

The Stock Market Boom and Crash of 1929 Was Not a Bubble

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A Book of Readings

Edited by

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To the memory of Irving Fisher

Charts

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*Mass Production, the Stock Market Crash and the Great Depression:
The Macroeconomics of Electrification*

1. INTRODUCTION

In the aftermath of the Stock Market Crash of 1929, Yale University economics professor Irving Fisher insisted that the stock market boom of 1928-1929 was not a bubble, but rather was grounded in fundamentals. According to him, U.S. industry was more productive, owing to what he referred to as improved fundamentals. In Chapter VIII of *The Stock Market Crash—and After* entitled, *Scientific Research and Invention*, he pointed out that:

A prime reason for expecting future earnings to be greater was that we in America were applying “science and invention to industry as we had never applied them before. Inventing is now a profession. Invention is today recognized as having a high cash value and is eagerly sought after by progressive corporations. The contrast with the past, even a few years ago, is very great, and the contrast is enormous with a generation of a century ago. We still talk about the wonderful innovations—power looms, steam engines and locomotives and the various elements of the English “industrial” revolution” of the eighteenth century—which had such a profound effect on business and banking (Fisher 1930, 119).

Fisher was extremely bullish about the state of the U.S. economy, which explains his defense of the stock market boom as being based on fundamentals. The problem, however, with his approach was manifold. First, he provided no hard estimates of the extent to which productivity and hence, potential output and income had increased. His references were general in nature and could well have been culled from trade journals or even newspapers of the day. Second and perhaps more important was the crash, specifically if the boom had indeed been justified by fundamentals, then why did the DJIA crash on October 23 and 29? In other words, If the U.S. economy was, in fact, more productive as he contended, then why did the market crash, on two occasions?

The vacuum that had been left by the absence of a legitimate underlying cause or causes was soon filled by speculation. Perhaps the most celebrated was the view, put forward by the Pecora Commission, charged with investigating the causes, that the stock market boom had been caused in large part by unscrupulous Wall Street bankers who had carelessly risked millions of depositors’ dollars on the floor of the stock exchange, provoking

in the process a speculative bubble that burst in response to higher interest rates. In short, the fact that traditional banks had metamorphosized into investment banks, risking depositors' money on highly speculative investments, was the underlying reason.

This view has, for lack of credible alternatives, become the standard in the literature, being the object of a number of theoretical contributions. For example, Philip Cagan's work on hyperinflation provided a dynamic framework in which to explain bubble-like phenomena. The recent collapse of the U.S. housing market (i.e. 2007) provided further evidence of the presence of bubble-like phenomena, leading many to conclude that financial markets are inherently unstable and thus in need of regulation/overseeing.

There have been, however, discordant voices. First, there are the findings of Rutgers University economics professor Eugene White (1986) to the effect that Wall Street banks that invested in the stock market had done better than those which had not, casting doubt on the Pecora thesis. Second, McGrattan and Prescott (2004) and Beaudreau (2014,2018) have argued that the stock market boom was in fact motivated by fundamentals and that Irving Fisher was right all along. McGrattan and Prescott (2004) used individual stock price data, along with a series of price-earnings ratios (pre- and post- WWII), to infer that market-valued intangible assets had increased in the late 1920s, representing roughly 67 percent of the value of tangible assets, thus justifying the increase in share prices. Unfortunately, McGrattan and Prescott (2004) were unable to identify specific intangible assets, as well as being unable to rationalize (read: provide a convincing narrative) of the crash.

Beaudreau (1996,2014,2018), on the other hand, presented a refinement of their argument, pointing to a specific technology shock, namely the shift to electric unit drive, commonly known as electrification, as well as invoking the legislative struggle over the proposed Smoot-Hawley Tariff Act. According to Beaudreau (1996,2014,2018), electric unit drive vastly increased the rated capacity of much of U.S. industry. However, given the lack of market opportunities, labor markets began to weaken, prompting a political response on the part of the Republicans in the form of another general upward revision of the tariff schedule, known as the Smoot-Hawley Tariff Bill.

