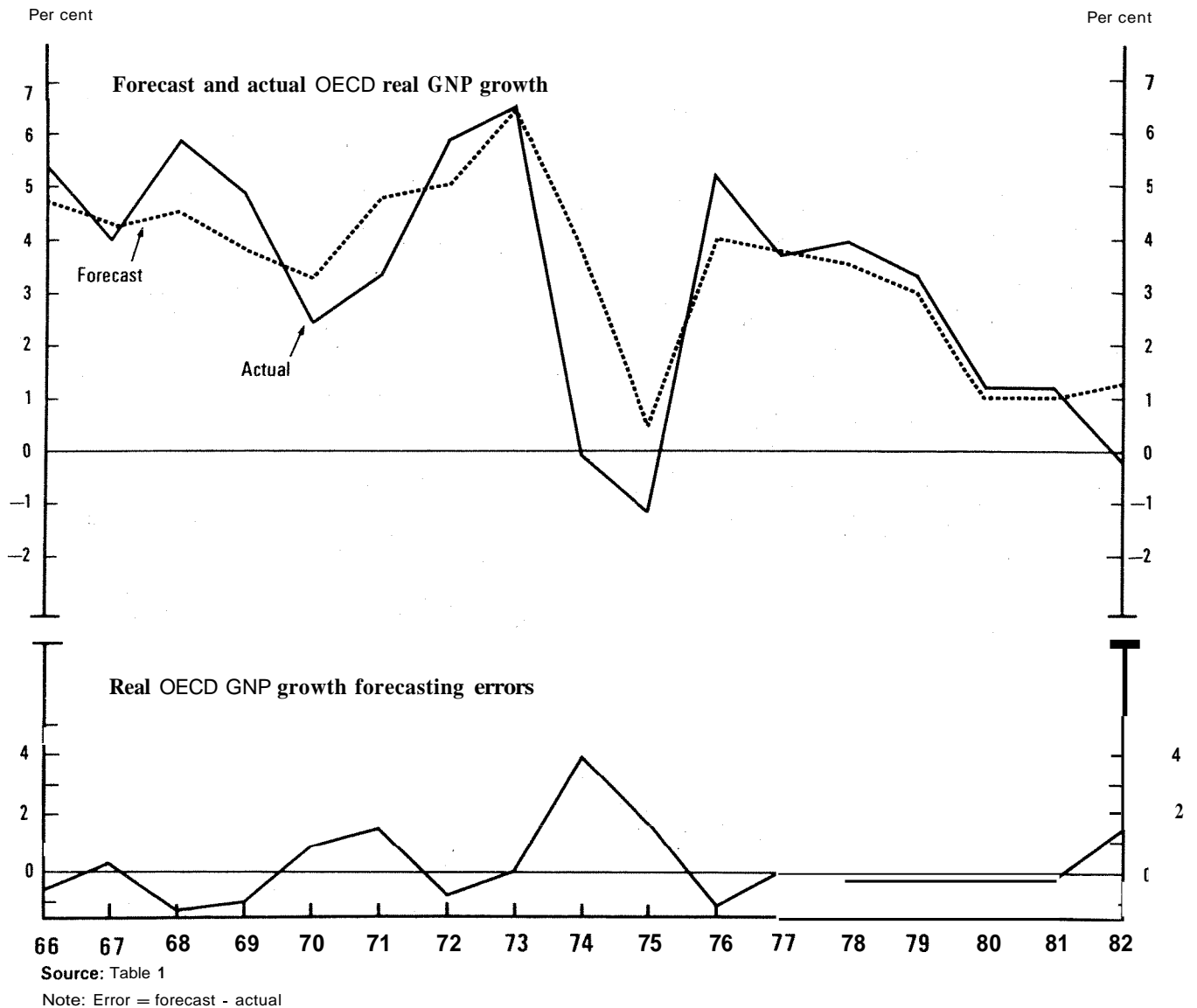
Table 1. Forecast and actual OECD real GNP growth

	Forecast	Actual	Error
	(1)	(2)	(1) - (2)
1966	4%*	5.4*	-%
1967	4 $\frac{1}{4}$ *	4.0*	$\frac{1}{4}$
1968	4 $\frac{1}{2}$ *	5.8*	-1 $\frac{1}{4}$
1969	3%*	4.8*	-1
1970	3 $\frac{1}{4}$ *	2.4*	$\frac{3}{4}$
1971	4%*	3.3*	1 $\frac{1}{2}$
1972	5*	5.8*	-%
1973	6 $\frac{1}{2}$ *	6.5*	0
1974	3%	-0.1	4
1975	$\frac{1}{2}$	-1.2	1%
1976	4	5.2	-1 $\frac{1}{4}$
1977	3%	3.7	0
1978	3 ^h	3.9	- $\frac{1}{2}$
1979	3	3.3	- $\frac{1}{4}$
1980	1	1.2	- $\frac{1}{4}$
1981	1	1.2	- $\frac{1}{4}$
1982	1%	-0.2	1 $\frac{1}{2}$
Mean absolute error			1

* Seven largest countries.

Note: Forecast values for year t are taken from the December OECD *Economic Outlook* of year $t-7$, and actual values from the December OECD *Economic Outlook* of year $t+1$. The 1967 forecast was taken from the November 1966 edition of the OECD Observer, and the 1966 forecast from the March 1966 edition of the OECD Observer. Where forecasts were expressed as ranges, the mid-point was taken. Exceptionally, the December 1971 OECD *Economic Outlook* did not present a year-ahead forecast because of uncertainty about exchange rates just before the Smithsonian realignment; accordingly the 1972 forecast and the 1970 actual shown in the table are the figures published in the July 1972 OECD *Economic Outlook*. The 1966 and 1967 actuals, and the 1966, 1967, 1968 and 1969 forecasts were obtained by weighting together the individual-country forecasts, using the weights published with the forecasts. The 1982 actual was adjusted for exceptionally large data revisions to the U.K. national accounts, and differs slightly from the figure published in the December 1983 OECD *Economic Outlook*. The correlation coefficient (r^2) between the forecast growth rates and the actual growth rates is 0.7. If the observations for 1974 and 1975 are excluded, the coefficient (as referred to in the text) is 0.8.

CHART 1
Forecast and actual OECD real GNP growth,
and errors



tendency to mis-predict many of the years of maximum change, although 1973 was an honourable exception.

To examine the issue of systematic bias further, the data on forecasts and actuals are plotted in Chart 2. The various points, which represent forecasts for individual years, should each be considered in relation to the line AA'. Any forecast lying on this line is correct; forecasts to the left are under-predictions, and forecasts to the right are over-predictions. It can be seen that, discounting 1974 and 1975, which as discussed in Section V were highly special years, the forecasts for most years lie close to the AA' line. That having been said, there is some evidence of modest systematic bias. The dotted regression line was fitted to the data excluding

the observations for 1974 and 1975. The equation of the line (with the standard errors in brackets) is

$$\text{Actual} = -0.3 \pm 1.1 * \text{Forecast} \quad r^2 = 0.8$$

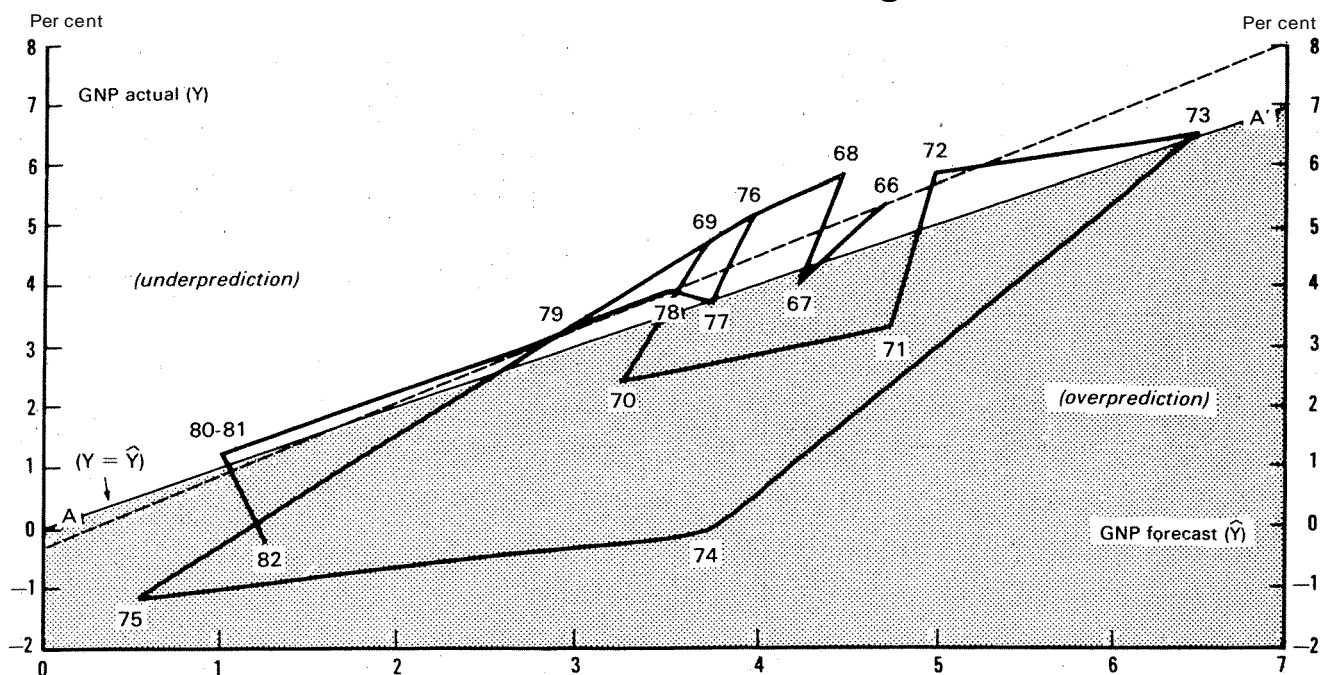
$$(0.59) \quad (0.75)$$

The fact that the slope coefficient is slightly greater than unity suggests some tendency towards proportionate under-prediction of the growth rate when it exceeds 3 per cent, and the fact that the constant is less than zero suggests that there is a uniform tendency to over-predict when growth falls short of 3 per cent. However, these conclusions are not statistically significant, given the size of the standard errors of estimate: the constant term is insignificantly different at the 5 per cent level from zero, and similarly the slope coefficient is insignificantly different from unity. Further, the effects of the adjustments which would be implied, at least ex post, to the OECD projections are rather small. For example, taking the regression coefficients at face value, the following "adjustments" to the OECD forecasts might be implied:

Forecast	Adjusted forecast
0	-1/4
3	3
5	5%

This forecasting performance, which is consistent with a broad understanding of the forces acting on the OECD economy, is a better performance than that offered

CHART 2
**Scatter diagram of forecast
 and actual OECD real GNP growth**



Source: Table 1.

by conventional naive models, which take as their prediction for each year either the growth rate of the previous year (Column (i) below), or the average of some previous run of years – three in the example shown in Column (ii). The projections produced by a more sophisticated **ARIMA (Auto-Regressive Integrated Moving Average)** model also prove inferior to those produced by methods founded in structural economic relationships (Column(iii))⁴.

	(i)	(ii)	(iii)
1967	1.4	1.7	1.1
1968	-1.8	-0.9	-2.6
1969	1.0	0.3	1.0
1970	2.4	2.5	0.9
1971	-0.9	1.0	-0.2
1972	-2.5	-2.3	-2.3
1973	-0.7	-2.7	-1.4
1974	6.6	5.3	4.9
1975	1.1	5.3	1.2
1976	-6.4	-3.5	-3.6
1977	1.5	-2.4	1.0
1978	-0.2	-1.3	-2.1
1979	0.6	1.0	0.9
1980	2.1	2.4	0.9
1981	0.0	1.6	0.7
1982	1.4	2.1	1.9
Mean absolute error	1.9	2.3	1.7

Many of these errors are greater than 1 percentage point, and some are very large. The mean absolute error is on average twice as large as for the OECD forecasts.

The next stage is to investigate these figures more closely, to see why the larger errors occurred. That is the subject of the next three sections.

III. THE ACCURACY OF SINGLE-COUNTRY FORECASTS FOR **GNP**

Single-country forecasts might be expected to exhibit somewhat greater errors on average than the OECD area forecast which, representing an aggregate of individual-country forecasts, (albeit internationally consistent), could thereby be expected to benefit from some cancelling of errors. This section takes up the issue of single-country GNP forecasting errors, by examining projections by national forecasters and the OECD Secretariat for 14 individual OECD Member countries.

