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ON THE USE OF MACROECONOMIC
FORECASTS IN SOME BRITISH
COMPANIES*

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ABSTRACT: This paper describes how macroeconomic forecasts are used in
five large British companies. Questions that are studies include the
following: which forecasts are needed, which of alternative available
forecasts are used, how are the forecasts evaluated and how are they
used. Also the possible links of the macroeconomic forecasts to
corporate level planning and forecasting models are examined.

KEY WORDS: Econometric models, forecast evaluation, scenarios,
          sales forecasting, corporate planning

TIIVISTELMÄ: Tässä raportissa kuvataan suhdanne-ennusteiden käyttöä
viidessä brittiläisessä suuryrityksessä. Erityisesti keskitytään seu-
raaviin kysymyksiin: mitä ennusteita yrityksissä tarvitaan, miten teh-
dään valinta vaihtoehtoisten ennusteiden välillä, sekä miten ennusteita
arvioidaan ja käytetään. Lisäksi käsitellään makroennusteiden yhteyksiä
yritystason suunnittelu- ja ennustemalleihin.

ASIASANAT: Ekonometriset mallit, suhdanne-ennusteet, skenaariot, myynti-
          ennusteet, yrityssuunnittelu

ON THE USE OF MACROECONOMIC FORECASTS IN SOME BRITISH COMPANIES

1. Introduction

This report summarizes the discussions the author had with economists at five large British companies. The aim of the discussions was to find out what kind of macroeconomic forecasts the firms are using, how they evaluate different forecasts and how they are using the forecasts. Also links between the macro variables and corporate level planning models were examined.

It is likely that the companies involved do not represent average British companies in their use of forecasts. First of all, they are all large and have therefore more personnel and other resources available for following the economy than smaller companies have. Secondly, they are participating in the consortium of London Business School's (LBS) Centre for Economic Forecasting (CEF) and are therefore perhaps more actively involved in the use of forecasts than some other large companies. It is hoped, however, that this report gives good examples of the various possible uses of macroeconomic forecasts. Since the companies are quite different from each other (a bank, a public sector company and private manufacturing companies) their forecasting practices are different. However, these differences also partly reflect variations in the companies' attitudes towards modelling.

The CEF makes the LBS macro model available for the companies so that they can make their own forecasts that can differ from those published

by CEF. The model is available as a personal computer version or on the LBS mainframe computer. It is basically an income-expenditure model, but recent developments have centered on developing its supply side. There is also a large, disaggregated financial sector flow-of-funds model linked to the macro model. The forecasts and simulations can be made either using rational expectations of some variables or exogenizing these variables. In the rational expectations option the forecasts produced are such that the values of the expectational variables are equal to the outcome produced by the model. This is especially the case in the financial sector, where asset prices are forward-looking variables in some equations. For a short, nontechnical description of the model, see Sean Holly: "The London Business School Model", LBS Economic Outlook, June 1984.

2. Use of forecasts in the companies
2.1. Midland Bank

The main purpose for using forecasts at the economics department of Midland Bank is to produce own forecasts for internal use and for customers. Own forecasts are made quarterly; twice a year the forecasts is somewhat more extensive. In addition, monthly forecasts are made of exchange rates, interests and the retail price index.

The main outside forecast in use is the LBS forecast. The forecast is not taken as given, but Midland Bank's views on policy, exchange rates, earnings and possibly other variables are imposed and the model is rerun. It is felt that LBS has no greater expertise on exchange rates than the bank. The bank's views tend to be more "market

dominated". In the longer run, the fundamentals, like purchasing power parity, are given more weight. This forecast is made without using the rational expectations option of the LBS model. Another feature of the LBS model not in use at Midland Bank is the financial sector, which is too complicated. Other alternative UK forecasts are looked at when they appear, and own opinion may be affected by them. However, no formal combinations are made of the alternative forecasts.

For industry variables, the Cambridge forecasts are used, but own judgment is used for evaluating the situation in different industries. Therefore, some of the figures from the Cambridge forecast may be adjusted, but the end result has to be consistent with the forecast for aggregate industry. For foreign countries, many available forecasts are used. In addition, own judgment plays an important role. It is checked that the individual country forecasts are consistent with each other.

