Rational Stock Speculation

VOLUME I

WALTER THORNTON RAY

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RATIONAL STOCK SPECULATION

VOLUME I

BY

WALTER THORNTON RAY

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TO
MY FATHER, MOTHER,
SISTER AND WIFE

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INTRODUCTION

I grew up in the famous "corn belt" of central Illinois, and, after finishing school, started life as an engineer in Chicago, on Lake Michigan. The climate of Illinois, and of Chicago especially, is very changeable, and the mistakes of the Weather Bureau in the early days used to be a standing joke, notwithstanding that it was right most of the time; but the point I wish to make is that during my early life the percentage of correct predictions increased so markedly as to be noted by the man on the street. This improvement resulted from scientific study, and was all the more noteworthy because of the complexity of the data available, and the apparent hopelessness at first sight of ever deducing any general and uniform laws. Some years later it occurred to me that the phenomena of the stock market offered another fruitful field for such systematization, and I went to work on it spasmodically and ignorantly, and, of course, did over many things I later found had been done before. But I have kept at it through all the years, and this book represents some of the results.

There is good reason for being glad to give to the world a book which aims to help put stock speculation on a more secure basis, for every such publication tends to reduce the fluctuations of prices by aiding the speculator to sell short when prices are top-heavy and buy for a rise when they are unduly depressed, instead of making matters worse by buying near the top and selling in fear near the bottom. I dismiss as demagogic and ignorant those objections to speculation as being "gambling." Gambling is the taking of a chance blindly, without study or preparation, as in throwing dice, or in buying stocks when you have never even read a good text-book on political economy, or estimated future earnings of the company you buy into. Speculation is really one of the high arts, and no man can hope to last in it who is not a student and a scholar; the popular idea of the wealthy speculator as being dressed in a loud check suit, sporting numerous diamonds, drinking large amounts of fine whiskey, etc., is all wrong; only the cautious students are permanently successful.

Speculation, as distinguished from gambling, consists in estimating the future in the light of the past, after more or less careful study, and buying or selling accordingly. I used to think, years ago, that speculation was an unmixed evil, until I read President Hadley's remarks on it in his book on Economics, and the speech of the present Chief Justice White, of the United States Supreme Court, in defense of speculation in cotton futures. The speculator is the producer's and consumer's best friend; this is true even of the much-hated grain and cotton speculator, for all

speculators are buffers between irregular supply and uncertain demand, in return for what they can get out of it.

That there is gross evil in manipulation is not to be denied, but it is growing less all the time, and business morals are rising so fast that Harriman, for instance, regretted being a party to the "corner" in Northern Pacific in 1901. But, at its worst, manipulation was never more than an excrescence on beneficial speculation.

Speculation is of the very essence of progress; there is a saying as old as words, "No risk, no gain." When you find a nation whose people are too good to speculate, even in real estate, its inhabitants are all dead,—as are all good husbands. The more ambitious a man, if he be normally constituted, the more anxiously he is looking all the time for speculative chances; usually he winds up with a throw of dice, as in Amalgamated years ago, or Erie common, or as I did with Corn Products Refining common.

Many persons think speculating on a margin is gambling; there is absolutely no moral difference between such and buying outright, any more than there is a moral difference between buying a house and lot in "Hopeville" on cash down and on a little cash and a mortgage, when you do not expect to live in it, but to sell it.

There is a strong popular sentiment among those who have never studied economics deeply that short selling is wrong, especially since it is ordinarily done in the futures of cotton and grain. There is no use arguing the morals of this subject; I refer again to Hadley and White. As my contribution, I cite a case which has been generally overlooked—real estate. This business is notoriously crooked and underhand, with commissions and rake-offs taken surreptitiously from both sides;—why? Because the corrective bear is absent; speculation can be only for a rise. I knew very well that residence property in a little city I lived in for some years was not worth $125 a front foot for lots hardly 200 feet deep, a mile from the center of town, and I know they will not be for many years yet; and the holding of it at such figures was a grave injury to the town, for many people refused to buy and build in it, but moved away. Yet I dared not sell a single lot short, thus benefiting all but a few large holders of town-edge property by helping bring down prices to reasonable figures, because I should have been in a "corner" the hour I sold.

This book is culled from part of about ten years of investigation; I have no apology whatever for its thinness, but rather am proud, for most of my readers are busy people; that is why they have a little money with which to speculate. It may be interesting to know that the text itself has been worked down from nearly 300 pages to less than 100. The curves

on the plates have been selected from at least twenty times as many omitted ones.

The reader may wonder why I am willing to sell to the world what I consider a good thing, and wonder why I do not use the information myself; the answer is simple. I do use the curves myself, and have made money with them; and if ten thousand people should start using them next month, they would not hurt me perceptibly, because the market is too big.

This book is intended as an aid in forecasting long swings of stock prices. This is a fit place to say that such studies can never replace studies of the prospective and comparative futures of individual stocks, such as are professionally furnished by such authorites as Roger W. Babson, of Boston, and by C. M. Keys, Thomas Gibson, Henry Hall and John Moody, of New York. I wish especially to commend John Moody's most comprehensive annual volumes entitled "Moody's Analyses of Investments, Part 1, Steam Railroads, and Part 2, Public Utilities and Industrials." The making of such analyses of individual securities is a profession in itself, with which data such as that in this book has nothing to do; the two classes of investigation supplement each other, inasmuch as analyses of individual securities keep investors and speculators from buying "lemons," and investigations such as are described in this book aid investors and speculators to buy and sell opportunely, at the expense of the rash, the ignorant and the gamblers. Very sound advice is also obtainable from most brokers and many investment bankers of the highest integrity. Within the last four or five years the moral uplift has hit the old-line brokers the same as it has you and me, with the result that the great majority of brokers are not trying now to get all the commissions they can out of their clients, but to have them make money surely, even though slowly; accordingly, thousands of brokers are studying values earnestly, and with more solicitude for their customers than ever before.

It is not too much to say that the profits which have resulted, and will result increasingly in the future, from the wise purchase of cheap but promising stocks are perhaps greater than can be reasonably hoped for from speculating in the long swings; but there is no good reason why the two cannot be somewhat combined. There is more opportunity now than ever before to buy into good companies cheaply, because there is more publicity of corporation accounts; I do not doubt that if a reader should pay a dozen investment advisers, such as those named above, to select for him twenty-five stocks of greatest promise for a very long pull, they would all agree on at least three or four; and I believe that their combined judgment would stand a 90-per cent. chance of making good. Thus I do

not hesitate to place such investigations as mine squarely in the second rank so far as the speculative investor is concerned; but I as unhesitatingly place them in the first rank as to their influence in equalizing the excessive and unfortunate variations in the prices of stocks, securities and commodities, for we must all hope for one phase of our commercial life after another to become so steady as no longer to need the balance-wheel-speculator, thus compelling him to move up into higher planes of usefulness in his profession.

In selecting the curves to be presented in this book, I have tried to use only those which were right at least three-quarters of the time when they gave any indication at all; the reader can easily see that there would be no value in a curve which was right on only two-quarters of its indications and noncommittal the rest of the time. As time goes on, some of these curves will become useless, then wrong, owing to changes in fundamental economic conditions. For example, thirty or forty years ago industrial activity followed the crops after a couple of years, because there was then no crop-estimating service, and it was some months after the harvest that the nation learned for sure just what the earth had given it; but now yields are estimated so well in advance that the industries discount them before the harvests; if the weather bureaus of the world ever become able to predict the weather in general, and thence the crops, for a couple of years ahead, we may be sure that soon thereafter no speculator will care anything about the probable crops of the coming Fall. Another reason why variations in crops affect us less and less is that we are becoming less a principally-agricultural country; our railroads no longer fast when the grain crops are poor. It was owing to these considerations that I omitted an extensive plate treating of crop conditions.

This is a good place to state that each vertical ruled line on a chart represents the last midnight of its month; for example, the first vertical line on the left is labeled "1895," which means that it represents midnight of January 31, 1895. The next line represents midnight of February 28, 1895. Thus the intermediate heavy vertical lines, not labeled, represent midnight of July 31st. In order to make sure of no misunderstanding, this explanation is repeated on each plate.

It will be noticed that the plates are not numbered consecutively; the vacant numbers have been left purposely, so as to permit the insertion in their correct places of certain plates on similar subjects in a future edition, wherever thought advisable.

I wish to acknowledge my indebtedness for suggestions and criticisms to Messrs. Charles P. Wofford, J. G. Dailey and Edward W. Reel, of Spartanburg, S. C.; to my wife, Isabel M. Ray; to Dr. J. Dillard Jacobs,

of Atlanta, Ga.; and to Messrs. Band & White, printers of this book, both of whom have taken much care in its production. Mr. White personally set every letter.

I am pleased to credit the "Wall Street Journal," of New York City, with the averages of stock prices for the last eighteen or twenty years, both on the plates and in the text. That excellent paper publishes these averages each day for the day before, as well as frequent summaries extending back over its whole existence, arranged both in the form of monthly high and low values, and of the "course of the market." It is the latter arrangement I have used, as needing fewer lines, and giving a more instructive picture for this particular purpose. It is only a well-earned tribute to the "Wall Street Journal" to say that this clean and unbiased paper ought to be read daily by both the students of the values of individual securities and of the long market swings as regularly as they eat their meals.

I also acknowledge my indebtedness to the "Commercial and Financial Chronicle," of New York City, which appears weekly and contains the largest collection of data, tabulated uniformly, available anywhere to my knowledge. It is indispensable for such work.

To many other periodicals I have attributed data wherever used.

ELIMINATING SEASONAL VARIATIONS

Substantially the whole commercial world enjoys a considerable variation in climate or seasons in a year. This seasonal variation results in wide variations in nearly all commercial and financial data, which should therefore be corrected in order to make the quantities of any year comparable with those of others years, when the months being compared are not the same. Inasmuch as most of the commercial countries are still growing rapidly, the effort is complicated by a more or less annual increase in the values we have to work with, although it is these very increases we are after, wishing to know whether or not they are more or less than "normal."

There are a number of ways of eliminating seasonal variations, known to mathematical statisticians, but I have found four simple ones ordinarily sufficient, and only these four will be described, especially since only the first three are used in this book; the fourth is included because it is used every day by commercial and financial journals, and looks easiest when finished, although it is really the most complex method of the four and not suitable for the plates of this book.

These methods will be illustrated by applying them to two purely hypothetical cases, for which see the table entitled "Table Illustrating Methods of Correction for Seasonal Variations." We shall take up the columns of this table in order.

Column (1) names the months of three consecutive years. The quantities in column (2) are repeated for each year, as there is no annual growth; these quantities might be, for example, the average monthly temperatures of some very hot place. It will be noticed that all the Januaries are 100, all the Februaries 110, etc.

In column (3) are given the sums for the last twelve months of the quantities in column (2); this summation constitutes the first and easiest method of eliminating seasonal variations, for it will be noticed that every sum is 1500. For example, taking the first year and adding together all the items, thus: 100+110+120+130+140+150+150+140+130+120+110+100, we get the sum of 1500. Similarly, beginning with February of the first year and ending with January of the second year, thus—110+120+130+140+150+150+140+130+120+110+100+100, we get the sum of 1500. The seasonal variations are completely eliminated because each sum contains each month of the year as a constituent one time.

This sum-of-the-last-twelve-months method has two disadvantages; first, there can be no missing monthly quantities, unless they are estimated, for the shortage of a single month will make impossible the sum-

TABLE ILLUSTRATING METHODS OF CORRECTING FOR SEASONAL VARIATIONS

(1) Months of the year	(2) Quantities with regular seasonal variations but with no annual growth	(3) Sums last 12 months of quantities in Column (2)	(4) Percentage ratio of each quantity in Col. (2) last year to this year	(5) Percentage ratio of each quantity in Col. (2) this year to last year	(6) Percentage ratio of each quantity in Col. (2) to same quantity the month before	(7) Quantities increasing 1 unit each month in addition to the changes of the values in Col. (2)	(8) Sums for the last 12 months of the quantities in Col. (7). The values of Col. (8) increase by 12 each month. Compare Col. (3)	(9) Percentage ratio of each quantity in Col. (7) last year to this year. Compare Col. (4)	(10) Percentage ratio of each quantity in Col. (7) this year to last year. Compare Col. (5)	(11) Average of quantities in Col. (7) for same months last year and this year	(12) Percentage ratio of each average in Col. (11) to average of month before	(13) Percentage ratios to be expected in third year of each month's value in Col. (7) to value of month before, on basis of averages of first two years, as given in Col. (12)	(14) Actual percentage ratio of each value in Col. (7) to value of month before	(1) Months of the year
J.	100	.....	.....	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	J.
F.	110	.....	.....	.....	110.0	111	.....	.....	.....	.....	.....	.....	.....	F.
M.	120	.....	.....	.....	109.1	122	.....	.....	.....	.....	.....	.....	.....	M.
A.	130	.....	.....	.....	108.2	133	.....	.....	.....	.....	.....	.....	.....	A.
M.	140	.....	.....	.....	107.7	144	.....	.....	.....	.....	.....	.....	.....	M.
J.	150	.....	.....	.....	107.1	155	.....	.....	.....	.....	.....	.....	.....	J.
J.	150	.....	.....	.....	100.0	156	.....	.....	.....	.....	.....	.....	.....	J.
A.	140	.....	.....	.....	93.3	147	.....	.....	.....	.....	.....	.....	.....	A.
S.	130	.....	.....	.....	92.9	138	.....	.....	.....	.....	.....	.....	.....	S.
O.	120	.....	.....	.....	92.3	129	.....	.....	.....	.....	.....	.....	.....	O.
N.	110	.....	.....	.....	91.7	120	.....	.....	.....	.....	.....	.....	.....	N.
D.	100	1500	.....	.....	90.9	111	1566	.....	.....	.....	.....	.....	.....	D.
J.	100	1500	100.	100.	100.0	112	1578	89.3	112.0	106	.....	.....	.....	J.
F.	110	1500	100.	100.	110.0	123	1590	90.3	110.8	117	110.3	.....	.....	F.
M.	120	1500	100.	100.	109.1	134	1602	91.0	109.9	128	109.4	.....	.....	M.
A.	130	1500	100.	100.	108.2	145	1614	91.7	109.0	139	108.6	.....	.....	A.
M.	140	1500	100.	100.	107.7	156	1626	92.3	108.3	150	107.9	.....	.....	M.
J.	150	1500	100.	100.	107.1	167	1638	92.8	107.7	161	107.3	.....	.....	J.
J.	150	1500	100.	100.	100.0	168	1650	92.9	107.6	162	100.6	.....	.....	J.
A.	140	1500	100.	100.	93.3	159	1662	92.4	108.2	153	94.5	.....	.....	A.
S.	130	1500	100.	100.	92.9	150	1674	92.0	108.7	144	94.1	.....	.....	S.
O.	120	1500	100.	100.	92.3	141	1686	91.5	109.3	135	93.8	.....	.....	O.
N.	110	1500	100.	100.	91.7	132	1698	90.9	110.0	126	93.3	.....	.....	N.
D.	100	1500	100.	100.	90.9	123	1710	90.2	110.8	117	92.9	.....	.....	D.
J.	100	1500	100.	100.	100.0	124	1722	90.8	110.7	118	100.9	.....	.....	J.
F.	110	1500	100.	100.	110.0	135	1734	91.1	109.8	129	109.3	110.3	108.8	F.
M.	120	1500	100.	100.	109.1	146	1746	91.8	109.0	.....	.....	109.4	108.1	M.
A.	130	1500	100.	100.	108.2	157	1758	92.3	108.4	.....	.....	108.6	107.5	A.
M.	140	1500	100.	100.	107.7	168	1770	92.8	107.7	.....	.....	107.9	107.0	M.
J.	150	1500	100.	100.	107.1	179	1782	93.3	107.2	.....	.....	107.3	106.4	J.
J.	150	1500	100.	100.	100.0	180	1794	93.3	107.2	.....	.....	100.6	100.5	J.
A.	140	1500	100.	100.	93.3	171	1806	93.0	107.5	.....	.....	94.5	95.0	A.
S.	130	1500	100.	100.	92.9	162	1818	92.6	108.0	.....	.....	94.1	94.7	S.
O.	120	1500	100.	100.	92.3	153	1830	92.2	108.4	.....	.....	93.8	94.5	O.
N.	110	1500	100.	100.	91.7	144	1842	91.6	109.2	.....	.....	93.3	94.2	N.
D.	100	1500	100.	100.	90.9	135	1854	91.1	109.8	.....	.....	92.9	93.7	D.

mation of all twelve sums into which it should go; second, each sum is an average of 5.5 months behind the months which make it up. For instance, taking the first year, the sum of 1500 would have to be plotted on the line of December 31, which is 11 months after January 31, 10 months after February 31, and so on down to December 31, which it is not at all behind; the average lag is thus 5.5 months. In practice neither of these objections amounts to much; if any missing month be estimated wrongly by as much as 12 per cent., the sum will be wrong by only one-twelfth as much, or 1 per cent. As to the lag of 5.5 months,—it is not so serious as one would think, because the fundamental trend becomes plainly apparent when the seasonal variations are eliminated, and most financial effects do not become operative until their producing causes have been at work a good deal longer than 5.5 months. All things considered, this method is by far the simplest I have found, and I resort to others only of necessity.

In column (4) we use another method of seasonal elimination, that of calculating the ratio of each month's value last year to the value of the same month this year. When this method is applied to column (2) the answers are all 100 per cent., because each month has the same value in each of the three years. When we come to column (9) we shall see a difference.

In column (5) we use the same method upside-down; that is, we divide each quantity this year by that of the same month last year; in this case, too, we get 100 per cent. each time, but, again, in column (10) we shall see a difference. These two columns are put in to help the reader grasp the method, for they seldom occur in practice.

In column (6) we have the percentage ratio of each quantity in column (2) to the same quantity the month before; as an example, the February value of 110 is 110 per cent. of the January value of 100. These values repeat themselves each year, and show the seasonal variation of column (2) from month to month. Variations as great as these within a month are the rule rather than the exception, and on considering them we realize the necessity of eliminating seasonal variations.

Column (7) is the same as column (2) excepting that it has a growth of one unit each month; the first value is 100, the next 110+1, the next 120+2, the next 130+3, the next 140+4, amounting respectively to the totals of 100, 111, 122, 133, 144, and so on, as entered in column (7). We have thus in this column the regular seasonal variation of column (2) plus a constant growth each month, amounting to 12 units per annum. Each month's value in the second and third years of this column is 12 units greater than the value of the same month the year before.

In column (8) we eliminate seasonal variations by our former expedient of adding together the values for the last twelve months ending with each month; for instance, by adding together all the values for the first year in column (7), we get 1566. On subtracting from this sum the value for January of the first year (100) and adding the value for January of the second year (112), we get 1578, which is the sum of the twelve months ending with January of the second year. It will be noticed that the quantities in column (8) increase by twelve units each month, regularly, because the seasonal variation is eliminated, and the twelve units increase is pure, steady growth. The increase is twelve units per month instead of one, because each of the numbers in column (8) is the sum of twelve months. If this line were plotted on ordinary cross-section paper, it would be perfectly straight, and would slope upward to the right at the rate of twelve vertical spaces per month, if one space were allowed for each unit.

This column (8) is the father of nearly all the curves in this book.

Column (9) is analagous to column (4). It will be noticed that the values in this column rise from the beginning to the middle of each year and then fall gradually, but not quite to the level from which they started; and the peak at the middle of each year is a little higher than for the year before. In other words, this is an undulating curve which gradually tends to rise toward 100 per cent. The season variations are eliminated by dividing each last year's value by this year's, as is proven by column (4). The undulations are caused by the addition of one unit to each month's value.

Column (10) is nothing but the reciprocal of column (9), as can be proven by dividing the quantity in either column into 1.000 and getting the value on the same line in the other column. This is an undulating curve, with the seasonal variations eliminated, and it tends to approach a value of 100 per cent. It should be studied in comparison with column (5). It is the same as column (9), when plotted, but upside-down.

We have now disposed of the first three methods of eliminating seasonal variations—getting the sums of the last twelve months, ending with each month, getting the ratios of the last year's values to this year's, and getting the ratios of this year's values to last year's. We now come to the fourth and last method, the one in common use.

To get the first value in column (11), we add together the column (7) values for January of the first year and January of the second year, and divide by two, thus: $(100+112)\div 2=106$. To get the next value—$(111+123)\div 2=117$. Now, it is usual to get the average of a value for each month from the last ten years, instead of the last two, but a two-year average will illustrate the principle.