The data. Forecasters in a large number of OECD countries were asked for information on the year-ahead accuracy of forecasts for real **GNP** and for inflation,

whether measured by the GNP deflator or the consumer price index. Thus the forecasts sought were those made in October, November or December for the following calendar year. The forecasters were also asked to supply the values of the actuals against which the forecasts should be compared. This seemed the most sensible approach because only those who made the forecasts really know which series, to which base year, and so on they were trying to predict. Forecasters were asked to provide estimates of the actuals made about one year after the outcome, as described in the footnote to Table 1. In some cases, however, there were substantial subsequent revisions to the estimates of the actuals, and in others the actuals were not obtainable on the precise basis sought – see the Annex tables for details.

The response was good. There were a few disappointments, generally in respect of official forecasts which could not be made available, but overall the forecasters were able to be forthcoming, in some instances going to considerable lengths to secure the data being asked for. Details of the country coverage obtained, as well as the actual data, are given in the Annex.

There were some pearls among the data. In particular there were three superbly-long series, for Japan from **1955**, Norway from **1952**, and Sweden from **1949**. The evidence of these early data, together with some scattered figures on forecasting accuracy in the United States in the immediate post-World War II years (see especially Sapir, **1949** and Zarnowitz, **1979**) is that mistakes were sometimes very large by present day standards.

Serious economic forecasting got underway only in the early **1960s** in many OECD countries – as indeed in the OECD Secretariat – and the number of returns that have been obtained are consistent with this. For **1950** there is just one series. For **1955** there are three and by **1960** five. By **1966** however, there are nine series, and in addition the OECD Secretariat had begun publishing its forecasts. Hence the analysis presented below starts in the year **1966**, and runs to **1982**, by when there are 33 series.

A decision had to be taken in respect of data for the United States, for which there are very many serious private sector forecasters. If all, or even many, of these were to be included, these would swamp the number available for other countries, and might in any overall summary thereby give a misleading impression of forecasting accuracy in OECD countries generally. Accordingly, advantage was taken of an offer by Stephen McNees⁵ who supplied a "consensus series", an unweighted average of about 50 important private sector forecasts. There does not appear to be a sufficient number of private sector forecasts for swamping to be a problem for other countries, except perhaps Germany for which the joint-forecast of the five main institutes has been taken. The official and the OECD forecasts were then added to the sample. Overall the OECD forecasts account for about 40 per cent of the total.

Principal findings. The main findings are that

- the overall distribution of the errors in the single-country forecasts (national forecasters and the OECD Secretariat) is approximately normal (Chart 3). Within this overall sample, the errors of the OECD forecasts exhibit some positive skewness (a bias towards growth optimism) (Chart 4). National forecasts also display some positive skewness of their errors (Chart 5);
- about half of the total forecasts (national forecasters plus the OECD Secretariat) were within 1 percentage point of the outcome, and a further one-fourth were between 1 and 2 percentage points of the outcome (Chart 3). But there were some extremely large errors, even when taken in relation to the rapid growth that some countries were experiencing at the time:
- overall the OECD forecasts seem neither markedly superior nor markedly inferior to those of the national forecasters (comparison of Charts 4 and 5);
- the frequency distribution of errors year-by-year shows, as might be expected, marked positive skewness in some years, and marked negative skewness in others. This point is taken up in Section IV.

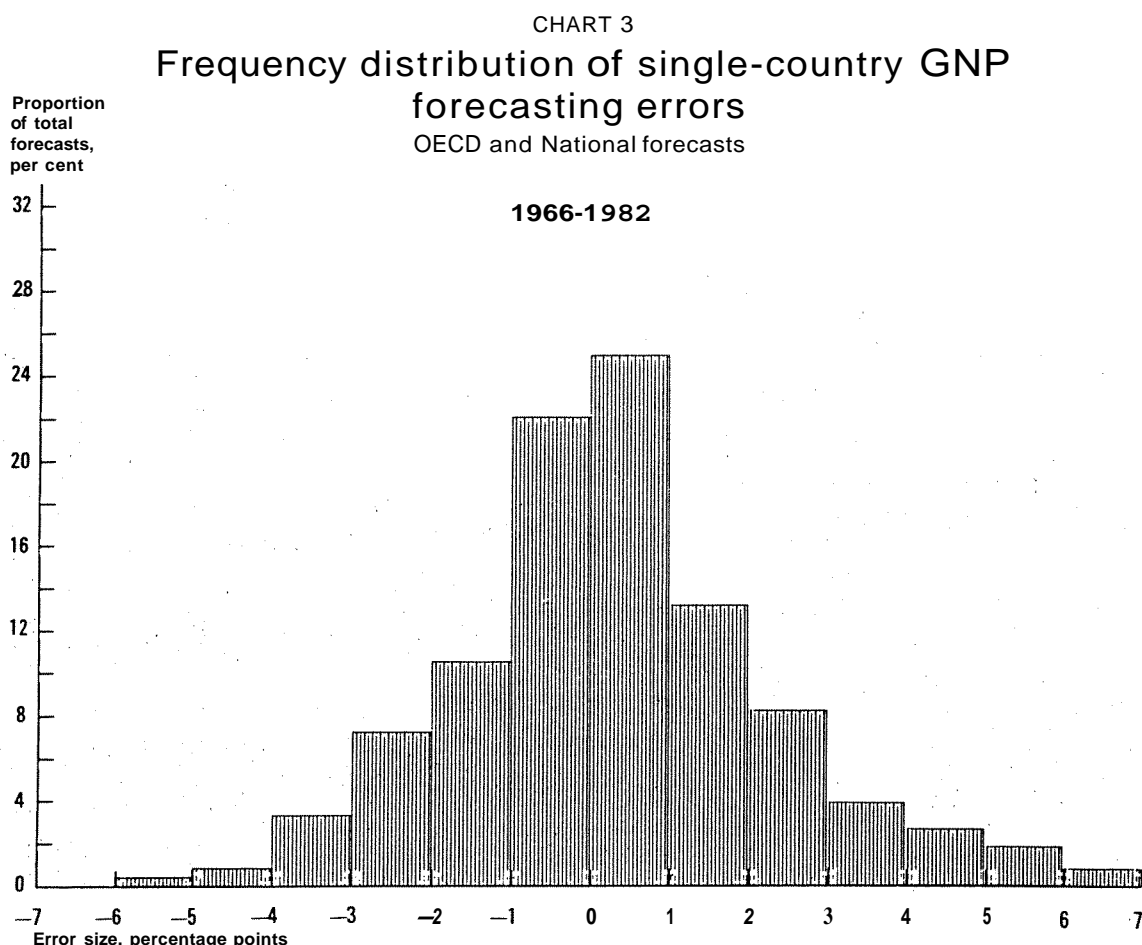


CHART 4

Frequency distribution of single-country GNP forecasting errors

OECD forecasts

1966-1982

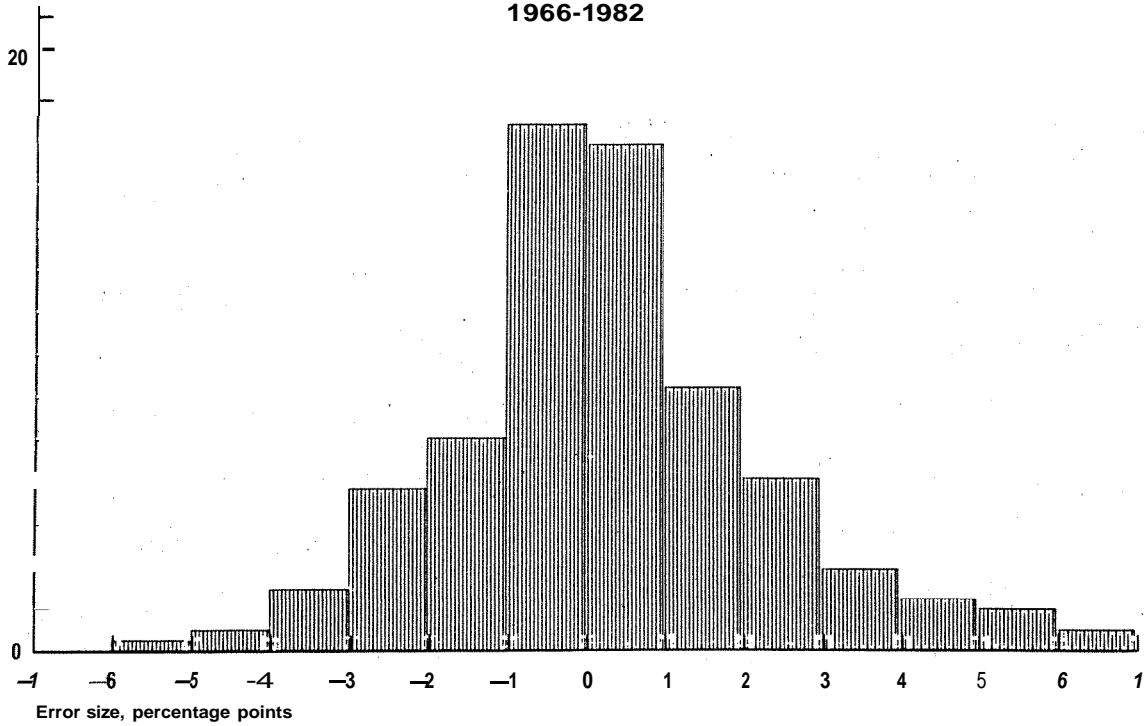


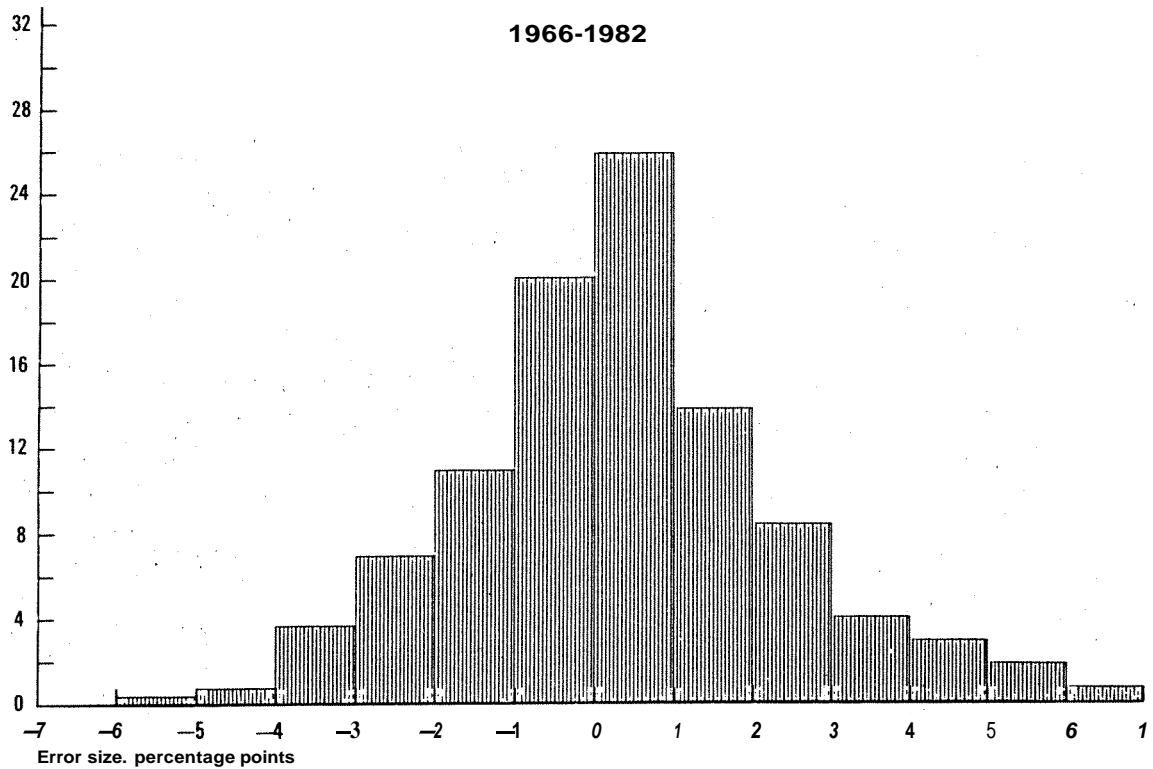
CHART 5

Frequency distribution of single-country GNP forecasting errors

National forecasts

1966-1982

Proportion of total forecasts, per cent



It is not clear what qualitative interpretation should be placed upon these figures, for in part the assessment of how impressive or unimpressive such a forecasting performance is depends upon how difficult the forecasting task is considered to be, and what sort of accuracy had been expected. But it is probably fair to say that such accuracy is somewhat less than many forecasters once had hoped would prove possible, yet at the same time somewhat better than some present-day detractors would suggest. Clearly many questions are raised, most importantly perhaps "why did these errors occur, and in particular, why did the *large* ones occur?" There are conceptually two types of source: errors that originated in the country in question (originalsin), and errors that were transmitted from outside the country (acquired sin).

