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Chapter Author: Oswald W. Knauth

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CHAPTER XX

STATISTICAL INDEXES OF BUSINESS CONDITIONS AND THEIR USES

BY OSWALD W. KNAUTH

NATIONAL BUREAU OF ECONOMIC RESEARCH

This chapter treats the question whether, and in how far, the use of general statistics may be expected to lessen the violent fluctuations of the business cycle. Before attempting an answer, it is necessary to recall what statistical data are now available to the business public, as well as the gaps in our information.

I. WHAT THESE STATISTICAL INDEXES ARE

General business statistics come from three main sources—government, trade associations, and private organizations. In their publications, each agency utilizes extensively data obtained from others, so that the line of demarcation in regard to the source of the data which each presents is not clear. For instance, the *Survey of Current Business* published by the Department of Commerce draws heavily on trade associations, on such private sources as the F. W. Dodge Company for building statistics, on *Bradstreet's* and *Dun's Review* for price indexes and commercial failures, and on the *Journal of Commerce* for dividends paid by corporations. In turn, of course, the trade associations and private organizations utilize each others' and the government's material wherever possible.

Government Series.—The main government sources of current statistics are as follows:[1]

1. The Department of Commerce publishes each month (a) *The Survey of Current Business*, which is perhaps the most comprehensive single report on business conditions. Started in July, 1921, it is constantly expanding its scope. In addition to current monthly figures, comparative data covering a period of years are given at quarterly intervals. The circulation does not yet exceed five thousand. (b) *Commerce Reports*, giving a survey of foreign trade and a variety of notes on business conditions. This series dates back to 1880. (c) *Monthly Summary of Foreign Commerce of the United States.* (d) The Bureau of the Census not only

[1] A more detailed statement of sources may be had by referring to the *Survey of Current Business*. Only currnet information is here listed.

supplies the fundamental data for all statistics of population, agriculture and manufacturers; but it also compiles a variety of monthly reports, such as cotton ginned, cotton consumed, and stocks of coal.

2. The Department of Agriculture publishes each week *Weather, Crops and Markets*, a compilation of the most recent news concerning agricultural conditions and prospects.

3. The Department of Labor publishes the *Monthly Labor Review*, which contains a large amount of information on labor conditions, as well as data on cost of living and an index number of wholesale prices.

4. The Federal Reserve Board publishes monthly the *Federal Reserve Bulletin* which contains a wealth of statistics concerning the banks, prices in the United States and foreign countries, production, stocks, and shipments. Its publication was begun in May, 1915.

5. The Bulletins of the twelve Federal Reserve Banks have attained a high standard of excellence, and are fairly uniform in the material they cover. Besides showing the financial condition of the banks in each section, they also collect many trade statistics, such as samples of the volume of retail and wholesale trade, commercial loans, and commercial paper outstanding.

6. The Interstate Commerce Commission publishes a *Preliminary Statement* of the Operations of Class I Railroads.

Trade Association Series.—The information published by trade associations and trade journals is so extended as to defy detailed description in a short space. Trade journals are frequently, though not always, closely connected with associations. The inter-relations of business are such as to make much of this information referring pirmarily to a particular industry of interest to all business men. This is, of course, particularly true of the basic industries, and the production of pig iron, copper, coal, and petroleum receive wide publicity. But much of the yet unpublished material collected by trade associations would be valuable to a wide circle of allied industries. Of late the Department of Commerce has secured the wider dissemination of some of this material. Nevertheless, much remains to be done in making available to all business enterprises data now confined to a few.

The degree of excellence of the statistical material gathered by trade associations is very uneven. An examination of the work of a considerable number of associations indicates that over one-half do not gather general statistical data of any kind. Only a small proportion—not over one-fourth—collect consecutive material of a comparable nature. Most of the statistics date back only to 1917, though in a few cases compilation was begun before the war. This does not mean that trade associations themselves are of such recent growth but that only during the last few years have they begun to collect data concerning their industries on a large scale.

The data covered by the more ambitious associations—and these are few in number—cover the following items:

Consumption of raw material	Capacity of normal production
Raw materials on hand	Orders received
Output of finished product	Unfilled orders
Finished product on hand	Actual rate of consumption
Finished product sold	Normal rate of consumption
Shipments	

In most cases, however, statistics are confined to current production and stocks of goods. These data, of course, are valuable as far as they go.