Midland Bank has its own, fairly simple, model for forecasting some variables of interest, which are not available from the LBS model. This includes e.g. profits. This macro model takes the modified LBS model forecasts as inputs. There is also a model for defaults, which is run parallelly to the macro model.Some attempts have been made to forecast Midland Bank's current accounts and deposit accounts using own and competitors' interest rates etc. However, there is a problem in the definition of the variables, since the environment changes rapidly. For example, there are new types of accounts.

The longest forecast horizon used is five years, although sometimes longer run scenarios are needed. Deterioration of forecast accuracy with lenghtening of the forecast horizon is taken into account by using ranges for the longer run forecasts.

Own forecasting performance is occasionally evaluated. For example, in the exchange rate forecasts it has been found that forecast error three periods ahead tends to be smaller than the error in two periods ahead forecasting. When the horizon shortens, there is probably too much cautiousness and too little regard to fundamentals. This bias is difficult to correct in practice. There is a general policy of using monthly "no change" forecasts, since the main assumptions are not changed that often.

2.2. Shell UK

The main use of forecasts at the business environment unit at Shell is that they give a general picture of the economic situation. The actual figures are not so important. In longer run analysis Shell is a scenario-based company.

Several forecasts are followed, but the LBS forecast has been found to be the most useful. This is partly because it is felt that CEF's views are in line with Shell's "intellectual picture". An important reason for using the LBS forecasts is also that it is possible to follow the discussion that goes into producing the forecast. The most important part of the forecast is the main picture it gives, but even this is not necessarily adopted. The forecast serves more as a discipline

device: it forces one to think whether to agree with the forecast or not and why. In this way it can be used for changing the way people think.

Less attention is paid to the actual figures and details. Also, there is no time to do own simulations with the LBS model. However, some figures are needed e.g. at the personnel and finance departments and for making the annual plan. The business environment unit is the central planning unit; product level analysis is made at divisions. However, there is no formal link from macro forecasts to the corporate level. For the various uses, an internal bulletin is circulated, which includes figures for approximately 15 main indicators. This includes main GNP categories, exchange rates, inflation, employment, manu-facturing production etc. The figures are partly based on the LBS forecasts, but they are also a synthesis of other forecasts. If changes are made from the basic forecasts, consistency of the figures is not necessarily checked. In the bulletin the forecast horizon is two years.

The chief economist in contact with several macro model groups. However, when evaluating the forecasts, the background of the fore-casting units, e.g. their political leanings, are taken into account. There is no time to compare the track records of different forecasts.

The forecast horizon within the company varies. Disaggregated energy demand is forecasted for six months to one year ahead. Horizon for the main macro indicators is two years, but the forecasts can give general ideas also for longer run developments. For long run analysis,

forecasts are not used. Instead, the analysis is based on scenarios. One reason for this has been the poor performance of forecasts in the 1970's when the scenario approach was adopted. Another reason is that the horizon of the analysis is so long - up to 25 years - that forecasts are not useful. It is felt that the scenarios are a good way of coping with uncertainty. They take into account also environmental, social and political factors, energy resources, attitudes towards nuclear power, etc.

2.3. Imperial Chemical Industries (ICI)

At the planning department of ICI macro forecasts are used as an input to a corporate sales forecasting model. Information on the key figures are circulated also to other departments. The items that are followed are the main GNP categories, industrial production, retail and consumer prices, exchange rates and demand for and production of chemicals.

For the UK, the LBS forecast is used. Earlier also own simulations were made with the model. Since the importance of the UK market for ICI has diminished, now less effort is devoted to forecasting UK variables and usually the LBS forecast is taken as given. However, some figures may be adjusted. If larger changes are made, the whole forecast is rerun. Often it is better to try to influence the LBS forecast at the CEF consortium meetings. It is felt that ICI may have useful input to the forecast, since the chemical industry leads the rest of the economy by approximately one quarter.