The task of identifying the cases where error contributions of the first type were key is formidable, and is not addressed in this paper. On the other hand it does appear possible to throw some light on a number of instances where a significant contributor to error in individual-country forecasts was developments which, from the standpoint of the individual economy, originated abroad. Hence Section IV takes up the issue of forecasting error that is transmitted internationally.

IV. THE COINCIDENCE OF SINGLE-COUNTRY FORECASTING ERRORS FOR GNP

Conceptually the differences between forecast and outcome for individual-country forecasts can, from the vantage point of any single country, be divided into two essentially-exclusive categories:

- i)* errors originating in the domestic part of the forecast, whether because of a post-forecast policy change, or an error in one or more of the component elements of the domestic forecast; and
- ii)* error in the forecast of, or assumption about, developments in other countries, whether inside or outside the OECD. Error in the assumption about, or forecast of, the exchange rate implicitly also falls into this category.

If, in any given year, the forces acting on the OECD economy were broadly neutral, and if each single-country forecast were made essentially in isolation, with little contact between and discussion among those making forecasts for other countries, it might be expected that some country forecasters would over-predict domestic developments, while others would under-predict. Likewise, some would over-predict, or make too strong an assumption about, developments in the rest of the world, while others would do the reverse. Hence in a broadly normal year without significant discussion among forecasters it might be that

- i) the balance between the number of positive forecasting errors and the number of negative forecasting errors would be fairly close to zero; and
- ii) the various single-country errors would approximately cancel one another, so that a forecast for the total **OECD**, made up from component country forecasts, would turn out to be relatively close to the actual outcome.

Of course this is somewhat of a stylisation. Seldom is a year perfectly normal for any country, and in some years the **OECD** economy as a whole is markedly affected by a non-neutral force or set of forces. Furthermore, national forecasters do in fact talk to one another, each trying to form a view of likely developments abroad. Hence neither proposition (i) nor proposition (ii) could be expected to hold in a strict sense; there will likely be random fluctuation in the balance of pluses over minuses, so that the balance would be unlikely to be exactly zero except by chance.

However, in addition to the years when the balance between positive and negative country errors is likely to be fairly close to zero – which could well represent the majority – there are also likely to be, from time to time, certain special, atypical years for which the single-country errors are rather far from randomly distributed. This could arise in any one of a variety of ways. It could be that the entire **OECD** economy is affected by an external shock. If the shock is unexpected, or the likely effects are fairly generally misunderstood, the result is likely to be a significant forecasting error, for the **OECD** area as a whole and thereby for most countries individually. Or, running the other way, it may be that something rather general happens and is misforecast *within* the **OECD** area, leading to errors for most countries individually and thereby for the **OECD** area as a whole. A systematic shift in the personal savings ratio following a sharp change in inflation worldwide would be an example, as would an underestimation of (linkage) effects of a significant swing in the stance of aggregate demand policy in a number of countries simultaneously. The obverse could also occur, with individual-country forecasters, as a result of talking together, convincing themselves that something important was going to happen but which in the event did not.

Such considerations raise a presumption that, in at least many of the years when the balance between positive and negative forecasting errors across countries is markedly different from zero, that is to say when a significant majority of single-country forecasters either over-predict or under-predict likely developments in their countries, the forecasting error for the **OECD** economy as a whole is also likely to be relatively large.

The evidence. In order to look at the sources and causes of forecasting error from this international transmission standpoint, the data on **OECD** Secretariat and national-forecasters' errors for the single-country forecasts of year-ahead real **GNP** described in Section III were analysed on a year-by-year basis to calculate each

year's balance between positive and negative errors. The balance statistic B was computed, being the total number of positive forecasting errors less the total number of negative errors, the whole divided by the total number of forecasts. Hence B is bounded by the values ± 1 , a value of $+1$ indicating that all forecasters over-predicted, a value of -1 that all under-predicted, and a value of 0 that as many over-predicted as under-predicted. The results are shown in the first column of Table 2.

These data are consistent with the notion that there were a number of years which were basically "normal" from the forecasting point of view, in that in these years the number of over-predictions was approximately balanced by the number of

Table 2. Analysis of single-country forecasting errors: year-ahead real GNP

	Balance of single country errors (OECD plus national forecasts) (B)	Memorandum items	
		GNP-weighted sum of single country errors ^a (National forecasts)	Error of OECD forecasts for OECD area
	(1)	(2)	(3)
1966	-0.13	-0.6 ^b	-%
1967	0.22	-0.2 ^b	¼
1968	-0.58	-1.7 ^c	-1¼
1969	-0.40	-0.4 ^c	-1
1970	-0.10	0.6 ^d	¾
1971	0.38	1.3 ^d	1½
1972	-0.52	-0.8 ^d	-%
1973	0.33	0.8 ^d	0
1974	0.94	2.2	4
1975	0.69	1.7	1%
1976	-0.52	-0.4	-1¼
1977	0.39	0.5	0
1978	0.03	0.2	-¼
1979	-0.39	0.2	-¼
1980	0.09	-0.3	-¼
1981	0.39	0.5	-¼
1982	0.52	2.3	1½

a) United States, Japan, Germany, France, United Kingdom, Italy, Austria, Denmark, Finland, Netherlands, Norway, Sweden and Switzerland.

b) Excluding France, Italy, Denmark and Switzerland.

c) Excluding Italy, Denmark and Switzerland.

d) Excluding Denmark.

Notes

1. The balance, B, was computed as the sum of the number of over-predictions minus the sum of the number of the under-predictions, divided by the total number of forecasts. Hence the Statistic B lies in the range $-1 \leq B \leq 1$.

2. This column gives the error for OECD-area GNP implicit in the single-country forecasts. It is computed as the GNP-weighted sum of the single-country errors: the errors of the various national forecasts for each country (see the Annex) were first averaged, to give an overall figure for each country.

3. These are the same figures as in Table 1.

The correlation coefficient (r^2) between the columns of figures (all correlations are positive) are:

$$r^2_{1,2} = 0.87 \quad r^2_{1,3} = 0.83 \quad r^2_{2,3} = 0.88$$

under-predictions. But there were also some years – five stand out – in which a significant majority of country forecasters, whether in the **OECD** Secretariat or in countries, underestimated growth – **1968, 1969, 1972, 1976** and **1979**, and four years when a significantly large number overestimated growth – **1971, 1974, 1975** and **1982**.

By and large these years in which single-country forecasts exhibited systematic error were indeed also the years in which the largest forecasting errors were made for the **OECD** area as a whole, whether by national forecasters or by the **OECD** Secretariat. For the national forecasters, **1968** was the year of largest under-prediction for the **OECD** area as a whole when all their forecasts are taken together, and **1971, 1974, 1975** and **1982** were the years of greatest over-prediction. For the **OECD** Secretariat, **1968, 1969** and **1976** were years of significant under-prediction of **OECD GNP**, and again **1971, 1974, 1975** and **1982** were years of significant over-prediction. The equivalence is not perfect: **1979** does not fit, for example. Inspection of the errors here reveals that while in **1979** a large proportion of forecasters (nearly half of the total of single-country forecasts) underestimated growth, the errors for the **OECD** economy as a whole were typically small, amounting to an underprediction of only $\frac{1}{4}$ percentage point for the **OECD** Secretariat's forecasts, and an over-prediction of about the same size for national forecasts. And there are other examples too. But overall there is a high and significant positive correlation between each column in Table 2 and each of the other two, indicating that there is a strong tendency for the largest errors for the **OECD** area as a whole to be made when the majority of single-country forecasters make errors in the same direction (for correlation coefficients, see the bottom of Table 2). And it is emphasized that there is no *necessary* reason why there should be as high a correlation between columns (1) and (2), and (1) and (3), as there is between (2) and (3).

The fact that the years in which single-country forecasts exhibited systematic error were generally also the years in which the largest forecasting errors were made for the **OECD** as a whole suggests two possible explanations:

- a misunderstanding, a misquantification (for instance due to policy changes), or both, of some force or group of forces that affected the **OECD** economy as a whole; or
- a misunderstanding or misquantification of a force or group of forces that affected just a few economies (or maybe even just one) with the effects then being transmitted to the others. The main "transmission" channels would have been, presumably, the international trade and financial linkages, although on occasion less tangible effects such as the international transmission of changes in confidence may also have been important.

V. POSSIBLE REASONS FOR THE LARGEST FORECASTING ERRORS FOR GNP

This section suggests some of the possible causes of the larger forecasting errors identified in Sections II and III. Rather than considering first the under-predictions and then the over-predictions, the examination is instead chronological, because that makes explanation more straightforward.

The 1968 under-prediction. One possible cause that stands out for the under-prediction of 1968, and which continued into 1969, is a possible failure to estimate accurately the strength of the impulse to growth provided by the very large fiscal expansion over the previous three years and the pronounced easing of the stance of monetary policy. Certainly, the stance of policy *was* expansionary. Consider first the United States. The McCracken Report (McCracken, *et al.*, 1977) observes that " ... the long expansion which began in 1961 was proceeding strongly as it entered 1965. Fiscal policy was expansionary ... reflecting the tax cuts of 1964 and the inability to finance by taxes the Vietnam war build-up and the social programmes stemming from the civil rights thrust and the "great society" goals of the Johnson administration. Demand pressures, as indicated by the GNP gap, became excessive in the second half of 1965, and remained heavy until mid-1969... The Administration did not seek a temporary tax surcharge until 1967, and it was not enacted until June 1968... Monetary policy, after a contractionary phase in 1966 (when the Federal Reserve Board may have attempted to compensate for excessive fiscal stimulus), eased and turned expansionary... By the time of the election in 1968, the impact of budgetary changes was turning negative, and the Federal Reserve Board was about to enter a period of severe restraint and rising interest rates that would persist through 1969." (p. 47).

In Japan, too, aggregate demand policy was expansionary, adding to the strong demand boost coming from exports, particularly to the United States. Again quoting McCracken, "The economy was coming out of a mild recession in 1965. Supported by expansionary monetary policy and a government budget which was both expansionary and strongly oriented towards government and private investment, the economy entered upon a long period of strong economic growth, real GNP increasing by 55 per cent in the four years to 1969" (p. 48).

Lastly, aggregate demand policy was expansionary in Europe also. McCracken again: "A major expansionary budget in 1967, Germany's first recourse to deficit financing, contributed to an unprecedented boom in 1968-70... In France, 1966-67 was a period of relatively sluggish demand expansion, but following the *événements de mai* in 1968 strongly expansionary policies were followed, subsequently moderated in conjunction with the 1969 devaluation ..." (pp. 48-49).

Thus in the years leading up to 1968 there was a synchronised expansion in the three largest **OECD** countries, and then policy swung in the fourth too. The size of the impact of the fiscal part of this expansion was quantified in the **McCracken Report** (*op. cit.* pp. 278-281) – see Table 3.

Table 3. Fiscal impact measure, nine OECD countries*
Weighted sum of total budgetary changes,
excluding multiplier effects
A positive number indicates a stimulus to aggregate demand
Per cent of GNP/GDP

1965	0.2	1971	-0.2
1966	0.9	1972	-0.7
1967	2.2	1973	-1.5
1968	-0.4	1974	-0.9
1969	-1.9	1975	1.9
1970	0.0	1976	-0.9

* United States, Japan, Germany, France, United Kingdom, Italy, Canada, Netherlands, and Sweden.

Source: **McCracken, et al., (1977), pp. 339-340.**

These figures are not ideal, in that they measure only the first round impact of fiscal policy; allowance for multiplier effects could well double these numbers. But they are the best available for the period. They indicate that, in terms of the size of the initial impact, the years 1965 to 1968 witnessed one of the two biggest swings in the stance of fiscal policy over the 12-year period for which those data were calculated (the other, equally large, was the movement towards contraction over the three years 1972 to 1974, but in this case monetary policy tended to counteract, rather than reinforce, the fiscal influence).