This is not the place to discuss government policy toward the publication of prices. But it is proper to note that, as a result of this policy, nearly all executives who have been approached have disavowed any attempt to gather price data. Many would like to do so, for they regard their information as defective without the inclusion of this item. Were prices not practically ascertainable in some other way, the defect would be most serious. But the statistical loss is tempered by the fact that many trade journals as well as other agencies supply market quotations. They do not, it is true, cover this field as completely and efficiently as could the associations. Still, a casual acquaintance with the market will keep a dealer in touch with price developments, whereas he would have little chance of obtaining reliable data in regard to stocks, raw material, and rate of production without the aid of a central agency.

Of secondary importance in hindering the gathering of price statistics is the reported unwillingness of individuals to disclose the facts, except where they are available generally through advertising. And many prices are special prices.

Other obstacles which are reported by trade associations as increasing the difficulty of gathering general information are:

Considerations of individual credit. This obstacle is especially serious in industries in which the unit of production is relatively small.

In many industries, the tradition under which the leaders have grown up has been to favor complete secrecy concerning the operations of individual plants, and this tradition yields ground but slowly.

Fear on the part of many individuals that they might disclose the existence of surplus stock and thus influence prices to their own disadvantage.

The lack of standardization of certain industries.

Inadequate help on the part of individual concerns to get out reports.

Inability of the secretaries of some associations to find simple units of production.

Series Compiled by Private Organizations.—Private organizations which publish statistical series are of two kinds—those which gather some type of specific information and those which attempt broad generalization and interpretation.

Organizations Publishing Specific Information.—Some of the more important original compilations of statistics are:

The index of construction costs made by the Aberthaw Construction Company of Boston and published in the *Survey of Current Business.*

The freight car loadings published weekly by the American Railway Association, of Washington, D. C.

The monthly index number of prices and business failures published by both *Bradstreet's* and *Dun's Review.*

The record of building activities in twenty-seven states published monthly by the F. W. Dodge Company, of New York.

The record of building expenditures in certain selected cities published by *Bradtsreet's.*

The monthly dividends of corporations published by the *Journal of Commerce* of New York.

The "unfilled orders" published monthly by the United States Steel Corporation.

The course of bank clearings in leading cities given in the *Commerical and Financial Chronicle.*

In addition, many trade journals collect and publish fundamental statistics for their industries; the monthly reviews of certain large banks contribute to the available fund of information; and the current service of such organizations as Babson's Statistical Organization, Moody's Investor's Service, Poor's Publishing Company, and Standard Statistics Company contain a variety of specific data.

Organizations Making General Analyses of Business Prospects.—The outstanding attempts to produce broad generalizations of the present and future trend of business are described as typical of the methods employed. They are taken up in alphabetical order as follows:[1]

Babson's Statistical Organization, Wellesley Hills, Mass.
Brookmire Economic Service, 25 West 45 Street, New York, N. Y.
Business Barometer Dial, 347 Fifth Avenue, New York, N. Y.
Harvard Economic Service, Cambridge, Mass.   .
Moody's Investors Service, 35 Nassau Street, New York, N. Y.
Poor's Publishing Company, 33 Broadway, New York, N. Y.
Standard Statistics Company, 47 West Street, New York, N. Y.

These organizations attempt not merely to present the current statistics of business—they do that; but in addition they attempt to present the information in such form that it may be used for forecasting business conditions.   In considering the influence of their work in regard to lessening the cyclical fluctuations of business, it must be noted that the number of concerns which these agencies reach is not large.   It is estimated that their total circulation, including duplications, is about 40,000.   Their

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[1] The descriptions have in each case been submitted to and passed upon by the organizations named.

influence, however, extends beyond their immediate mailing lists. Many of their subscribers, especially trade associations and large firms, pass along to their members or agents the conclusions reached.

Babson's Statistical Organization.—The mainstay of the Babson system is the assumption that in business, as in physics, the law holds that "action and reaction are equal." For every period of prosperity, by which is really meant "over-expansion," there must be an equal period of depression or contraction.

This equality has not been proved but is assumed at the outset. The problem is, then, to find statistical measurements whereby it can be determined when we are in a period of over-expansion and how great is its intensity and duration. This period is shown on the chart as an area. The area covered by the period of depression—determined by its intensity and duration—must equal in area the preceding over-expansion before the next upward movement may be expected.