The short run, one year ahead, exchange rate forecasts are obtained from ICI's own currency dealers. In the longer run, a purchasing power parity view is used. However, there have been difficulties in tying the short run and long run forecasts.

For USA and Canada, forecasts from the US forecasting institutes, DRI, Chase and Wharton, are used much in the same way as LBS forecasts for the UK. It is made sure that the forecast used is consistent with ICI's world assumption. For the other countries, ICI's local staff, e.g. market researchers, supply the figures. They are typically not based on any models directly. In the planning unit these figures are adjusted according to own judgment. This is partly based on an informal track record of the local "forecasters". In some countries ICI does not have enough staff to supply forecasts. For example, for small European countries the DRI European survey is used. It is checked that these figures are consistent with the forecasts used for the larger countries.

In all, the general picture is more important in the forecasts than the actual figures. This is so because whether a recession or a recovery is expected partly determines how marketing efforts are directed.

The corporate sales model is disaggregated by area and partly by type of production. The six areas are UK, continental Western Europe (CWE), USA, Canada, Australia and the rest of the world (ROW). The current shares of the areas of total sales are approximately 25 % each for UK, CWE, USA+Canada, and Australia+ROW. The UK and CWE markets are further disaggregated to commodity chemicals and other chemicals. The former

include petrochemicals, fertilizers, plastic, fibres etc., which are mainly sold to other industries as raw materials. Hence they may be called industrial production related. The latter include pharmaceuticals, agricultural chemicals, pesticides, dyestuffs, paints etc. These are called GNP related, since they include many items that are sold to final consumption or to the non-industrial sectors of the economy. There are a total of 8 sales figures to be forecasted.

The basic structure of each of the 8 sales models is the following (D denotes percentage change):

(1) sales = price*volume*base

(2) $D(price)$ = inflation rate + $D(real\ price)$

(3) $D(real\ price) = a_0 + a_1 * D(real\ oil\ price) + a_2 * (volume\text{-}trend)$
$$+ a_3 * D(exchange\ rate) + u_1$$

(4) $D(volume) = b_0 + b_1 * D(activity) + b_2 * D(market\ share) + u_2$

Equation (1) is a sales identity. Base is sales in the base year of the price and volume indexes. Equation (2) is an identity that shows the decomposition of the change in ICI's average price to inflation rate and change in ICI's real product price. ICI's average product price is assumed to be the same as the average price for the chemical industry as a whole.

Equation (3) is a real price equation. The real chemical prices have decreased approximately 2-3 % annually, except for the oil crisis periods. The only cost variable in the model is the real oil price. Oil accounts for approximately 25 % of total production costs and oil price changes are shifted to chemical prices rapidly. The volume-trend

variable is deviation of production from a trend and approximates capacity utilization effects on price; hence $a_2 > 0$. In addition, market specific variables may be added. For example, in Europe chemical prices tend to be DM dominated; therefore an exchange rate term is added. It is based on the DM/£ exchange rate, which is adjusted to past changes in chemical prices. This is in a way a chemical-related purchasing power parity. On the other hand, some of the models are simpler. The nominal prices of pharmaceuticals are seldom changed so that their real prices are dominated by the inflation rate.

Equation (4) is the demand equation. The activity variable is industrial production for the commodity chemicals and real GNP for the other chemicals. The market share variable is ICI's objective. It reflects the use of policy variables, i.e. how much marketing efforts are devoted to changing the market share. For example, in the UK the goal is to keep the market share constant. The market share is not price determined. Rather, it depends on available capacity in different markets and on marketing efforts. There are price effects on volume through exchange rate changes. However, this is difficult to model, since often firms stick to volume and let the price fall if exchange rates change. Therefore this impact has not been included in the models.

The models are mostly annual. If there are significant lagged effects, quarterly data is used, although only the annual sales forecast is reported. Average lag in these cases is 1 1/2 quarters.