A synchronisation of policy across countries, particularly the major countries, risks leading to an under-prediction of the consequences. There is no necessary reason why this should be so: it ought to be possible to get the **sums** right. But the risk is that while the typical single-country forecast may capture broadly correctly the domestic consequences of its own policy, insufficient allowance may be made for the effects on its exports, and hence its **GNP**, of the consequences **of** the expansionary policies in other countries. One area where miscalculation of this sort was almost certainly important for a number of single-country forecasts in 1968 was the error in predicting **U.S.** imports, which grew much faster than import functions at that time were predicting⁶.

If policy-related linkage errors were important then, taking into account the lags with which fiscal policy is generally considered to operate, it would seem likely

that the peak effect, and hence also perhaps the major underestimation, would indeed have been in 1968. Further, it would have manifested itself, for some countries at least, as a significant under-prediction of the growth of world trade. An explanation of this sort seems to have been offered at the time, although like most backward-looking discussions in the OECD *Economic Outlook*, it is rather short, essentially descriptive rather than analytic, and somewhat hesitant. Under the heading "The unexpected strength of demand in 1968", the December 1968 OECD *Economic Outlook* pointed to faster than expected domestic demand growth in the United States, Germany, France and the United Kingdom. This spread through international trade to the other OECD countries: "The sharp upturn in import demand in the major OECD countries brought about a significant change in the business conditions of the smaller industrial countries in Europe, all of whom are highly dependent on international trade". (p. 9); and "In Canada and Japan, the export boom had an immediate effect on activity, both through its domestic impact and by sustaining productive investment". (p. 8).

Not only was the boom somewhat stronger than expected, but it also surprised many commentators by the time it took to tail off – also an indication that the lagged effects of a policy stimulus were being underestimated. The OECD *Economic Outlook* of July 1969 noted that "In the second half of last year output was expanding strongly in nearly all OECD countries. The United States was responding only slowly to disinflationary policies and in Europe demand was building up rapidly, with general reflation continuing in Germany and a resurgence of demand in France... Only in the United Kingdom has pressure eased so far this year as much as expected." (p. 7).

Thus while all such situations have a "chicken and egg" element to them, it would seem at least possible that an important reason for the 1968 underestimation was a failure to allow fully for the effects of international linkage. At the level of the individual country forecast, this failure manifested itself as unexpectedly strong exports. At the level of the OECD area as a whole the failure would have manifested itself – if the exercise were indeed performed at that level of aggregation – as the application of too low an OECD area multiplier to the change in the fiscal stance.

The over-prediction of 1971. Although 1971 is singled-out by the arbitrarily-taken 1-point criterion, it is probably more appropriate to consider the years 1970 and 1971 together; the year-ahead GNP forecasting error made by the OECD Secretariat was an over-prediction on both occasions – $\frac{3}{4}$ point for 1970 and $1\frac{1}{2}$ points for 1971, just as 1968 and 1969 were both years of under-prediction. Similarly, the years 1974 and 1975, both years of over-prediction, are taken together below.

It is rather hard to disentangle the various reasons for the 1970/71 over-prediction. The July 1971 OECD *Economic Outlook* noted that "The

deceleration in the growth of OECD output in 1970 was greater than foreseen", but the only suggested reason was special factors, "... in particular the General Motors strike in the United States and the continuing social unrest in Italy". (p. 9) Then, writing about 1971, the December 1971 OECD **Economic Outlook** noted that "Growth has strengthened less than was expected a year ago" (p. 16), but again does not really establish why this was so.

However, it seems suggestive at least that the years 1970 and 1971 immediately followed a substantial restrictionary policy swing. The McCracken Report notes that "Between 1968 and 1969, the stance of both fiscal and monetary policies moved strongly towards restriction ..." (p. 51). And on the basis of the fiscal impact calculations cited in Table 3, the size of the swing towards restriction of fiscal policy in 1968 and 1969 together was over 2 percentage points of the combined GNP of the nine biggest economies. This was the second-largest fiscal policy swing in the 12 years from 1965 to 1976.

The over-predictions of 1974 and 1975 and the under-prediction of 1976. These three errors occurred in sequence, and are best examined in that way. The 1934 over-prediction followed the 1972-73 boom which, at the level of the OECD economy as a whole, had been accurately forecast (more on that below). Unravelling the reasons for the over-predictions of 1974 and 1975 is one of the most complex tasks for the whole post-war period. The basic elements of the story have been written about a great deal⁷. It is generally considered that quantitatively the most important factors shaping the level of aggregate demand at that time were the rapid build-up of the OPEC current surplus (deflationary), a fiscal swing towards restriction (impact measure -1.5 per cent in 1973, and -0.9 per cent in 1974 – see Table 3), monetary policy which, according to McCracken, moved "markedly" towards restriction in 1973 (*op. cit.* p. 65) and a sharp deterioration in consumer and business confidence (also deflationary).

The very large (4 percentage point) over-prediction for 1974 published in December 1973 OECD **Economic Outlook** can be largely discounted because, although the policy stance was known, that forecast did not take account of the substantial end-1973 hike in the price of internationally-traded oil. Comfort might be taken from the fact that the July 1974 OECD **Economic Outlook**, containing forecasts made after the oil price rise had taken place, predicted 1 per cent OECD GNP growth for that year; the outcome was a marginal decline, of 0.1 per cent, so this forecast might appear to have represented a reasonable forecast in the light of the new circumstances. However the December 1974 OECD **Economic Outlook** predicted growth of ½ per cent for 1975, whereas the outcome was a decline of 1.2 per cent – an over-prediction of 1¾ per cent. Hence, while it would appear, on the basis of the **analysis** published at the time, that the basic economic forces then operating on the OECD economy were broadly understood, it cannot be claimed that their impact or, perhaps more importantly, their timing was at all well predicted.

Hence for reasons that relate to the novelty of the shock (simultaneously demand-deflationary and price inflationary), its size, and its pervasiveness, large forecasting errors were made. To have forecast those events correctly would have required, at a minimum, an international analytic framework and a quantified set of relationships that the **OECD** Secretariat did not have at the time. It is interesting that less detailed calculations made for the **OECD** area as a whole proved, on that occasion, to be more pertinent than what resulted from summing initial single-country forecasts made on the basis of inappropriate assumptions about the external environment.

The two years of declining **GNP** in 1974 and 1975 were followed by a year of very rapid (5.2 per cent) **OECD** growth in 1976. The **OECD** Secretariat correctly predicted an upturn. However the 4 per cent forecast was $1\frac{1}{4}$ points less than the outcome, and hence qualifies as a large error for the purposes of this present examination of forecasting error. The main forces acting on the **OECD** economy at that time were the reflationary rundown of the **OPEC** current account surplus, a large fiscal swing towards expansion, equivalent on an impact basis to about 2 per cent of the **GNP** of the nine largest economies (Table 3), and a return of private and business confidence which resulted in a stockbuilding and investment boom. Pinpointing the precise cause of the under-prediction when there were so many influences at work is probably impossible. In retrospect, it seems clear that an important cause was that the strength of the reversal of the previous downward trend in stockbuilding was, while it lasted, tremendous.

The 1982 over-prediction. The forecasting error of **OECD** **GNP** in 1982 was one of the largest recorded since **OPEC I**, amounting to about 1% percentage points for the **OECD** forecast. Although it is difficult to assess with certainty the reasons for the unexpected weakness of activity in 1982, it seems that the main reasons again lie within the **OECD** area and in particular with policy-related factors. According to calculations by the **OECD** Secretariat the combined deflationary impact of fiscal and monetary tightening in 1982 accounted for at least $1\frac{1}{2}$ percentage points of the area's **GNP**. Several other policy-induced factors also played an important role. Business sector behaviour apparently changed somewhat in the environment of tight monetary conditions, leading to unexpectedly strong inventory decumulation which reduced the **OECD** area's growth rate by very nearly 1 percentage point. Further, high real interest rates, especially in the United States, almost certainly were one factor contributing to the strong dollar. Together with the direct effects of high interest rates on the value of debt repayments, the result was an unexpected strain on **LDCs'** financial position, which obliged them to reduce their imports by much more than the fall in export earnings alone can explain. While this effect was expected, its magnitude in 1982 was under-predicted: it now appears that this factor may have reduced **OECD** activity in 1982 by around 1 percentage point.

Large errors that were not made. Any such catalogue of forecasting errors and the possible reasons for them is bound to engender the feeling that mistakes were being made perpetually. It is therefore worth recalling that this was not so. Of 17 year-ahead OECD forecasts for real OECD GNP, only 5 show errors greater than 1 percentage point and, if the special-circumstances 4 point error of the December 1973 pre-oil-price-rise forecast is discounted, no error was as large as 2 percentage points. Furthermore not all of the years in which the smaller forecast errors were made were easy ones to forecast. For example, the years of the 1972-73 boom were well forecast (a $\frac{3}{4}$ point underestimation of 1972, and no error at all was made for 1973, despite that being one of the years of fastest GNP growth ever achieved by the OECD economy^S). Secondly, the five year period from 1976 to 1981, which saw the second oil shock that was proportionately as large as the first, produced no forecasting error larger than $\frac{1}{2}$ a percentage point.

The consideration of these various episodes, some of under-prediction and some of over-prediction, suggests two broad observations:

- the largest forecasting errors for year-ahead real OECD GNP were each typically made following a year or two in which there had been an atypical and relatively large shock to the OECD economy – generally from policy or (on the first of the two occasions) a change in the price of internationally-traded oil;
- at the level of the OECD economy as a whole, this suggests either that the impact of these shocks was under-predicted, or that the forecasting process did not allow for a full tracing-through of the effects – whether between countries, through inadequate capture of the international linkage effects, or within countries, through an underestimation of the dynamic behaviour of economic agents.

VI. THE FORECASTING RECORD FOR INFLATION

Since the mid-1960s, the forecasting record for inflation, as measured by the errors in the forecasts of national forecasters and the OECD Secretariat for year-ahead GNP deflators, has in a number of respects been broadly similar to that for real GNP. For individual countries, almost half of the forecasts were accurate to within a percentage point of the outcome, and a further quarter had errors between 1 and 2 percentage points (Chart 6). Also, as was the case with real GNP, a minority of forecasts were very inaccurate. A few of the inflation errors were over 6 percentage points. Some of the largest of these errors, although not all of them, are attributable largely to the effects of each of the two major increases in the price of internationally-traded oil, first in 1973/74 and then in 1978/79

CHART 6
**Frequency distribution of single-country inflation
forecasting errors**
OECD and National forecasts



At the level of the **OECD** area as a whole too there are parallels with the forecasting record for real GNP. Single-country inflation forecasting errors have had a tendency to offset one another, so that the forecasting errors for **OECD** inflation have been smaller. A GNP-weighted average of single-country forecasting errors made by national forecasters, which can be taken as representing the forecasting errors for **OECD** inflation implicit in the sum total of single-country forecasts, exceeded 2 percentage points only in 1973 and 1974, when errors of 3½ to 4 percentage points were made (first column of Table 4). In the latter year, the apparent error was attributable to the oil price rise at end-1973, which happened too late to be incorporated in the forecasts. But the large error in 1973 seems to have been substantially due to under-prediction of the various effects of the strong world boom, reinforced by speculative influences, on non-oil commodity prices. The **OECD** forecasts for inflation in the **OECD** area show a broadly similar pattern (second column of Table 4) although exact comparison cannot be made for the whole of the period since the mid-1960s because the **OECD** did not publish inflation forecasts in some of the earlier years.

An interesting and important difference however is that, unlike the forecasts of real activity, those for inflation appear to have exhibited a distinct bias – down-

wards – at least in the earlier years. From 1966 to 1972 the growth of OECD inflation implicit in individual country forecasts was systematically under-predicted. Forecasters were apparently slow to take full account of the fact that inflation was accelerating: while they forecast some acceleration, they did not appreciate its full extent, perhaps because of a failure, in a number of countries, to allow fully for the effects of increasingly-widespread indexation, *de facto* or *de jure*, of wage rates to the cost of living.

More recently, on the other hand, inflation errors have been smaller. They have almost always been less than 1 percentage point, the one exception being the 1978 OECD forecast for 1979, and much of that is attributable to the technical assumption of no change in the price of internationally-traded oil. Most recently of all, in 1982, the rate of OECD inflation was over-predicted, in large part related to the over-prediction of worldwide activity and also because of an unexpectedly widespread de-linking of wage settlements to the cost of living, itself probably in turn a consequence of the depth and length of the recession in OECD countries.