The component parts of this system are two. First is the line of business activity made up from the following twelve items:

> Immigration
> New Building
> Failures
> Bank Clearings[1]
> Yield of Leading Crops
> Railroad Earnings
> Commodity Prices
> Total Foreign Trade
> Foreign Money Rates
> Domestic Money Rates
> Canadian Conditions
> Stock Market Conditions

Each of these items is expressed in terms of the highest and lowest variations during the period 1901–1911, and the last series in each division is given a double weighting. The weighted average is then used to establish the line of business activity. The average condition of the years 1903–1904 is taken as an arbitrary starting point. Variations are expressed in terms of dollars, on the ground that business is conducted in money terms and that any business barometer must be constructed so as to indicate this fact.

The second part of the system is the line of growth from which prosperity or depression is measured. It must comprise such a series as will express not only physical growth but also changes in money values. Bank clearings outside New York City were first chosen to represent this line. Since 1919 check transactions, adjusted so as to cause no break with the earlier years, have been substituted.

[1] Check Transactions substituted Jan. 1, 1919.

In order to fit this line of normal growth, or $x - y$ line, as Mr. Babson calls it, to the line of business activity, the years 1905–1908 were selected, on the ground that they included a complete business cycle. According to the assumption that action and reaction are equal, there must during this period have been as great an area between the two lines above the $x - y$ line as below it. The $x - y$ line was so placed as to produce this result.

It was then found that a change of 1 per cent in check transactions for succeeding years was equal to one-half a point on the barometer scale used, and the line of business activity for the following years was plotted on this basis.

The first test of the system came after the cycle containing the years 1909–1915 was finally completed. Then it was found that the area above the line during this period was almost exactly equal to the area below the line. Accordingly, it is held that the present system functions in a satisfactory manner. However, the system is not taken as final. As Mr. Babson puts it, "We are all in the elementary stage of economic study, and when some better method has been devised by economic research for locating the $x - y$ line, we shall adopt it." It is predicted that the current depression must complete an area, measured in terms of intensity and duration equal to the preceding period of over-expansion before a new period of expansion can set in.

Several points must be borne in mind to understand what this system shows, and what it does not pretend to show.

It does not forecast the length or intensity of a period of expansion. It forecasts only the length and intensity of a depression after the previous period of over-expansion has been completed.

The line of normal growth ($x - y$ line) is considered the level of true prosperity.

Security values usually reach their high and low points during the first quarter of periods of over-expansion and depression.

The course of any period of over-expansion or depression cannot be foretold. It can only be said that the area of the depression as measured by length times intensity will be the same as the preceding area of over-expansion.

Periods of depression can be mitigated only by changing the slope of the line of normal growth, which in turn according to Mr. Babson can be accomplished only by increasing per capita production, by eliminating waste, and by right living.

Brookmire Economic Service.—Two years ago, the Brookmire Economic Service discontinued its curve of business activity because it failed to forecast movements during the violent price changes which accompanied the war. Since then, this agency has centered its attention on the construction of a forecasting curve of stock and commodity prices. This forecasting curve is to be sharply distinguished from a curve of business activity. It is not that. But the expectation is that its movement will precede changes in business activity, and its component parts are selected with this end in view.

The curve is made from a simple average of the following six series:

> Speculative activity
> > (Average price of forty stocks and number of shares
> > sold on the New York Stock Exchange)
>
> Domestic production and marketing
> > (A composite of many items)
>
> Ratio of imports to exports
>
> The speed of turnover of bank deposits
> > (Ratio of bank deposits to total clearings)
>
> American commercial paper rates
> > (Four to six months commercial paper)
>
> The open money-market rate in London

Two of these series—the third and fourth—are expressed in terms of ratios. In the first, fifth, and sixth, no secular trend is discernible. Only one series, the second, is expressed in terms of production and this line is corrected for secular trend. The importance to the general average of all six series of any possible error in the secular trend chosen for this single series is held to be very small.

The averages for current months are compared with the average of the base years 1904–1913, and relative fluctuations are expressed in terms of the maximum fluctuations. In this way an equal weighting of the fluctuations is accomplished.[1] Then the points are plotted on a semilogarithmic (natural x, log y) chart, in order that the importance of extreme fluctuations in any one of the series may be lessened.

A special device is introduced to guard against over-emphasizing the importance of minor fluctuations which might erroneously be thought to indicate a change in trend.

