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Business Forecasting in the United States:

Recent Developments by Individual Companies[1]

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Under modern conditions, production and trade are mainly undertaken with reference to future requirements. As these requirements cannot be known beforehand, the business man is faced with the necessity of making forecasts. The degree of accuracy with which these are made determines to a large extent the success of the undertaking, both as regards effective planning and profitableness. It also has important bearings on the stability of the business man's demand for labour and on the effectiveness with which he can satisfy consumers' needs. In view of these vital consequences, much attention has been given in recent years to methods of ensuring greater accuracy in forecasting. This is especially true of the United States of America. During a recent visit to that country, the writer had opportunity to study the forecasting systems of a number of business undertakings. The present article gives an outline of the main problems involved and the methods applied.

DEVELOPMENT OF FORECASTING

SYSTEMATIC forecasting is based mainly on a study of the relationships and trends of various series of economic statistics. The practical possibilities and social significance of such a study are indicated in the following quotation from a recent statement by Mr. Hoover, Secretary of Commerce, and now President-elect of the United States. Referring to the business situation in his country, he said :

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[1] The general problems and methods of business forecasting are surveyed in *Economic Barometers*, a report submitted to the Economic Committee of the League of Nations by the International Labour Office. Studies and Reports, Series N (Statistics), No. 5. Geneva, 1924.

The past five years have been remarkable for generally sustained prosperity, without the violent fluctuations which have characterised most of the previous periods of great activity. In large measure this has been due to greater knowledge of the current facts of business and a growing experience in utilising this knowledge. The small business man particularly has been benefited through the use of current statistics. . . .[1]

Both in the United States of America and other countries, analysis of business statistics for forecasting purposes is mainly a post-war development. In the United States, the adoption of systematic methods of fore casting by individual undertakings has been largely due to the stimulus given by the bitter experiences of the 1920-1921 slump. Very many companies were entirely unprepared for the sudden break in prosperity which occurred and were caught with large stocks of products on hand. As a result of rapidly declining prices these stocks greatly depreciated in value and entailed enormous losses.

The shock caused by these losses resulted in an attitude of great caution on the part of business men and also in a desire to try any method which might enable them in the future to foresee approaching changes in business prosperity. They therefore turned eagerly to the results of investigations undertaken by a number of organisations with the object of establishing systems to forecast the general course of business activity.[2] Some of these organisations had, in fact, predicted the depression of 1920-1921 and also the recovery of 1922. One of them — the Harvard Economic Service — had also conducted researches into pre-war conditions and had shown that its system would have enabled forecasts to be made of the various booms and depressions during the decade 1903-1913.[3]

Business men were much impressed by these successes and began to place considerable reliance on the predictions made by one or other of the forecasting services. Their confidence was, however, soon shaken, for in 1923 and subsequently the forecasts of well-known services were not always confirmed by actual experience, while comparisons of forecasts made by the various services

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[1] Foreword to *How to use Current Business Statistics* (United States Department of Commerce, Bureau of the Census; Washington, 1928).

[2] Among the best known of these organisations are the Harvard Economic Service, Babson's Statistical Organisation, Brookmire's Economic Service, and the Standard Trade and Securities Service of the Standard Statistics Company.

[3] An outline of the Harvard system of forecasting is given in the International Labour Office report on *Economic Barometers*. For full details the publications of the Harvard Economic Service should be consulted.

showed that their predictions were often conflicting. Consequently the " science " of business forecasting fell under a cloud and for a time was discredited in the eyes of large numbers of business men.