Having considered separately the forecasting errors for real GNP and inflation, it is natural to consider whether there is any tendency for the errors to cancel, that is to say for nominal GNP to be forecast better, on average, than its two components. There is apparently no such systematic tendency for the OECD forecasts, as can be

Table 4. Forecasting errors for OECD area GNP deflator

	GNP-weighted sum of single- country errors ^a	Error of OECD forecast
1966	-1.1 ^b	..
1967	-0.2 ^b	..
1968	-0.5 ^c	-¼
1969	-1.5 ^d	..
1970	-1.3 ^e	-1¾
1971	-1.0 ^f	..
1972	-0.8 ^f	0
1973	-3.4 ⁱ	-3
1974	-3.9	-4%
1975	0.5	¾
1976	-0.2	½
1977	-0.1	0
1978	-0.9	-½
1979	-1.0	-1 %
1980	-0.8	-½
1981	0.2	-1
1982	1.3	1%

a) Weighted average of national forecasts for United States, Japan, Germany, France, United Kingdom, Italy, Austria, Denmark, Finland, Netherlands, Norway, Sweden and Switzerland.

b) Excluding France, Italy, Denmark, Finland, Norway and Switzerland.

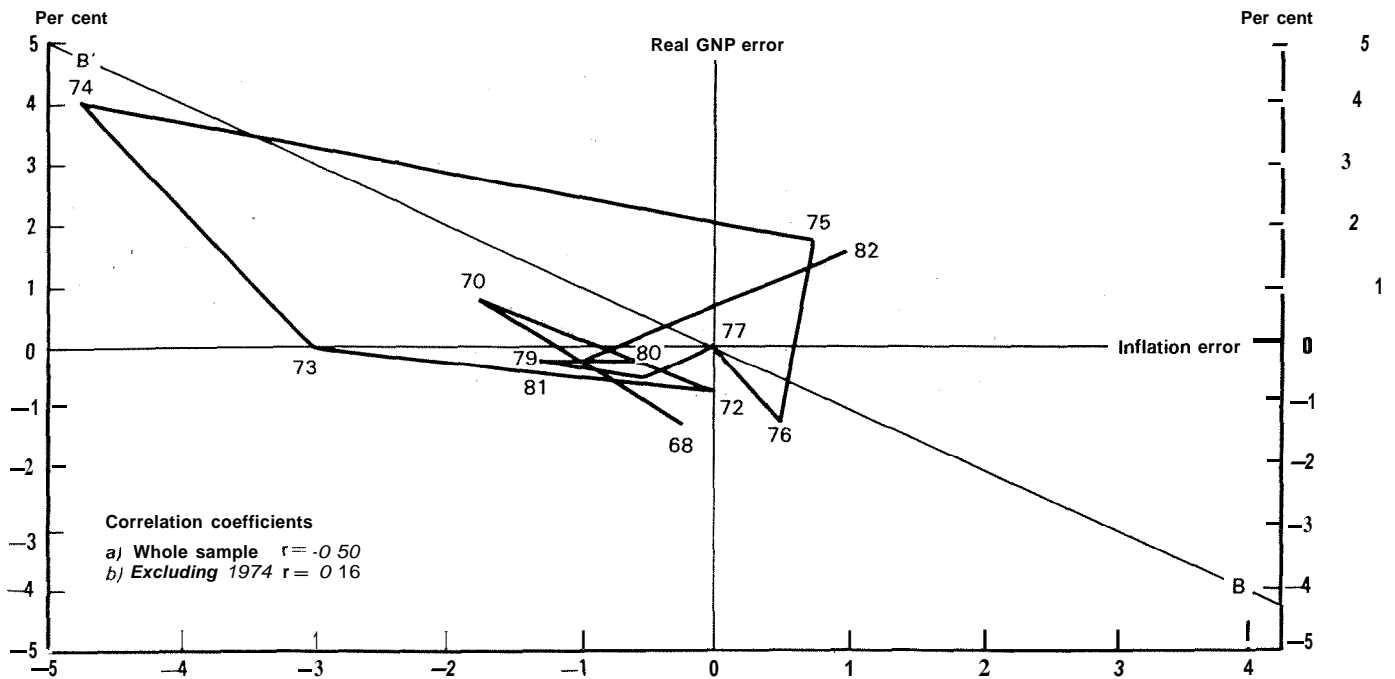
c) Excluding Italy, Denmark, Finland, Norway, and Switzerland.

d) Excluding Italy, Denmark, Norway, and Switzerland.

e) Excluding Denmark, and Norway.

f) Excluding Denmark.

CHART 7
Forecasting errors for OECD real GNP and inflation



seen from Chart 7. Offsetting errors would reveal themselves as a tendency for the forecasting errors to lie along the negatively-sloped 45° line BB' . In fact no such tendency is apparent, if 1974 is excluded from the sample. For that year, the year of the largest-ever mistake in forecasting **OECD real GNP**, **nominal GNP** was forecast almost exactly.

SUMMARY AND CONCLUSIONS

This article has concentrated on elements of the forecasting record of the OECD and national forecasters that, at least on the basis of circumstantial evidence, can be traced to events which were transmitted internationally, from one economy to another and on around. The main findings are:

- i) In many years, errors in the year-ahead **GNP** forecasts for some countries were broadly offset by errors in the opposite direction for others. This suggests, though of course it does not prove, that in those years the main sources of forecasting error were to be found *within* individual economies.
- ii) In a minority of years, on the other hand, the majority of single-country **GNP** forecasts exhibited errors in the same direction.

- iii) It was generally, although not uniformly, in these years that the largest errors were made in the forecasts for **OECD GNP**, whether by the **OECD Secretariat** or on the basis of the weighted sum of national individual-country forecasts. (This is a non-trivial result: it could be, and on one occasion was, the case that the majority of single-country forecasters made errors in the same direction, but that these were small, as was the error for the **OECD** area.)
- iv) The years in which the largest errors were made, for countries individually and for the **OECD** area as a whole, were generally years following a large shock to the **OECD** economy, whether from within (large swings in the stance of policy) or from without (the first oil shock).

These findings suggest that when a large shock impinges upon the **OECD** economy, often the ultimate effects are under-predicted. It may be that the source of much of the error is "domestic", in that the size of the shock within each country, or its domestic consequences, are underestimated. Alternatively it could be that insufficient allowance is generally made for the effect of the shock on activity abroad, and hence on the growth of export markets facing the individual economy. At the level of the **OECD** economy as a whole, this is equivalent to applying too small a multiplier, explicitly or implicitly, to the shock when its ultimate likely effects are being calculated. In practice errors of both sorts – domestic and "international" – are likely to have been important over the period in question.

The systematic use of a formal international linkage model in forecasting should help to reduce the internationally-transmitted element of forecasting error. It is noteworthy that the forecasting record in the aftermath of the second oil shock, when such techniques were in use, and there was some history to go by, was much better than after the first. This is unlikely to be the entire explanation, however: private sector spending behaviour was much smoother on the second occasion, probably reflecting adaptation of consumer and the business behaviour to such a shock, and the forecasting task was thereby made somewhat easier.

These considerations may, however, give a useful guide to the likely accuracy of forecasts in the future. For the majority of years it would seem reasonable, when making a single-country forecast, to expect that the overall world environment within which the forecast is being made will have been predicted to within an accuracy of 1 percentage point, both for real year-ahead **GNP** and year-ahead inflation. But for years immediately following a large shock (say 1 per cent of **GNP ex ante**) to the **OECD** economy, and particularly when the shock brings into play channels of transmission that are not well understood and quantified on the basis of past experience, the forecasting errors for the **OECD** area, and thereby economies individually, are liable to be much larger – twice as big or even more. This applies equally to output and inflation.

If these propositions are even broadly correct, they suggest that it ought to prove possible to warn policy makers on those occasions when the conjunction of

events is such that relatively large forecasting mistakes are likely to be made. The policy inference that it is appropriate to draw may vary from case to case; but it may well often be appropriate in such circumstances to elect to place relatively greater weight on the indicators as they come in through the year, and relatively less weight on the forecasts, than would be appropriate in a more normal year.

NOTES

1. For an interesting sample of recent studies of forecasting accuracy, see Cipolletta and de Roo (1981), Daub (1981), Hatjoulis and Wood (1979), and McNees (1979 and 1981). For recent studies which include forecasts of country-groupings, generally made by the international organisations, see Barker (1983), Fontenau (1983), and MacFarlane (1983).
2. There are many other considerations too in the assessment of forecasting accuracy, although not of direct concern to this paper. For a useful recent review, see Klein and Young (1980), especially pp. 131 to 147.
3. For a number of individual countries, on the other hand, it may be OECD market growth projections, rather than GNP projections, which are considered to be of greatest importance, countries tending to prefer their own domestic demand projections.
4. The model estimated here is:

$$X_t = 0.82 * X_{t-1} + 0.13 * X_{t-2} + e_t + 0.52 * e_{t-2},$$
 where X_t is OECD real GNP growth (Table 1 in the text), detrended by taking first order differences, and e_t is a disturbance term. For a discussion of the theoretical background and practical methods of time series analyses, see Box and Jenkins (1970).
5. McNees has for many years been the unofficial scorekeeper of the accuracy of economic forecasts in the United States. Many of his articles on this subject are to be found in various issues of the *New England Economic Review*.
6. Goods imports, for example, grew by nearly 22 per cent in volume, over 4 times as fast as the growth of GNP (4.7 per cent). Most import functions at the time would have predicted import growth at only about 10 per cent.
7. See for example OECD (1980), pp. 128-130, OECD (1982), pp. 139-140, Llewellyn, Ostry and Samuelson (1982), Llewellyn (1983), and Larsen and Llewellyn (1983).
8. Other years of rapid OECD real GNP growth were 1950 (8.3 per cent), 1951 (7.1 per cent), 1955 (6.8 per cent) and 1964 (6.2 per cent). All occurred before the OECD Secretariat started forecasting, after which no such rate was achieved – see Maddison (1983), page 86.

ANNEX

Accuracy of year-ahead forecasts for real GNP and inflation

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	5%	5.8	-0.6			
1967	4	2.4	1.6			
1968	4%	4.9	-0.4	3	4.0	-1.0
1969	2%	2.8	-0.3	3%	4.7	-1.2
1970	1%	-0.7	2.2	4	5.5	-1.5
1971	4	2.7	1.3	-	4.7	-
1972	5%	6.1	-0.4,	3%	3.2	0.6
1973	6%	5.9	0.4	3%	5.6	-2.1
1974	2%	-2.1	4.4	6%	10.3	-3.6
1975	-2	-1.8	-0.2	10%	9.3	1.2
1976	5%	6.0	-0.3	6%	5.3	1.5
1977	4½	4.9	-0.4	5%	5.9	-0.7
1978	4%	4.4	-0.2	6	7.3	-1.3
1979	2	2.3	-0.3	7%	8.8	-1.6
1980	-1¼	-0.2	-1.1	9%	8.9	0.6
1981	¾	1.9	-1.2	10½	9.5	1.0
1982	-½	-1.9	1.4	8	6.0	2.0

Country: United States

Source: Consensus*

	GNP			GNP deflator		
	Forecast	Actual ^a	Error	Forecast	Actual ^a	Error
1969	3.3	2.8	0.5	3.3	5.1	-1.8
1970	1.1	-0.2	1.3	4.7	5.4	-0.7
1971	3.2	3.4	-0.2	3.9	5.0	-1.1
1972	5.5	5.7	-0.2	3.2	4.2	-1.0
1973	6.1	5.8	0.3	3.3	5.8	-2.5
1974	1.1	-0.6	1.7	5.9	8.8	-2.9
1975	-0.8	-1.2	0.4	9.1	9.3	-0.2
1976	5.9	5.4	0.5	6.0	5.2	0.8
1977	5.0	5.5	-0.5	5.5	5.8	-0.3
1978	4.3	5.0	-0.7	5.9	7.4	-1.5
1979	2.4	2.8	-0.4	7.4	8.6	-1.2
1980	-1.3	-0.3	-1.0	8.8	9.2	-0.4
1981	1.2	2.5	-1.3	9.5	9.6	-0.1
1982	0.5	-2.1	2.6	7.9	6.0	1.9

• The medium forecast from the ASA/NBER survey.

a) Most recent estimates.