When the average of the six factors used is above the 1904–1913 base, then the slope is upward, and it continues to be upward *as long as* the average is above the 1904–1913 base. In order to plot this upward movement on the chart, the amounts are cumulated so long as the averages are above the base. For instance, if the final figures obtained for the first three months of the upward movement are +125, +100, +150, then the actual points plotted are +125, +225, +375. And this cumulation continues until the average is below the 1904–1913 base. The slope of the curve and its place on the chart thus has no significance.

One further caution. A neutral zone, extending about 3 per cent of the range of fluctuation above and below the base-line has been established. When the average is within this zone, it is held to have no significance, and the next point on the forecasting curve moves directly sideways. When, however, the cumulative total of points within the

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[1] An exception is the ratio of imports to exports, which is given one-half the weighting of the other items.

neutral zone is such as to bring this total out of the zone, then the effect is recognized as significant.

The vital point in this system is, therefore, a crossing of the neutral zone by the average. And even here one further safeguard is introduced. If within four months the neutral zone is again crossed, then the entire movement is to be disregarded. As a matter of fact, the effect of this change in warning signals is apt not to be serious, for few business men are in such a liquid condition that they can entirely reverse their position in less than four months.

Constructed in this way, the forecasting curve is expected to precede a change in stock prices by one month and in commodity prices by six or seven months. Special emphasis is laid on the statement that this is only approximately true and that action based on the curve must be tempered by judgment. It is held that the extent of a movement can never be foretold, for there are no natural limits to either a rise or a fall in prices. The problem therefore resolves itself into discovering the time when a change in movement will take place; and even the time sequence of business movements, while following recognized grooves, may be hastened or retarded by particular circumstances.

The test of the method is in its capacity to function. And the way in which it has functioned in the past may be seen by reference to Ray Vance's "Business and Investment Forecasting," recently published by the Brookmire Service.

Business Barometer Dial.—The Dial Analysis uses a clock on which are shown the movements of twelve basic factors. These factors are grouped under three main heads:

Indexes of General Confidence: railroad earnings, bank clearings, bank balances, bond sales, stock sales, new securities, new building.

Indexes of Business Conditions: crops, exports, labor conditions, failures.

Index of General Conditions: commodity prices.

The index of each of these factors is shown on the Dial; first, as a percentage change from the previous month, and next, as an average of the previous twelve months compared with an average of the preceding sixty months. This moving "normal" of the preceding sixty months is a distinctive feature of the system. That period is chosen as being not too far in the past to invalidate comparison, and yet long enough to furnish a fair base-line for comparison with the present.

These twelve series are then studied singly and in relation to each other to determine the future trend of business which is discussed in detail in the text of the bulletins.

Harvard Economic Service.—The Harvard Economic Service places its main reliance for the forecasting of business conditions upon the cyclical fluctuations shown by its three major curves, representing (*A*)

Speculation, (*B*) Business Activity and (*C*) Banking and Money Conditions, and upon the time sequence between the changes of trend in these curves.

The statistical series used in making each of these curves are first corrected for their seasonal and secular trends, and are then expressed in terms of their pre-war standard deviations.

After careful study and comparison of the different series,[1] it was decided to use the following data for the construction of each of the post-war indexes:

(*A*) Speculation
    Bank clearings in New York City
    Prices of twenty industrial stocks
    Number of shares traded on the New York Stock Exchange.
(*B*) Business Activity
    Bradstreet's price index
    Bank clearings outside New York City.
(*C*) Banking and Money Conditions
    Four to six months commercial paper rates (New York)
    Sixty to ninety days commercial paper rates (New York).

The five recurrent phases of the business cycle are depression, revival, business prosperity, financial strain and liquidation of securities, industrial crisis and liquidation of commodities.

In the interpretation of these curves, the movements of each must be considered in relation to the movements of the others. Normally, for instance, a trend downward of curve (*C*) (money) should forecast an upward trend in curve (*A*) (speculation). Similarly, a pronounced trend in (*C*) (money), occurring with an upward trend in (*A*) (speculation) and (*B*) (business), will forecast a change of trend first in (*A*) and then in (*B*). If any of the curves may be considered of primary importance, it is curve (*C*) (money). However, an upward movement of curve (*C*) (money) at a time when curves (*A*) (speculation) and (*B*) (business) are both low and tending downward cannot be permanent, and so the movements of (*A*) and (*B*) forecast the movement of (*C*).