The reasons why the forecasts were unreliable are mainly two-fold. First, scientific forecasting was, and still is, at an early stage in its development. Its methods and conclusions were to be regarded as experimental and tentative rather than as established and irrefutable. There had been a tendency to place too much reliance on factors which had been operating for a number of years without allowing sufficiently for new elements of the post-war period. Thus the Harvard forecasts were based largely on the relative movements of three series of statistics representing respectively the average prices of stock exchange securities, the general course of business activity, and money rates of interest. A rise in stock exchange security prices, especially if accompanied by declining money rates, was regarded as forecasting several months ahead an improvement in business prosperity; the converse was also considered to be valid.[1] Statistical investigations had shown that these sequences had frequently occurred in the past and it was assumed that they would recur in the future. Such an assumption seemed not unreasonable. A rise in stock exchange security prices usually represents the cumulative opinion of the financial world that an improvement in business prosperity will shortly take place, and although allowance must be made for many individual errors in judgment, the financial world as a whole is likely to be specially well informed with regard to probable trends of business prosperity. Its opinion that an improvement is probable will be strengthened if money rates are declining, as easier credit conditions tend to stimulate business activity. From 1923 onwards, however, the sequences on which the Harvard forecasts were based ceased to manifest themselves with their former regularity. This was mainly due to a systematic regulation of business activity by the Federal Reserve Banking System; tendencies toward undue expansion or contraction of business were held in check by restriction or easing of credit conditions. For a time adequate allowance was not made by various forecasting services for this and other new factors.

The second reason why predictions with regard to changes in the general course of business activity failed to give satisfaction

[1] It is some sequence relation such as this, where the movements of one series regularly precede and therefore predict the movements of a second series, which forecasters desire above all to find, as it enables plans to be adapted closely to forthcoming changes in business conditions.

to business men was that inevitably the situation of particular industries was merged in the general average, while no account was taken of the special position of the individual undertaking. Yet these are the elements in which the ordinary business man is most vitally interested. The movements of business as a whole may be of primary interest to the economist and the politician, but they are of only secondary importance to the business man. He is interested above all in his own undertaking and in the development of the industry to which it belongs.

Need for Special Forecasts

It is evidently necessary for the business man to keep in touch with general movements of business activity. Fluctuations in business activity are in part the result of the operation of general factors which affect most, if not all, industries. Thus the depression of 1920-1921 was due to the influence of general factors and few industries escaped their effects. In fact, detailed studies of the booms and depressions of the economic cycle show that to a large extent separate industries and also individual undertakings show variations in prosperity broadly similar to those of business in general.

Nevertheless, although general booms and depressions are usually reflected in the separate industries and undertakings, the effects may differ considerably in intensity, while there are likely to be exceptions. This will be especially true in the case of minor fluctuations of general business activity. Practically all industries and undertakings are likely to show changes in prosperity somewhat similar to those of industry as a whole when there are well-defined general waves of boom and depression. But if the fluctuations of general business are only slight, it becomes of especial importance to study the situation of the separate industries and undertakings. Thus many industries and undertakings may be in a prosperous condition and an extension of their scale of production justified at a time when business as a whole is slightly depressed. The converse is also true.

It follows that the importance of making special forecasts will become greater if, on the lines indicated above, the United States Federal Reserve Banking System, and also the central banks in other countries, succeed by their credit policy in rendering steadier the general development of business activity, or, in other words, in diminishing the extent of business cycle fluctuations. On the one

hand, it is evidently more difficult to forecast general changes if variations from normal development are minor in character than if they are wide. On the other hand, as already indicated, the necessity for studying the fluctuations of special industries and branches becomes of primary importance when general fluctuations are only slight; these special fluctuations may be considerable. even though the general flow of business as a whole is fairly steady.

The supplementing of forecasts for industry as a whole by forecasts for special branches is particularly important from the social point of view. The greater the accuracy of the forecasts made by individual business men, the more stable will be the demand for labour. Therefore, in so far as unemployment is aggravated by fluctuations of prosperity, effective forecasting by individual business men will result in a diminution of unemployment. Also the more accurately the business man forecasts the future demand for his products, the more effectively will consumers' requirements be met.