Inasmuch as we have obtained the average for each month of the year, our next step will be to find out the percentage of increase or decrease from each month to the next. The first figure in column (12) states that the value 117 in column (11) is 110.3 per cent. of the value 106 of the month before; that is, the "normal" increase from January to February is 10.3 per cent. Likewise, the "normal" increase from February to March is 9.4 per cent.; and the "normal" change from July to August is a decrease down to 94.5 per cent. of the July value; that is, a decrease of 5.5 per cent.

Having learned the normal changes from month to month of the averages based on the first two years, we shall now proceed to find out how well the monthly changes of the third year fit the rule. To aid us, I have copied the values of column (12) into column (13), but a year lower down, so as to bring them onto the corresponding lines of the third year. The heading of column (13) will help make the procedure clear.

In column (14) we have the "Actual percentage ratio of each value in column (7) to value of month before." Referring to column (7), when we divide the February value of the third year (135) by the January value (124), we get the percentage 108.8. That is, the increase from January to February was 8.8 per cent. Likewise, the decrease from July to August was down to 95.0 per cent., or 5.0 per cent. From January to February we could have expected an increase of 10.3 per cent., but it was only 8.8; and from July to August we could have expected a decrease of 5.5 per cent., but it was only 5.0 per cent. Thus we see that while this method enables us to see changes immediately without waiting 5.5 months, it is open to the objection of requiring as a base many previous years of values. When it comes to calculating the monthly deviation of each month for about twenty years, and for several curves on a plate, the labor is prohibitive, unless there be a short-cut I have not found.

PLATE I—ADVANTAGES OF LOGARITHMIC SPACING OF CROSS-SECTION PAPER

Plate I is devoted to aiding the general reader to appreciate the immense advantages of the logarithmic spacing of cross-section paper for plotting commercial and economic curves in growing countries. These advantages are well known to men who, like myself, belong to the engineering and scientific professions, but, so far as I know, this is the first time cross-section paper, ruled as are these sheets, has been used in this way.

To show the great worth of such ruling, I may relate an incident which occurred some years ago in the Western Society of Engineers of Chicago: Mr. A. Bement read a very comprehensive paper on the coal production of Illinois for many years back. He included in his paper a curve of the annual production from the times of the earliest records, which, being plotted on ordinary paper with uniform spacing both ways, was nearly level at first, and then rose more and more rapidly, until at the date of the paper it was not far from vertical. I replotted his annual values on paper such as I have used for this book, and the curve became an astonishingly straight line, so much so that it was never more than a very few per cent. above or below a perfectly straight line drawn through the curve, *excepting* in the cases of two or three early years, the lowness of whose points had entirely escaped notice in the former plotting. I ventured the opinion in the discussion in which I submitted the replotting on the logarithmic paper that there was more coal mined these two or three years than had been reported to the State authorities. Mr. Bement immediately made a private investigation, and his final values brought up the low points to reasonable positions.

Soon after the above incident a number of very large and progressive companies in Chicago began to plot their monthly accounts on logarithmic paper, and I am told that one which is known all over the world and which has cut "melon" after "melon" has extended this practice into every department, and that the president seldom looks at any accounts excepting when so plotted. There is no doubt that the every-day commercial use of logarithmic paper is coming in to stay, and it is therefore with no hesitation whatever that I have decided to use it in this series of books on speculation, for if there is any field in which we must be looking out for changes in the rate of increase or decrease of quantities it is in the field of speculation. Every speculator of every kind crudely and usually unconsciously tries to estimate changes in rates of growth before others do, and if such a man will only take the trouble to master the logarithmic system of charting data he will never regret it; and he

can master this system and get some results in a fraction of the time he spends figuring percentages of growth in the usual ways.

Let us now take up in detail Plate I, entitled "Advantages of the Logarithmic Spacing of Cross-Section Paper." A little to the left of the center of the plate is a short straight line sloping upward to the right, having on it some numbered dots; these dots and numbers are twelve small spaces apart horizontally, and each space represents a month's time, so that the dots are a year apart. The fourth number, beginning to count at the bottom, is 1000, the fifth 1100, the sixth 1210, the seventh 1331, and the eighth and last 1464. Now, if $1000 were loaned out at 10 per cent. compound interest, compounded annually, the above figures would be the amounts at the ends of their respective years. Likewise, if $752 were loaned out at the same rate and the interest compounded annually, at the end of the third year it would amount to $1000. The point for the reader particularly to notice is that this line, from its beginning at 752 to its end at 1464, is perfectly straight. This means that on this chart a line sloping upward at this line's angle represents an annual growth of 10 per cent., compounded annually. On ordinary cross-section paper this line would be curved upward.

Let us now consider the ordinary chart in the lower right-hand corner. It is spaced horizontally the same as the logarithmic chart, the lines being half a year apart; beginning with the line farthest to the left and going to the right, every other line is numbered, the total width being nine years. Along the right-hand edge the horizontal lines are numbered from 10 at the bottom to 30 at the top; the number of vertical spaces has no relation whatever to those of the logarithmic spaces, and cannot have. This is the reason why I began the bottom of this ordinary chart somewhere between 90 at the bottom and 10 near the bottom of the logarithmic spacing, so that no one could get the impression that a horizontal line numbered 10 on an ordinary chart ought to be level with the line of the same number on a logarithmic chart. The ordinary chart used here might have had its vertical spaces numbered from 0 to 20, or 0 to 13, or any other way, so far as going with a logarithmic chart is concerned.

Beginning at the lower left-hand corner of the little chart is a curve ascending toward the right, which branches at the end of the third year; the middle branch is a continuation of the lower trunk of the curve, and for its whole length it rises at the rate of 20 per cent. increase per annum, compounded annually. The upper branch increases after the end of the third year at the rate of 40 per cent. per annum, compounded annually; that is, at the end of the third year the annual rate of increase changes from 20 to 40 per cent. The lower branch increases after the end of the third year at the rate of 10 per cent. per annum, compounded

annually; that is, at the end of the third year the annual rate of increase changes from 20 to 10 per cent. When ordinarily plotted, each of these three branches is a curve, as in the case under discussion. Now, let us look at the same data plotted directly above on the logarithmic chart. Every branch is a straight line; further, the changes of direction of the upper and lower branches at the end of the third year are unmistakable, whereas they might have been overlooked in the little chart below, especially in the case of the 40-per cent. branch. It will be noticed that the +20-per cent. branch is exactly parallel to the straight line beginning at 10 in the lower left-hand corner of the logarithmic chart and rising rapidly to the right, ending in the middle of the plate, where it is labeled +20%. Any line drawn anywhere on this logarithmic chart at the same ascending angle would represent an increase of 20 per cent. each year over the value at the end of the year before. It will also be noticed that the branch labeled +10% is parallel to the line beginning at 10 in the lower left-hand corner of the logarithmic chart, and rising toward the right to the middle of the plate, where it is numbered +10%; it is also parallel to the line beginning at 20 on the lower left-hand edge of the plate and rising toward the right, and labeled +10% at its end. Any line drawn at this slope anywhere on this logarithmic chart would represent an increase of 10 per cent. each year over the year before. This applies to the line first discussed, numbered in eight places from 752 to 1464.

Returning to the little ordinary chart, a descending line labeled —20% begins in its upper left-hand corner at the level marked 30 and drops toward the right at the rate of 20 per cent. per annum. This line represents the amount of money you would have at the end of each year if you gave $30 to some one and allowed him, in return for taking care of it, to take out at the end of each year 20 per cent. of the money you had left at the beginning of the year. It is evident that you would not have much left after a few years, although at the end of eternity there would still be a little due you. This curve is hollow on its upper side, and such curves always are on ordinary cross-section paper. Looking above on the logarithmic portion of the chart, we see the same data appears as a straight line descending toward the right. Remembering that all of the money would never go to the caretaker, and seeing that this line is straight, we are at first inclined to suspect the correctness of our work, because it appears that after a few years the line would hit the bottom of the sheet. The answer is that, although this plate has a bottom and a top, the logarithmic spacing extends upward and downward without end, repeating itself over and over, as will be later explained. We can never plot a zero value on a logarithmic chart, for it has none, which is one of

its disadvantages. This reminds me of a story about a boy who was asking an old man what held up the world, and received the reply that Atlas held it on his shoulders; the boy asked what Atlas stood on, and the old man said, "A turtle." When the boy persisted in asking what the turtle rested on, the old man said, "A granite rock"; and when the boy wanted to know what held up the rock, the old man said it went "clear down." The top of our logarithmic sheet we may liken to the sky, which goes "clear up."

On the left margin of the plate is a scale of numbers; beginning with 10 close to the bottom, the next number above it is 11, the next 12, and so on up to 90 and 100, which, however, is put down as 10; above this comes 11, and a repetition of the numbering below up to 90 and 100, which, again, is put down as 10; above this comes 11, and the chart stops, although it might go up by repetition forever. The reader will see now where we get the 90 at the very bottom; it is part of the next section below. If we were plotting some points of a line whose lowest point was 10, and which had a point further up at 100, and another further up at 1000, the lowest point would lie on the lowest line numbered 10, the intermediate point on the center line of the chart numbered 10, and the highest point on the highest line numbered 10. Or these three lines numbered 10 might be taken as standing for 0.1, 1.0 and 10.0; or they might be taken as standing for 100,000, 1,000,000 and 10,000,000. The truth always to be borne in mind is that the center line numbered 10 invariably represents 1000 per cent. of the value of the lowest line numbered 10, and that the highest line numbered 10 invariably represents 1000 per cent. of the value of the middle line numbered 10. Descending from the top, the middle line numbered 10 invariably represents 10 per cent, of the highest line numbered 10, and the lowest line numbered 10 invariably represents 10 per cent. of the middle line numbered 10. From the bottom up, these lines represent values proportional to 1, 10 and 100, and never any other proportion. Exactly the same proportionality exists between any of the other horizontal lines; for instance, 90, 900 and 9000; or 11, 110 and 1100.

Near the left edge of the plate, about midway of the height, are four very heavy vertical lines, labeled "100% increase," "60% increase," "30% increase" and "10%" (increase). The reader can very easily verify the correctness of these percentages. Directly above, these very heavy lines and their labels are repeated; the lines are of exactly the same length as their twins below, and the reader will find no trouble in verifying the correctness of the percentages given. Now, the fact that these two sets of lines are of exactly the same length brings us to the realization that the same vertical distance represents the same *percentage* of increase any-

where on the chart. Herein lies the great advantage of logarithmic spacing of cross-section paper. The reader can substantiate the truth of this relationship by a little experimenting.

On the lower half of the plate, near the left edge, are four more very heavy vertical lines, labeled "90% decrease," "60% decrease," "30% decrease" and "10%" (decrease). The first line was not labeled 100% decrease as in the cases of the increases above, because it would be impossible to have a chart long enough; the chart and the line would have to go "clear down." It will be noticed that the line representing 60% decrease is about twice as long as the line representing 60% increase; but the line representing 10% decrease is only a little longer than the line representing 10% increase.

The six lines forming a fan in the left lower half of the plate represent annual increases, compounded annually, at the rates of 10, 9, 8, 7, 6 and 5 per cent., as labeled. The lines just above them, labeled 10% and 20%, have been discussed before.

In the upper left-hand corner of the plate are three lines which represent annual decreases, as labeled, at the rates of 5, 10 and 10 per cent., compounded annually. For instance, the fifth end-of-the-year dot on the middle line represents 90% of 90% of 90% of 90% of 90%, which is 59.049 per cent.

The phrases "End first year," "End second year," etc., are for use with the three descending lines in the upper left-hand corner, just discussed, and the eight ascending lines previously discussed in the lower left-hand corner.

The years on the right half of the chart, both above and below, are numbered in Arabic numerals from 1 to 9.

On the right side of the chart, above and below, are two zig-zag curves, whose semi-annual values are denoted by crosses. These curves represent a buiness which increases at the rate of 10 per cent. every half year for four half years, and then decreases 20 per cent., and thereafter repeats the same growth and decline twice more. Now, any one who tried to determine from the lower ordinary chart alone what the average rate of growth was over a series of years, would have some trouble, especially if he did not have the percentages of growth and decline just given; but by drawing the straight, heavy, dashed line through the curve, as plotted on the upper, logarithmic, portion of the plate, the determination is made easy. By comparison with the fan-lines in the lower left-hand corner of the plate, the average rate of increase over a series of years is found to be about 6 per cent., as labeled in the right-hand margin.

The vertical logarithmic spacing for these charts was transferred from a slide-rule. The vertical distances are proportional to the log-

arithms of the numbers; for instance, the distance from 10 to 20 is proportional to the logarithm of 20, the distance from 10 to 30 is proportional to the logarithm of 30, the distance from 10 to 80 is proportional to the logarithm of 80, the distance from 10 to 100 (located on the next line above marked 10) is proportional to the logarithm of 100, and so on. These logarithms of numbers can be obtained from any table of logarithms in algebras, engineers' pocket-books, etc. I saved all this trouble by copying the distances off a slide-rule, as remarked above.

The logarithmic spacing, then, shows the *percentage* of increase or decrease. The ordinary spacing shows the *quantity* of increase or decrease.

INTEREST RATES

It is well known that interest rates for money and the movements of stock prices are intimately related; but when the usual attempts are made to forecast stock-market movements by a study of changes in interest rates, little dependable information is obtained. These attempts are ordinarily made by plotting stock prices and interest rates on cross-section paper, whereupon it is found that the peaks and hollows of the stock curves come first. There are two fundamental troubles, which helped to keep me in the dark for years: first, interest rates are highly seasonal in most parts of the world, being usually high in the fall; second, the stock-market is known to go ahead by weeks or months of openly-published information of such character as ordinarily affects the prices of stocks, so far as this information can be hastily assimilated without study or rearrangement; interest rates are public knowledge all over the world.

Stocks are purchased primarily for the dividends they pay, and secondarily for the dividends it is hoped they will pay. When their market price is low, a holder usually gets more return on each hundred dollars so invested than he would on the money loaned out at interest. When their market price is high, he usually gets less return. I have said "usually" because the business and financial world is never in equilibrium for more than a very short time; prices of all things swing up and down too far. It is in these exceptions that the opportunities lie for making money. After interest rates have become so low that money can hardly be loaned at all, there is still time, ordinarily, to buy cheap stocks; and after interest rates have become so high as to return more than stocks purchased at the current market prices, there is still time, ordinarily, to sell stocks close to the very top. The reason why most all of mankind has not already gotten rich off this simple fundamental principle is that it is hard to tell when interest rates are high and low, and have taken a new trend, because these rates vary so widely as to be almost baffling.

There are a number of ways to correct any set of monthly values for ordinary seasonal variations, some of them explained in the chapter entitled "Corrections for Seasonal Variations." Interest rates fall into two general groups,—(a) those which are changed hourly, daily or weekly at the bargaining of lender and borrower, and, (b) those which are changed only at long intervals by the lenders, such as the Bank of England, the Bank of France, or the Imperial Bank of Germany (Reichsbank), etc. Group (a) is very responsive to contemporaneous conditions, but group (b) is sluggish, and can afford to be, because its members hold

whips in their hands. Therefore, any seasonal correction for group (b) must be more down-to-date than that for group (a).

The easiest way to eliminate seasonal variations is to add together all the values for the twelve months ending with each month. This method is used for group (a), the data for which appear in secondary form in Plates VI and VIII. Referring to Plate VI, its title is "New York Interest Rates." In the present edition of this book I have used only the following:

Highest call-money rate during the month on the New York Stock Exchange;

Average call-money rate during the month on the New York Stock Exchange;

Lowest call-money rate during the month on the New York Stock Exchange;

Highest rate during the month in New York for choice 60 to 90 day double-name commercial paper;

Lowest rate during the month in New York for choice 60 to 90 day double-name commercial paper.

PLATE VI.—NEW YORK INTEREST RATES

Of course, the call-money rates are the most sensitive; they are also the most unreliable. One might anticipate forecasting from them some of the short market swings which the more sluggish rates would not be expected to show. In common with most of the subjects of this book, Plate VI begins with the year 1895, because data were available to me only from the year 1890 on most of the subjects treated, and the five years from 1890 to 1895 were not enough to justify the insertion of another plate; suffice it to say that these curves have been actually calculated and plotted from 1890, and found after careful study to be quite as prophetic as for the twenty years since.

Inasmuch as this interest Plate VI is the first one in which this method of seasonal elimination is used, the data from which it was constructed are given in part in Table I. The interest rates were obtained from the "Commercial and Financial Chronicle," published in New York City, from which they can still be obtained shortly after the end of each month. In Table I, column (1) contains the year and month; column (2) the highest call-money rate touched during each month; column (3) the sum of these rates for the last twelve months; column (4) the reciprocal of this sum, that is, the number obtained by dividing 1.000 by the sum under consideration. The remaining columns contain similar data for the average and lowest call-money rates. Owing to the data having been collected into this table from different sources, there are slight but immaterial arithmetical discrepancies throughout the table, but the first two years have been accurately arranged for the purpose of the following explanation. Referring to Table I, and the maximum rates in column 2, let us add together all the values for the year 1895, thus: 1.50+3.00+5.00+3.00+2.00+1.50+3.00+1.50+3.00+3.00+2.50+100.00=129.00. Next, let us add together the values for the twelve months ending with January, 1896, thus: 3.00+5.00+3.00+2.00+1.50+3.00+1.50+3.00+3.00+2.50+100.00+35.00=162.50. Next let us add together all the values for the year ending February, 1896, thus: 5.00+3.00+2.00+1.50+3.00+1.50+3.00+3.00+2.50+100.00+35.00+8.00=167.50. In this manner we proceed throughout the whole table. In practice there is a short cut to getting these sums, which is explained in the chapter on "Eliminating Seasonal Variations."

It will be noticed that each of the sums, 129.00, 162.50 and 167.50, contains one constituent of each month in the year; therefore, seasonal fluctuations are eliminated. *But*, the sum 129.00, for instance, is an average of 5.5 months behind the items which go to make it up, for it is 11

months later than the January item, 10 months later than the February item, and so on down to the December item, which it is not at all behind; so as a whole these sums are about six months late. Nevertheless, for our use they are early enough.

A line plotted from these 12-month sums has another very valuable characteristic—it is very smooth. Most financial data vary so widely from month to month that when curves representing two or three of them are plotted on the same sheet the sheet looks in spots like the maze of barbed-wire fences on the hill-front of a fort; and it is about as hard to get one's mind through them. It is, therefore, a great relief to smooth out these curves, even though the points are six months late; further, the smooth curves are so much plainer that the mind actually grasps the situation sooner.

It seems probable beforehand, since stocks are fundamentally held for their dividend returns, that when interest rates go up stock prices will come down, and such is the case. But, inasmuch as the interest curve runs oppositely to the stock curve, an effort of the mind is required to compare the two, and one becomes confused. It is plain that it is well to have a *rise* in the interest curve foreshadow a *rise* in the stock curve. This can be done by turning the interest curve upside-down, bodily. The way I chose was to divide every 12-month sum into 1.000, getting its reciprocal. On Plate VI only these reciprocals are plotted, with the one exception of the curve labeled "Sums for last 12 months of minimum New York rates on choice 60 to 90 day double-name commercial paper," which curve of sums is put on for explanatory purposes. Its inverse mate is labeled "Reciprocals of sums for last 12 months of minimum New York rates on choice 60 to 90 day double-name commercial paper." Comparing these two mates, it will be found that every peak of one is a hollow of the other, and every hollow of one a peak of the other. If a mirror be held perpendicularly to the paper, with its lower edge parallel to the horizontal lines of the plate, the image of either curve will have the same shape as the other curve. They are related as are a tree on the bank of a still lake and its image in the water.