Country: **United States**
Source: **Council of Economic Advisers**

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1964	5.0	4.7	0.3	1.5	1.9	-0.4
1965	4.0	5.4	-1.4	2.0	1.8	0.2
1966	5.0	5.4	-0.4	2.0	3.0	-1.0
1967	4.0	2.5	1.5	2.5	3.0	-0.5
1968	4.2	5.0	-0.8	3.2	3.8	-0.6
1969	2.7	1.7	1.0	3.2	5.1	-1.9
1970	1.2	-0.4	1.6	4.0	5.3	-1.3
1971	4.5	2.7	1.8	4.5	4.6	-0.1
1972	6.0	6.5	-0.5	3.2	3.0	0.2
1973	6.7	5.9	0.8	3.0	5.3	-2.3
1974	1.0	-2.2	3.2	7.0	10.2	-3.2
1975	-3.0	-2.0	-1.0	11.0	8.7	2.3
1976	6.2	6.2	0.0	6.0	5.1	0.9
1977	5.7	5.7	0.0	5.5	5.9	-0.4
1978	4.7	4.3	0.4	6.0	8.3	-2.3
1979	2.2	0.8	1.4	7.4	9.0	-1.6
1980	-1.0	-0.3	-0.7	9.0	10.0	-1.0
1981	1.7	0.7	1.0	10.2	8.6	1.6
1982	3.0	-1.2	4.2	7.2	4.6	2.6

Country: **Japan**
Source: **OECD**

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	6%	9.7	-3.5			
1967	10%	13.3	-2.8			
1968	9	14.2	-5.2	3%	4.0	-0.5
1969	9%	12.3	-2.8	5%	4.5	1.0
1970	11%	10.7	0.6	4%	6.7	-2.0
1971	10%	6.7	3.8	-	4.3	-
1972	6½	9.6	-3.1	4½	4.6	-0.1
1973	10%	10.2	0.6	5%	12.0	-6.3
1974	7%	-1.8	9.3	9%	21.1	-1 1.9
1975	2	2.1	-0.1	14%	7.1	7.4
1976	4¼	6.3	-2.1	5%	6.4	-0.9
1977	6	5.2	0.8	6%	5.5	1.3
1978	5	5.6	-0.6	5¼	4.8	0.5
1979	4%	5.9	-1.2	4%	2.0	2.5
1980	4%	4.2	0.6	5%	3.2	2.6
1981	3%	3.0	0.8	5	2.8	2.2
1982	3%	3.0	0.8	4%	2.0	2.3

Country: Japan

Source: Official*

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1955	4.5	10.8	-6.3	-1.8	2.2	-4.0
1956	4.2	6.1	-1.9	0.0	5.8	-5.8
1957	6.5	7.8	-1.3	1.0	4.9	-3.9
1958	3.0	6.0	-3.0	-0.7	-1.1	0.4
1959	5.5	11.2	-5.7	0.6	3.9	-3.3
1960	6.6	12.5	-5.9	1.1	5.9	-4.8
1961	9.2	13.5	-4.3	0.5	7.9	-7.4
1962	5.4	6.4	-1.0	0.0	2.5	-2.5
1963	6.1	12.5	-6.4	1.9	5.0	-3.1
1964	7.0	10.6	-3.6	2.5	4.8	-2.3
1965	7.5	5.7	1.8	3.3	4.7	-1.4
1966	7.5	11.1	-3.6	3.5	5.4	-1.9
1967	9.0	13.1	-4.1	4.0	4.3	-0.3
1968	7.6	12.7	-5.1	4.2	4.4	-0.2
1969	9.8	11.0	-1.2	4.2	5.3	-1.1
1970	11.1	10.4	0.7	4.2	6.3	-2.1
1971	10.7	7.3	3.4	4.0	4.1	-0.1
1972	7.2	9.8	-2.6	4.9	5.8	-0.9
1973	10.7	6.4	4.3	5.1	14.7	-9.6
1974	2.5	-0.2	2.7	10.1	18.2	-8.1
1975	4.3	3.4	0.9	11.1	6.0	5.1
1976	5.6	5.7	-0.1	7.0	7.0	0.0
1977	6.7	5.8	0.9	6.6	5.0	1.6
1978	7.0	5.7	1.3	4.7	3.8	0.9
1979	6.3	6.1	0.2	3.0	1.3	1.7
1980	4.8	5.0	-0.2	4.4	2.6	1.8
1981	5.3	3.3	2.0	3.6	2.1	1.5
1982	5.2	3.3	1.9	3.0	1.6	1.4

* Fiscal year (April-March). Due to changes in the accounting system and the base year, the forecasts and the actuals are not strictly compatible.

Country: Germany

Source: OECD

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	3%	2.4	1.4			
1967	3%	-0.2	3.7			
1968	3%	7.0	-3.8	2 ² / ₄	2.2	0.3
1969	5	8.0	-3.0	2%	3.5	-1.3
1970	4%	5.4	-0.9	4%	7.3	-3.1
1971	3	2.8	0.2	-	7.6	-
1972	2	3.0	-1.0	5 ³ / ₄	6.1	-0.4
1973	5%	5.3	-0.1	5%	5.8	-0.6
1974	3%	0.4	2.9	7	6.8	0.2
1975	2%	-3.2	5.7	6%	8.1	-1.6
1976	3%	5.7	-2.5	4	3.3	0.7
1977	3%	2.6	0.9	4	3.6	0.4
1978	3%	3.5	-0.3	4	3.9	0.1
1979	4	4.5	-0.5	3 ¹ / ₂	3.8	-0.3
1980	2%	1.8	0.5	4 ¹ / ₂	4.8	-0.3
1981	- ¹ / ₄	-0.2	-0.1	4	4.2	-0.2
1982	1%	-1.1	2.4	3%	4.8	-1.3

Country: Germany
Source: Consensus*

	GNP				GNP deflator			
	Forecast	Actual ^a		Error	Forecast	Actual ^a		Error
1963	3.8	3.2	(3.1)	0.6	3.0	2.9	(2.8)	0.1
1964	5.5	6.5	(6.6)	-1.0	2.0	2.8	(3.0)	-0.8
1965	5.0	4.4	(5.4)	0.6	4.0	3.9	(3.6)	0.1
1966	4.0	2.7	(2.6)	1.3	3.0	3.6	(3.6)	-0.6
1967	2.5	-0.5	(-0.1)	3.0	2.5	0.8	(1.3)	1.7
1968	5.0	6.9	(6.1)	-1.9	2.0	1.9	(1.9)	0.1
1969	3.5	8.4	(7.5)	-4.9	2.5	3.1	(4.2)	-0.6
1970	4.0	4.7	(5.0)	-0.7	4.5	7.4	(7.6)	-2.9
1971	4.0	2.9	(3.2)	1.1	5.0	7.7	(7.8)	2.7
1972	1.0	2.8	(4.1)	-1.8	5.0	6.2	(5.4)	-1.2
1973	5.0	5.4	(4.6)	-0.4	5.5	6.1	(6.5)	-0.6
1974	3.0	0.4	(0.5)	2.6	7.0	6.5	(6.8)	0.5
1975	2.5	-3.6	(-1.6)	6.1	7.0	8.3	(6.1)	-1.3
1976	4.0	5.6	(5.6)	-1.6	4.5	3.1	(3.4)	1.4
1977	5.5	2.4	(2.8)	3.1	4.0	3.6	(3.7)	0.4
1978	3.0	3.4	(3.5)	-0.4	4.0	3.9	(4.2)	0.1
1979	4.0	4.4	(4.0)	-0.4	3.5	3.8	(4.0)	-0.3
1980	2.5	1.8	(1.9)	0.7	4.5	5.0	(4.5)	-0.5
1981	0.0	-0.3	(-0.3)	0.3	4.5	4.1	(4.2)	0.4
1982	1.0	-1.2	(-1.1)	2.2	4.5	4.8	(4.8)	-0.3

* October joint-forecasts of the five leading institutes.

a) Preliminary official estimates. The most recent estimates are indicated in parentheses for reference.

Country: Germany
Source: Five wise men

	GNP			GNP deflator		
	Forecast	Actual ^a	Error	Forecast	Actual ^a	Error
1963		3.2			2.9	
1964		6.5			2.8	
1965		4.4			3.9	
1966		2.7			3.6	
1967	3.0	-0.5	3.5	2.0	0.8	1.2
1968	4.0	6.9	-2.9	1.5	1.9	-0.4
1969	4.5	8.4	-3.9	3.0	3.1	-0.1
1970	4.5	4.7	-0.2	5.0	7.4	-2.4
1971	4.5	2.9	1.6	5.0	7.7	-2.7
1972	1.0	2.8	-1.8	5.0	6.2	-1.2
1973	5.5	5.4	0.1	6.0	6.1	-0.1
1974	2.5	0.4	2.1	7.5	6.5	1.0
1975	2.0	-3.6	5.6	6.0	8.3	-2.3
1976	4.5	5.6	-1.1	4.0	3.1	0.9
1977	4.5	2.4	2.1	4.0	3.6	0.4
1978	3.5	3.4	0.1	3.5	3.9	-0.4
1979	3.8	4.4	-0.6	3.0	3.8	-0.8
1980	2.8	1.8	1.0	4.5	5.0	-0.5
1981	0.5	-0.3	0.8	4.0	4.1	-0.1
1982	0.5	-1.2	1.7	4.0	4.8	-0.8

a) Preliminary official estimates (as in the table above). See the table above for the most recent estimates.

Country: Germany

Source: Official

	GNP			GNP deflator		
	Forecast	Actual ^a	Error	Forecast	Actual ^a	Error
1963		3.2			2.9	
1964		6.5			2.8	
1965		4.4			3.9	
1966		2.7			3.6	
1967	2.0	-0.5	2.5	2.0	0.8	1.2
1968	4.0	6.9	-2.9	2.1	1.9	0.2
1969	4.5	8.4	-3.9	2.5	3.1	-0.6
1970	4.5	4.7	-0.2	5.0	7.4	-2.4
1971	3.5	2.9	0.6	4.5	7.7	-3.2
1972	2.5	2.8	-0.3	5.0	6.2	-1.2
1973	4.5	5.4	-0.9	5.5	6.1	-0.6
1974	1.0	0.4	0.6	6.8	6.5	0.3
1975	2.0	-3.6	5.6	6.5	8.3	-1.8
1976	4.5	5.6	-1.1	4.0	3.1	0.9
1977	5.0	2.4	2.6	3.5	3.6	-0.1
1978	3.5	3.4	0.1	3.5	3.9	-0.4
1979	4.0	4.4	-0.4	3.5	3.8	-0.3
1980	2.5	1.8	0.7	4.0	5.0	-1.0
1981	-0.5	-0.3	-0.2	4.5	4.1	0.4
1982	1.3	-1.2	2.5	4.0	4.8	-0.8

a) Preliminary official estimates (the same as in the previous two tables). See the upper panel of the previous page for the most recent estimates.

Country: France

Source: OECD

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	4¾	4.9	-0.2			
1967	5	4.4	0.6			
1968	4%	4.2	0.3	2%	5.0	-2.3
1969	5%	7.9	-2.2	6%	6.9	-0.4
1970	4	5.9	-1.9	5%	5.7	-0.2
1971	5%	5.1	0.7	-	5.0	-
1972	5	5.5	-0.5	5%	5.7	-0.5
1973	6	6.0	0.0	5%	7.3	-1.8
1974	5%	3.9	1.6	7%	11.1	-3.4
1975	3	-1.2	4.2	12%	14.0	-1.3
1976	3	5.2	-2.2	10½	9.6	0.9
1977	3	3.0	0.0	9%	8.7	0.6
1978	3%	3.3	-0.1	8%	9.9	-1.4
1979	3%	3.3	0.2	9%	10.3	-0.8
1980	2	1.2	0.8	11	11.5	-0.5
1981	1	0.3	0.7	11%	11.7	-0.2
1982	2%	1.9	0.6	14	12.6	1.4

Country: **France**Source: **Official**

	Commercial GDP ^a			Commercial GDP deflator ^a		
	Forecast ^b	Actual ^c	Error	Forecast ^b	Actual ^c	Error
1968	5.0	4.6	0.4	1.8	4.1	-2.3
1969	7.6	7.6	0	4.1	6.6	-2.5
1970	4.0	5.9	-1.9	4.8	5.1	-0.3
1971	5.7	5.5	0.2	3.1	5.5	-2.4
1972	5.2	6.1	-0.9	3.9	6.2	-2.3
1973	5.8	5.8	0	5.2	7.3	-2.1
1974	5.5	3.0	2.5	6.7	10.8	-4.1
1975	4.2	0	4.2	9.7	12.7	-3.0
1976	4.7	4.9	-0.2	8.0	9.9	-1.9
1977	4.8	3.3	1.5	8.0	8.4	-0.4
1978	4.5	3.3	1.2	7.8	9.8	-2.0
1979	3.7	3.4	0.3	8.9	10.4	-1.5
1980	2.5	1.4	1.1	9.1	11.5	-2.4
1981	1.6	0.4	1.2	10.5	11.4	-0.9
1982	3.3	2.1	1.2	13.2	12.1	1.1
1983	2.0	0.9	1.1	8.9	9.8	-0.9
1984	1.0	—	—	6.7	—	—

a) Volume-price split is based on real GDP calculations at prices in the preceeding year.

b) Forecast for year t is the budget projection published in September of year $t-1$.

c) Actuals are those published in 1983 National Accounts (INSEE). Definitive estimates for 1968-1980.