Developments by Individual Companies

Although the early failures of services making general forecasts had resulted in a widespread belief that the so-called "science" of business forecasting could be of little value, a number of business men were of the opinion that the idea was sound. They recognised, however, that to give the best results the statistical and economic investigations on which forecasts are based must be suited to the situation of each separate industry and business. Accordingly a number of companies in the United States have undertaken systematic reviews of all the data available, as a basis for forecasts to be used by the directors in framing their policy and establishing their budgets for the ensuing period. At the same time the general forecasting services have reviewed their systems and extended their researches. The result of these developments has been to improve the probabilities of forecasting with reasonable accuracy. Also the limitations as well as the possibilities of forecasting are now recognised and consequently exaggerated claims are no longer made.

The investigations of the various companies which have adopted systematic forecasting methods have been greatly facilitated by the work of the general forecasting services, and especially of the Harvard Economic Service. These services, in addition to launching the idea of systematic forecasting and publishing general forecasts, have made valuable studies of the problems and methods

of the statistical investigations which lie at the basis of scientific forecasting. Thus they have indicated the necessity of studying separately the long-period or secular trend of development, the cyclical fluctuations, and the seasonal variations of business activity. Unless these are isolated and considered separately, it is difficult to determine what factors are operating and to estimate their relative influence on future business activity. For example, an increase in the production of pig iron during the first six months of 1928 may be due to seasonal demand, to cyclical improvement of business activity, to the general trend of development of the country in consequence of increasing population and wealth, or to a combination of these causes. In order to enable each of these movements to be studied separately, the Harvard and other forecasting services have called attention to and have employed statistical methods which enable each movement to be isolated. They have also described and made use of methods by means of which the degree of correlation of the movements of different series of statistics may be established. It is often important to determine the extent to which a rise or fall in one series of statistics, e.g. production of pig iron, is preceded, accompanied, or followed by a similar movement in another series, e.g. building contracts. If statistical analysis shows close similarity in the movements of two or more series, some causal relation may be looked for which may be of value for forecasting purposes. On these lines, certain of the general forecasting services, by calling attention to problems of method, have provided a valuable basis for the developments undertaken by individual businesses and have served to ensure the wide adoption of sound statistical analysis.[1]

Forecasting Criteria used by Individual Companies

As already indicated, practically all businesses are more or less affected by general factors. Therefore, in making forecasts for individual businesses, general factors must be brought under review. They include factors of a financial character, such as rates of interest for money, which constitute an element in cost of production. A second important factor is the general course of business activity,

[1] It is outside the scope of the present article to describe the statistical methods used in analysing and comparing data for forecasting purposes. They are outlined in *Economic Barometers*, published by the International Labour Office; more detailed descriptions are given in the publications of the Harvard and other forecasting services, and also in text books on statistical methods.

as a high rate of activity is likely to result in increased demand for the products of each of the different industries. A third general criterion, to which considerable attention is given, is the course of stock exchange prices. The course of these prices is regarded as of special importance for the purposes of forecasting, since, as indicated above, it represents to a considerable extent the opinion of the financial world with regard to future business prospects. Another criterion of importance is the general movement of wholesale prices. In considering the movements shown by these and other criteria, the series of statistics compiled by Government Departments and business organisations are utilised.[1] In the case of the larger business corporations which have established forecasting systems, the many series of statistics available are carefully examined and often combined by special methods considered by the corporation to be the most appropriate for its own purposes. The smaller business undertakings are frequently not able to undertake the expense involved, and therefore make use of the surveys of general business activity made by one or other of the forecasting services.