We shall now take up Plate VI in detail. The three curves for New York Stock Exchange call-money rates are quite irregular, but their peaks and hollows come at the same time. The first peaks are in the closing months of the year 1894. The *Wall Street Journal's* average price of 20 railroad stocks reached its highest point in the first few days of September, 1895, and fell rapidly until August, 1896. By the end of January, 1897, (falling on the vertical heavy line labeled 1897), all three call-money curves had turned unmistakably upward; if one had doubted the tendency of the minimum-rate curve (the uppermost of these three

TABLE I—NEW YORK INTEREST RATES

1 Year and month	2 Highest call rate in month	3 Sum rates in Col. 2 last 12 months	4 Reciprocals of sums in Col. 3	5 Lowest call rates in month	6 Sum rates in Col. 5 last 12 months	7 Reciprocals of sums in Col. 6	8 Average of call rates during month	9 Sum of averages in Col. 8 last 12 months	10 Reciprocals of sums in Col. 9	11 Maximum rate in month on choice 60 to 90-day double-name commercial paper	12 Sum rates in Col. 11 last 12 months	13 Reciprocals of sums in Col. 12	14 Minimum rate in month on choice 60 to 90-day double-name commercial paper	15 Sum of rates in Col. 14 last 12 months	16 Reciprocals of sums in Col. 15
1894.															
J. . . .	1.50	.....	.....	.50	.....	.....	1.00	.....	.....	3.75	.....	.....	3.00	.....	.....
F. . . .	1.50	.....	.....	.50	.....	.....	1.00	.....	.....	3.75	.....	.....	3.00	.....	.....
M. . . .	1.50	.....	.....	.50	.....	.....	1.05	.....	.....	3.50	.....	.....	3.00	.....	.....
A. . . .	1.50	.....	.....	1.00	.....	.....	1.10	.....	.....	3.50	.....	.....	3.00	.....	.....
M. . . .	1.50	.....	.....	1.00	.....	.....	1.10	.....	.....	3.00	.....	.....	2.75	.....	.....
J. . . .	1.50	.....	.....	1.00	.....	.....	1.05	.....	.....	3.00	.....	.....	2.75	.....	.....
J. . . .	1.00	.....	.....	1.00	.....	.....	1.00	.....	.....	3.00	.....	.....	3.00	.....	.....
A. . . .	1.00	.....	.....	1.00	.....	.....	1.00	.....	.....	3.25	.....	.....	3.00	.....	.....
S. . . .	1.00	.....	.....	1.00	.....	.....	1.00	.....	.....	3.50	.....	.....	3.00	.....	.....
O. . . .	1.00	.....	.....	.50	.....	.....	1.00	.....	.....	3.00	.....	.....	2.50	.....	.....
N. . . .	1.00	.....	.....	.50	.....	.....	1.00	.....	.....	3.00	.....	.....	2.50	.....	.....
D. . . .	3.00	17.00	.059	1.00	9.50	.105	1.40	12.70	.079	3.00	39.5	.0253	2.75	34.4	.0290
1895.															
J. . . .	1.50	17.00	.059	1.00	10.00	.100	1.20	12.90	.077	3.00	38.5	.0260	2.75	34.2	.0292
F. . . .	3.00	18.50	.054	1.00	10.50	.095	1.65	13.55	.074	4.00	39.0	.0257	3.50	34.6	.0289
M. . . .	5.00	22.00	.045	1.00	11.00	.091	2.10	14.60	.069	4.00	39.5	.0253	3.75	35.4	.0282
A. . . .	3.00	23.50	.043	1.50	11.50	.087	2.20	15.70	.069	4.50	40.5	.0247	3.50	36.0	.0278
M. . . .	2.00	24.00	.042	1.00	11.50	.087	1.35	15.95	.063	3.00	40.5	.0247	2.50	35.6	.0281
J. . . .	1.50	24.00	.042	1.00	11.50	.087	1.15	16.05	.062	2.75	40.5	.0247	2.50	35.4	.0282
J. . . .	3.00	26.00	.038	1.00	11.50	.087	1.45	16.50	.061	3.00	40.5	.0247	2.75	35.2	.0284
A. . . .	1.50	26.50	.038	.75	11.25	.089	1.65	16.55	.061	4.00	41.0	.0244	3.25	35.5	.0282
S. . . .	3.00	28.50	.035	1.00	11.25	.089	1.55	17.10	.058	4.75	42.0	.0238	3.50	36.0	.0278
O. . . .	3.00	30.50	.033	1.00	11.75	.085	2.10	18.20	.055	5.00	44.0	.0227	4.50	38.0	.0263
N. . . .	2.50	32.00	.031	1.50	12.75	.078	2.00	19.20	.052	4.50	46.0	.0217	3.75	39.5	.0253
D. . . .	100.00	129.00	.0078	1.00	12.75	.078	4.55	22.35	.045	6.00	49.0	.0204	4.00	41.0	.0244
1896.															
J. . . .	35.00	162.50	.0062	1.00	12.75	.078	5.10	26.25	.038	6.00	51.5	.0194	6.00	43.5	.0230
F. . . .	8.00	167.50	.0060	2.50	14.25	.070	4.00	28.60	.035	6.00	53.5	.0187	5.00	45.0	.0222
M. . . .	4.50	167.00	.0060	2.50	15.75	.063	3.50	30.00	.033	5.50	55.0	.0182	4.75	46.0	.0217
A. . . .	4.50	168.50	.0059	2.50	16.75	.060	3.10	30.90	.032	6.00	56.5	.0177	5.00	48.0	.0208
M. . . .	4.00	170.50	.0059	1.50	17.25	.058	2.55	32.10	.031	4.75	58.5	.0171	4.00	49.0	.0204
J. . . .	3.00	172.00	.0058	1.50	17.75	.056	2.00	32.95	.030	4.50	60.0	.0167	4.00	51.0	.0196
J. . . .	4.00	173.00	.0058	1.00	17.75	.056	2.10	33.60	.030	5.50	62.5	.0160	4.50	52.0	.0192
A. . . .	15.00	186.50	.0054	1.50	18.50	.054	4.10	36.65	.027	10.00	68.5	.0146	5.50	55.0	.0182
S. . . .	12.00	195.50	.0051	3.00	20.50	.049	5.70	40.80	.025	10.00	74.0	.0135	7.00	58.0	.0172
O. . . .	127.00	319.50	.0031	2.00	21.50	.046	10.00	48.70	.021	7.00	76.0	.0132	6.50	60.0	.0166
N. . . .	96.00	413.00	.0024	1.00	21.00	.048	6.25	52.95	.019	6.00	77.0	.0130	4.00	60.5	.0165
D. . . .	3.00	316.00	.0032	1.00	21.00	.048	1.95	50.35	.020	4.00	75.5	.0133	3.50	59.5	.0168
1897.															
J. . . .	2.00	285.00	.0035	1.00	20.5	.049	1.75	47.0	.021	4.00	73.5	.0136	3.00	57.0	.0175
F. . . .	2.00	280.00	.0036	1.50	19.5	.051	1.60	44.7	.022	3.00	70.0	.0143	3.00	55.0	.0181
M. . . .	2.00	275.00	.0036	1.50	18.5	.054	1.66	42.6	.023	3.50	68.0	.0147	3.00	53.0	.0188
A. . . .	2.00	270.00	.0037	1.25	18.0	.055	1.55	41.2	.024	3.75	66.0	.0152	3.50	52.0	.0192
M. . . .	2.00	268.00	.0037	1.25	17.5	.057	1.40	40.0	.025	3.75	65.0	.0154	3.25	51.0	.0196
J. . . .	2.00	267.00	.0037	1.00	17.0	.059	1.20	39.1	.026	3.50	64.0	.0156	3.00	50.0	.0200
J. . . .	2.00	265.00	.0038	1.00	17.0	.059	1.15	38.2	.026	3.75	62.0	.0161	3.00	48.0	.0208
A. . . .	2.00	252.00	.0040	1.00	16.5	.060	1.25	35.3	.028	4.00	56.0	.0179	3.50	46.0	.0217
S. . . .	4.00	244.00	.0041	1.00	14.5	.069	2.00	31.6	.032	4.50	51.0	.0196	3.75	43.0	.0227
O. . . .	4.50	123.00	.0081	1.50	14.5	.069	2.60	24.3	.041	4.50	48.0	.0208	3.75	40.5	.0247
N. . . .	2.50	30.00	.0333	1.50	15.0	.066	1.80	19.8	.050	4.00	46.0	.0217	3.50	40.0	.0250
D. . . .	5.50	33.00	.0300	1.50	15.5	.065	2.90	20.8	.048	4.00	46.0	.0217	3.00	39.5	.0253

on the plate), he might have waited until the end of February, 1897. He could then have bought just before a four-point decline in both rails and industrials, after which came a rapid rise of about 15 points in both averages. By the end of December, 1897, all three of these curves had turned downward; on January 7, 1898, the industrials touched a high point, and the rails did so on February 10th. These points were not quite as high as were touched in the previous September, but almost as high. Indeed, one might have been on the lookout in September, 1897, because the low-rate curve was horizontal from June to July, 1897. During the first half of 1898 the three curves do not agree; the maximum and average curves were bearish, but the minimum curve was bullish, as were stocks. At the end of October, 1898, all three turned upward slightly and temporarily, and this is when a big rise started in stocks, which culminated in the Spring of 1899. Now, common sense must be used in interpreting these curves. For the year ending with April, 1898, the sum of the *maximum* rates for the 12 months just closed was 43 per cent. only, as will be seen in Table I. Now, one-twelfth of 43 per cent. is only 3.6 per cent.—surely a cheap-fuel rate on which to feed a rising market. Therefore, it would have been unreasonable to expect these curves to be right as to the main trend in the Spring of 1898. By the end of March, 1899, all three call-money curves were going down, and the low-rate curve (the most reliable toward the close of bull moves) had been going down without interruption for four months. We, therefore, are not surprised to see a downward drift of stock prices begin in April, 1899, and last for about a year and a half. But it did not amount to a major swing, because money was not dear all over the world; nevertheless, it was well worth avoiding or taking advantage of, especially in the industrials. By the middle of 1900 all three of these curves were definitely and sharply going up, and one would have had plenty of time to load up in the Fall of 1900, before the run-away bull market. It is worthy of note that the high-rate curve (the lowest one of these three on the plate) was about as low in the Spring of 1900 as in the Fall of 1896; both easy-money conditions were the foundations for handsome market rises soon after. Throughout the first three months of 1901 the low-rate curve never got up to its peak of November, 1900; the average-rate curve was not rising as fast as it had been; and the maximum-rate curve hesitated in February, 1901. Pursuantly, we find a sharp peak in both rails and industrials on June 17, 1901. This was about the time of the Northern Pacific "corner." By the end of May all three of these curves had turned downward, especially the high-rate curve, whose fall was precipitous. In the latter part of 1901 all the curves were uncertain; industrials backed and filled thereafter (for they were "undigested"), but the rails went up until the Summer of 1902. It will be shown on Plate VIII that this action of the rails was not surpris-

ing, because of the money market in England. By the end of August, 1902, all three curves were descending, as in fact the low-rate curve had been for months, with a slight exception in December, 1901. Accordingly, the rails touched their long-swing peak at about 128 on September 9, 1902, and the industrials touched a secondary high point of about 68 on September 19, 1902.

By the Summer of 1903 all three curves were going upward, the minimum-rate curve steadily so. In this case the interest curves' hollows were nearly a year prior to the stock curves' hollows, but better early than late. Still, if one had bought at the first suggestion of the curves in June, 1903, he would have been able to look over his investment in a year and a half.

There are some temporary declines in the three curves in November, 1903, which perhaps suggested the second bottom of stocks in the Spring of 1904.

By the end of February, 1905, all three curves had passed their peaks, and stocks touched a high point in March and April, reacted about 10 points, and then gradually worked up to higher points in January, 1906. This rise during 1905 would have been lost to one who heeded only these call-money curves; but it was indicated by some of the other interest curves, to be discussed later. I remarked at the start that call-money rates were the most sensitive, but a little unreliable. Still, no man ever went broke by cashing in early 70 per cent. of a big profit, all of which he could have had by selling a few months later.

All three of these curves reached low points in the Fall of 1906, just before the crash, and a buyer might have purchased blindly, if he had not remembered that the low points of these call-money curves came several months early in 1900 and 1903. Some of the other interest curves, to be mentioned soon, would have saved him. Besides, no one could expect to get a bargain at top-notch prices. These three curves had hollows also in the Fall of 1907, and by the end of January, 1908, had started definitely upward. Stocks were on the bargain-counter again in February.

By the end of February, 1909, all three call-money curves had passed their apexes, and by the middle of the year they indicated that the long upward swing was nearing its close; especially so the reliable minimum-rate curve. In the Summer and Fall of 1909 the rails and industrials started down.

In August, 1910, the minimum-rate curve started up, and a month later the others followed. Stocks touched a low point in July, and another in September. A purchase in September would have resulted in several points profit by the middle of 1911, by which time one would have had three months notice to get out from the minimum-rate curve. If the bull tip of these curves had been mistrusted, the profit would have been lost;

or the market might have been entered in September, 1911. In any case, all three curves would have given definite warning to sell out or sell short by October, 1912, for they were going rapidly downward.

By the middle of 1913 they were all going up, and are still (May, 1914). Stocks touched low points in June, 1913, and points nearly as low in November and December, six months later.

On Plate VI are two curves pertaining to interest rates in New York for choice 60 to 90-day double-name commercial paper—a curve of maximum rates (below) and one for minimum rates (above). Both these curves are reciprocal curves, each point being the reciprocal of the sum for the last 12 months of the money rates in question. At first I used to divide each of these monthly sums by 12 before calculating the reciprocal, to get the average-rate, but I quit it as being unnecessary, because the shape of a curve is exactly the same on logarithmic paper after dividing or multiplying every point in it by any number. This property is explained on page 17. Two or three pages back it was explained that the reciprocal curve was its mate upside down; the sum-curve there discussed is plotted on this Plate VI for the minimum rates on choice 60 to 90-day double-name commercial paper. It will not be discussed again.

Taking up these curves in detail, it will be noticed that they are much smoother than the call-rate curves, and more reliable, but that their peaks and hollows fall about six months later. During the last half of 1894 these two curves rose rapidly, and their peaks were reached at January, 1895, after which they descended gradually, with a slight reversal for three months in the minimum-rate, which corrected itself, however, before stocks reached their high points in September, 1895.

By the end of December, 1896, both curves had turned upward; stocks were a good buy then, and as good a buy four months later. During the last two months of 1897 both curves were plainly rising more slowly, and during January they developed flat tops. A reaction of about 10 points in stocks took place here. These curves fell rather slowly for two or three months, not as rapidly as they had risen the Fall before; and by the end of August they had started up. Here common sense was valuable again, for at the end of March, 1898, the sum of the maximum rates for the last 12 months had been only 48.0 per cent.—an average of 4.0 per cent. after dividing the sum for the 12 months by 12. (See Table I.) It would hardly have been anticipated that the upward swing was at an end with commercial paper rates at this figure.

By the end of August, 1899, the curves had passed their peaks, and one could have taken advantage of the September peaks to get out or sell short again for a reaction. Short selling would have had to be covered soon, for money was a little cheaper in August than in March, 1898.

By the middle of 1900 both curves were flat-bottomed, and in November definitely started up; the three call-money curves had done so several months before. A December purchase would have been in time for a quick rise of 20 to 30 points, but on the advice of all other curves, including those of Plates VIII and X, a November purchase might have been risked, with a resulting profit 10 points greater.

These two curves did not rise with much enthusiasm, and by the end of April had begun to flatten out; in May one of them dropped. Two of the call-money curves had already turned down in April, and one had leveled out on its peak. The market reacted sharply in May, but touched a second high point in June. Therefore, both these curves were mildly bearish, and the industrials never did recover their high point of May. The rails drifted upward until they touched high in September, 1902, in accordance with European money conditions, by which time these foreign conditions had given definite notice to sell, as will be explained when discussing Plates VIII and X.

The minimum-rate curve gave definite bullish indications in December, 1903, as the call-money curves had done unmistakably months before; but one could still have purchased on the ground floor six months later. These two curves did not indicate clearly the first but lower market peaks of March, 1905, as did the call-money curves, but they would have left a holder in for *the* peak of January, 1906, whereas the call-rates would have kept him out.

By the end of February, 1908, both curves had turned upward, and stocks could still have been bought within a few points of the extreme bottom. In August, 1909, the peaks had been passed, simultaneously with the peak of the railroad stocks and two or three months before that of the industrials.

The two curves turned up again in December, 1910, or January, 1911, as the call-money curves had some time before; a purchase here might have yielded a few points profit if closed out on the peak of July, 1911, as one might have been ready to do, because the minimum-rate call curve had been going down for about three months. Further, for the year ending with December, 1910, the *minimum-rate* on choice 60 to 90-day double-name commercial paper had averaged 4.63 per cent. (see Table I), so the main trend of stocks was not upward. If one had stayed in through the slump of September, 1911, as these two curves suggested, he would have gotten a little higher price in the Fall of 1912, at which time he would have had some months' notice from all three call-money curves, as well as from these two.

These curves continued downward until the winter of 1913, and are now rising (May, 1914), as is every other curve on Plates VI, VIII and X.

PLATE VIII—FOREIGN OPEN-MARKET INTEREST RATES

In Plate VIII are given some reciprocal curves concerning open-market rates abroad; all of these curves illustrate once more how small the world is today, when we can almost forecast the movements of American stocks from across the ocean.

We naturally look to England first, for London is the great trading floor of the world, unhampered by too many laws and by tariff walls; the English, too, are the great speculators of the world, and the great foreign entrepreneurs of other countries, because their own grand island is too small to feed them all. It is only reasonable that its money market should be a mirror for all the world.

All the curves on Plate VIII have been calculated from data of one of the latter days of each month; for instance, the last Thursday. The curve entitled "Reciprocal of sums for the last 12 months of the interest rate on London open-market 60 and 90-day bank bills" was calculated from data in United States Senate Document 578, until January 1, 1909; thereafter I used the weekly editorial values given in the "Commercial and Financial Chronicle."

At the beginning of 1894 this curve began to rise rapidly, and reached a peak in July, 1895, just before stocks did, but it had been almost flat-topped for some months. A secondary and higher peak occurred in April, 1896, when stocks were at the top of a reaction in a bear market. The ensuing decline practically ceased temporarily in the Spring of 1897, and by the end of January, 1898, the interest curve had turned downward, in time to give one some benefit from the 10-point reaction in February and March. The next bottom was reached in the Fall and Winter of 1898, a little after stocks started up. By the end of July, 1899, the curve was going down rapidly, and stocks reached a secondary high point in September, after which they slipped down 10 or 15 points.

From the Spring of 1896 to the Spring of 1899 the general trend of this interest curve was *downward,* and the general trend of the stock curves *upward*—just contrary to our fundamental principle, apparently. But for the year ending March 31, 1896, the open-market rate had averaged only 0.78 of 1 per cent.—a stagnation rate. (Obtained by taking the March value from the curve, dividing it into 1.000 to get the sum for 12 months, and then dividing this sum by 12, thus: 1.000÷0.108÷12=0.78.) For the year ending with March, 1899, the average rate was still only 2.40 per cent. It could hardly be expected that stocks had reached their zenith, whatever the general trend of this curve showed. As a matter of fact, this curve would have helped us slide down the occasional bear reactions in a long bull market.

The long descent of this curve never stopped until the Fall of 1900; in October and November, 1900, it turned up, and so did stocks. But in the first few months of 1901 it hesitated, and soon thereafter our industrials touched high, and our railroads their first high. Thereafter this interest curve rose rapidly until the Summer of 1902. Our industrials never fully recovered, because they were water-logged, but Europe was not so much afraid of our "regulated" rails. The curve turned down definitely in August, and the rails touched high in September, and the industrials rallied some.

In 1904 the curve started unmistakably upward, and stocks soon followed. By the close of November, 1905, this curve was going down rapidly, and the extreme tip was reached by rails and industrials in January, 1906.

The long decline of this curve and stocks followed, and never definitely reversed until February, 1908, when bargains could still be had. One might have been misled by this curve's action in April, 1907, into buying too soon, but such slight reversals are likely in curves, due to arithmetical discrepancies in calculation; in this case the decline in March was so great that the slight recovery in April still left the curve low and the trend probably downward, as proved later to be the case.

In the Summer of 1909 the curve flattened completely on top of the highest peak it had had for years; stocks touched high that Fall. After the sharp drop of 1910, the curve had been turning up for two months by the end of April, 1911; a purchase then would have resulted in a small profit if closed out soon, say in July, after the money-rate curve had made a little peak and dropped. During the latter part of 1911 the curve rose uncertainly, and stocks had a reaction, then rose until the Fall of 1912. By the time the October peak in stocks arrived this interest curve had been going down decisively for several months; it never hesitated until the Fall of 1913, and is now rising rapidly (May, 1914).

There is one curve on this Plate VIII which I did not have sufficient data to complete before going to press; in another edition of this book I shall endeavor to bring it down to date. I refer to the one labeled "Reciprocals of sums for the last 12 months of interest rates allowed on deposits by English banks"; this data was also taken from United States Senate Document 578; the original source of the information was the London "Economist." This curve has substantially the same shape as the open-market-rate curve, and will not be discussed further; it was included to secure the safety of numbers. It naturally lags a little behind the open-market curve, because bankers will not change the deposit allowance until they see good reason to.