There is, in addition, a deterministic accounting model, which takes the forecasted sales as an input. Taking into account oil related, manpower and other costs and depreciation, total profitability in a market is determined. There is a link from macro variables to the accounting model, since wages are determined by inflation and general economic situation. However, this link has not been modelled explicitly. The wage forecast is judgmentally based on the macro forecasts.

The area models are expressed in different currencies, UK in £'s CWE in DM's, US in $'s, Canada in Canadian $'s, Australia in Australian $'s and ROW in $'s. The profit figures are converted to £'s to obtain total corporate profits. This give a central view of profits. Different units produce their own profit forecasts, which are added up to give a bottom-to-top view of profits. Some units, e.g. petrochemicals, have their own forecasting models similar to the corporate level model. On the other hand, the pharmaceuticals unit does not use macro variables, except for inflation and exchange rates. The central profit figure gives an idea on whether the units are too optimistic or pessimistic.

Uncertainty in the profit forecast is taken into account by running alternatives based on different economic scenarios. This gives an outer limit to profits. Also sensitivity analyses are conducted. For example, effects of exchange rate changes or increases in industrial production or inflation rate can be studied. The results are presented in terms of events which have an effect of the same magnitude on profits, not in terms of the likelihoods of different events to happen.

The model works well for a 5 year horizon, but in the longer run the mix of businesses changes so much that forecasts are not useful. For example, the shares of the industrial production and GNP related businesses may change so that the activity variable in the model no longer works well. Also, there may be significant changes in exchange rates.

The planning horizons at ICI are 3, 5 and 10 years, so that the model can be used for the shorter plans. However, there are some reservations that have to be taken into account. First, the model is not very useful for short-run profit planning, since within the year profits are affected by strikes, weather etc., which cannot be modelled. Second, exchange rates are perhaps the most important factor in profitability. Raw materials costs are mostly in $'s, sales are mostly in £'s, $'s and DM's and other costs in £'s. Therefore even small changes in the exchange rates can have a large impact on profitability. This is difficult to take into account in the model. Thirdly, changes in the political and socio-economic environment can be more important factors in the long run profitability than economic growth. This includes e.g. attitudes towards the use of chemicals in agriculture and towards nuclear power. There is a division at ICI that looks at this kind of "futures".

The above description is based on the presently used model. The forecasting model is rebuilt every 2-3 years. The present stage of development is to switch from the regional view to an international view. There will be world demand models for 9 different product groups and 4 regional models for commodity chemicals.

2.4. Central Electricity Generating Board (CEGB)

The main use of macro forecasts at the economics department of CEGB is as inputs to electricity demand forecasting in the intermediate run planning. In the longer run, a scenario approach is used.

Several forecasts are made at CEGB. In the short run, even daily or hourly peak demand are forecasted. The horizon in the intermediate run forecasting is 8 years. This corresponds to the time needed for planning and building new electricity generation capacity. The long run analysis extends to a horizon of 25 years. Here, mainly the intermediate run forecasting is discussed.

The macro figures needed in the intermediate run analysis are main GNP categories, manufacturing and service sector output, retail price index, real exchange rates etc. The starting point is to produce figures for the eighth year of the plan. Therefore, no ranges of forecasts can be used. Two sets of figures are produced, one by the CEGB and another by the Electricity Council. However, they try to agree on a common final set of figures. The macro forecasts are then used in various ways in forecasting electricity demand in the forecast period. This forecasting is made both at the macro level and by disaggregating the industries. In the future, also a regional breakdown of the forecast will be considered. Also the Electricity Council and the regional Area Boards make demand forecasts. There are hence three demand forecasts, but a common forecast is agreed on, which is then used in all planning.

The main forecasting services used by CEGB are the LBS and Cambridge forecasts. The former is used for the macro figures and the latter for industry level analysis. In practice, the final figures adopted are a combination of also other model results, since the Electricity Council uses the Oxford and National Institute models.