In addition to general factors affecting the business, special attention must be directed to criteria peculiar to the industry of which the business forms a part. Among the criteria which must be studied are the course of prices for the raw materials and finished products, and changes in the volume of production and of stocks. It is often particularly important to study the relation between changes in prosperity in the industry concerned and changes in the prosperity of allied industries. In some cases it may be that a change in activity in an allied or associated industry will give warning of an approaching change in the industry concerned. Thus, changes in the total value of building contracts awarded are often followed after an interval by corresponding changes in the demand for various fittings used in buildings.[2]

Of special interest are the criteria which concern the individual undertaking itself. The undertaking is in possession of information frequently not available to outsiders, and there are advantages in

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[1] The International Convention adopted by the International Conference relating to Economic Statistics organised by the League of Nations, Geneva, November-December 1928, is designed to increase the quantity and international comparability of information compiled and published by Government department as to trade, production (including indexes of industrial production), wholesale and retail price indexes, and certain other classes of economic statistics.

[2] The American Radiator Company, for example, finds statistics of building contracts awarded of great value in indicating forthcoming changes in the demand for radiators.

making the fullest use of this information. Among data of value for forecasting purposes are reports from agents of the undertaking in various parts of the country. These agents are in close touch with conditions of demand, and although they may be unduly influenced by psychological factors, their reports regarding such conditions cannot fail to be of value. These reports may be usefully supplemented by a study of the economic position of the class or classes of persons who consume the firm's products. Thus, a firm which produces a commodity largely consumed by workers' families will be aided in forecasting probable demand by an examination of changes in earnings in the various localities in which it is interested. Also no firm will neglect to study the actual orders received for its products, making allowance for the possibility of cancellation of orders. Of particular importance is the relation between the cost of production per unit of output of the undertaking, and the selling price of the product. Above all, the individual undertaking, unless monopolistic in character, must give close attention to the situation of its competitors; the forecast of the firm's probable sales will be affected by the strength or weakness, and especially by the price policy, of the undertakings with which it is in competition.

With regard to these criteria, the accumulated information, and especially statistical series as to past experience, cannot fail to repay study and provide a basis for future action. Such study of past experience with the object of establishing general rules and tendencies for future guidance constitutes the essential basis for systematic forecasting. But when past experience has been fully utilised there is still a large measure of uncertainty with regard to the future. Although the trends and relations of the past are likely to be maintained to a considerable extent in the future, there is always the possibility of new factors coming into operation, or of variation in the importance of existing factors. With regard to these, past experience has often little or nothing to contribute and their influence cannot be determined by scientific methods. Outside the scope of scientific forecasting properly so called are the effects of decisions made by the undertaking itself, for example changes in management or policy or a period of special advertising of the undertaking's products. In some of these cases past experience may be an aid in estimating probable effects, but there are no established trends by which judgment may be guided. All these considerations inevitably lead to the conclusion that systems of scientific forecasting can never provide anything in the nature

of automatic prediction. They can, however, furnish the business man with the soundest possible basis for his judgment regarding the future, utilising for this purpose all that past experience can contribute.

Review of Systems Adopted by Various Companies

Using criteria on the lines indicated above, a number of individual undertakings in the United States have introduced forecasting systems, the results of which have been of considerable value. An outline is given below of the systems adopted by three undertakings which have highly developed forecasting arrangements, and are representative of different fields of industry in the United States. Attention is directed only to the chief features of the systems and to the most characteristic of the criteria used; the statistical methods employed are not discussed. The descriptions given are limited almost entirely to forecasting methods, and these are to be clearly distinguished from the use which an undertaking makes of a forecast in planning its future production. The problem of business planning once the forecast has been made lies quite outside the scope of this article.

The systems reviewed are those of the American Telephone and Telegraph Company, the General Motors Corporation, and the Walworth Manufacturing Company. Other industrial undertakings have introduced systems on somewhat similar lines to those described. Also most of the large banking corporations make detailed forecasting studies. The systems of the banking corporations are, however, largely concerned with the operation of general factors, and are similar in character to the studies made by certain of the general forecasting services. They are therefore not included in the present survey.