The curve for France is labeled "Reciprocals of sums for last 12

months of Paris open-market discount rates"; the values are for the latter days of each month. This curve has the same general shape as the London open-market curve, but in some places is superior as an indicator. French rates are remarkably steady. There was a rapid rise throughout 1894, and a decided but irregular peak in the Spring of 1895. There was a deceiving peak in the Summer of 1896, when our stocks were lowest; this false-lead appeared also in the English open-market curve, and one or two of the others, but earlier and less pronouncedly; undoubtedly there is an explanation, but I do not know it. But from the middle of 1896 to the close of 1898 this French curve was remaining horizontal, through a rising stock market, while the English curve was falling, as discussed above. However, in the Fall of 1898 the Paris curve began to fall sharply, while the English curve was still rising lazily, thus suggesting, perhaps, that the long bull rise was soon to pause, as it did in the Spring of 1899. In the Summer of 1900 this interest curve flattened out and turned upward stubbornly, while our stocks were cheap just before a big rise. There was some hesitation in the Fall of 1901, but the curve went up to a peak in May, 1902, three or four months before stocks did likewise. There was a secondary peak in January, 1903, (absent in the English curve), perhaps having a little to do with the secondary stock peak simultaneously. By the Spring of 1904 this curve was going steadily upward, while stocks were in their second bottom. A high peak was formed in May, 1905, months before stocks touched high in January, 1906.

On the long decline there was a ripple in November and December, 1906, perhaps forming a base for the last stubborn stand of the bulls. The following deep bottom in 1907 and 1908 was coincident with the low levels of American stocks. Then came a long and unhesitating rise, until the Summer of 1909, with a peak well in advance of the high stock peaks.

In the Fall of 1910 the curve leveled out and edged very slowly upward for nine months, along with our uncertain but rising stocks; in the middle of 1911 began a sharp decline, with a slight hesitation at our high market peak in the Fall of 1912, but the trend never really changed until the Fall of 1913. It is now upward (May, 1914). From the Summer of 1909 to the Fall of 1913 the general indication of this curve was that we were in a major bear market, and a glance at the stock curves proves it. The same reasoning cannot be applied to this curve on this last long decline as was applied to the London open-market-rate curve for the years 1896-99, because the rate never got down to 1 per cent. any single month in 1909 in Paris, and for the year averaged much higher. In other words, we were not recovering from a stagnation period, but were paying for a boom.

PLATE X—FOREIGN BANKS' OFFICIAL DISCOUNT RATES

Plate X, pertaining to Foreign Official Bank Rates, is included, notwithstanding that I have not been able to get much out of them; these rates are too sluggish, too uniform. I have studied extensively only three official rates—those of the Bank of England, the Bank of France, and the Imperial Bank of Germany (Reichsbank).

In the cases of these banks, if the rates obtaining on the last day of each month be handled as were the open-market rates, by adding together the 12 monthly values ending with each month, then the curves obtained are too late to be of speculative service, with the partial exception of that of the Bank of Germany, for Germany has been one of the rapidly-growing countries of the world, her citizens are very able, but very ambitious and aggressive, and therefore always working close to the edge.

Referring to the line labeled "Reciprocals of sums for last 12 months of Reichsbank minimum discount rate," we see it rose rapidly during 1894, and was flat-topped for most of 1895; this flat top suggested that our big stock rise was about over, although the decline in stocks started before the drop in this interest curve. From this time until the Summer of 1900 the general downward trend of this line is apparently as untrue to the course of the market as was the decline of the London open-market line; worse yet, it was not sufficiently sensitive to have helped us use any reaction in the long bull market. But the same explanation applies as for London—the world was recovering from years of stagnation, and the Imperial Bank rate was extremely low. For instance, at the end of July, 1896, the rate had averaged only 3.25 per cent. for the preceding year; Germany was still young then industrially, and money under 4 per cent. was extremely cheap, and is cheap yet. In the Fall of 1900 this curve started up almost unmistakably, along with our stocks; it had been level-bottomed since July. It flattened out in October, 1902, with no previous warning from itself, when stocks were off some points from their previous peaks.

There was a little suspicious hesitation in the latter part of 1903, but not enough to be worth anything, considered alone. During the Spring of 1905 this curve was rising rapidly, and might have encouraged one in believing that our market reaction at that time was a temporary incident. By the end of December, 1905, the top had been flat for two months, and the ensuing direction downward for two more months, before both rails and industrials touched their high points in January, 1906. From here on

the decline was steady until the Spring of 1908, with no "bum steer" in the Spring of 1907.

In the Fall of 1910 this German curve leveled out, *but at a comparatively high level,* indicating that the market would perhaps back and fill for a few months or a year, as it did; but at the beginning of 1912 a decided drop commenced, foreshadowing the stocks' decline in November and December; there was a little belated hesitation in the curve in September and October, corresponding to the stock market's peak. The curve did not reverse its trend again until the Winter of 1913, and it is rising decidedly now (May, 1914).

We now come to another method of treating these three official bank rates. In the chapter on Eliminating Seasonal Variations it is explained that this can be done by dividing a value for May (say) of this year by the value for May of last year; or by dividing the value for May of last year by the value for May of this year. These two methods give curves which are the reciprocals of each other; that is, one will be high where the other is low, and low where the other is high. We can use either method, according to the purpose for which we want the curves. Now, we found in Plates VI and VIII that when interest rates went up stocks went down, and vice-versa; it is therefore evident that in this method of eliminating seasonal variations we can save ourselves the trouble of getting the reciprocals by dividing last year's rates by this year's, and be done with it. Suppose the Reichsbank rate last May was 4 per cent. and this May 3 per cent.; if we divide 4 by 3 we shall have 133 per cent., which is greater than 100 per cent., and which makes us feel optimistic on stocks, because money for carrying them is cheap. We might have obtained this 133 per cent. by dividing 3 by 4, getting 75 per cent., and then dividing 100 per cent. by 75, getting 133 per cent.

Now, with most worldly data it happens that the variations from month to month are so great that the eye and mind become confused if they attempt to interpret a curve plotted simply from the ratios of last year's values to this year's; we therefore must adopt some scheme for smoothing the curve, even at the cost of its promptness. The easiest way to do this is to add together the last two monthly ratios or percentages, or the last three, or the last six, or the last twelve; but in this case the curve would not be very prompt, averaging 5.5 months late, as explained on page 12. It is best to add as few months as will give an easily interpreted curve; for these official bank rates I have chosen the last six. It is to be remembered that the seasonal variation is already corrected or eliminated by dividing last year's bank rate by this year's (at the close of the same month), and that this adding together of the last six months is

merely for the purpose of smoothing the curve, at the cost of making it less prompt by about 2.5 months. I have not taken the trouble to divide these six-month sums by six to get the average, because the curve would still have exactly the same shape when plotted on this logarithmic spacing of the charts.

Let us consider together the three curves thus obtained for the Imperial Bank of Germany (Reichsbank), the Bank of England, and the Bank of France. These three curves are labeled, respectively, "Sums for last six months of ratio of Reichsbank rate last year to rate same month this year," "Sums for last six months of ratio of Bank of England rate last year to rate same month this year," and "Sums for last six months of ratio of Bank of France rate last year to rate same month this year."

The English and German curves rose rapidly in 1894 and fell rapidly in 1895, well before the peak in stocks; the French curve was a year late. The German and English curves touched low points in the Spring of 1897, along with American stocks, and then rose rapidly, the German curve leveling out for some months late in the year, when our stocks were reacting, *but not before.* During the Spring and Summer of 1898 the curves declined, but too late to put a follower in on the Spring stock reaction. This decline was reversed in October and November, in time for the sharp rise in the Winter of 1898-99. The French curve was misleading. The English and German curves hesitated at the close of 1898, as stocks did in January, 1899. The three curves were discordant until the early Fall of 1900, when they all started up, as stocks did soon after. The low bottom of the French curve in 1899 might have encouraged one to expect a long-pull profit in a couple of years, nothwithstanding that stocks then looked very high.

Before 1901 opened the English curve had flattened out; the French curve did so in May, just before the second big stock reaction. By the middle of 1902 the German curve had unmistakably passed its second peak, the English curve probably had, and the French curve had been level for nine months. Stocks touched high in September. The German and English rates passed their low points in the late Summer of 1903, about when stocks were lowest. Both rates hesitated in the first half of 1904, suggesting that the bargains were not all gone.

Long before January, 1906, the English and German curves were declining precipitously; they turned upward in the Fall of 1906—a year too soon for American markets. The French curve was right this time, being a year behind the others. In the Winter of 1908-09 all three official-rate curves passed their tops and started down rapidly, seven months before our stocks did. Early in 1910 they recovered, and soon our stocks hit lows in July. The trend of all three curves was downward

in 1912 excepting for slight recoveries in the Fall, when stocks touched high; but by the end of December there was little doubt as to their main trend.

By the Winter of 1913 all three had started vigorously upward, and are still going up (May, 1914). Whether they are a year ahead of stocks, or are deceiving us, remains to be seen; probably not, because the depression of 1913 was not a major crisis in industry or the stock market.

In general these curves are not as trustworthy or as prompt as the open-market curves, but their general importance makes a summary worth while.

The English curve was right on its high peaks of 1894, 1899, 1902, 1905, 1908-09 and 1911-12 (six times); it was wrong on its peak of 1897-98 (one time).

The English curve was right with its low points in 1897, 1898, 1899, 1903, 1910 and (probably) 1913 (six times); it was wrong with its low points in January, 1899, (perhaps) and partially in September, 1910 (two times).

The German curve was right on its peaks in 1894, 1896 (partially), 1898-99, 1899 (partially), 1902, 1905, 1908-09, 1911 aud 1912 (say, eight times); it was wrong on its peaks in 1898, 1901, September, 1904 (possibly), April, 1907, and October, 1912 (possibly) (five times).

The German curve was right with its hollows in 1896, 1897, 1898, 1900, 1903, June, 1904, 1907 (perhaps), 1910 and 1913 (say, eight times); it was wrong with its hollows in 1899 (possibly), 1901-02, 1904-05 (possibly), 1906, 1907 (perhaps) and 1912 (six times).

Summarizing, the English curve was right twelve times and wrong three times; the German curve was right sixteen times and wrong eleven times. It is not always easy to say whether United States stocks have moved up or down, because rails and industrials do not always move together, nor do even all rails move together. It is only reasonable that the English rate should more accurately presage our market movements, because it is more international than the German.

The French rate is hardly worth summarizing; it was wrong in 1895, right in 1899, right in 1901, right in 1907, right in 1908-09, right and wrong in 1912, and right in 1913; perhaps it may be said, therefore, to have been right six times and wrong two times. The action of this curve may be summarized in the slang statement that when the Bank of France changes its discount rate "something has dropped."

My data for the twenty years prior to 1894 are incomplete, but it is interesting to note that the curves for the European bank rates foretell stock movements more reliably than they do in the late '90's, given on

Plate IV. A later edition of this book may start one or more of these interest plates twenty years earlier, with 1875.

EFFECT OF THE NEW FEDERAL RESERVE ACT

It seems to be the concensus of good financial opinion that within the next two or three years call rates will rise and become steadier, while time rates will gradually sink to a lower level. I see no reason for thinking that the prophetic properties of these interest curves for the United States will be much changed, beyond bringing the peaks and hollows of the two classes of curves closer together as to time, and making all of them more co-ordinate with the open-market rates of England and Europe.

PLATE XV—PRICES OF IRON AND STEEL

Plate XV contains curves deduced from the prices of pig iron and steel scrap and billets. I regret that I do not have at hand the prices of steel scrap prior to 1900. I am indebted to the "Iron Age" and Mr. Hull's book for most of the prices used herein. For years I plotted all kinds of iron and steel prices faithfully, and studied them, but did not get very far.

Now, when the mercantile agencies and the trade papers send men out to ask thousands of people how times are, who is interviewed? The merchants and producers of commodities. How do these answerers like to see prices of commodities move between the time they place orders for their products' constituent materials and the time they get in the money for their products? Up. How do the other 80 per cent. of us like to see prices move between the time when we agree on the wages or salary for a new job and the ends of the months when we get our pay checks? Down, for then we can save a little money to spend on luxuries and stocks. If we have to spend more than we make for pig iron and food, we may even have to sell ten shares of stock. I know the Congressional committees are told by those who have money to take a trip to Washington to testify that when times are hard and prices low the poor laboring man or the clerk is out of a job, but statistics indicate that even in the hard times of the '90's only a surprisingly small percentage of the population was out of work, compared with the usual percentage. Who owns most of the stock shares of the country, or at least the semi-floating shares? That 80 per cent. of us, for nothing has been more surprising of late than the figures published by the "Wall Street Journal" and other financial papers, showing the wide distribution of stock ownership among the silent 80 per cent.

Having these considerations in mind, and knowing that we all save the most money when we are badly scared of our jobs, and thus lay the sound foundation of an orderly recovery and a later boom, I took new heart and went at iron prices again. Plate XV gives the results for the last twenty years. I have calculated this data for about twenty years prior to 1895, and found it as prophetic of stock-market movements as for the twenty years since, with the qualifications that for that period stock-price averages are not so concordant, and pig iron prices were moving so irresistably downward because of giant engineering strides as sometimes to disguise almost beyond recognition the tendency of prices of iron to rise in boom times.

Acting on the theory that iron prices might be more or less seasonal,

that a smooth curve was wanted, and that falling iron prices are a great unhappiness for those who have it for sale, I calculated for several standard brands of iron the sums of the average prices for the last twelve months ending with each month, and took the reciprocals of these sums; only these reciprocals are plotted, with the single exception of the curve labeled "Sums for the last 12 months of the average monthly prices of pig iron in Philadelphia," which curve is included, as in the case of one of the interest charts, to show the relation between the reciprocal curves and the sum curves from which they are derived. As explained on page 24, these curves are related to each other in shape as are a tree on the bank of a still lake and its image in the water, when looked at from a boat off shore.

This Philadelphia iron curve consists of two parts, which lap during the years 1909 and 1910. The first portion is based on the monthly prices given out by the American Iron and Steel Institute on No. 1 anthracite foundry pig iron in Philadelphia, and the second portion on the "Iron Age's" average monthly prices of standard brands of eastern Pennsylvania No. 2x foundry pig iron in Philadelphia. The curve giving the sum of the average prices for the last 12 months will not be further discussed.

All the reciprocal curves of iron prices will be discussed together. From the prices available on many kinds of iron in many parts of the country, I chose the ones indicated in the labels of the curves, listed below:

Reciprocals of sums for last 12 months of prices of Southern No. 2 foundry iron in Cincinnati;

Reciprocals of sums for last 12 months of prices of two kinds of foundry pig iron in Philadelphia;

Reciprocals of sums for last 12 months of prices of heavy melting steel scrap in Pittsburg; and

Reciprocals of sums for last 12 months of prices of Bessemer steel billets in Pittsburg.

During 1894 all these curves rose steadily, but in the first half of 1895 they leveled out and began to fall. Stocks touched their high in September. By the end of July, 1896, these three curves had started upward, and in August was the bargain day of bargain days. In November and December, 1896, the billet curve hesitated, and there were some more pretty good bargain days, but the steady rises of the other curves indicated that the main trend of stocks was still upward. During the latter part of 1897 the Cincinnati curve nearly leveled out, at the time of a 10-point reaction, but the other curves suggested that the advance was not over. In 1898 two of the curves began to drop off very slightly, and by the end of March, 1899, the downward trend of all three had been

unmistakable for a month; in April both rails and industrials rounded high peaks, reacted several points, and touched peaks nearly as high in the following September.

All three curves rounded bottoms in the summer of 1900, giving two or three months' notice of the coming big rise. In 1901 the Pittsburg scrap curve commences to aid us; it leveled out in May, and in June both rails and industrials touched their highest peaks, the industrials for years to come, and the rails for over a year ahead. Long before the middle of 1902 all four curves were going down sharply, which was notice to sell out and sell short on the peaks of July and September.

By the end of July, 1903, all four curves were moving upward definitely, their lowest points having occurred three or four months before stocks touched their lowest point in September. By the end of January, 1905, all four curves were either going down or had leveled out, and by the end of February their trend was plain. Stocks rounded their first high peaks in March and April. One who had acted on these curves only would have missed the high stock prices of January, 1906, completely, but the continuing downward trend of these iron curves would have encouraged him in selling short on some of the high points, especially toward the close of the year, when the Cincinnati curve was dropping more sharply.

In the Fall of 1907 all four curves turned upward, giving plenty of notice to get aboard. By the end of September, 1909, three of the curves were going down, and the fourth had been horizontal for two months. The Pittsburg scrap curve, the most sensitive of all, had by this time been going down sharply for ten months. Stocks touched high points in October and November.

Three of the curves turned upward in July, 1910, when stocks were cheap; the fourth did so two months later, when stocks were still cheap. The scrap curve was a couple of months ahead of the others in this Summer of 1910.

The depression in rails in the Fall of 1911 was not suggested at all by these curves, which failure should make us cautious in the future. The drop in stocks after the Fall of 1912 was clearly prophesied months before by all four iron curves.

In the Spring and Summer of 1913 three of the iron curves touched bottom about the same time as stocks in June, and months ahead of stocks in November. They are now rising rapidly (May, 1914).

PLATE XVII—PRICES OF THE NON-FERROUS METALS

We had such gratifying success in working up the price data of several kinds of iron and steel into stock-market barometers that it will be interesting to see what we can do with other metals. We cannot reasonably anticipate as trustworthy indications because none of these metals is more than a fraction as important commercially and each of them is limited to use in a few fields, comparatively. Further, most of them are subject at times to more or less effective manipulation; of late years this has been so much true of tin that I did not attempt to do anything with its price averages. I have used the "Iron Age" prices of lake copper, lead and spelter, all in New York. As in the cases of interest rates and pig iron, the sum was calculated for each month of the average prices per month for the last 12 months (which sum is equal to 12 times the average price for the last 12 months), and that sum was divided into 1.000, which gave its reciprocal, and resulted in turning the curve upside-down. For the sake of making this inverting process clearer to the reader, I have put on the curve plotted from the 12-month sums of the copper prices; it will be noticed that this curve and its inverted reciprocal mate move up and down in opposite manner at all points.

The copper curve is the only one for which I have data at present prior to 1898. By the middle of 1895 it had started down, well before stocks touched their September peak. In the middle of 1896 it made a bottom, when stocks were cheapest. There was a faint flat top in the late Fall of 1896, simultaneous with the November stock peak. There was a depression in the Spring of 1897, simultaneous with a slump in stocks. By the close of 1898 this line was going down decisively, when the field was entered by the lead and spelter lines, which were also descending rapidly. In the early part of 1899 the industrials touched what proved to be as high a figure as they reached for years afterwards, and the rails began a two-year rest on a landing before they started up the next flight of stairs. By the time stocks touched a low point in June, 1900, and also even more truly in September, all three of these curves had touched their bottoms and started up.

From the middle of 1896 to the beginning of 1899 the copper reciprocal curve was level or declining slightly, whereas the general trend of stocks was strongly upward. In this respect the copper curve was undoubtedly misleading, as were the interest-rate curves. However, we must remember that in 1896 the price of copper averaged only about 10 cents a pound, and that it had previously been around 9 cents for a long time; the world was recovering from stagnation, and the general trend of

all prices could have been expected to be upward. When this stagnation yielded to optimism and the boom beginning about January, 1899, stock prices did not withstand the resulting higher living expenses very many months.

This is a good point at which to mention the two most noted copper corners. The French "Secretan Syndicate" operated during the ten years just preceding this chart, and the final trail of low prices resulting from the six years of unloading ended about 1894. In February, 1899, the Amalgamated Copper people began their work by boosting the price of copper from about 12 to about 17 cents, at which high figure they were able to keep it until the Autumn of 1901, at the end of which year the price dropped back to about 12 cents. The resulting low prices of 1902 caused the curve of the 12-month sums of prices to drop rapidly throughout that year, and, inversely, caused the reciprocal curve of these sums to rise rapidly, just at the time when the spelter reciprocal curve was falling, anticipatory to the fall in stocks in 1902 and 1903.

In the years 1901 and 1902 these three curves were at variance in their indications, due to the Amalgamated Copper "corner." In January, 1904, the copper and spelter curves were at the low points of depressions, and the lead curve was non-committal; this was a good time to buy American stocks. Perhaps the reason why all three curves were not unanimous in the winter of 1903-04 was that the stock market was depressed largely for a peculiar reason of its own at that time—the previous excessive issues of "water" in our industrials.

By the end of January, 1905, the copper and spelter curves were dropping rapidly, and the lead curve slowly; this was in time for the minor stock peak of March, 1905. By the Fall of 1905 all three curves were declining rapidly, long before the high stock peak of January, 1906. The decline never even hesitated until the Summer of 1907, and by the time all three curves were rising surely and rapidly bargain days were at hand in the late Fall.

The low copper prices (and high level of the reciprocal curve) in 1909, 1910 and 1911 were probably due in part to the advent of the porphyry producers.