In this method of forecasting, then, the direction of movement of each curve is far more important than its absolute position. The order of importance may be stated as follows: First, the direction of movement of each curve considered in connection with the direction of movement of the other curves. Second, the direction of the immediately preceding movements. Third, the magnitude of such movements from the last turning-point. Minor fluctuations do not denote a long-term swing, but a persistent movement covering several months is significant.

While the series used in making the curves are corrected for secular trend, the experience of the service shows that any possible error in this

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[1] *The Review of Economic Statistics*, January and April, 1919.

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correction will not affect the results within a short period of three to five years.   That there is danger of error in measuring these secular trends is frankly pointed out.   A recent bulletin issued by the Service, entitled *Interpretation of the Index of General Business Conditions* by Warren M. Persons, explains the use of this system in detail.

Moody's Investors Service.—Moody's Investors Service publishes as part of its service a *Monthly Analysis of Business Conditions,* which is primarily intended for investors.   The developments in financial conditions, production, foreign trade, the labor market, etc., are briefly discussed.   In connection with this work, but considered as of secondary importance, there is presented a trade barometer which is used to indicate "the rise and fall of business prosperity."   The items used in this barometer are:

Average daily bank exchanges for the United States
Gross revenue of class I railroads
Merchandise exports
Merchandise imports
Gross value of the monthly iron output of the United States
Dun's index number of commodity prices
A four-month average of liabilities of commercial failures (a negative quantity)

The method of weighting and combining these series is not made public.

Poor's Investment Service.—Poor's Investment Service concentrates on specific information.   In addition to *Special Letters* on the outlook for certain securities, Poor's publish a *Weekly Letter* which contains their forecast regarding the business of a large number of corporations.   General business conditions are also discussed in the *Weekly Investment Letter* as well as in their *Monthly Mercantile Letters.*   The aim is to present the conclusions of the staff in a manner easily understood by business men without entering into the technicalities which have led to these conclusions.   The underlying principles on which these letters are based are (a) that business conditions are too complex to be analyzed by any short-cut method, (b) that practical considerations can only be properly weighed and summarized by practical men and (c) that only long-term movements of the market can be foretold with any regular degree of assurance.

Standard Statistics Company, Inc.—The Standard Daily Trade Service's study of the business cycle (in the course of which they have minutely examined, classified, and interpreted voluminous data extending back over a period of more than thirty years) has led to the conclusion that the supply of money and credit available at any given time is the governing force in business activity, prices, and security market movements.

The movements denoting depression and inflation are represented on their chart by three curves which show the money supply, stock

prices and business. By hypothesis, the money-supply curve is the controlling factor, and its movements are reflected, after a lag, in the other two curves.

These curves are made as follows:

Money-supply Curve.—A line representing, from 1901 to 1915, a thirteen-weeks moving average of the ratio of deposits to loans of the New York City Clearing House banks, and from 1918 to date a thirteen-weeks moving average in terms of the standard deviation of first, the ratio of deposits to loans of between six hundred and eight hundred and twenty Federal Reserve Member banks and second, the ratio of total reserves of the twelve Federal Reserve banks to deposit and federal reserve note liabilities combined.

The base-line for the first period was an average for the years 1901–1913. But in computing a base of the post-war period, it was found that the data were insufficient to permit the application of mathematical methods. Accordingly, the base was determined by inspection after a careful study of the years 1919–1921.

The money-supply curve breaks off in the year 1915 and is not resumed until 1918. This interval was the formative period of the Federal Reserve System. Because of this factor as well as the war, the old monetary relationships were in a state of flux, and the new relationships had not yet taken definite shape.

Stock-price Curve.—This is a line representing the actual monthly range from 1901 to 1914 of twenty railroad and twelve industrial stocks and, from 1915 to date, the actual monthly range of twenty-five rail and twenty-five industrial stocks.

Business Curve.—This is a line representing a monthly average of the ratio of the value of bank clearings outside of New York City to normal conditions. The normal conditions line about which the business curve moves was drawn on a logarithmic scale over a period of thirteen years (from 1901 to 1913 inclusive) with secular growth and seasonal variations eliminated. For the years since 1913, normal is estimated by a projection of the previously calculated curve.

All three of these curves swing generally in rythmic movement. As said, however, the money-supply curve is the indicator and points the way. By crossing its own normal line in a downward direction, the money-supply curve gives the signal that stock prices are at or near the top and that the strategic moment for selling has arrived. The same movement indicates that, from three to nine months later (roughly) business expansion will have reached its maximum and that a contraction may be expected to begin.