It should be emphasised that large numbers of business undertakings both in the United States and in other countries make forecasts on the basis of similar data to those used by the undertakings mentioned below.[1] The distinction between firms which have and those which have not adopted systems of scientific

[1] Some indication of the use made of current business statistics in the United States is given in: *How to use Current Business Statistics* (United States Department of Commerce, Bureau of the Census; Washington, 1928). The degree of success in forecasting attained by certain companies in the United States is indicated in an article on "Industrial Forecating" by Charles P. Whitt, Ph. D., published in *The Annals* of the American Academy of Political and Social Science, No. 228, Sept. 1928, pp. 109-125.

forecasting lies not so much in differences in the data brought under review, as in the extent to which the data are subjected to systematic statistical and economic analysis with a view to the establishment of general trends, relations, and sequences of movement.

The American Telephone and Telegraph Company

This company, which is nation-wide in its activities, has developed a detailed system of statistical investigation as basis for its forecasts. Owing to the size of the undertaking and the character of the services which it renders, forecasts are made not only for periods of a few months or years but also for longer periods, often of fifteen to twenty-five years.

These long-period forecasts, which may be considered first, are made in order that the Company may plan the location and installation of its telephone system and other plant in such a way as to meet most satisfactorily the future requirements of a rapidly growing community. Unless plans are made many years ahead, serious difficulties would arise, e.g. inability to secure the most suitable sites for plant.

In establishing the long-period forecasts careful analyses are made with regard to the probable development of each locality.[1] The most important element studied is the growth of population, and estimates are made of the probable total population of each city or other urban district fifteen to twenty-five years hence. In making these estimates the influences which have caused the past growth of each city and the influences which are likely to operate in the future are examined. The two chief factors are: (1) the excess of births over deaths, this being indicated by the population statistics; (2) the attraction of the locality to population from other areas, and especially the attraction of industrial developments. In many American cities the second of these factors has been found to be the more important.

When an estimate has been made of the future total population of any city, a classification is undertaken into economic groups. A main distinction is drawn between residential buildings and business premises. In the case of the former, estimates are made

[1] A detailed account of the methods adopted in making these long-period forecasts is given in an article in the *Harvard Business Review*, April 1923: "Forecasting the Future Market in a Large Community", by E. L. STONE, Jr., Commercial Survey Engineer, American Telephone and Telegraph Company.

of the probable numbers of families occupying dwellings of different rentals, there being a close relation between the rental of a dwelling and the demand for telephone service. Similarly, estimates are made of the total number of business firms of each class — offices, wholesale and retail establishments, manufacturing undertakings, and workshops. The estimates both for residential population and business firms are made for subdivisions of each city, an intimate knowledge of local conditions being necessary for this purpose.

These analyses enable a picture to be drawn of the development of each city and of the country as a whole a considerable number of years ahead. Such a picture, together with estimates of probable technical improvements in telephone and telegraph equipment and forecasts of the probable changes in demand for and use of telephone and telegraph services, enables comprehensive plans of future developments to be established.

Closely related to the long-period forecasts, but based on different statistical analyses, are forecasts for periods ranging from several months to several years. These short-period forecasts form the basis for budget plans of year-to-year operating expenditures. They enable the administration to determine the most favourable opportunity to issue new capital. Orders for materials required for new construction can be placed a sufficient time in advance, supplies can be purchased in large quantities when prices are relatively favourable, and workers can be trained to meet the growing requirements of the undertaking.

The short-period forecasts are based on a detailed review and analysis of business conditions throughout the country, a monthly summary being compiled.[1] The data reviewed include : (1) financial conditions ; (2) industrial activity in the chief industries, covering production, employment, wages, and commodity prices ; (3) trade and transportation ; (4) agricultural conditions ; (5) reports from associated companies regarding business conditions in the areas in which they operate. Charts are constructed to show the movements of the various groups over a period of years.