Before the opening of 1909 all three curves had rounded peaks, suggesting that the steady rise in stocks had not many more months to run. Thereafter for a couple of years all three curves gave practically no indications, unless it be admitted that the spelter curve foretold by a couple of months the recovery from the sharp dip made by stocks in July, 1910, and that the comparatively level courses of the copper and lead curves until the beginning of 1912 indicated that stocks would suffer no serious declines, or would even work up a little, as proved to be the case.

During the year 1912 the copper and spelter curves fell rapidly, but the lead curve did not begin its decline until early Fall; but all three curves, considered together, gave ample warning of the coming decline in stocks in 1912-13. All three curves passed through depressions in 1913, when stocks did, or a little before, and are now rising (May, 1914).

Considering these curves as to the long market swings, they have either been non-committal or right at every time of low stock prices. They were right on the stock peaks of 1895, 1899, 1906 and 1909; they were wrong or contradictory on the peak of 1902. Thus their total grade is high enough to make them worthy of the speculator's attention.

PLATE XIX—PRICES OF COMMODITIES IN GENERAL (INDEX NUMBERS OF PRICES)

We were very fortunate in being able to construct valuable barometric curves from the prices of pig iron, and curves nearly as valuable from the prices of the non-ferrous metals; it is therefore of great interest to see what we can do with the prices of commodities in general, index price numbers, as they are called. When these numbers are high, prices are high, and vice-versa. An explanation of their origin will not be gone into here, as information is available in so many other places. Suffice it to say that in general these numbers agree in their changes, and all the curves plotted from them have the same general shape.

It will be remembered that in the case of the iron curves we added together the twelve monthly prices for the year ending with each month, and took for our guidance the reciprocals of these sums. On this Plate XIX I have plotted only one of the sum curves, for comparison with its reciprocal—the one labeled "Sum last 12 months of London 'Economist's' index number of prices (broken or dashed line)." All the other curves are reciprocals.

Referring to the curve labeled "Reciprocal of sum last 12 months of London 'Economists's' index number of prices (full line)," we notice a peak in the first half of 1905, about six months before stocks touched their highest point in January, 1906. Thereafter the decline was steady until the late Fall of 1907, when our stocks were lowest; the index curve was unmistakably on the rise before February, 1908. It formed a peak in the early Summer of 1909, some months before stocks did. Then came an uninterrupted decline until the Spring of 1913, since which there has been a slow but unbroken rise; the last two or three months the curve has turned up more sharply, and is still rising (April, 1914). It may be surmised that the steady decline of this curve from 1909 to 1913 was an indication that we were in a major bear market, which is just about to close. English commodity prices are more natural than our own, being in a free-trade country; only ocean freight stands between goods in any country and England, and such freights are low. In a future edition I expect to complete this curve for the earlier years, as I did not have time to do in this one.

We shall next take up the curve of greatest interest in this country, the one at the bottom of the plate, labeled "Reciprocals of sums of Bradstreet's index numbers last 12 months." Before 1900 we were recovering from a stagnation period of very low prices, so that the general trend of prices was upward, and the trend of this reciprocal curve downward, and

therefore superficially misleading. But in the Fall of 1900 its decline ceased, simultaneously with a low region in stocks. The curve rose a little, then leveled out in 1901 and dropped off in 1902, well ahead of the 1902 peak of rails, but after the 1901 peak of the industrials. It has been remarked elsewhere that there was a special reason for the decline in industrials during these years, in that they had been watered too much.

The next bottom of Bradstreet's curve was in the first half of 1903, several months before the lowest prices of stocks. The high stock prices of January, 1906, were anticipated some months in the decline of this curve, which continued downward without hesitation until the Fall of 1907. The trough of the depression in the curve came two or three months ahead of the lowest stock values.

Before the opening of 1909 our curve was going steadily downward, about a year ahead of stocks, and it did not reverse its trend until the Fall of 1910, too late to be of any service. Its next peak was in the Winter of 1911, nearly a year in advance of the high stock prices of 1912. In the Spring of 1913 it made a bottom before stocks did. It is now turning upward with moderate rapidity.

In order to save some reader possible confusion, I am due to explain that although Bradstreet's Index Numbers are calculated for the prices pertaining on the first day of each month, they are plotted on this plate on the line of the month before, since this line represents in point of time midnight of the last day of this preceding month; the error is therefore less than a day.

Now that the rate of our gold production is decreasing, we can expect prices to fall slowly, and all these reciprocal lines to rise, unless the extending use of "check-currency" increases fast enough to make up for the diminishing gold supply. One man's guess is as good as another's, and mine is that for the next few years prices are apt to remain at approximately present levels, so far as currency influences are concerned, wherefore we may hope that in the near future these reciprocal-price-index curves will be of more service than in the past, especially in the United States now that our tariff wall has been lowered; we may bear in mind the fact that tariffs can affect commodity prices, but not those of stocks, excepting possibly indirectly, because no country will ever succeed in imposing a duty on stock certificates.

In the middle of the height of the sheet is a smooth line labeled "Reciprocal of sum last 12 months of index price number of 47 wholesale articles in England, from 'Abstract of Labor Statistics of the United Kingdom for 1913.'" I regret that at the time of publication I am unable to put on the point for December, 1913. The values in this table were

given for only one date in each year, and I was therefore obliged to connect the points (represented by large dots) with a smooth curved line, which may be months too late or early with some of its rises or declines. In general this curve agrees with the others on the plate, and this is the reason for putting it on, because its points are too far apart and are obtainable too late to be of practical service.

The highest curve on the plate is labeled "Reciprocals of sums for the last 12 months of U. S. Bureau of Labor's index number of wholesale prices. (Points are yearly until December, 1900, thereafter monthly.)" I have not the points for 1913 at the time of going to press. The high and low portions of this curve are almost simultaneous with those of the Bradstreet's curve at the bottom of the plate. This curve, like the English official curve, cannot ordinarily be constructed until too late to be of practical use, and it is included because it seems to substantiate the soundness of the principle on which all these curves rest,—that when living and manufacturing expenses are high people cannot buy stocks, but rather have to sell them.

Summarizing the value of these curves, we can say that apparently the London "Economist" and the "Bradstreet" curves are genuine stock-price barometers, changing either simultaneously with stocks or months ahead, usually the latter. The fact that these reciprocal curves rise with stocks, or just ahead of them, after low periods, is a manifestation of liquidation.

PLATE XXV—IRON PRODUCTION IN THE UNITED STATES, AND UNFILLED ORDERS FOR STEEL

I suppose about the first thing any student of applied economics does, when he comes to study iron and steel data, is to plot on cross-section (co-ordinate) paper the monthly production of pig iron in the United States and elsewhere. On Plate XXV this line is labeled "Annual rate of each month's production of coke and anthracite pig iron in the United States." It is obtained by dividing the tonnage production of any month by the number of days in that month, and multiplying the quotient by 365 (the number of days in a year). This expedient serves to raise the February points considerably, to raise the points of the 30-day months a little, and to lower the points of the 31-day months a little. Thus, one does not have to bear in mind the difference in lengths of the various months. The information for plotting this line was obtained, already calculated, from a splendid book by George H. Hull, entitled "Industrial Depressions, or, Iron the Barometer of Trade," and from "The Iron Age." I wish to take this opportunity to commend Mr. Hull's book, for it gave me an entirely new viewpoint for studying industrial statistics.

This monthly-production curve immediately impresses one by its extremely deep depressions; no wonder Carnegie said the steel business was a pauper-millionaire business. The decreases in production in the latter parts of 1903 and 1907 within the short spaces of only three months amounted to 50 per cent. On looking at the high portions of the curve it is seen that they come about a year after the high portions of the stock curves. This is just a little late. It costs money to keep a blast furnace running when it is making money, but it also costs money to bank it and pay watchmen; therefore, the operator of a furnace usually needs a brick house a falling down on him, to paraphrase a good comic song, before he will quit. The monthly production curve shows this very plainly. If the reader will take a little sheet of paper, put the upper right hand corner even with the horizontal line numbered 10 (the middle line of the sheet), and about half of an inch down the side of the sheet make a little mark even with the horizontal line numbered 80, he will then have on the little sheet of paper a vertical distance corresponding to a decrease of 20 per cent. anywhere on the plate. With this little measuring rod, let us look for times when the monthly rate of production fell 20 per cent. or more in, say, three months. (I adopted a 20 per cent. decrease and a time limit of three months as the result of experimenting.) Such three-month decreases ended with August, 1896, August, 1900, November, 1903, July, 1904, December, 1907, and December, 1913. Every one of these months

was a bargain month, with the possible, but not probable, exception of the last. The same rule applied practically without modification many years prior to 1895. One trouble in studying those early years is the scarcity of reliable stock-price averages; the averages of various compilers do not agree completely among themselves, due to no fault of the compilers. Any one who undertakes to construct such averages has his own troubles, because receiverships and assessments and other confusing irregularities were almost the order of the day.

Now, the very irregularity of this line makes it confusing to interpret. I, therefore, adopted the expedient of adding together all the values for each 12 months just closed, to make the curve smooth, notwithstanding that it made its turns less prompt by about 5.5 months. I adopted the sums of the last 12 months, because experiment showed that it required about that many months to smooth out the curve, and because any possible seasonal variation would be eliminated. The resulting curve is labeled "Sum total production of pig iron in the United States for the last 12 months." During the 12 months ending December 31, 1912, about 29,400,000 tons were produced. For the 12 months ending January 31, 1913, about 30,100,000 tons were produced, etc.

Now, this curve is slower than the single-month curve discussed before, but more trustworthy. We found it a good plan to wait until the other curve had dropped at least 20 per cent. in three months or less before concluding it was a good time to buy; because of the tardiness of this smooth curve, and of its greater trustworthiness, let us see how we should have fared if we had bought when this curve had made a level or declining top only one month long. We should have bought in the early parts of the months August, 1896, March, 1899, August, 1900, November, 1903, November, 1907, August, 1910, and September, 1913. The 1896 purchase would have been in the very depth of the worst panic we ever had; the 1899 purchase would have kept us tied up for years in the industrials, but would have let us out with a handsome profit in two years in the rails; further, horse sense would have made any man suspicious of buying after a long and vigorous rise of nearly three years, during which rails had risen about 100 per cent. and industrials 150 per cent. above the panic prices of 1896; the 1900 purchase would have netted a handsome profit in either class of stocks within six months, and a higher profit within a year. By the middle of 1900 industrials had had a good decline, and rails had stubbornly refused to drop down very much, so that a buyer would not have needed to be much afraid. The 1903 purchase would have been in the bottom of a stock depression, and would have yielded a handsome profit within a year, and a magnificent one within three years. The purchase of November, 1907, speaks for itself;

the "tip" from this curve and the price level of stocks surely agreed that month. The purchase in August, 1910, would have yielded a neat profit a couple of months later, and a better one within a year. The purchase of September, 1913, would still have its owner tied up now (April, 1914).

Now, it is a little risky to buy at the first month's indication of any curve. If one had waited until this curve had been flat-topped or going down for two successive months, he would have stayed out in 1899 and bought in December instead of September, 1913, about 5 points lower.

The weekly periodical, "The Iron Age," publishes about the first of each month the number of furnaces thought to be in blast at that time; probably it would be possible by utilizing these figures to anticipate the two curves above discussed by about a month, but with some uncertainty. I have not yet had time to work up these data, but a later edition may include such a curve.

So far the discussion of these production curves has been devoted to finding out when they say to buy. I have studied these curves considerably, as well as several others, which I either discarded or did not think worth including, trying to find out when to sell, but arrived at no conclusion I feel safe in printing.

The curve of unfilled tonnage orders of the United States Steel Corporation gives much the same indications. When the points for unfilled tonnage at the end of each month are plotted, the curve is not quite as irregular as the pig iron production curve, but its peaks and hollows also come too late. Further, it appears to have a rather decided seasonal character, as there is more or less of a peak each Winter; I have, therefore, not put it on this plate, but have put on the sums of the unfilled orders for the last 12 months. This curve is labeled "Sum of tonnage of unfilled orders of the United States Steel Corporation for the last 12 months." Until the middle of 1910 these figures were given out only quarterly, and in order to calculate this curve during that earlier period I was obliged to estimate values for the two months in between, but it is not likely that any small errors thus introduced would shift the peaks and hollows more than a month. By the time the public gets hold of these figures they are about a month old, and this lateness must be borne in mind in considering the value of the curve.

A purchase of stocks two months after the curve was known to have been going down for at least a month would have been made in October, 1903, or in November, 1907, or in September, 1910, or in October or November, 1913; every one of these purchases would have been a good one. The 1913 purchase could have been closed out already at a small profit. It will be noticed that the peaks of this curve come about three months ahead of those of the corresponding iron-production curve, but

inasmuch as the figures are available a month later, the net precedence of the unfilled tonnage curve is about two months.

None of the iron and steel curves discussed so far tells us when to recognize a market peak—that is, when to go short; but the reader may take for what he considers it worth the observation that a short sale for a long pull would never have proved profitable a single time while one of these curves was unmistakably going down. In other words, these curves suggest rather uncertainly when not to be short; the iron-production curve also gave true indications in this respect for some years prior to 1895. It will be interesting to see whether or not this indication holds during the next few months.

PLATE XXX—BOND TRANSACTIONS ON STOCK EXCHANGES, AND BOND AND SECURITY PRICES

Plate XXX gives the sums for the last 12 months, ending with each month, of the total bond sales on four of the principal stock exchanges of the United States; it also gives the aggregate market value of about 387 security issues on the London Stock Exchange; the average price calculated monthly by the "Wall Street Journal" of 25 representative American railroad bonds; the average price "of eleven leading (American) bonds," as calculated for a number of years by the Babson Statistical Agency, Wellesley Hills, Mass.; the average price of 10 railroad bonds as given in "Business Cycles," by Wesley Clair Mitchell; and the price of British consols, at high and low points for each year, as selected by the "Wall Street Journal," as being representative of the market course of this premier security.

All of the figures for the bond transactions on these exchanges were juggled around by various statistical methods, with the hope of finding some reliable indications of the time to buy as well as the time to sell; but the methods were either too complicated for a book like this, or the hints too vague. For instance, I tried six-month sums instead of the twelve-month sums here given; the curves so obtained were about three months earlier than the others, but they sometimes gave false "tips," which they later took back, perhaps too late. The fact is that in the big panics these twelve-month curves were early enough; one cannot gracefully expect an inanimate line always to put him in at the very bottom.

The curve labeled "Sum for the last 12 months of bond sales on the New York Stock Exchange" is the most important and the smoothest of them all. Its peak of March, 1896, came too late to get one out on the stock peak of September, 1895, but it was in ample time to do so half-way down the slump to August, 1896. By the end of January, 1897, a three-month bottom had been formed, and stocks were still obtainable at bottom prices before the long rise. In November, 1897, there was a one-month recession, which might have made a man cautious enough to take advantage of part of the stock reaction which occurred one or two months later; in December, 1897, and January, 1898, this reaction was completely made up, in plenty of time for one to become a bull again. In September, 1898, there was a slight recession, immediately corrected, but no quick turn could have been made out of it, unless, possibly, one had been put on the lookout by a similar recession in July in the curve devoted to the Consolidated Stock Exchange of New York.

In January, 1899, there was a slight recession, which could have been construed as a strong tip to sell on the high peak of April next, especially when the bond curve did not rise as great a distance in March as it had in January—the last month before the recession. By the end of August, 1899, the bond curve had been going downward three months a *greater* distance each month, and this was a week before stocks touched a second high point in September, substantially as high as the point of April. The Consolidated Exchange curve had also dropped off from its July peak.

In September and October, 1900, the curve dropped less each month than the month before, and in November it turned upward decisively. This was after the rise in both rails and industrials was well under way, but it was in time to utilize half of it. The stock peaks in the Spring of 1901 would have escaped utilization, but the curve would have notified one months in advance of the high railroad peak of 1902 and the secondary peak of the industrials at the same time. The smaller bond curve peak in the Fall of 1902 might have induced one to stay in too long, but it would have gotten him out on the later rally within five points of the extreme top. For a short sale this secondary short peak and its immediate decline would have been more valuable than the main broad peak of a year before, for then the bearish indication of this curve and the bearish actions of stocks were coincident.

One who was watching this curve for the time to buy would probably have done so at the end of January or in February, 1904. If he had waited for an unmistakable upward turn of this curve, he would have entered just after the end of September, 1904, as soon as he had worked up the September bond sales. He would then have been betting with a sure hand, but for only half the pot.

Before the occurrence of the market peak of January, 1906, the bond curve had been declining rapidly for four months. It never faltered once in its ensuing fall until it made a clear-cut bottom in the Fall of 1907, one or two months before stocks touched low. It then rose as unfalteringly until it formed a nice, round top in 1909, and fell sharply in November, in plenty of time to tip a speculator out or short within a very few points of the extreme top. In fact, it was apparent at the end of August that this curve's peak was rising less and less rapidly, and one might have sold within one or two points of the highest prices, dependent on his skill, so far as this curve was concerned.

At the end of February, 1911, this curve had apparently formed a bottom, and a purchaser would have had a profit of a few points within three months. If he had failed to sell out before the slump in the Summer of 1911, this curve would have encouraged him in hanging on for

the higher prices in the Fall of 1912, of whose coming and going the curve gave several months' plain notice.

In the latter part of 1913 the curve dropped less and less rapidly, formed a nice bottom, started up rapidly in January, 1914, and is still going up (April, 1914).

Reviewing this New York Stock Exchange Bond Sales Curve, we can say that it has never been wrong, excepting partially in 1896, although it is sometimes so late in recovering from its hollows as to give a follower only half a loaf. I wrote to the Secretary of the New York Stock Exchange, personally, asking for any such compilations of monthly bond sales prior to 1892, and received the reply that he did not have them, and did not know where the information might be secured. It is pleasing to note that the immense and sudden drop of nearly 30 points in the average of the rails in the first half of 1893 was clearly foretold by that portion of the curve which my data have enabled me to construct. That decline in those days of low values of railroad stocks meant 40 per cent. in half a year.

I have been favored by Mr. Horace H. Lee, Secretary and Treasurer of the Philadelphia Stock Exchange, with a list of monthly bond transactions on that exchange from the close of 1899, and he has very kindly volunteered to copy them off for earlier years if a lost or misplaced book is found; if it is not, I shall have to resort to the daily records, but in either case I hope to complete this highly significant curve for many years previous to this chart in a later edition of this book. Although the transactions are smaller than on the New York Exchange, it is to be remembered that they are more on the investment order, and the judgment of the investor is apt to be better than that of the speculator who does not study.

The peak of March, 1901, was over two months ahead of the stock peak of July, and the general downward drift of this curve in 1901 and 1902 was prophetic of the coming peak and decline of railroad stocks in 1902. By the middle of 1904 the bond curve was pretty certainly on the rise, while stocks were still very cheap. This recovery was two or three months ahead of that of the New York curve.

The peak of 1905 was about simultaneous with that of New York, but not as smooth, because a curve deduced from a smaller amount of business cannot be expected to be as smooth. In April, 1906, the volume was excessively heavy, amounting to about $8,000,000, which elevated this curve for a year. Nevertheless, it rose no more after April, so that one could have escaped being misled.

The two bottoms in the Winter of 1907-08 were simultaneous with the bargains in stocks, but a couple of months behind the New York

curve. One or two months' warning was given of the coming decline in the Fall and Winter of 1909. A purchase at the end of December, 1910, would have afforded a profit of about five points within half a year. The stock peak and subsequent decline of the Fall of 1912 were indicated a year ahead. The curve was apparently making an irregular bottom in the Winter of 1913-14.

The bond sales on the Boston Stock Exchange are much smaller than in New York, but they represent an old community of sagacious investors as well as a very clever contingent of speculators. It is interesting to note that the showing of the Boston Exchange is substantially the same as that of the others. The record I have begins with 1903 only, but I expect to secure from a professional compiler the monthly figures for many years previous. The values from which the present curve was calculated were published some weeks ago in the "Wall Street Journal."

The apparent bottom in February and March, 1904, might have induced one to buy at the end of April, in consideration of there having been a two-month rise; if he had waited until the end of October or November, 1904, he would still have received the benefit of over half the rise.

The smooth peak in the Fall of 1905 would have suggested that a sale be made on the extremely high prices which followed a few months later; in view of the fact that by January, 1906, all these bond curves were descending rapidly from high peaks, even a cautious man would have risked a heavy short sale at the top.

A speculator watching this curve alone might have bought too soon at the end of May, 1907, but the other curves would have saved him. By the time the bargain prices of October and November were at hand this curve had been steadily moving upward for some time.

A well-rounded peak was formed in the Spring of 1909, six months or more before stocks followed suit. Thereafter came a steady decline until the opening of 1911; a purchase at the end of March or April would have furnished a profit of a few points within a few months by selling out while the selling was good, without waiting for the Summer peaks of this curve and the Philadelphia curve, which came too late; the New York curve never formed a peak at all.