Country: **United Kingdom**Source: **OECD**

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	1%	1.6	-0.4			
1967	0	2.0	-2.0			
1968	3	3.6	-0.6	6	3.7	2.3
1969	2%	1.9	0.6	4%	5.1	-0.6
1970	3	2.2	0.8	3	7.7	-4.7
1971	3	1.4	1.6	—	9.0	—
1972	3%	3.0	0.3	7	6.7	0.3
1973	5	5.3	-0.3	—	7.3	—
1974	3½	0.1	3.4	6%	12.5	-6.3
1975	1%	-1.8	3.6	19%	27.3	-7.8
1976	0	2.1	-2.1	16%	15.2	1.1
1977	1%	1.6	-0.4	12	13.3	-1.3
1978	3	3.3	-0.3	11%	10.3	1.5
1979	2¼	1.5	0.8	10	14.6	-4.6
1980	-2	-1.8	-0.2	16%	18.9	-2.4
1981	-2	-2.2	0.2	14%	12.1	2.4
1982	¼	1.2 ^a	-1.0	9	7.6 ^a	1.4

a) The 1982 actuals were taken from the July 1983 OECD Economic Outlook. The national accounts data were subsequently revised substantially due to a change in the base year from 1975 to 1980.

Country: United Kingdom

Source: NIESR

	GDP			Consumer price index		
	Forecast ^a	Actual	Error	Forecast ^a	Actual	Error
1960	3.4	3.5	-0.1			
1961	2.5	1.1	1.4			
1962	3.3	1.8	1.5			
1963	3.5	6.3	-2.8			
1964	6.0	5.6	0.4	1.8	3.5	-1.7
1965	3.9	2.9	1.0	3.0	4.9	-1.9
1966	2.2	1.8	0.4	3.1	4.0	-0.9
1967	0.3	2.1	-1.8	2.0	2.6	-0.6
1968	2.9	4.4	-1.5	4.8	4.7	0.1
1969	3.3	2.5	0.8	4.5	5.7	-1.2
1970	2.8	2.0	0.8	4.3	5.9	-1.6
1971	1.1	1.5	-0.4	7.6	8.4	-0.8
1972	3.4	2.7	0.7	4.9	6.5	-1.6
1973	6.3	7.1	-0.8	5.7	8.6	-2.9
1974	-1.1	-1.5	0.4	14.5	17.3	-2.8
1975	2.4	-1.1	3.5	18.0	23.6	-5.6
1976	1.3	2.6	-1.3	14.6	15.7	-1.1
1977	0.9	2.6	-1.7	14.2	15.2	-1.0
1978	2.7	3.2	-0.5	8.5	8.8	-0.3
1979	2.9	1.8	1.1	9.6	12.8	-3.2
1980	-0.5	-2.4	1.9	15.8	16.0	-0.2
1981	-1.3	-2.4	1.1	10.5	10.9	-0.4
1982	1.4	1.3	0.1	8.3	8.3	0.0

a) The figures are those published in February each year.

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	4%	5.4	-0.9			
1967	5%	6.0	-0.5			
1968	5	5.4	-0.4	3	1.5	1.5
1969	5%	4.8	0.7	2%	4.1	-1.9
1970	7%	5.2	2.6	4%	6.3	-1.6
1971	6%	1.1	5.7	-	6.9	-
1972	3%	3.5	0.3	4%	6.0	-1.5
1973	5	6.0	-1.0	6%	10.5	-4.0
1974	7%	3.2	4.1	10	16.9	-6.9
1975	-¼	-3.7	3.5	18%	17.5	1.0
1976	1%	5.6	-4.1	12%	17.8	-5.3
1977	-½	1.7	-2.2	19%	18.3	1.5
1978	1	2.6	-1.6	12%	13.3	-0.6
1979	3%	5.0	-1.5	12%	15.2	-2.5
1980	2	4.0	-2.0	16%	20.4	-3.7
1981	-1	-0.2	-0.8	16%	17.6	-0.9
1982	1	-0.3	1.3	16	17.5	-1.5

Country: Italy
Source: ISCO (Rome)

	GNP			Private consumption deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	6.8	5.1	1.7	3.9	4.8	-0.9
1971	6.0	1.4	4.6	4.5	5.2	-0.7
1972	3.5	3.2	0.3	6.7	5.9	0.8
1973	5.0	5.9	-0.9	8.0	11.0	-3.0
1974	6.5	3.4	3.1	9.5	19.7	-10.2
1975	0.0	-3.7	3.7	19.0	17.4	1.6
1976	2.0	5.6	-3.6	10.0	17.5	-7.5
1977	3.0	1.7	1.3	17.0	18.0	-1.0
1978	2.0	2.6	-0.6	11.5	12.7	-1.2
1979	4.0	5.0	-1.0	11.5	14.9	-3.4
1980	1.5	4.0	-2.5	14.5	20.3	-5.8
1981	0.0	0.2	-0.2	15.5	19.0	-3.5
1982	1.0	-0.3	1.3	17.0	16.7	0.3
1983	1.3	-1.4	2.7	15.0	15.1	-0.1

Country: Canada
Source: OECD

	GNP			GNP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1966	4%	5.9	-1.2			
1967	4	2.8	1.2			
1968	4	4.7	-0.7	4	3.6	0.4
1969	4	5.0	-1.0	3	4.7	-1.7
1970	4	3.3	0.7	4	4.1	-0.1
1971	4	5.5	-1.5	-	3.3	-
1972	5%	5.8	-0.1	4	4.6	-0.6
1973	6	6.8	-0.8	4%	7.6	-3.1
1974	5%	2.8	2.7	6%	13.8	-7.1
1975	3%	0.6	2.9	12	10.8	1.2
1976	4%	4.9	-0.7	9½	9.5	-0.3
1977	3%	2.7	0.8	7%	6.9	0.6
1978	3%	3.4	0.4	6%	6.4	0.1
1979	4	2.8	1.2	7	10.5	-3.5
1980	1%	0.0	1.5	9	10.6	-1.6
1981	1%	2.9	-1.7	9%	10.1	-0.6
1982	1	-4.4	5.4	11	10.1	0.9

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	4	7.1	-3.1			
1971	4	5.2	-1.2			
1972	4	6.4	-2.4			
1973	5%	5.5	0.0			
1974	4%	4.4	0.1	8	10.8	-2.8
1975	3	-2.0	5.0	11	8.8	2.2
1976	1	5.2	-4.2	7	5.8	1.2
1977	3¼	3.5	-0.2	6%	4.9	1.6
1978	1½	1.5	0.0	5%	4.9	0.6
1979	2%	5.1	-2.3	4	4.0	0
1980	2	3.1	-1.1	4	4.6	-0.6
1981	0	0.0	0.0	5	5.9	-0.9
1982	1%	1.1	0.7	5%	6.6	-1.1

Country: Austria
Source: WIFO (Vienna)

	GDP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1964	4.5	6.0	-1.5	2.5	3.8	-1.3
1965	5.0	3.0	2.0	4.0	5.0	-1.0
1966	4.0	4.3	-0.3	2.5	2.2	0.3
1967	3.0	2.5	0.5	5.2	4.0	1.2
1968	2.0	4.1	-2.1	3.8	2.8	1.0
1969	4.8	6.4	-1.6	3.2	3.1	0.1
1970	5.0	7.1	-2.1	4.5	4.4	0.1
1971	4.0	5.2	-1.2	5.0	4.7	0.3
1972	4.0	6.4	-2.4	4.7	6.3	-1.6
1973	5.0	5.5	-0.5	7.5	7.6	-0.1
1974	3.0	4.4	-1.4	8.5	9.5	-1.0
1975	3.5	-2.0	5.5	9.5	8.4	1.1
1976	1.5	5.2	-3.7	7.5	7.3	0.2
1977	4.0	3.5	0.5	6.3	5.5	0.8
1978	1.5	1.5	0.0	4.5	3.8	0.7
1979	3.0	5.2	-2.2	3.0	3.7	-0.7
1980	2.5	3.6	-1.1	4.8	6.4	-1.6
1981	0.0	0.1	-0.1	6.0	6.8	-0.8
1982	2.0	1.1	0.9	5.8	6.4	-0.6

Country: **Denmark**

Source: **OECD**

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	3%	3.2	0.6			
1971	3%	3.6	-0.1			
1972	3%	5.0	-1.2			
1973	5%	3.5	2.0			
1974	4	1.3	2.7	9½	11.0	-1.5
1975	1	-0.7	1.7	15	11.5	3.5
1976	4	5.0	-1.0	7	8.8	-1.8
1977	1%	1.8	0.0	7½	9.0	-1.5
1978	1	1.0	0.0	10	9.7	0.3
1979	2%	3.5	-1.0	6	7.1	-1.1
1980	¾	-0.2	1.0	10	8.4	1.6
1981	1%	0.1	1.4	8%	9.6	-1.3
1982	3%	3.6	-0.3	9%	9.7	-0.2

Country: **Denmark**

Source: **Economic Council**

	GDP			GDP deflator		
	Forecast	Actual ^a	Error	Forecast	Actual ^a	Error
1974	3.3	-0.7	4.0	10.3	12.8	-2.6
1975	2.0	-1.0	3.0	12.5	12.8	-0.3
1976	4.5	6.5	-2.0	7.5	9.0	-1.5
1977	1.0	2.3	-1.3	9.0	8.7	0.3
1978	2.0	1.8	0.2	9.0	9.6	-0.6
1979	3.0	3.7	-0.7	5.5	7.5	-2.0
1980	0.3	-0.4	0.7	9.4	8.2	1.2
1981	-0.9	-0.9	0.0	8.9	10.5	-1.6
1982	2.8	3.4	-0.6	10.1	10.5	-0.4
1983	2.0	2.5	-0.5	7.9	7.6	0.3

a) Most recent estimates

	GDP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1976	4.0	6.5	-2.5			
1977	2.0	2.3	-0.3	10.5	11.1	-0.6
1978	1.0	1.8	-0.8	12.0	10.1	1.9
1979	2.5	3.7	-1.2	7.0	9.6	-2.6
1980	-1.0	-0.4	-0.6	10.0	12.3	-2.3
1981	0.0	-0.9	0.9	10.0	11.7	-1.7
1982	2.5	3.4	-0.9	9.0	10.1	-1.1
1983	0.0	2.5	-2.5	8.0	6.9	1.1

Country: Finland

Source: OECD

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	6	7.4	-1.4			
1971	5	2.3	2.7			
1972	3½	6.8	-3.3			
1973	6	6.0	0.0			
1974	4¾	4.2	0.6	10	19.1	-9.1
1975	3	0.1	2.9	13½	16.3	-2.8
1976	0	0.4	-0.4	14	10.6	3.4
1977	4	0.5	3.5	10	10.0	0.0
1978	0	1.4	-1.4	9	8.0	1.0
1979	3½	7.2	-3.7	7	7.5	-0.5
1980	4½	5.0	-0.5	10	9.2	0.8
1981	2¾	1.4	1.4	11¾	11.9	-0.1
1982	1¼	2.5	-1.2	10¼	9.2	1.1