One of the most important compilations for the purpose of short-period forecasting is that undertaken in connection with the

[1] The statistical methods employed to deal with seasonal variation, trend, and the correlation of movements are similar to those described and used by the Harvard Economic Service.

construction of an index to show the course of general business activity. The Company constructs its own index. Its statistical studies have shown that there is usually a close relation between the course of general business and the movements of most series of telephone data. Forecasts are therefore made of the broad movements of general business activity and these are used as basis for forecasting the course of telephone development. All that is attempted is to use the general business curve, together with estimates of the influence of various factors likely to operate in the early future, as a means of forecasting the broader cyclical movements. The forecasts indicate the present outlook as to the main trends; they do not pretend to give indications with regard to minor fluctuations around the main trend. The forecasts are revised every few months as new data become available.

The general business index or curve is a composite of a number of important indexes of industrial activity. It shows movements in the *volume* of business activity, the influence of price fluctuations being eliminated.[1] This elimination is important, as indexes which include the effects of price changes do not show satisfactorily the variations in industrial activity alone. For example, an increase in the *value* of pig iron produced may be due to an increase either in *volume* of production or in *price per unit* or in both. There are obvious advantages in studying separately changes in volume and in prices, and it is for this reason that the influence of price fluctuations is eliminated from the general business index.

The series included in the general business index cover the production of pig iron, steel ingots, bituminous coal, paper, lumber, sole leather, and electric power, cotton consumption, the activity of wool machinery, net ton-miles of railway traffic, and railway car loadings. In combining these separate series into an index of general business, weights are applied so that each series exerts on the final index an influence appropriate to its own importance. Forecasts are also made of the course of wholesale prices and of other important series.

Responsible officials of the Company are of opinion that the system of statistical analysis and tentative forecasts which has

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[1] Long-period trend and seasonal variations are also eliminated in order that attention may be concentrated on cyclical fluctuations. Separate studies are made of long-period trend and seasonal variations, and the results are combined with those derived from the study of cyclical fluctuations for the purpose of constructing the final forecast.

been developed is indispensable to the successful administration and operation of this large and complex organisation.[1]

General Motors Corporation

The General Motors Corporation, like the American Telephone and Telegraph Company, is one of the giant businesses of the United States. It is primarily engaged in the manufacture and sale of automobiles, automobile parts, and accessories. A number of makes of cars of different grades are produced by separate divisions, while special divisions are organised for the production of accessories.

For planning future production, a system of forecasting has been developed.[2] This system differs from that of the American Telephone and Telegraph Company in that it is limited to short-period forecasts. In the motor industry, forecasts covering a considerable period of years are not essential, while attempts to make such forecasts would hitherto have met with little success owing to the rapid changes which have taken place in the development of the industry.

An estimate is made each year for the twelve-month period from 1 August to 31 July, of the number of cars likely to be sold to the public by the entire automobile industry. The estimate is subdivided into sales of low, medium, and high priced cars. It is based primarily upon actual experience and trends of sales during recent years. Allowance is made for the effects of the probable condition of general business activity during the coming year, there being a close relation between business prosperity and the demand for automobiles. With regard to the trend of sales, account is taken of increase of population and wealth of the country. In estimating the influence of changes in the general business situation, the Corporation does not compile a special index of business activity. It utilises instead the statistical reviews and forecasts made by

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[1] The Western Electric Company, which supplies the American Telephone and Telegraph Company with materials and equipment, uses the forecasts of the latter Company as basis for its own construction and operating programmes. It also examines closely the market situation and prospects of the chief raw materials which it uses, e.g. copper and lead.

[2] Cf. "Financial Control Policies of General Motors", a paper read before the Annual Convention of the American Management Association in New York City, March 1926, by Albert BRADLEY, Assistant Treasurer, General Motors Corporation.

other bodies, but supplements them by its own appreciation of the economic factors likely to affect the course of general business during the ensuing twelve months.