Own runs are made with the LBS model to obtain forecasts 8 years ahead. The model is used roughly in the following way. First, all exogenizations and constant adjustments in the LBS forecast are removed and own exogenizations and adjustments are made. This includes CEGB's world view: oil price and demand, exchange rates, government spending, salaries, balance of payments, consumer expenditure etc. With these exogenizations and adjustments, acceptable figures are seeked for the 8th year. Then further adjustments are made to obtain a reasonable profile for the intervening years. It is often hard to judge where and at what level the "fixes" should be set, since the model is used only once a year and there is not enough manpower to follow what is going on in the model. For example, some of the adjustments in the original LBS forecast may be there because some equation in the model does not work well. Also, some features of the model, like the rational expectations option and the financial sector, are too complicated and therefore not used.

The Cambridge model is used for industry level forecasts. The manipulation of the model is done by the Cambridge model group and not at CEGB. Values for some key exogenous variables are supplied by CEGB to Cambridge and it is intended that similar macro figures as from the LBS model are obtained. The resulting industry forecasts are used as a guide, but adjusted by own judgment if needed. For example, direct

discussions are made with firms in the coal, gas, oil and iron and steel industries. This affects the forecasts adopted for these industries. This process results in a breakdown of output and manpower (and hence productivity) forecasts by industry. The Cambridge model group is currently developing regional forecasting, which CEGB is planning to use in the future.

Approximately every three years the own forecasting track record is looked at. It has been found in the past that CEGB's macro forecasts of the UK economy are not very accurate. In fact, this is the main source of error in electricity demand forecasts. Since the required forecast horizon is long, it is difficult to find other forecasts to which own results could be compared.

There are various links from the macro figures to electricity demand forecasting, although in some cases the links are judgmental. In the short run forecasting, which is made at the operations department, considerable weight is given to trends in demand and sales. There is a unit at CEGB that looks at oil, gas and coal industries to analyze the competitive position of electricity. They have some industry models, e.g. a model of the world coal market. There are also some models of the UK energy sector. They take as inputs forecasts of exchange rates, economic growth etc., which are supplied by the CEGB economics department. On the other hand, they produce forecasts oil price etc., which are used by the economics department as inputs to the LBS model. There is also a link from the inflation forecast to tariffs forecasting.

In forecasting electricity demand, an econometric approach is partly
used, but it is still under development. The basic breakdown of
electricity demand is to domestic, industrial and service sectors, but
industries and services are also further disaggregated. There are
demand models for the aggregate industry and services and for some of
the disaggregated industries. They take as inputs the corresponding
forecasts of output and productivity. The models may also include e.g.
prices and energy-output ratio. The latter accounts for energy
conservation effects. There are also deterministic forecasting models,
which do not use estimated demand elasticities. As a result, there are
alternative forecasts, although in the end only one set of figures is
used. There is also an overall look at the energy-GDP ratio. This is
used as a benchmark and compared to the bottom-to-top forecast
obtained by adding up the sectoral forecasts.

The Area Boards' demand forecasts are more based on own experience,
but they also have some demand models for the industrial and
commercial sectors. Their forecasts are often higher than CEGB's.

The long run analysis is not made every year. In the scenarios, upper,
central and lower cases are presented. There is an analysis of the
factors that are needed to produce the middle case. The use of
econometric models in the long run analysis is not useful, since the
relationships change and with models it is more difficult to present
widely differing alternatives.

2.5. Unilever

The economics department at Unilever uses macro model forecasts in order to supply the macroeconomic assumptions for budgets and longer run planning at various divisions.

The main forecasting services used are LBS, Oxford and National Institute. Values of some key exogenous variables are supplied to the forecasting units and they run the models. No own simulations are made with the models, since there is no time to do this and especially since the modelling groups do the manipulation of the models, constant adjustments etc., more efficiently.

The actual figures used in planning are more or less averages of the 3-4 forecasts used. As a result, the figures are most likely not always consistent with each other. Some attention is given to the general picture given by the various forecasts. For example, it is felt that recently CEF has been too optimistic about the supply side responses. In this kind of cases the forecast in question is given informally less weight.

At present, no outside industry level forecasts are used, although previously Unilever used the Cambridge forecasts. This partly reflects the fact that Unilever's production is mainly consumer goods. However, some disaggregation of e.g. the LBS model would be useful.

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