By crossing its normal line in an upward direction, the money-supply curve gives the signal that stocks are at, or close to, the bottom, that rising prices are in prospect, and that the time to buy has arrived. By

the same signal, a broad recovery of business is indicated a few months later.

The position of the money-supply curve at a given time indicates the relative plenitude or shortage of the credit supply. It is to be borne in mind, however, that the position of this curve above or below the normal line is not of great significance. The vital point is the direction in which the curve is moving and the time at which it actually crosses the normal line.

The movements of the different curves take no account of mere fluctuations and short-time breaks and swings. They give no signals for buying or selling securities for day-to-day or week-to-week rises and breaks. What they do give are indications which the investor and business man, having in mind the broader aspects of the situation and the long pull, may well take into consideration.

The faithfulness with which the various curves have usually reflected actual conditions may be gaged by reference to the chart which is published by the Service.

The conception which underlies this system is that the business cycle is a series of responses to money conditions. In a depression, money is plentiful, stock prices are low, and business is at a standstill. Money first flows into stocks, then into business. As the momentum of business increases, it absorbs money from the banks and from stocks. Then banks seek to protect themselves and drain money away from business, producing a recurrence of depression.

II. DATA WHICH ARE LACKING

Readers who have waded through the preceding pages may get the impression that the business public is already provided with far more statistics and interpretations of statistics than it can assimilate. Certainly the business public does not make the full use of what is now available, and certainly much may be done by compact presentation to make the existing figures more serviceable. Yet it remains true that the man who tries to forecast the probable future developments of practical importance to his own affairs finds that he needs data not to be had.

To list all the important subjects concerning which statistical information is lacking would be impossible. But a few of the gaps in the present array may be noted.

1. While American index numbers of wholesale prices are relatively good, those data do not make possible comparisons between the course of prices in different industries or in different sections of the country. The distinction, important in many trades, between "contract" and "market" prices is not brought out. Comparatively few manufactured articles appear in the price records. The differences between manufacturers' prices and jobbers' prices are not shown. Finally, the accuracy

of the quotations used is not always above suspicion, for the figures are often collected from secondary sources.

2. Available retail prices are confined mainly to foods and fuels, and even this limited range of quotations is obtained only from cities and towns of considerable size.

3. While a marked improvement has been made of late in collecting commodity statistics, the list of articles concerning which production, shipments, and stocks are known is still very short. And the statistics of this sort now compiled usually omit stocks in the hands of merchants —not to speak of consumers.

4. Unfilled orders are among the most important data for avoiding business disasters; yet the statistics now published are limited to a very few industries—or rather a few establishments.

5. As shown more fully in other chapters, the United States lags far behind several other countries in the fullness and accuracy of its statistics of employment, which are a most valuable index of business conditions in general and of consumers' demand in particular.

6. We have no adequate data concerning the credit condition of business enterprises.

7. The condition of banks not connected with the Federal Reserve System is reported by the Comptroller of the Currency only once a year.

8. The statistics of savings and investments are both fragmentary and ambiguous.

This list of gaps in the data needed for the intelligent guiding of economic activities sounds formidable, though it is far from complete. It should be remembered, however, that the ideal of providing exhaustive data is very recent, and that rapid progress has been made towards its realization within the last generation. Nor is there reason to believe that this progress will slacken in the future. Indeed we may count upon the continued improvement of our statistical equipment with as much confidence as we may count upon the advance of any industrial art.

III. HOW STATISTICAL DATA CAN BE USED

How can the available data be used by the business community? Does their use tend to stabilize production and employment?

If we grant for the moment that the indexes of general business conditions collected by public and private agencies are substantially accurate, then it should be possible to determine from them whether the general trend at a given time is toward greater or less activity. In reaching this judgment, it is of primary importance to locate the approximate position of general business in the current business cycle.

The second step is to learn the relation of the particular industry to the general business cycle. Is depression in this industry likely to come relatively early or relatively late? Is a recovery likely to precede or to

follow a general upward movement?   Does the industry drop sharply from its peak production, or has it a gradual decline?   What are the industries which are so related that a sudden expansion or decline in one will give a warning of change in another?   Or is the industry in question a specialty for which no close relation to the business cycle may be discernible?