The next step is to determine from the estimated total sales of low, medium, and high priced cars of the whole automobile industry the probable proportions which the Corporation's grades of cars, or "car divisions", will be likely to represent. In determining these proportions account is taken of the effect on sales of the production of new models, of changes in prices, and of the competitive situation of other producers.[1] Account is also taken of stocks of second-hand cars. These general forecasts are considered in relation to estimates prepared by each car division of the Corporation of probable operations during the year, including sales, costs, profits, and capital requirements. In all cases the selling price policy of the Corporation is of primary importance, for, until this is formulated, no satisfactory forecasts can be made.

The forecasts for a year ahead provide valuable assistance in the establishment of the general plans and policy of the Corporation, but are not considered of sufficient accuracy as a basis for the actual programme of production. This programme is constructed for periods of four months only Each car division makes each month a forecast of sales, stocks, and production requirements covering the current month and the three succeeding months. These forecasts are examined by the Central Office of the Corporation and accepted, or if necessary modified, in association with any division concerned, in order to bring them into line with the general programme and forecasts of the Corporation as a whole.

Of special importance in preparing the programme of production is the effect of seasonal variation. The demand for cars is highly seasonal, being greatest in the spring; according to recent data compiled by the Corporation, sales in April are nearly four times as great as in December or January, while March, April, and May together represent 37.5 per cent. of the year's sales.[2] Statistics of sales during recent years have been used to provide a measure of seasonal variation month by month. On the basis of this

[1] An interesting example of the effect of the last of these factors was that afforded during the recent change in the model of Mr. Henry Ford's cars. During the process of remodelling, the cessation in the production of Ford cars enabled other producers to plan the production of and to sell a considerably larger number of cars than normally.

[2] Curiously enough, although most automobiles are used throughout the year and closed cars now represent 75 per cent. of all cars sold, seasonal variation has shown little change in recent years.

information production is spread more evenly over the year than if related to the demand conditions of the moment; extreme fluctuations in the use of plant and labour are thus avoided.

The forecasts covering four months are modified each month in the light of actual experience. For this purpose the Corporation maintains close contact with the demand for its cars. Reports are sent every ten days to each car division by its dealers showing the number of cars sold, the number of orders, and the number of cars in stock. This information, received in all from a total of some 18,000 dealers, enables the production programme to be adjusted closely to market conditions and is also used to modify the estimate of sales for the year.

It is claimed that the result of this system of forecasting and future planning has been that " increases or decreases in production schedules have been less violent than heretofore ". In other words, there has been greater stability in the employment of capital equipment and of labour. At the same time the consumer has benefited from the reduced costs, while the return on investment has been unimpaired.

The Walworth Manufacturing Company

This Company, which manufactures a variety of metal goods, has for several years undertaken systematic forecasting on the basis of a detailed statistical and economic analysis of past and present experience.[1] Near the end of each quarter the chief officers review the business situation and establish a production programme for the two succeeding quarters. Each class of product and the situation of each works is considered.

The plans are based on a survey of the general business situation and prospects, together with a review of indexes for those branches of industry which make use of the Company's products. Thus, fluctuations of orders received for the Company's products (i.e. the *quantities* ordered) are carefully examined and related to indexes of business prospects in general, there being a close correspondence

[1] The products of the Company include valves, pipe-fittings, and tools of cast iron, malleable iron, brass, and steel. An account of the forecasting methods adopted is given in *Budgeting to the Business Cycle*, by Joseph H. BARBER, Staff Assistant to President and Head of Planning and Statistics Section, Walworth Manufacturing Company (New York, 1925). Cf. also *The Economic Control of Inventory*, by the same author.

between changes in the prosperity of business in general and changes in the demand for the Company's products.