This is a good place to remark that the quick reaction in stocks in the Fall of 1911 has not seemed to have any sound basis in any of the curves I have plotted on economic conditions, and was probably due largely to scares over "trust" prosecutions, the Interstate Commerce Commission's Pacific States rate decision, etc. This is a good illustration of the truth that political scares are a great blessing to the speculators when fundamentals do not look especially bad. Acting on this principle

of "coppering" politics, a man who had bought either rails or industrials at the end of February, 1912, could have made a 10-point profit within a few months, and every one of these bond curves would have gotten him out on or before the high region in the Fall.

By the end of December, 1913, this Boston curve had been ascending more and more rapidly for five months, the Philadelphia curve had dropped only a little the last month, and the New York curve rose slightly from the bottom it had plainly been approaching for two or three months; a purchase here would have afforded an immediate profit of a few points, but whether it would have been better to hold on for a long pull remains to be seen, for last month (March) all these curves were hesitating.

In interpreting movements of the bond curves for the next two or three years, we must bear in mind the truth of what that man of wonderful insight, James J. Hill, is reputed to have said, "The world is waterlogged with bonds." Some curves I have drawn, but not included in this book, verify this remark precisely. It is unsafe to express a decided opinion as to the resultant effect on the volume of bond sales, as measured in terms of par value, as were the data for all these curves. The curves of this sheet indicate that bond sales and bond prices increase and decrease together; we must remember that most investors cannot distinguish very clearly between a true bond and what is really a well-protected preferred stock, so that the standing of the true bonds is suffering a good deal of late years from the bad company which has broken into their society. We can therefore expect that with unduly low prices of bonds the bond sales will continue unduly low for a considerable time, which fact we should bear in mind in viewing these curves.

The curve of the New York Consolidated Stock Exchange was a better guide in 1894 and 1895 than that of the big exchange; most of its early peaks and hollows were a month or so later than the others, but its sharp rise in 1903 was a year and a half earlier, and nearly that much earlier than the Philadelphia Exchange; it was about two years ahead of the Boston Exchange. The peak of 1904 was also a year ahead of the other curves.

The curve labeled "Aggregate market value of about 387 securities of the London Bankers' Magazine" is compiled for about the 20th of each month (excepting one or two months in the summer), and is published about the first of the following month. This aggregate includes stocks of all kinds, and bonds, from all the main countries of the world. It is, therefore, a world-wide index. It is very comforting to see that it varies in general with the movements of our stocks, excepting for the first one or two years of this plate; in order to show this more distinctly, by

confusing the eye less, the two Summer values between which would lie the uncalculated point are in each year connected by a straight line.

The reaction of our stocks in the Fall of 1897 was foreshadowed by the leveling out of this curve well beforehand; the same remark applies to the Spring of 1899. The irregular decline of this curve for over two years thereafter was more or less simultaneously copied by our industrials, but not so much by our rails; but we must remember that many of our rails had recently received clean bills of health from reorganizations with money assessments, and one should not expect young children to stop growing completely in times of slight famine.

The high point of 1902 was a couple of months ahead of those of our stocks. The recovery from the sharp depression in January, 1904, was in plenty of time for one to buy cheap stocks. The level top of 1905 was formed months before our final up-shoot of January, 1906.

Beginning with January, 1907, more securities were included, or the basis of computation was changed,—it makes no difference to us what was done, but the curve starts considerably higher. Still we can see quite as well that at that time there was in progress a sharp decline, which never definitely reversed until January, 1908, or February, at the latest interpretation. Our stocks were still very cheap. Evidently our little reaction in the Winter of 1908-09 was world-wide, as was also the immediate recovery. By the end of October, 1909, this international line had formed a round peak, and so had our stocks, but there was still time to act close to the top.

The little depression in our stocks in 1910 and the little peak and depression in 1911 were all more or less simultaneous with similar shapes of this curve, and the 1911 movements of our stocks were well behind the international movements. This curve had been level or declining for nearly a year before our stocks touched their peak in the Fall of 1912, and it has been declining more or less irregularly but sharply ever since.

The curve labeled "Annual highs and lows of British consols" was plotted directly from a table in the "Wall Street Journal"; I regret I have not at hand the monthly prices of this premier security, as experience has taught me the two curves sometimes do not look much alike to the eye, especially near the tops and bottoms, where we want to be on the lookout for the first slight reversal of trend. Nevertheless, some valuable tentative conclusions can be drawn, especially from the minor fluctuations.

The price of consols has had a generally downward trend for two reasons, the much-talked-of increase in the world's gold supply, and the reduction of the interest rate on consols from 2¾ to 2½ per cent. in January, 1904. Bearing these factors in mind, we can proceed to look

for temporary changes in the downward trend. I am afraid to venture any opinion on the years before 1901, not having monthly prices; but in 1902, 1906, 1908 and 1911 there were peaks, simultaneous with or in advance of those in our stocks; in 1899, 1901, 1903, 1907, perhaps in 1911, in 1912 and 1913 there were similar depressions silmultaneous with or in advance of our stocks, usually. Lately (April, 1914) there was a sharp rise of about four points, said by some to have been a response to the passage of the Federal Reserve Act in this country; if this be a good reason for staid consols, it ought to be a better one for speculative stocks in the near future. But in all events it is to be borne in mind that consols are an obligation of only one government, and therefore subject to local political conditions as well as to international economic changes.

The curve labeled "Average price of Babson's eleven leading bonds" is one of the very best I have been able to secure ready-made, and begins on this chart with 1903. Some other tables I have seen covering many years previous to 1903 show almost as high a barometric action as do this curve and the excellent curve from the "Wall Street Journal" for the years within their periods; but they were plotted in such manner as to make me feel uncertain in taking off their points, so for the present at least I am omitting them.

Just as this manuscript is being completed there has come into my hands a monumental work, undoubtedly destined to be accepted as very high authority and to be widely read for years to come; every one at all interested in such subjects should at once secure a copy of this work and study it carefully; I refer to the new Memoir of the University of California, Volume 3, published at Berkeley, Cal., entitled "Business Cycles," by Wesley Clair Mitchell. In it is the best compilation I have seen of early average bond prices, and I am so willing to accept it that I have plotted his values on this Plate XXX, and labeled it "Average monthly prices of Wesley Clair Mitchell's 10 railroad bonds."

Generally speaking, the peaks and depressions of this bond-price curve are simultaneous with those of stocks for the minor peaks and all of the low points; but they are usually ahead of the long-swing high peaks of stocks, inasmuch as they indicate by flattening out on top the approaching exhaustion of capital for investment. This flattening out of the bond-curve peaks occurred in the Summer of 1892 (earlier than shown on this sheet), in the Summer of 1894, the Summer of 1895, the Spring of 1896, the Summer of 1897, notably in the Summer of 1899, the Spring of 1901, the Spring of 1902, the Spring of 1905, the Spring of 1909, and the Winter of 1910-11. It is hardly too much to say that every one of these level or declining tops preceded a stock decline of considerable magnitude by several months.

It is worthy of remark that the three lines given of average bond prices do not always agree in their changes up or down for the first month or two of a movement; this variation is only another instance of the wisdom of never acting on one curve alone when other similar ones can be constructed and studied, especially at the first dim indications of a change. In this connection it may be remarked that all three of these averages have the fault of being calculated from railroad bonds only, although it must be admitted that some industrial bonds are a little like mortgages on building lots in a dying town.

The curve labeled "Average price of 'Wall Street Journal's' 25 railroad bonds near the end of each month (beginning with January, 1907)" is obtainable from that paper immediately at the close of each month, and is especially valuable because it is made up of so many issues. It also is more sensitive than averages containing fewer issues, but possibly not quite so reliable in foretelling the exhaustion of capital, because the prices of some of the issues tend to rise as the physical worths of their properties are built up.

Looking at these curves together, their hollows are simultaneous with those of stocks, or a little ahead of them, and their recoveries in plenty of time to buy at low prices. Their flat peaks are well in advance of those of stocks. Since the Fall of 1910 their trend has been slowly downward, and only in 1913 did they apparently form bottoms; this Spring and Summer of 1914 will be interesting times for digesters of these curves.

Although the world's gold production has declined the last year or so, the release of our national treasury's huge stock may help to keep down bond prices; one man's opinion on this gold-supply subject is about as good as another's, and so I may be allowed to state mine, which is that many of those who have the last two or three years written so much about rising commodity prices and falling bond prices have wakened in a nearly-finished show.

PLATE XXXV—VOLUME OF STOCK SALES ON THE NEW YORK STOCK EXCHANGE

So much has been written on the subject of the volume of stock sales as related to changes in stock prices that it seems inconsiderate to add another. My reason for doing so is that I believe I have treated the matter differently, and covered a longer period. In all of the work I have done on subjects such as are covered in this book, I have been surprised to see how one can apparently substantiate almost any preconceived opinion by using data covering a few short years rightly selected. This is especially so of the movements of the stock market since 1904, because they have been unusually periodic. In all cases, consequently, I have constructed curves for as many years previous to 1895 as I could, to make sure that broad deductions were not temporal.

There is a saying that when stock sales exceed a million shares a day foolish money is being traded for stocks. There are a number of statistical methods to test this saying out, the simplest being to plot the monthly volume of stock sales with stock prices, and this I did; but with the usual result, when the plotted values are so variable, that I could not see the woods for the trees. What we want to do, of course, is to test out a generalization of this maxim to the effect that high sales go with stock peaks. We really ought to work with weeks instead of months, because these data of sales are more nearly coincident with prices than any we have handled so far; but this book deals with monthly data only, and this matter will be so handled as to be readily modified weekly or even daily.

If we were to put on this plate the total stock sales for each individual month, there would be little room for anything else; I therefore have put on only the highest months of each peak in volume of sales, as very large dots, connected with lines. An inspection of these dots will show that out of 14 such peaks in sales 12 of them were on relatively high or very high market prices; another was on the rallies in the sharp decline of the Spring of 1907, when a lot of amateurs had to let go, and a lot of professionals got out or sold short; another was in January, 1914, representing either accumulation or distribution. If these last heavy sales had been at a much higher market level there would be little doubt as to their being the latter.

I have also put on the sales for very low individual months, preceded and followed by the months before and after. These volume points are denoted by crosses, instead of large dots, as in the case of the very high sales. There are 10 of these low-volume crosses, and a purchaser would

have made at least a small profit within a year by purchasing just after any one of them; after five of them he would have made large profits.

There are a number of ways to smooth a curve, some of which are used elsewhere in this book; the simplest way is to add together all the values for some certain number of months ending with each month, and plot the sums on the lines of the terminal months, as has been done for 12-month sums on many of these charts. The objection to this method is that it makes the sales-volume curve about six months late, although for the purpose of our present investigation it would be perfectly legitimate to plot the sum for the 12 months ending with December, say, on the line of the June before, for this December sum would be the total sales for the year just closed, whose center day was June 30th. But for the purposes of this investigation there is another more vital objection to even this method, and that is that every month in the year has exactly the same importance or weight in making up the sum which would be plotted on June, whereas the June sales should count in heavily, May and July less, April and August less still, March and September still less, etc., etc., for as many months each side of June as it is thought well to use. Out of a number of such curves I have chosen for this Plate one derived by adding together seven times the sales of the month on which the point is plotted, six times the sales of the month before and six times the sales of the month after, three times the sales of the second month before and three times the sales of the second month after, and one times the sales of the third month before and one times the sales of the third month after. While this looks like a very complicated process, its actual accomplishment can be made very simple by the aid of some mathematical short-cuts and a very simple adding and subtracting machine devised for such purposes. These processes will not be described here for lack of space and because they would be uninteresting to the general reader, who has bought this book to get results rather than methods. As a short and descriptive name I have labeled this curve the "1367631-sales-volume curve," and in the text it will be referred to as the "1367631 curve." I regret sincerely that at present I have no records back of 1895. All sales volumes include both the listed and unlisted departments of the Exchange until the time when the latter was abolished.

Perhaps the actual calculation of a couple of values will be of interest to those mathematically inclined, although I shall not use the short method mentioned above. The months are denoted by their initials:

Year and month	Millions of shares sold	Calculations of two points and answers.
1895.	J. 2.55	
	F. 3.10	
	M. 5.75	
	A. 4.45	7×4.45+6×5.75+6×8.60+3×3.10+3×7.00+2.55+5.10=155.2
	M. 860	7×8.60+6×4.45+6×7.00+3×5.75+3×5.10+3.10+6.00=170.6
	J. 7.00	
	J. 5.10	
	A. 6.00	

On inspecting this curve it will be found that all but one or two of its peaks occur with or before high stock peaks, and they therefore represent what is supposed to be distribution; granting this motive in the sellers, the small peak in the Spring of 1907 was prompted likewise, and although it came on prices well below those which had ruled in 1906, it was well above those on the way at the time. The minor peak in the Fall of 1911 was due to political scares being given the railroads and "big business." It has been remarked elsewhere that practically all the curves of this book based on economic conditions failed to give any advance notice of this short slump, and so at its bottom the political indications might well have been "coppered."

It is interesting to note that the deep depressions of this curve come with or a little ahead of stock bottoms; and it is also interesting to observe that in months of panic stocks are not brought out and dumped at sacrifice prices in enormous amounts, as seems to be common opinion.

Inasmuch as this curve lags three months behind the data we are able to get (because we cannot know the sales for three months in the future), we can hardly use it excepting for very long-pull work; but it does substantiate unmistakably the correctness of the common opinion that when stock prices are high and a very heavy period of sales comes along, it is a good time to step out from under. It also substantiates the common opinion that periods of extreme dullness after a considerable decline are good times to buy. But the actual choosing of the selling and buying days has to be left to the skill of the individual.

We have here nearly twenty years of this curve; looking at it as a whole, we are struck by its low ends and high middle. The highest peaks occurred in 1905 and 1906, at the time of the highest stock prices; the peaks of 1908 and 1909 did not mount so high, and those of 1911 and 1912 were less high still; we might then be justified in drawing the conclusion that there is perhaps an approximate cycle of about twenty years in stock prices, and that since 1906 we have been in the declining

portion of it. It will be interesting to see what the next five years bring forth.

I have also made studies of the indications of various ratios of sales, such as the ratio of the volume of sales this month to the volume last month, the ratio of the volume this month to that of the two previous months added together, etc.; but to date I have not succeeded in getting them into such shape as to be of much practical help, although I have spent dozens of hours in studying them. It can be said their indications are to the effect that a heavy increase of sales this month compared to last month means usually distribution after a considerable rise, or accumulation toward the end of a period of low prices, in anticipation of the coming rise. This whole matter of volume of sales is not very amenable to mathematical treatment, and probable a pure "chart reader" can go wrong on it more easily than on any of the other subjects treated in this book; to get the three curves of rather doubtful utility which are given on this plate, I devised, constructed and studied about twenty, and some of them are such as have in past years been published, as covering short periods only, by others. I am satisfied there is far more in sales volumes than any one has yet published, but I must admit I have not yet found the cue.

PLATE XL AND XLI—STATEMENTS OF NEW YORK CITY CLEARING-HOUSE BANKS

In forecasting market conditions the statements of various groups of banks are usually considered very helpful, and rightly. Indeed, so much has been written on this subject that I should not include anything, preferring to refer readers to other authors who have made special studies in this field, excepting for two or three reasons; it is my expectation to write a fairly complete series of books on speculation in various fields, of which this is the first one on stocks, and this class of data is too important to pass with nothing but a mention and a reference to other books; again, the items of bank statements are nearly all of highly seasonal character, necessitating elimination of the seasonal variations before they can be studied to good advantage, and they are also quite variable from month to month; wherefore I am of the opinion that a set of smoothed curves, with the seasons eliminated, can be made to present this information to readers in a form to be very rapidly grasped. It is also worthy of remark that old-time curves when plotted on logarithmic paper take on a new instructiveness, for then the student can see changes in the rate of growth of any value (such as bank deposits) months before he can when plotted on regular cross-section paper. This is another way of saying he can see new influences at work in the dark months before they have come into the light of public observation; it is not even necessary to know what these new influences are, for by their deeds we know them. There is a discussion of this property of the logarithmic chart in the chapter which is entitled, "Advantages of the Logarithmic spacing of Cross-Section Paper."

For these Plates XL and XLI, entitled "Statements of New York City Clearing-House Banks," I have chosen only four items—

Sum of the specie and legal tender (total money holdings),

Per cent. reserve to deposits,

Loans, and

Net deposits.

The money holdings and the per cent. reserve are likely to be considerably altered, but gradually, throughout the next two years, by the working of the New Federal Reserve Act. Heretofore the percentage of reserve required has been 25.00, but it will be reduced to 18.00. Other things equal, the money holdings will decline. These changes will likely come about so slowly as not to impair seriously the reliability of these curves, and any such effect will not be troublesome more than four years at most, probably hardly over two. The discussion of these curves will

therefore proceed without further reference to these impending changes.

Someone said that the secret of success in any profession lay in getting the business; likewise, the secret of successful banking lies in doing it on other people's money. While this feature has been much harped on by demagogic politicians, it is the very basis of pure banking. If all people were absolutely honest, absolutely worthy of confidence, and accurate calculators as to their financial status at some certain time in the future, there would be no need of a bank having any capital, any surplus or any reserve. The present reserves represent the suspicion the public has that the bankers may not be perfectly honest, the knowledge they have that they are not all-wise, and the suspicion the bankers have that the depositors may some time lose their fool heads and want to draw out too much money at once. Accordingly, we find that the higher the financial plane of honesty in any country, the lower the percentage of reserves carried by the banks. England does the largest commercial banking business in the world on the smallest reserve—I forget just what, but I think about 5 per cent. for all the banks of the Kingdom. The theoretical ideal reserve would be 0.00, for then no gold and silver would be idle in vaults—it would all be in table-ware, in scientific instruments, in special machinery, in a thousand utilities we cannot afford it for, and, loveliest of all, on our women. All this explanation was one time summed up by a pure economist in a definition of a bank which has never been half appreciated. He said, "A bank is an institution for certifying credits." Now, the ordinary bank does many other things, but most of them are for the purpose of helping make a satisfactory profit.

The above explanation was indulged in as a preparation for the consideration of loans and deposits; I name loans first because they are the fathers of deposits. When you and I borrow money from a bank we really get it to certify to the community that we are thought worthy of being allowed to use more of the community's fund of wealth than we happen to own; nine times out of ten we never see the loans as money, but put them to the credit of our accounts, where they become deposits. This is an important point, which even some bankers do not see, as was remarked by C. W. Barron in the "Wall Street Journal" in a series of articles on the new Federal Reserve Act. He said these bankers confused cause and effect as did the old lady who never could understand why her hens laid fewer eggs when they were high priced.

Now, whenever we find the loans of the New York banks greater than the deposits, it means that the banks are loaning some of their own money, which state of affairs announces the presence of strained conditions. This is so well known that several writers have said it was well to buy stocks at such a time. Careful test of the past will show that this.

has not always been true, nor has any other such rule been invariable enough to depend on. It is not logical to expect to get a sure tip from one or two weeks or even months indication of any values as variable as the items of a bank statement.

In order to get smooth curves, with the seasonal variations eliminated, I resorted to the same expedient as for most or all of the other plates. The items of the average condition in the last weekly statement of each month were used, because they were the latest in each month, are available the next day, and saved me the trouble of averaging four or five statements for each month.

Because of the acknowledged importance of the condition of the New York banks, two plates are devoted to the subject, Nos. XL and XLI, the first covering the troubulous times between 1875 and 1895 and the second the period between 1895 and 1915. Because of the many currency experiments made within the first period, the exceptional course will be taken of discussing the last plate first.

The most important curve for the stock speculator to watch is the one labeled "Sum for last 12 months of total money holdings at last report of each month (specie and legal tender)." It had a sharp peak in October, 1894, 10 or 11 months before the stock-market high point of September, 1895. Later peaks were in May, 1899, December, 1901, March, 1905, March, 1909, and February, 1912. Every one of them occurred either with or months before a stock-market culmination. As much cannot be said for the low regions, for they sometimes came a little too late to put one in on the bottom, although one would have made big money by buying at the end of the first month's rise of this curve in every case, excepting possibly in April, 1907, when he would have had to hold a year and a half; however, in this case the other curves on this sheet would have saved him, and even this curve itself would immediately have warned him of its previous mistaken indication, because in June and July it leveled out after an insignificant rise in time to let its victim out with a loss of a very few points. If one had been very cautious and had been watching the trend of this curve weekly instead of monthly, he might even have made a very small profit.