Country: Finland

Source: Ministry of Finance

	GDP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1960	4.0	9.6	-5.6			
1961	5.0	7.0	-2.0			
1962	4.0	3.4	0.6			
1963	3.0	3.0	0.0			
1964	3.5	6.3	-2.8			
1965	6.0	4.7	1.3			
1966	4.0	2.2	1.8			
1967	3.8	2.7	1.1			
1968	3.5	2.8	0.7			
1969	6.0	8.7	-2.7	3.0	2.3	0.7
1970	6.0	7.7	-1.7	2.0	2.7	-0.7
1971	5.0	1.9	3.1	2.5	6.5	-4.0
1972	3.5	7.2	-3.7	5.0	7.2	-2.2
1973	6.0	6.0	0.0	5.0	11.7	-6.7
1974	5.0	3.5	1.5	8.5	17.4	-8.9
1975	3.0	0.2	2.8	11.5	17.8	-6.3
1976	1.5	0.9	0.6	11.5	14.3	-2.8
1977	5.0	0.5	4.5	10.0	12.7	-2.7
1978	2.5	2.7	-0.2	9.0	7.6	1.4
1979	3.5	7.4	-3.9	8.5	7.5	1.0
1980	4.0	5.1	-1.1	7.5	11.6	-4.1
1981	3.5	1.4	2.1	10.0	12.0	-2.0
1982	2.0	2.6	-0.6	9.5	9.3	0.2
1983	2.5	3.3	-0.8	7.0	8.4	-1.4

Country: Netherlands

Source: OECD

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	3%	6.0	-2.5			
1971	5%	4.7	0.6			
1972	2%	4.4	-2.1			
1973	4%	4.2	0.6			
1974	3%	3.3	0.2	8%	9.5	-1.0
1975	2%	-1.1	3.6	10%	11.0	-0.5
1976	1%	4.6	-2.8	8½	8.3	0.2
1977	3%	2.3	1.0	6%	7.2	-0.7
1978	2%	2.4	0.4	5%	5.3	0.2
1979	3	2.3	0.7	4%	3.8	0.5
1980	1%	0.5	1.3	5%	5.3	0.5
1981	¼	-1.2	1.5	7	6.3	0.7
1982	½	-1.6	2.1	6½	5.7	0.8

	GNP			Private consumption deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1962	3.9	3.5	0.4	2.0	2.6	-0.6
1963	4.1	3.6	0.5	2.1	3.8	-1.7
1964	5.6	8.8	-3.2	2.0	6.8	-4.8
1965	2.6	5.4	-2.8	4.5	4.0	0.5
1966	5.5	2.6	2.9	4.5	5.4	-0.9
1967	3.7	5.7	-2.0	4.6	3.0	1.6
1968	3.7	6.4	-2.7	2.9	2.6	0.3
1969	3.9	7.0	-3.1	4.0	6.1	-2.1
1970	3.6	6.7	-3.1	3.6	4.4	-0.8
1971	4.2	4.3	-0.1	5.1	8.3	-3.2
1972	2.8	3.9	-1.1	7.0	8.8	-1.8
1973	4.7	6.0	-1.3	5.0	9.3	-4.3
1974	4.3	4.0	0.3	6.2	10.1	-3.9
1975	3.5	-2.1	5.6	9.4	10.7	-1.3
1976	3.7	5.6	-1.9	8.5	8.8	-0.3
1977	4.3	2.5	1.8	7.0	6.0	1.0
1978	2.9	2.4	0.5	6.0	4.5	1.5
1979	3.0	2.2	0.8	4.3	4.4	-0.1
1980	2.4	1.0	1.4	6.1	6.9	-0.8
1981	0.4	-0.7	1.1	6.5	6.5	0.0
1982	1.0	-1.5	2.5	6.5	6.0	0.5

Country: Norway

Source: OECD

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	4%	3.5	1.3			
1971	5%	5.0	0.5			
1972	4	4.3	-0.3			
1973	4%	3.7	0.6			
1974	5%	3.7	1.8	6	11.6	-5.6
1975	5%	3.0	2.5	12%	11.5	1.0
1976	5	6.0	-1.0	9%	8.7	0.8
1977	7	4.1	2.9	9%	7.4	2.1
1978	6	3.5	2.5	8%	6.2	2.3
1979	2%	3.2	-0.7	4	7.0	-3.0
1980	4%	3.8	0.5	9	15.4	-6.4
1981	¾	0.8	0.0	10M	14.8	-4.3
1982	0	-0.5	0.5	9%	11.0	-1.5

Country: Norway

Source: Department of Finance

	GNP			Private consumption deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1952	3.0	3.6	-0.6			
1953	3.1	4.6	-1.5			
1954	2.8	5.0	-2.2			
1955	2.0	1.9	0.1			
1956	3.3	5.2	-1.9			
1957	3.0	2.9	0.1			
1958	3.0	-0.9	3.9			
1959	4.3	5.1	-0.8			
1960	4.5	5.7	-1.2			
1961	3.9	6.3	-2.4			
1962	4.0	2.9	1.1			
1963	3.9	3.8	0.1			
1964	4.3	5.0	-0.7			
1965	4.5	5.3	-0.8			
1966	4.6	3.8	0.8			
1967	5.2	6.3	-1.1			
1968	4.4	2.3	2.1			
1969	4.0	4.5	-0.5			
1970	4.7	2.0	2.7			
1971	5.5	4.6	0.9	5.7	6.4	-0.7
1972	4.7	5.2	-0.5	5.0	6.6	-1.6
1973	4.6	4.1	0.5	5.0	7.8	-2.8
1974	5.4	5.2	0.2	6.3	9.2	-2.9
1975	6.2	4.2	2.0	11.6	11.7	-0.1
1976	7.0	6.8	0.2	8.7	8.7	0
1977	8.0	3.6	4.4	8.3	8.6	-0.3
1978	6.8	4.5	2.3	9.0	8.3	0.7
1979	1.8	4.5	-2.7	4.4	5.2	-0.8
1980	4.2	3.6	0.6	6.1	10.1	-4.0
1981	1.0	0.3	0.7	11.5	13.5	-2.0
1982	-0.1	0.0	-0.1	10.5	11.8	-1.3

Country: Sweden

Source: OECD

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	3%	4.8	-1.0			
1972	3	0.3	2.7			
1972	3%	2.1	1.4			
1973	4%	1.5	3.0			
1974	5%	4.2	1.3	7%	8.6	-1.1
1975	2%	0.8	1.7	11%	14.6	-3.1
1976	¼	1.5	-1.2	8	11.0	-3.0
1977	2%	-2.5	4.8	9	11.5	-2.5
1978	0	2.8	-2.0	11	9.3	1.7
1979	3%	3.8	-0.3	7%	6.7	0.6
1980	3	1.4	1.6	8%	11.6	-3.3
1981	1%	-0.8	2.1	10%	9.9	0.6
1982	1%	0.6	0.9	9%	8.2	1.3

Country: Sweden

Source: Federation of Swedish Industries

	GDP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1973	4.0	3.9	0.1	5.8	6.7	-1.0
1974	4.5	4.3	0.2	8.0	9.9	-1.9
1975	2.0	2.2	-0.2	8.5	9.8	-1.3
1976	1.0	1.2	-0.2	7.5	10.3	-2.8
1977	2.1	-2.0	4.1	8.0	11.4	-3.4
1978	-0.5	1.3	-1.8	10.3	10.1	0.2
1979	4.0	4.3	-0.3	7.3	7.2	0.1
1980	2.6	1.9	0.7	10.5	13.7	-3.2
1981	-0.5	-0.7	0.2	10.8	12.1	-1.3
1982	0.3	0.5	-0.2	9.0	8.6	0.4
1983	0.7	1.9	-1.2	12.0	9.0	3.0

Country: Sweden

Source: NIER

	GDP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1949	1.5	6.5	-5.0	1.5	2.0	-0.5
1950	2.2	6.6	-4.4	0.5	1.0	-0.5
1951	3.1	2.0	1.1	8.5	16.0	-7.5
1952	2.9	3.1	-0.2	5.0	8.0	-3.0
1953	0.6	5.2	-4.6	0.6	2.0	-1.4
1954	3.1	6.0	-2.9	0.0	1.0	-1.0
1955	3.3	3.4	-0.1	0.0	3.1	-3.1
1956	3.0	3.4	-0.4	3.5	5.0	-1.5
1957	2.0	2.3	-0.3	2.0	4.3	-2.3
1958	2.0	2.4	-0.4	1.5	4.4	-2.9
1959	1.0	5.5	-4.5	1.5	0.8	0.7
1960	4.0	3.7	0.3	4.0	4.2	-0.2
1961	4.0	5.6	-1.6	2.5	2.2	0.3
1962	3.5	4.3	-0.8	4.3	4.8	-0.5
1963	3.5	5.0	-1.5	2.0	2.9	-0.9
1964	4.5	6.8	-2.3	2.0	3.4	-1.4
1965	4.7	3.8	0.9	3.0	5.0	-2.0
1966	4.2	2.1	2.1	5.0	6.4	-1.4
1967	4.5	3.4	1.1	3.5	4.3	-0.8
1968	3.0	3.6	-0.6	3.4	1.9	1.5
1969	3.5	5.0	-1.5	1.8	2.7	-0.9
1970	3.8	6.5	-2.7	3.1	7.0	-3.9
1971	2.9	0.8	2.1	8.2	7.4	0.8
1972	2.9	2.2	0.7	4.5	6.0	-1.5
1973	3.9	3.9	0.0	5.7	6.7	-1.0
1974	4.7	4.3	0.4	6.9	9.9	-3.0
1975	2.0	2.2	-0.2	11.1	9.8	1.3
1976	1.6	1.2	0.4	8.9	10.3	-1.4
1977	2.6	-2.0	4.6	8.7	11.4	-2.7
1978	1.0	1.3	-0.3	10.9	10.0	0.9
1979	4.3	4.3	0.0	6.0	7.2	-1.2
1980	4.1	1.9	2.2	9.4	13.7	-4.3
1981	0.9	-0.6	1.5	9.9	12.1	-2.2
1982	1.3	0.5	0.8	8.5	8.6	-0.1
1983	1.8	1.9	-0.1	11.7	9.0	2.7

	GDP			GDP deflator		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	4	5.0	-1.0			
1971	3%	3.9	-0.1			
1972	4%	5.7	-1.4			
1973	4%	3.5	1.3			
1974	3%	-0.8	4.1	8	7.6	0.4
1975	1	-7.6	8.6	7¼	6.6	0.7
1976	1	-1.3	2.3	4½	2.3	2.2
1977	1½	2.7	-1.2	2	0.5	1.5
1978	2	0.2	1.8	2	3.2	-1.2
1979	W	2.2	-1.7	2	2.0	0.0
1980	2	4.4	-2.4	3	2.7	0.3
1981	1	1.9	-0.9	2½	6.9	-4.4
1982	¼	-1.2	1.5	4½	7.4	-2.9

Country: Switzerland

Source: AFW (Bern)

	GNP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1970	4.7	6.7	-2.0	4.0	4.0	0.0
1971	3.6	3.9	-0.3	4.5	6.9	-2.4
1972	4.0	3.2	0.8	6.2	7.6	-1.4
1973	4.2	3.2	1.0	6.5	9.0	-2.5
1974	1.8	1.7	0.1	9.0	10.0	-1.0
1975	-1.2	-7.5	6.3	8.0	6.6	1.4
1976	1.3	-0.6	1.9	3.5	2.2	1.3
1977	0.5	2.8	-2.3	2.0	1.2	0.8
1978	2.0	0.3	1.7	1.5	0.6	0.9
1979	0.7	2.8	-2.1	1.5	4.4	-2.9
1980	1.4	4.2	-2.8	4.0	4.5	-0.5
1981	0.4	2.5	-2.1	3.8	6.6	-2.8
1982	-1.7	-1.5	-0.2	4.5	5.6	-1.1
1983	-1.4	-0.1	-1.3	4.0	3.0	1.0

Country: Switzerland

Source: CREA (Lausanne)

	GNP			Consumer price index		
	Forecast	Actual	Error	Forecast	Actual	Error
1974	2.1	1.7	0.4	11.2	10.0	1.2
1975	-1.9	-7.5	5.6	10.8	6.6	4.2
1976	1.8	-0.6	2.4	3.6	2.2	1.4
1977	4.2^a	2.4^a	1.8	1.9	1.2	0.7
1978	1.2	0.3	0.9	1.6	0.6	1.0
1979	0.3	2.8	-2.5	2.4	4.4	-2.0
1980	1.0	4.2	-3.2	5.5	4.5	1.0
1981	-0.5	2.5	-3.0	5.2	6.6	-1.4
1982	-0.7	-1.5	0.8	2.9	5.6	-2.7
1983	0.9	-0.1	1.0	2.1	3.0	-0.9

a) GDP.

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