Research has not yet revealed any index external to the industry the movements of which regularly precede and therefore predict fluctuations in demand for the products of the Company. Nevertheless, by studying the movements of an index of general business conditions two important aids in forecasting are obtained. First, if the symptoms of a change in prosperity as shown by the Company's own indexes are confirmed by similar indications of the general index, a sounder basis for judgment regarding the future is provided than if the Company's indexes were the sole guide. Second, the relation of the Company's index to general movements enables a judgment to be formed as to the influences operating to cause a change in prosperity. On the one hand the cause may be within the Company itself; on the other hand it may be some external factor, the influence of which, once the factor is recognised, can be evaluated. Thus by careful statistical and economic analysis the possibilities of sound judgment regarding future prospects are increased.[1]

Of individual series external to the Company, particular attention is given to statistics showing building contracts awarded, many of the products of the Company being used in construction work. Among internal series, in addition to fluctuations in the quantity of goods ordered by purchasers, importance is attached to the width of the Company's gross profit margin, i.e. the relation between costs of production and receipts from sales. A narrowing of the margin between these two elements often gives warning of an approaching decline in prosperity. It is true that certain elements which enter into cost of production are subject to modification according to decisions of the Company. This is the case also with selling price, which largely affects receipts from sales. As already indicated, criteria which are largely affected by decisions of an undertaking are not among the most appropriate for determining the general economic trends and relationships upon which scientific forecasting is mainly based. But both costs of production and receipts from sales include elements which are influenced by external economic movements over which the individual undertaking often has little control, e.g. the cost of raw materials, money

[1] In making these various comparisons, the influences of seasonal variations and long-period trends are isolated from cyclical movements, each of these three groups being studied separately.

rates, and wage rates. Also the experience of many firms has shown that, to a considerable extent, in a period of intense production during a boom, production is less efficiently organised than in more normal times. Attention is concentrated mainly on increasing the output of the undertaking ; less care is given to maintaining machinery at a high standard of efficiency, workers with less training and efficiency are brought into employment, and wastes in organisation occur. At the same time the prevailing optimism tends towards over-production, with the consequence that prices begin to decline, or at least to rise less rapidly. It is not surprising, therefore, that a narrowing of the margin between costs of production and receipts from sales should give warning of a decline in business prosperity.

In addition to detailed reviews of indexes of business activity for the country as a whole in relation to data internal to the Company, studies are made of conditions in various localities in which the Company is specially interested. Among the series used to indicate local conditions, the one considered to be the most valuable is the bank " debits to individual accounts " in the chief cities of the locality. Finally, the forecasts based on statistical and economic analysis are considered in relation to sales estimates made by the Company's representatives in the different districts. Both sets of data are used in the establishment of the final estimate on which the production programme and budget plans are based.

As regards the influence of its forecasting system on stability of production and employment, statistics of the Company indicate clearly the valuable results obtained.

Conclusion

Developments on the lines described above both in the United States and also in certain other countries have led to progress in reducing business fluctuations. It would appear from the experience already gained that if business forecasting is to be of the greatest value with a view to ensuring increased stability and co-ordination of business activity, three related branches of investigation into economic statistics and factors are necessary. First, systematic general reviews should be made in order to determine the trends of general business activity. As a rule these may best be undertaken by independent research organisations or by bodies which are representative of the business community as a whole and the results should be published widely. Large business corpora-

tions may, however, often find it preferable, as in the case of the American Telephone and Telegraph Company, to conduct these investigations themselves rather than use the compilations and conclusions of outside bodies.

In the second place, general reviews and studies of trend require to be supplemented by special reviews and studies for each branch of industry. These may be undertaken by employers' organisations in each industry, by the central offices of cartels or trusts, or in some cases by joint bodies representing employers and workers. Such bodies not only possess the requisite knowledge of the special features of the industry, but are often in the most favourable position for securing additional statistical information from their members or components.

The third important stage is the utilisation by individual companies of the reviews and forecasts regarding the course of business activity as a whole and the special studies and estimates as to the future prospects of particular industries. These data, related to the position of the individual company, would provide a basis for forecasting the volume of production necessary to meet future market requirements. A wider adoption of such methods would be conducive to greater stability of production with its obvious advantages to employer, worker, and consumer, and would constitute the necessary complement to the action taken by central banks with a view to restricting within the narrowest limits the fluctuations of the business cycle.