Another important item to watch is the percentage of reserve to deposits; by the National Banking Act this percentage was set at a minimum of 25.00, and by the new Federal Reserve Act it will become 18.00 within perhaps two years. Now, inasmuch as the line labeled "Sum for last 12 months of percentage of reserve to deposits" was plotted from points obtained by adding together the percentages of reserve for the last 12 months, we can put on the sheet a horizontal line representing the legal minimum, at the height marked or numbered 30, this height

being located by multiplying 25.00 by 12 (months), which gives us 300.00, which is the same as 30 on this logarithmic paper. Likewise, we can locate the new minimum reserve line by multiplying 18.00 by 12 (months), which gives us 216.00, drawn on these plates at the level 21.6, for the year 1914 only. See page 18.

This reserve-percentage curve has about the same peaks and hollows as the money-holdings curve, but they are inclined to come some months earlier and to be a little less pronounced. This curve would have enabled one to take advantage of the reaction in 1898, as the first curve would not, but if he had not been watching the other curves he would have stayed out. The slow but steady decline of the reserve curve in the Winter of 1898-99 might also have suggested to one to sell out his industrials in the Spring or Summer of 1899, as none of the other three curves on this plate would have done; it might even have helped him to drop his rails and take them up a few points lower.

It would have been non-committal as to a purchase in the Summer of 1900 or a sale in the Summer of 1902; it would have suggested rather clearly a sale some time in 1905, and perhaps too early a purchase in 1907, although there was not in any month a sharp rise, and the curve was dangerously close to the minimum base line on 30 all the time. In December the curve touched the base line, and in the following months rose rapidly; these were bargain days.

We should have had six months' warning to get out in 1909; and, knowing the early habits of this curve, we might have suspected from its slight but steady upward movement in the first half of 1910 that any sharp dip of stocks in the near future would be followed by an early but partial recovery; this came to pass in July. The next clear indication was constituted by the steady decline which set in about July, 1911. The stock peak of this month would have passed us while asleep, but we should have had ample notice from every curve on this plate of the coming culmination in the Fall of 1912.

This reserve-percentage curve began rising slowly in the early part of 1913, before stocks touched their low points, and is rising still (May, 1914). It can be expected to have a generally downward drift throughout the next couple of years, toward the base line at 216. Therefore, it can be interpreted as bullish in the near future if it remains about level.

The loans and deposits curves will be considered together. It will be noticed at once that the deposits are the more variable. Consequently they are inclined to show coming changes first. The peaks of these curves are rather blunt, but they usually come some months in advance of the stock peaks, especially in the cases of the big declines. The hollows are not quite so trustworthy, but there was only one time when a player on

them would have lost money, and that might have been from a purchase in the Fall of 1906; *but at that time the loan curve was above the deposit curve, which would have suggested that the buyer wait until the other curves had turned upward decidedly.* Moreover, no one could think he was sure to get a bargain at the highest prices ever touched in history.

There is one property of the logarithmic spacing of cross-section paper which shows up well in these curves; it was remarked before that this property enables us to see influences at work in the dark. It will be noticed that long before these curves actually reach their peaks and drop off, they begin rising less and less rapidly. This valuable advance tip would be partly lost in most cases if these curves were drawn on ordinary paper, as is explained and illustrated in the chapter named "Advantages of the Logarithmic Spacing of Cross-Section Paper."

I do not know what effect the new Federal Reserve System will have on these curves, and can only venture a tentative opinion; probably the prophetic virtues of the peaks and hollows will not be lost, but it is possible the loans may tend gradually and permanently to work above the deposits.

Let us now turn to the first of these two plates, No. XL. During this time we were teaching most of the voters in a democracy that fiat currency does not pay, and some of us think the schooling was cheap in the end, inasmuch as it resulted in the new Federal Reserve Act, which has been gratifyingly endorsed by the greatest political economists all over the world.

Up to about 1879 the cheap greenback currency was driving out our good gold; I cannot help but think here of the incident in the second part of Gœthe's "Faust," in which the Devil comes across the ruler of a hard-up kingdom, with whom he wants to make some kind of a deal; as his part of the bargain he invents paper money, and the people reap the consequences; whether or not he thought of free silver we are not told. In 1878 came the Bland-Allison Silver Coinage Act, and on January 1, 1879, specie payments were resumed. The Sherman Silver Act was passed in 1890, and repealed in 1893. In 1896 the free silver agitation was defeated.

For the line of stock price averages beginning with 1881 and continuing to the beginning of 1895 I am indebted to a splendid book issued last year by Charles C. Jackson, of Jackson & Curtis, Stock Brokers, Boston, Mass., entitled "Six Industrial Crises." Mr. Jackson states with clearness the hypothesis that industrial crises are precipitated by the world's using up its stocks or reserves of commodities much faster than it replenishes them, so that prices rise exorbitantly and the boom comes

to an end. The cost of Mr. Jackson's book, with several large and costly charts, is only a dollar, and it is worthy the most careful study.

The average course of stock prices from the beginning of 1875 to the beginning of 1881, shown by the dotted curve, is not very reliable, having been compiled by myself from a number of publications. It is hard to construct a reliable curve for those early years, and a curve looks surprisingly different when the constituent stocks are changed.

The first pronounced bottom in the money-holdings curve was in the Fall of 1876, after a marked decline of over two years; the stock market hit the bottom some time in the Spring of 1877. There was a slight peak in the money curve in the Summer of 1877, and a few months later a reaction in stocks. There was a hollow in June, 1878, followed by a sharp and continuous rise for some months, ending in January, 1879, which ending indicated some months ahead the high stock prices of the Fall of 1879 and the deep reaction of the Spring of 1880. During the Spring of 1880 the money curve was rising rapidly, and did not round a peak until the Summer of 1881, some time in advance of the tumbling of stock prices.

It requires a big stretch of the imagination to fit the hollow of this curve in 1883 to the low prices of stocks in 1884, but this is evidently the situation, although the money curve was so far ahead this time that one who acted on it would probably have lost money by buying months too soon. Nevertheless, the extremely rapid rise in this curve foretold the recovery of stocks in 1885, and before the close of 1885 its own level peak had given notice of the top stock prices coming in 1886.

The figures in United States Senate Document 570 are very probably wrong for one or both of the years 1887 or 1888, because most of the items are the same for the two years. I have not yet had the opportunity of verifying them elsewhere; it is, therefore, only with caution we may draw the conclusion that the rise and culmination of this curve in 1889 foretold the similar course of stocks some months ahead. The trough of this curve in 1890 was simultaneous with low prices of stocks, as was the rise of 1891.

The round top of the money curve in 1892 was some months later than the crest in stocks, but not too late to let one out near the top, and some time before the precipitous slump in 1893. The sharp rise in October and November, 1893, was in time to put one aboard the long rise, which lasted until September, 1895, where the next plate begins.

The showing of the reserve-percentage curve is virtually the same, excepting that its stubborn decline in 1879 and its level course in 1880 and 1881 gave indication that the long market rise could not last forever. This is especially true of the early Summer of 1881 at the time when

the money curve was still going up, and the stock climax only a short distance ahead.

The deposit curve was under the loan curve until the middle of 1884, for in those days banking was less efficient than later on, wherefore the banks did more business on their own money. For the period covered by this plate these curves are mostly too late to have helped much, although they might have indicated when to sell out in the Winter of 1881 and the Spring of 1890.

Considering the times at which these curves cross each other, there has never been an instance during the period covered by these two plates when one would have failed to make at least a little money by buying stocks after the deposits curve had been under the loans curve, or in contact with it, or very close to contact with it but above it, and had begun to depart upward from it. Such purchases would have been made in October, 1884, November, 1893, March, 1904, September, 1908, April, 1911, and February, 1914. How profitable the last purchase would have been remains to be seen. It will be observed there would have been only six such purchases in about forty years, and only three of them on bed rock, very possibly four.

This scarcity of tips results from the fact that normally deposits exceed loans; it is only under unusually strained situations that these two curves touch, much less cross. It is not unreasonable to expect that under the future working of the banking law loans will come to be on a relatively higher level, so that these curves will touch or cross oftener.

PLATE XLV—BANK CLEARINGS IN THE UNITED STATES

It is but natural to expect that so important a subject as Bank Clearings, about which we can obtain such complete data so promptly, would be very valuable for forecasting market movements. It is valuable, but not of as much aid as is hoped for, possibly because everybody has the same world-wide chance. It is, therefore, unlikely we shall get much of value by plotting the simple figures as published, and I can confirm the finding of other previous investigators to this effect, for I have about a dozen such discarded attempts in my office. Here we encounter again the very obvious seasonal nature of bank clearings, which must be corrected. We also have the confusing element of growth in a young country.

My attention was first called to the usefulness of bank clearings, after I had about given them up, by an article in "Moody's Magazine" of June, 1911, by Mr. Fred R. Macaulay, who has contributed other excellent articles to magazines. He pointed out that whenever the excess of the New York clearings over those of all the rest of the United States fell to very low figures, stocks up to that time had always been a good buy. His reasoning was probably founded on the principle that a stagnation time is a good time for the buyer, and in my treatment of bank clearings I have been forced to fall back into the same kind of negative indications; that is, indications which tell us that things are in very bad condition, and not indications which tell us that things will soon be much better. In a young and ambitious country like this there is not much difference between the two. I do not think I have found any curves of greater value than that of Mr. Macaulay, but they do supplement his curve.

Inasmuch as his curve was of very irregular rises and declines, I shall not reproduce it here, but give a list of the months for which it dropped below the gradually rising line he selected as the critical level. This difference between the New York clearings and those of the rest of the country apparently dropped below his line in 1894, which was a little too early; during all of 1896 and the first half of 1897 it was low, and stocks were cheap. It crossed the line downward in April, 1898, July, 1900, September, 1903, November, 1907, August, 1910, March, 1911, September, 1911, and the Spring of 1913. The latter date also was a little early. Still Mr. Macaulay's fundamental stagnation principle in all probability remains sound, for stocks were cheap when this difference was low or had been low for some time. I think possibly it was a mistake to set any line as an arbitrary lower limit, because the fundamental influ-

ences controlling economic factors change with time. During the latter part of 1913 this difference was far below his line, and the inference probably was that then stocks were cheap.

It is interesting to consider the clearings outside of New York City in this same negative frame of mind—that is, to ask what is the state of the stock market when these clearings are low, for they grow with surprising regularity most of the time. If it be true, as everyone says, that the New York stock market foreshadows industrial conditions, then the clearings outside New York should tell a story, for there are practically no industrials inside New York City. In order to smooth the curve and eliminate seasonal variations, I adopted the old expedient explained at length in the text on the first plate on interest rates, of adding together the clearings for the last 12 months ending with each month. The resulting curve is labeled "Sum for the last 12 months of clearings outside New York City." There has never been an instance when stocks would have failed to yield a handsome profit soon or after a few months, if bought when a point of this curve was lower than the point two months earlier; that is, if bought when one had waited a month to make sure that the curve was going down. Such times of purchase would have been at the ends of the months of June, 1896, September, 1900, October, 1903, November, 1907, February, 1911, and November or December, 1913. The first four of these purchases would have been on bed rock, and the last two would have been profitable to the extent of a few points within three or four months.

The showing of this curve is merely a visible way of saying our country is growing so rapidly that things are in a bad way indeed and must improve soon, when clearings outside New York are less for two successive months than they were for the same two months last year. Of course, stocks were also cheap at other times than when this curve had declined for two months, but one could hardly ask more of a curve than that it seldom or never put him in at the wrong time.

In considering the depressions of this curve in the future we may have to bear in mind the effect of stationary or declining commodity prices, for the volume of bank clearings is swelled by high prices, and contracted by low prices, although the amount of goods changing hands may be the same. As future years pass we may find it advisable to wait three months after this outside New York clearings curve has dropped off, then possibly four.

I have corrected most of the curves on this chart by dividing them by Bradstreet's Index Number of commodity prices, and, of course, obtained some improvement; but on careful consideration of the improvement I have decided not to complicate matters in this way at present.

We must be conscious eternally that all the charts in the world cannot displace common sense, but only aid it; that this will always be true is evident from the fact that only a few dozen out of the hundreds of causes at work at any time can be handled statistically.

In order to make this chart complete, I have put on the curves for the clearings of New York City and of the whole United States, including New York City, and labeled them "Sum for the last 12 months of New York City clearings," and "Sum for the last 12 months of total United States clearings." These curves are rather unreliable, but they serve the very useful office of putting one on watch months beforehand for the vital drop in the outside-clearings curve.

It would be too bad to quit the outside clearings before getting from them some kind of hint as to when to sell; most any of us can tell when things are cheap, but most of us, including myself, have often held on too long; stockholders are proverbially hopeful.

Up to this time on this plate we have eliminated seasonal variations and smoothed curves only by our old device of adding together, to get the point for any month, the values for the last twelve months ending with that month. Now, we succeeded in finding some good times to buy through employing the principle that when a young country begins to grow downward it cannot continue doing so very long, and will soon start upward. By analogy we may surmise that soon after these outside clearings start upward with a bound, stocks will have risen nearly to their upper points on that long swing, on the principle that they discount coming commercial conditions, and that in industry as everywhere else pride goeth before a fall.

Accordingly, let us form a curve by dividing the clearings outside New York each month a year ago by those of the same month this year; but the ratio points of such a curve would be so irregular as to confuse the eye, and so we shall always add together the ratios of the last two months in order to smooth the curve. For instance, the value on January 31, 1912, is 193, which is the sum of 98 and 95; the value of 98 was obtained by dividing the clearings of December, 1910, by those of December, 1911, and the value of 95 was obtained by dividing the clearings of January, 1911, by those of January, 1912, thus:—

590÷600=98; and 600÷630=95; total 193.

The curve thus obtained is labeled "Sum for last two months of ratio of clearings outside New York last year to clearings same month this year." It is evident, since this curve is formed from ratios of quantites and not directly from the quantities, that over a series of years its course will be roughly horizontal, and not rising or falling; it, therefore, becomes necessary for us to establish a horizontal line of reference. In

order to do this we shall have to take a glance at the curve labeled "Sum for the last 12 months of clearings outside New York City." Through this curve I have drawn a straight line, which represents very closely the line of growth; it is easy to do this when a curve is plotted on logarithmic paper, and very difficult when it is not; if the reader does not believe this, let him try it. This straight line is ascending at the rate of about 7.5 per cent. per annum, which means that the normal clearings for any month last year are related to the normal clearings for the same month this year as 100.0 is related to 107.5, which is 0.93; inasmuch as we have chosen to smooth this curve by plotting the sum of the last two ratios, we must add together 0.93 and 0.93, giving us 1.86, which is the same on logarithmic paper after omitting the decimal. This level of 186 is the center line we want for our ratios curve, and it is drawn at that height on the chart.

In accordance with our principle that pride goeth before a fall, we may formulate a question something like this: On what months does this curve first drop below its center line after having been some time above it, thus indicating that clearings are rapidly becoming greater than they were at the same time last year, outside of New York City? These months are April, 1895, August, 1897, December, 1898, February, 1901, September, 1902, November, 1904, November, 1908, and February, 1912. Some of them are only a week or so ahead of peaks in stocks, and some months ahead. While this curve is well worth plotting and considering as a warning in rising markets, I do not have very much confidence in it; it came too close in July, 1903, to suggesting that a short sale might still make a little money for a pure chart-reader.

In concluding the remarks on bank clearings, I may say that the limited work I have done, still very incomplete, on the clearings in England and Europe tends strongly to confirm the findings of this plate; if, when extended and completed, it turns out to have enough reliable phophetic value, it may be included in a book treating of foreign conditions as affecting our markets.

PLATE L—BUILDING PERMITS IN THE UNITED STATES

For a long time I juggled data of building permits for many cities in many ways, only to find that the resulting curves were later than the stock market; I suppose I would be trying such schemes yet if I had not opportunely come across the book by Mr. George H. Hull on Industrial Depressions, in which he suggested in general terms, but unmistakably, the method of treatment adopted for this Plate L. While the fundamental principle is Mr. Hull's, I have so modified the treatment as to make it more available for stock-speculation purposes, and have extended it considerably.

About 120 of the cities of the United States give out shortly after the close of each month statements of the total estimated cost in dollars of the buildings for which permits have been taken out. These amounts are summarized in various trade papers by weeks and months, usually the latter. It is a question whether it is better to use the total of all of the cities of the country or of only a few certain large ones; I do not think it makes any appreciable difference. Mr. Roger W. Babson, of Wellesley Hills, Mass., compiles totals for 20 of the largest cities, and I have made use of his figures. I have also made use of compilations from various periodicals, and am pleased to give each its credit on the plate and in the text.

The prices of building materials and labor vary roughly with the price of pig iron, and less approximately with that of copper. Now, all these things are quite variable in price, and soar into the air in boom times. It is then that the total of building permits soars into the air, because the architects who plan the buildings base their estimates of costs on current prices, which are very high. So it happens that while this total of permits is high or rising, the amount of building contemplaed in these same permits is falling; if we picture in our imaginations all the building being done and to be done in plain, cheap, substantial brick factories, and the prices of brick and labor rising rapidly, we can well see that, although the value of the contemplated building might be remaining constant as measured in dollars, the number of cubic feet of building under contemplation would actually be less and less. So it comes to pass at the end of a boom that capitalists realize how little they are getting for their money, and that if they build any more they will get less; the wiser ones quit planning new constructions, but enough more keep on to swell each month the money value of permits, although the relative quantity of contemplated building is falling off. Simultaneously labor is harder to get, and most people think we surely have passed into a new

order of prosperity, when suddenly the bottom drops out of the stock market, which is soon blamed for the unsold brick and iron and the men out of work. It is the same old story of every man in the country, from capitalist down to the humblest laborer, having tried to hog it all. New currency systems can mitigate the consequences at the cost of lengthening them out conveniently, but they never will change human nature. No nation ever had nor has now a better banking and currency system than Germany, nor any better managed, but booms and bargain days come and go there about the same as here.

It is evident that if we divide the money value of the building permits for any month by the price of a representative constructional commodity, such as pig iron, we shall obtain a quantity proportional to the amount of building contemplated by the permits issued that month. But inasmuch as the most active part of the United States is in a cold winter climate, the relative amounts of building contemplated are of high seasonal variability, and we must correct for this variation. The easiest way to do this is our old way of adding together to get the point for each month the relative amounts of building contemplated for each of the 12 months ending with the month under discussion. It will be noticed the correction for varying prices of building materials is in this method, for I said "amounts" and not "values." At the same time, we also smooth the curve at the cost of making it nearly six months later, but it is still prompt enough, and this particular curve needs smoothing badly.

We shall first discuss the curve labeled "Sums last 12 months building permits issued in Babson's 20 cities divided by price Local No. 2 Foundry Pig Iron Chicago at furnaces." The peaks of this curve in 1906, 1909 and 1912 were either with or ahead of high stock peaks, but the hollows of 1908 and 1910 were too late to get a man in at the bottoms, although he would have made neat profits. Whether the apparent depression of 1913 was soon enough to be of service remains to be seen; or possibly it may be a halt before another downward turn.

The data of permits issued in Babson's 20 cities were treated in the same way, using the price of electrolytic copper instead of that of pig iron, and the resulting curve is labeled "Sum last 12 months building permits issued in Babson's 20 cities divided by price electrolytic copper, New York." Both these curves started up well ahead of stocks in 1904; the copper curve had been level-topped for some months by January, 1906, and was plainly declining by the end of November, 1906, while there was still opportunity to sell stocks at very high prices. The copper curve started up three months ahead of the iron curve in 1908, and when it was pretty surely upward-bound at the end of April, 1908, stocks could still have been purchased within less than 20 points of the extreme panic

prices of 1907. It made its next peak in 1909 a little ahead of stocks, and its next and last in 1911, well ahead of the market peak of the Fall of 1912, since which it has never risen.

It is hopeless to try to pick out short market swings from such curves as these.

Information regarding building permits in Manhattan and the Bronx is available for a long time back from various periodicals; I have taken it from "The Real Estate Record and Builders' Guide," published in New York City weekly. We might expect in advance that curves of this data would be more irregular than those of the whole country, but earlier in point of time, and such turns out to be the case. I have constructed the iron and copper curves of this data for all the years since 1883, and found them to forecast coming declines in the stock market fully as well as for the years on this Plate L. Therefore, I consider it safe to say that they are based on a fundamental trait of human nature summarized hundreds of years ago in the maxim that pride goeth before a fall.