The third step is to study the technical position within the industry itself.   In this respect the data provided by the trade associations which are actively engaged in statistical work often suffice to indicate the probable course of demand and production.   But frequently one must go further and analyze the different parts of an industry.   For example, the course of prices and production of expensive and of cheap machine tools vary widely and the demand that may be forecast at various stages of the cycle for the two types of product is quite different.   Similarly, the demand for expensive and cheap automobiles, for long distance and local telephone calls, for high-grade and low-grade tires, may fluctuate in widely different degrees and even in different directions.

Lastly, it is necessary to know the position of the particular establishment in regard to production, shipments, new orders, unfilled orders, and work in process.   To illustrate one method of handling this problem, Chart 56, suggested by Ernest F. DuBrul, is reprinted from *Machinery*, February, 1922.   Each of the items plotted is cumulative, net orders being the only one that can show a decrease, owing to cancellations. This chart indicates that in the establishment represented the production and sales have become badly dislocated.

If the establishment is keeping pace with its industry and adjusting its operations to the current phase of the general cycle of business, the sailing is clear.   When such is not the case, careful interpretation is called for.   For example, if while the industry is expanding, the factory is not getting its proportionate share of new business, then something is wrong either with the service, the sales methods, or the prices, unless the industry as a whole is over-expanding.   In considering such problems, not only the status of the particular establishment, but also the position of the industry as a whole and the general business situation should be considered.

Other illustrations of the successful application of statistics to the control of purchases of raw materials, production of finished goods, pricing of products, advertising, extension of plant, and the like are given in numerous industries in the preceding chapters—especially Chapters IX and X.   Here it is less necessary to argue the profitableness of good statistical work than to point out some of the difficulties in way of accomplishing it.   Many complaints are made regarding the inability of business men to understand statistical reports.   This difficulty is serious. The other side of the difficulty is the inability of statisticians to show clearly the lessons to be drawn from their work.   Yet even when the

CHART 56.—CONTROLLING PRODUCTION TO SUIT DEMAND
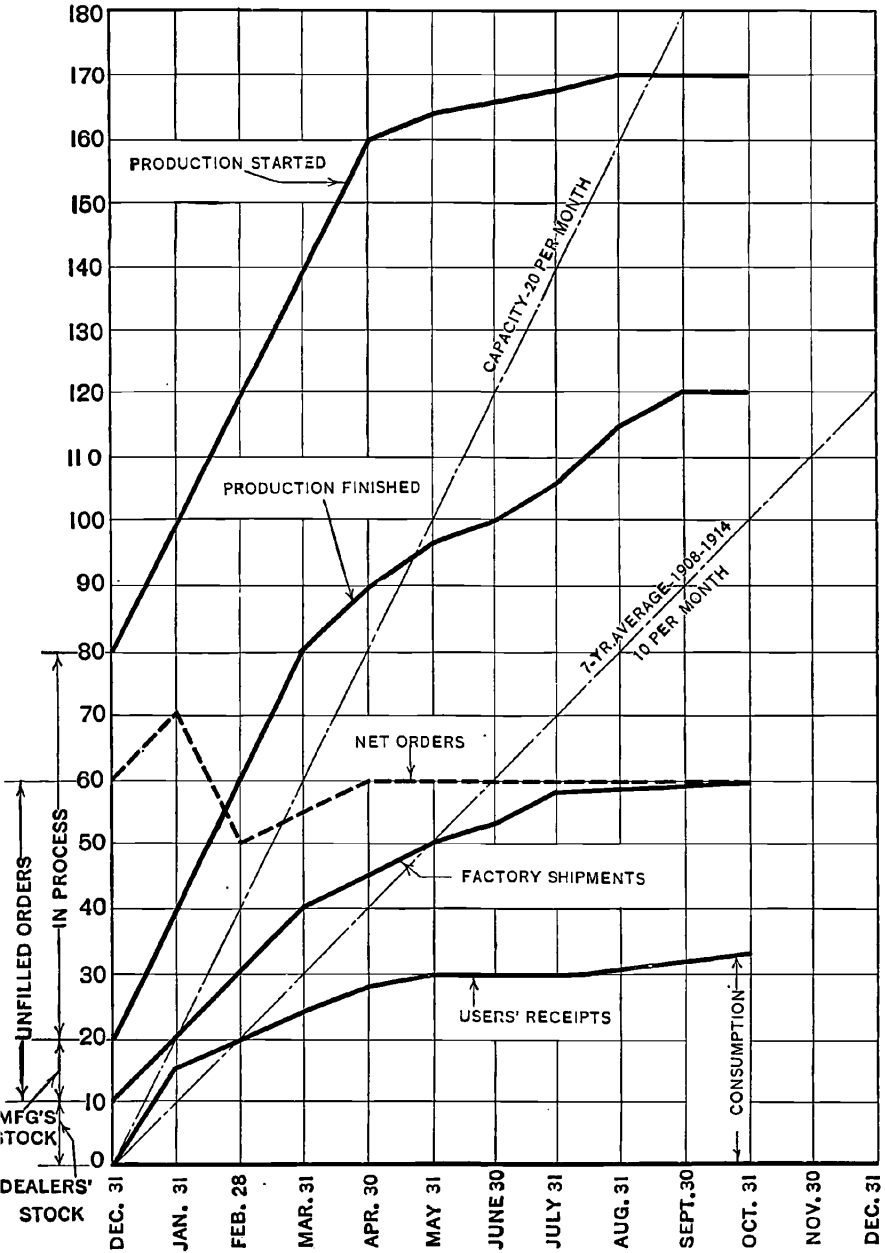
meaning of the figures is clear, it is difficult to give practical effect to their warnings. Contract positions cannot easily be altered and often cover periods six months to a year ahead. Few businesses are so liquid that instantaneous adjustments can be made. Of course occasionally, established concerns may sell out and close up temporarily or permanently. And this has sometimes been done to advantage, though it breaks the continuity of business. A shipping company of seventy years standing is reported to have sold all its ships in 1919 and bought them back at less than half the sales price in 1921. A few manufacturing concerns sold all their stock profitably in 1919 and closed their doors. But such actions require extraordinary courage and involve a risk of losing the intangible elements of organization. They cannot be generally adopted.

Another difficulty in arriving at correct conclusions regarding the future is the dynamic nature of industry. The interplay of forces renders it impossible to isolate any force or situation and determine its future course. Situations are the result of a conjuncture of many forces and depend for their outcomes on the relative strength of the many elements which unite to form them. The mere regrouping of the same forces, or an ability of business men to alter their time sequence, may greatly change the course of events.

The crux of the problem lies in a successful interpretation of what is "normal" in industry. Obviously, in a new industry the "normal" cannot be estimated with assurance. Successful forecasting based on the past is only possible where the past shows a regular movement within well-defined limits and where general conditions warrant the expectation that past movements will be repeated. Such regular growth can only be found in basic commodities and in standardized products whose demand is due to, and limited by, the activity of other factors in the industrial organization. The record of pig iron production for example, goes back to 1854 and shows a remarkably even trend. One can extend the curve and predict the "normal" of 1928 or 1930 with considerable confidence. The "normal" of certain other basic commodities can be foretold with a working degree of precision. To a less degree, the like can be done with standardized products, such as freight cars, radiators, paint, cereals, shoes, ships, and so on. And these standardized goods form the bulk of our production. From this range we pass into the uncertain and the unascertainable, the production of goods such as radio apparatus, 75 mm. cannon, and steel helmets. In regard to the latter we cannot even guess at the "normal" production. In these cases the past gives no guide as to the movement of the future.

If the work of applying statistics to the guiding of business affairs were easy and obvious, it would long ago have been undertaken as universally as bookkeeping. The difficulties just mentioned have so far limited the systematic use of statistics to a comparatively few concerns

managed with exceptional skill. But in many if not in most lines of business, these difficulties are of the kind that yield to persistent effort. The gains to be achieved and the losses to be avoided by the successful application of business statistics are so large that efforts to attain success will be persistent.

In many lines, and these the most important, information is already obtainable with which to substitute reasoned forecasting for "hunches." Will the further dissemination of these data enable business men to guide their conduct so intelligently that they will foresee and prepare against the extreme movements which make for prolonged periods of unemployment?

We cannot answer this question positively, because the experiment has not been tried on a large scale. If it is tried, we surmise that the prevision of the future on the part of a large element of the business community will lessen the extremes of prosperity and depression. But such a result is a matter of speculation. We can only say positively, first, that no stabilizing effect of this sort has been noted as yet in industry at large; and second, that numerous concerns in various industries have made use of statistical data and statistical analysis with profit to themselves.[1] The number of such concerns, moreover, is growing and we may look forward to still further growth. Such a cumulative movement, especially if vigorously supported by the government agencies in collecting and disseminating data, has promise of producing important effects upon the future course of business cycles.

[1] On the extent to which statistical information is now used see the data presented in Sec. II, Chap. XXI.