Let us inspect the curve labeled "Sum for last 12 months of building permits issued in Manhattan and the Bronx divided by price Local No. 2 Foundry Pig Iron Chicago at furnace." During the latter half of 1894 and the first few months of 1895 the curve rose rapidly, but by the end of July it had been level-topped for two months; stocks touched their high point in September, after our curve had been declining a month from the level top. There was a secondary peak in December and January, followed in a couple of months by a stock rally, then both this curve and stocks declined to low points in 1896, our curve being over two months earlier than stocks, so that it might have strengthened us in buying near the bottom. There was a poorly defined peak in the Winter of 1897, but it came too late to help one take advantage of the reactions in the bull market unless he had surmised that the general trend of the curve was upward and that the trend of the market probably was also, and had held himself in readiness to take advantage of short reactions.

Another level top was formed in the Summer of 1899 in time to tip one out on the second high peak that Fall, which the industrials did not reach again for two years. The fact that this permits peak was lower than the one 18 months before, which in turn was lower than the one 30 months before it, might have suggested that stocks were about to take a breathing spell, and they did. In December, 1899, there was a very sharp secondary peak, followed by a precipitous decline, which the industrials especially imitated, until the curve began to falter in the Summer of 1900, and stocks touched bottom before starting on a long rise; here again the curve was too late at the bottom, as these building-permits curves usually are.

In the early Summer of 1901 the permits curve leveled out very plainly, just barely in time for the very high stock prices of June. It then worked upward irregularly and slowly, and its next peak in the Winter of 1901 gave over half a year's notice of the coming top and decline in the rails in the Summer of 1902. Even the secondary peak in July, 1902, need not have deceived a man seriously, because it was too low and too soon over.

If one had bought in June, 1903, having been deceived by the apparent recovery of our curve the month before, he would not have had a poor bargain if he had held on, as his purchase would have been within 10 points of the extreme bottom touched a little later. This time the curve definitely recovered ahead of stocks. It turned downward in the Fall of 1905, the points for October, November and December being lower than that for September. Stocks touched high in January, 1906. The permits-curve decline in 1906 was well ahead of the slump of stocks in 1907.

In the Fall of 1907 our curve started to form a good bottom while stocks were still begging for buyers. It formed a sharp peak in July, 1909, two months ahead of the iron and copper curves constructed from the permits issued in Babson's 20 cities, in plenty of time to let one out within two or three points of that movement's very highest prices.

Any one who had tried to make money out of the short movements of this curve in 1910 and 1911 would probably have been "trimmed," but would surely have been saved from being long in the Fall of 1912, when stocks started on a considerable decline.

The same values of building permits from Manhattan and the Bronx for each month were also divided by the highest prices of lake copper in New York touched in the respective months, so as to get quantities proportional to the relative amounts of building contemplated, as before, on the assumption that copper price changes were representative of changes in the cost of building materials and labor; these relative-amount numbers were then added together for the 12 months ending with each month, so as to eliminate the seasonal variations and smooth the curve, exactly as was done when using the Chicago pig iron prices. The resulting curve is labeled "Sum for last 12 months of building permits issued in Manhattan and the Bronx divided by highest and average monthly prices of lake copper in New York." I used the highest monthly prices because they were obtainable for a long time back from "Stevens' Copper Handbook" without calculation, and can now be obtained from many other sources.

This copper curve is identical in its movements with the iron curve from 1883 to the Fall of 1900, when it failed to hesitate in the Fall, just

before stocks turned upward for a long rise; but it would have gotten us out on the Spring peak of 1901 better than the iron curve, for it actually dropped off a little. It did not foretell the coming and going of the Summer peak in 1902 as well as did the iron curve, but it was not harmfully late. When it started rising in the Spring of 1904 it did so eight months later than the iron curve, but not too late. Its 1905-06 peak was the same shape as that of the iron curve, but it began its descent a month or two earlier. The copper curve's depression in 1907-08 was over considerably the earlier of the two, which would have been a distinct advantage. In December, 1907, a change was made by beginning the use of the average monthly price of lake copper in New York, as calculated regularly by "The Iron Age"; inasmuch as the average prices are less than the highest prices, the quotients obtained by dividing by them are larger, and the sums of the 12-month periods are larger; thus it is that the curve starts in December, 1907, on a higher level, which need not confuse us, as both December sums are given.

The following rise was uninterrupted until the Summer of 1909, when the copper curve had the same shaped peak as the iron curve; its similarity to the iron curve persisted until 1912, when it turned downward first by a couple of months. Further, its general course was downward from the middle of 1909 to the middle of 1912, thus suggesting that we were in a bear period, while the peak of the iron curve was nearly as high in 1912 as in 1909.

We shall next look at the short curve labeled "Sum for last 12 months of building permits issued in the principal cities of the U. S. according to 'Construction News,' divided by 'Iron Age' monthly average price Local No. 2 Foundry Pig Iron Chicago at furnace." This is a long name for a short curve, but nothing ever provokes me much more when I read a book than a partial or indefinite description.

I regret that for two or three temporarily sufficient reasons I have only a few years of this curve. Its decline in the summer of 1899 was plain enough to suggest a sale on the September peak, and its rise in the Fall of 1900 was early enough to get one in very close to the bottom. In following this curve the high prices in the early Summer of 1901 would not have been realized, but those in the early Fall of 1902 were forecasted half a year ahead. This curve's plain upward turn at the end of August, 1903, would have suggested a purchase at the very bottom of the market, so far as this curve was concerned. It is my expectation to continue this curve after 1904 in a later edition. It is noteworthy that it was beginning to hesitate on the last month given, November, 1904.

The last curve we shall consider is another short one, which I hope to complete for earlier years in a later edition, labeled "Sum for last 12

months of building permits issued in the U. S. according to the 'American Contractor,' divided by price gross ton heavy melting steel scrap in Chicago." It was explained in the text on iron and steel prices that the prices of scrap tend to run a little ahead of those of pig iron. By the time this curve rose from its last bottom in 1908 one-third of the current rise in stocks had taken place. Still the apparent bottom in the Fall of 1907 might have made one believe that the worst in industrial construction would soon be over, making stocks a good buy then. This curve's one-month decline in June, 1909, might have put one sufficiently on guard to realize some of the peak prices of August. Unlike the other curves, this one has a low point on July, 1910, simultaneous with the slump in stocks. Thereafter it rose rapidly until the early Summer of 1912, which rise was deceptive by implying that the general trend of stocks was upward, whereas we know now it was not; still one would have made money by buying in the Summer or Fall of 1910 and selling in the Fall of 1912, strictly according to the curve.

The difference in the trends of the various curves on this sheet, especially in such backing-and-filling years as 1910 and 1911, furnish excellent substantiation of the caution of never placing final dependence on one or two curves if more similar ones can be worked up. It is noteworthy that all of these curves agree in their prognostications of coming big swings, but not of little swings; this is rather encouraging than otherwise, for when they do not agree we are cautioned to be careful.

This plate is not as complete in two respects as I hope to make it later; I want to construct similar curves for some well-built-up and old cities like Boston, Providence, etc.; because the element of rapid growth is not so confusing, and because these places have especially long foresight in commercial and financial matters; I further want to divide the monthly values of permits issued by the average monthly prices of other important constructional materials, like cement, which is now a very heavy item in all heavy improvements. I have tried dividing by Bradstreet's Price Index Numbers, and secured curves of about the same tendencies, but its fault for this usage is that among its constituents are a lot of commodities not used in building.

Reviewing these curves, we can say that they are among the best we have devised. They would never have failed to get us out very close to the top, and that is their great virtue, for most men want to stay their markets too long. Often they would have put us in very close to the bottom.

PLATE LV—PER CENT. RETURNS ON STOCKS AND BONDS

In the final analysis, the time to buy stocks is when they are cheap, and the time to sell them is when they are dear; but when are they cheap and dear? There's the rub. Of course, in the cases of individual stocks we have to look ahead and estimate earnings; but in the case of stocks in general we have to fall back on what they actually return on the money required to buy them at the current market price, compared to what we could get for the money put out at interest. In a broad way, a similar subject has been treated in the Plates on Interest Rates, and very successfully.

Above I spoke of what stocks actually return, as dividends, and not of what percentages they earn on their par values. It is true that, other things equal, stocks sell at prices roughly proportional to their earnings, but it is hard to get earnings up to date, whereas dividends can be estimated for some time in the future. Out of about twenty curves calculated on both earnings and dividends, for many groups of stocks, such as the "Wall Street Journal's" 20 rails and its 12 industrials, and the two combined, I finally decided to include in this book only one curve for stocks, and those very steady stocks usually; this curve is labeled, on Plate LV, "Average yield each month at highest price of each stock during month, using only Atchison, St. Paul, C. & N. W., N. Y. C. & H. R., Penn., Ill. Cent., and L. & N. (Heavy irregular line.)" One reason for selecting these stocks was that they were paying dividends at an early date.

The upper smooth, light curve is labeled "Average rate for last 12 months on choice 60 to 90-day double-name commercial paper in New York." The lower smooth, light line is labeled "Average open-market rate for money in London last 12 months." The London rate is included because money and stocks are international commodities, with no tariff walls between countries.

Looking simultaneously at the curves of stock yields and New York interest rates, we are struck with the fact that money at interest yielded more than stocks from 1900 to 1909, largely because we were in a long boom and stocks sold with the hope on; of late years the public has been getting a little more than even for the former deeds of railroad men, and so rails have been selling ex-hope.

Generally speaking, the showing of this plate is very disappointing, but we can make some valuable deductions. Only twice did railroad stocks get so high as to return less than money loaned in the London open-market—in the Spring of 1901 and the Winter of 1906; both occasions

marked stock peaks, but in different ways. When these curves crossed in 1901 the London interest rate was *falling,* and so stocks were not a very good short sale; but when they crossed in 1906 the London rate was *rising* rapidly, and stocks were a splendid short sale.

Considering all three curves together, rails have been a good buy whenever their yield was high, *and* the curves of New York and London interest rates were both either level-peaked or falling. Such times occured in the months of October, 1900, December, 1903, February, 1908, December, 1910, and November, 1913. Every one of these purchases would have yielded an immediate profit. Conversely, these rails have been a good short sale whenever their yield was low *and* both the interest curves were rising. Such times occurred in the months of August, 1902, October, 1905, September, 1909, and, perhaps, the early Fall of 1912. Every one of these sales would have been profitable.

The curve composed of big dots, labeled "Average return of Wesley Clair Mitchell's 10 railroad bonds," is plotted from his comprehensive book, "Business Cycles," mentioned also in the discussion of Plate XXX. This curve is included mainly for comparative purposes, but also to show that the changes in the return of bonds either precede or occur simultaneously with those of stocks. The precedence of bonds varies anywhere from no time to several months; this fact is merely the reverse of that established in the consideration of Plate XXX,—that changes in bond prices either precede those in stock prices or occur simultaneously.

The curves of this plate are not as helpful as those of many of the other plates. It is worth while remarking that some curves I have constructed of the percentages *earned* on the market prices of about 20 railroad stocks are now rising with surprising rapidity, and have been high for three or four years. This is not to say that they are unreasonably high now, but rather that they used to be too low.

FINAL SUMMARY

If the reader has faithfully studied through this book to this place, he may nevertheless well wonder which of these plates is most to be trusted. This can be said beforehand—that the great movements in either direction are naturally more uniformly prophesied by all the plates than the smaller ones; when the curves disagree or are non-committal, we may expect see-saw markets, for the very reason that the underlying causes are working in opposite directions. We must also remember that there are hundreds of economic and moral causes at work on stock prices all the time, although they can be classified into a comparatively few groups, as economists have shown us, and of these causes only a few are studied in this book, and some of the plates treat of manifestations rather than causes; nevertheless, every little addition to our sum of knowledge helps to eliminate in the future the very fluctuations which are the subject of study. When it comes to applying the fifteen studies in this book to actual rational stock speculation, it is evident that fifteen guides are better than none, and better when added to others than are those others by themselves, especially when the curves on the sixteen plates of this book agree so well in their indications. The opinion of every man who studies these plates will differ from those of all others as to their relative importance, but as my contribution I submit the following remarks:

PLATE VI—NEW YORK INTEREST RATES

The three curves based on call-money rates on the New York Stock Exchange are very sensitive, especially the maximum-rate curve, but they are sometimes misleading, or give their indications too soon. Of the three, the minimum-rate curve is the most reliable, especially approaching the top of a long rise of stock prices.

The curves based on choice 60 to 90-day double-name commercial paper are not so sensitive as the call-rate curves, but smoother and more reliable, and ordinarily quite early enough.

Under the operation of the new Federal Reserve Act it is probable that all the curves of this Plate VI will come to look more like each other, and this probability applies especially to the two groups of curves.

On the whole, all these interest curves considered simultaneously are excellent forecasters, so much so as to put this plate among the three or four best ones in the book.

The present indication (May, 1914) is for rising stock prices.

PLATE VIII—FOREIGN OPEN-MARKET INTEREST RATES

Since 1899 all three of these curves have been of high value as forecasters, and they have agreed well with each other; there is not much choice between them, but probably the London open-market curve is the steadiest, and also the most reliable for us, since it is the most international. From 1895 to 1899, inclusive, all of these curves were more or less superficially misleading, as pointed out and explained in the text, but before 1895 they were highly barometric, as during the years since 1899. Personally, I shall not be especially inclined to suspect their indications during the next two or three years, for times will probably not be exceptionally hard or exceptionally good.

At present (May, 1914) the curves indicate rising stock prices.

PLATE X—FOREIGN BANKS' OFFICIAL DISCOUNT RATES

The lowest curve on this plate, treating of the German Reichsbank rate, is quite steady, fairly reliable, but has to be calculated and plotted right up to date. Moreover, it is not unlikely that it will have to be read with the other eye on international politics; nevertheless, it is very much worth plotting, especially as its constituent data are obtainable up to the hour every day in the year.

The three curves at the top of the plate, treating the minimum official discount rates of the Banks of England, Germany and France, by a ratio method of computation, were quite reliable for a number of years before the beginning of this plate, and have been fairly so since 1899. The French curve is too steady to be of much use, but it is seldom misleading. The English curve is to be preferred to the German in this country, as resting on more of the world's commerce.

The curves of this plate are not as sensitive as those of Plates VI and VIII, but are perhaps as reliable in the long run. Their long-swing prophetic value is well established.

All these curves indicate a probable rise of stock prices in 1914.

PLATE XV—PRICES OF IRON AND STEEL

This plate deserves, perhaps, the highest rank in the book; not a curve on it has ever been wrong or too late; but it shows only the long swings. Not quite as much can be said for all of the preceding twenty years, because giant engineering strides were being made at times, and it is possible that this may happen again, although iron prices are not high enough now to permit of much more reduction. It is therefore likely that for many years to come the prices of iron and steel will continue to constitute one of our best guides to the future. These curves are unusually valuable because the prices on which they are based are public property and are obtainable up to the day any time, and the method of calculation is easy.

PLATE XVII—PRICES OF THE NON-FERROUS METALS

Excepting at times of manipulation, such as during "corners," the reciprocal price curves of lead, copper and spelter (impure zinc) are either moderately valuable or else non-committal. They do not have anything like the forecasting value of the iron curves, and have to be read with more care, but they are well worth keeping up to date. In the future they are likely to become more trustworthy, as the number of uses for their metals increases, and as public opinion develops more and more against both "corners" and price-wars.

Their present indication (May, 1914) is for rising stock prices.

PLATE XIX—PRICES OF COMMODITIES IN GENERAL (INDEX NUMBERS OF PRICES)

The London "Economist" and the American "Bradstreet" curves have been quite reliable since 1899, and usually several months in advance of changes in stock prices. As explained in the text, there is good reason to feel that for the next few years they will be of even more value. It is to be wished that the principal governments of the world would get together and agree on getting out a compound international index number promptly at the close of each month; nothing would do more to lessen the unfortunate variations in both industry and the security markets, all over the world.

At present (May, 1914) these curves suggest rising stock prices.

PLATE XXV—IRON PRODUCTION IN THE UNITED STATES, AND UNFILLED ORDERS FOR STEEL

The two curves of pig-iron production, by individual months and by 12-month periods ending each month, are of high value in telling us when stocks are cheap; and the same can be said of the curve below giving the sums for the last twelve months of the unfilled orders of the United States Steel Corporation, of which last curve it can also be said that it anticipates the pig-iron curves by a considerable time, thus putting us on the watch for what will probably be bargain days.

These curves do not tell us when to sell at the top, but they do tell us quite reliably when not to be short of stocks for a long pull.

At present all these curves are non-committal or a little bullish as to future prices of stocks, but they do tell us unmistakably that this is no time (May, 1914) to be short for a long pull.

PLATE XXX—BOND TRANSACTIONS OF STOCK EXCHANGES, AND BOND AND SECURITY PRICES

All the curves of bond-sales volumes on the principal stock exchanges of the United States are of high accuracy for telling us that we are approaching a peak in stock prices, and of fair accuracy for telling us that stocks are cheap, although sometimes these bond curves are a little late.

Not one of the curves has ever been really misleading, except the New York curve in 1895.

The curves of bond and security prices are either right or non-committal at times of low stock prices, and their round peaks are nearly always well in advance of the main peaks of stock prices. These curves are very trustworthy barometers for stocks in general, but they do not always agree among themselves on individual months.

The present indication (May, 1914) of all these curves is not very definite, because it is a time of comparatively low stock prices, but they give a suggestion of a coming rise, which may not be very great or last very long.

PLATE XXXV—VOLUME OF STOCK SALES ON THE NEW YORK STOCK EXCHANGE

The showing of this Plate XXXV is a decided but an inapplicable one, to the general effect that high volumes of sales and high stock prices go together, and the contrary in a much lesser degree. It is well known among traders that the "activity" of stocks is one of the "vital statistics" for them, but evidently they are right in considering that it takes an expert to make money out of hints from the volume of sales.

So far as I am willing to venture any conclusion drawn from this plate, it is to the effect that stocks are now moderately cheap (May, 1914). They may be cheaper before they sell higher.

PLATE XL—STATEMENTS OF NEW YORK CITY CLEARING-HOUSE BANKS, FROM 1875 TO 1894, INCLUSIVE

PLATE XLI—STATEMENTS OF NEW YORK CITY CLEARING-HOUSE BANKS, FROM 1895 TO 1914, INCLUSIVE

The curves of total money holdings and of percentage of reserves to deposits are usually of high barometric value, especially in foretelling the future coming and passing of stock-price peaks. The curves of loans and net deposits are also of value, particularly when that for loans goes above that for deposits. Considering all four of these curves simultaneously, they are quite reliable, and usually some time in advance of changes in stock prices; but they all undoubtedly require to be read in the light of each other.

At present (May, 1914) all these curves promise a bullish stock market.

PLATE XLV—BANK CLEARINGS IN THE UNITED STATES

Of the four curves on this plate there is only one that has much value, and this notwithstanding that these four are the survivors of over twenty; but this one has been highly dependable for telling us when to buy at low figures, and it is worth all the trouble its devising cost. It is labeled "Sum for the last 12 months of clearings outside New York City (intersected by the straight growth line)." Whenever two successive

points are lower than the point immediately before, it is a favorable time to buy; to date this curve has never been wrong in this respect. I have been able to deduce no curves from bank clearings telling, with any reliability, when to sell near the top.

At present (May, 1914) this plate is non-committal.

PLATE L—BUILDING PERMITS IN THE UNITED STATES

The curves of this plate are among the most reliable in the book, especially in foretelling coming declines from stock-price peaks, usually months ahead. In general they agree with each other as well as one could hope for. They are inclined to be a little late in announcing the expiration of a low period of stock prices, but they would never have brought about a loss.

At present these curves are not very decided as to the immediate future, but they seem to be recovering from a bottom, and we may cautiously draw the conclusion that stock prices are not apt to go much lower, and probably will start upward soon. (May, 1914.) They will again become of first-rate importance as bear arguments after they have had a considerable rise and take to rising less and less rapidly.

PLATE LV—PER CENT. RETURN ON STOCKS AND BONDS

In its general showing this Plate LV is disappointing, but some of its incidental features are of value. Rails have been a good buy whenever their yield was high *and* the curves of New York and London interest rates were both either level-peaked or falling; conversely, they have been a good short sale whenever their yield was low *and* both the interest curves were rising.

The curve of yield on bonds tends to run two or three months ahead of that on stocks.

At present (May, 1914) the indications of this Plate LV are for higher stock prices.

The author of this book has no service agency for the guidance of investors and speculators, and does not intend to have; he is simply acting as an author. Aside from hundreds of very conscientious bankers and brokers who are ready to aid all comers, even for small odd lots, there are a number of very thorough and careful professional advisers, such as John Moody, James H. Brookmire, Roger W. Babson, Thomas Gibson, C. M. Keys, the editors of magazines such as "The Magazine of Wall Street," the editors of papers such as the "Wall Street Journal," etc., all of whom are of high competence and undoubted integrity. This book is intended to supplement their work, and cover part of another field. From time to time new editions will be brought out, and the plates brought up to date.

Ray
Rational stock speculation