In short, he argued that the stock market boom and crash can be understood in terms of the legislative life-cycle of the proposed tariff bill against a background of improved fundamentals. From June 1928 when the Republican proposal was announced to July 1929, stock prices increased in response to tariff good news. They crashed, however, in October 1929 when

the Party splintered, and thirteen Senators crossed the floor to join the Democrats in their quest to lower tariffs.

In so doing, he was able to do what both Fisher and McGrattan and Prescott were not, namely rationalize both the boom and the bust. Stock prices appreciated in response to good tariff news against a backdrop of improved fundamentals, and crashed when the promise of greater sales, profits and earnings was quashed by dissent and division within the Republican Party.

This volume, being a compendium of published works, provides support for the view that the stock market boom and crash was not a bubble, but rather the result of changing fundamentals. It should as such be viewed as part of a bigger research program, pioneered by Peter Garber, who showed that speculative bubbles are a rare feature of markets. In short, it is shown that the stock market boom and bust was “engineered” by the Republican Party’s response to a widening output gap, namely higher tariffs.

The first article is a chapter taken from Irving Fisher’s “*The Stock Market Crash—and After*” entitled *Scientific Invention and Research*, which more than any other captures the essence of his post-crash argument. The chapter details the many changes thrust upon U.S. industry in the 1920s, focusing on power technology in general and electric unit drive and purchased electric power in particular. What is noteworthy about this chapter is its upbeat tone. One gets the impression that Fisher is overcome with emotion, describing the many changes that have occurred over a relatively short period of time. In his view, these changes were equivalent in magnitude and scope to those of the first industrial revolution.

The chapter leaves the reader with the distinct impression that the stock market boom could not have been caused by anything other than improved fundamentals. This is where McGrattan and Prescott’s “*The 1929 Stock Market: Irving Fisher Was Right*” starts, namely by asserting that Fisher was right. However, instead of estimating the effects of specific technologies on potential output and earnings, they use individual stock price data to estimate the value of intangible assets, from which they then conclude that Fisher was indeed correct to conclude that the boom could be justified by fundamentals.

This raises the question: why has this not become the norm? In the aftermath of the Financial Meltdown of 2008, the overriding view of the stock market in 1929 was that of a bubble, not unlike the alleged housing bubble of the 2000s. The answer, we believe, lies in its inability to explain the crash. As it turns out, both Fisher and McGrattan and Prescott were unable to provide a credible, consistent, explanation of the crash – of the precipitous decline in stock prices on October 23 and 29, 1929, which

understandably weakens their argument. After all, if it could be justified by fundamentals, then why the crash?

This is the topic of the next two papers. In “*Discriminating Between Tariff-Bill-Based Theories of the Stock Market Crash of 1929 Using Event Study Data*” and “*Electrification, the Smoot-Hawley Tariff Bill and The Stock Market Boom and Bust: Evidence from Longitudinal Data*,” a refinement of the Fisher hypothesis is provided based on work first presented in Beaudreau (1996). In short, it is argued that the stock market boom and bust can be understood as resulting from a legislative cycle set against a backdrop of improved fundamentals. The conversion to electric unit drive in the 1920s contributed to increasing the rated capacity of existing machinery and equipment, prompting a legislative response on the part of the Republican Party in the form of the Smoot-Hawley Tariff Bill, which advocated closing the U.S. market in order to increase domestic firms’ sales, revenues, profits and earnings. Perfectly informed investors responded by bidding share prices up. However, the tide turned in the summer of 1929 when 13 Insurgent Republicans broke with the party, and joined the Democrats in their bid to lower tariffs. The fatal blow was dealt on October 22, when the Insurgent Republican-Democrat coalition voted to lower the tariff on medicinal tannic acid, signaling their firm intention to lower all tariffs on manufactures. The bull turned into a bear, and the market plunged for the first time.

The second blow was dealt by Ranking Republican Senator David Reed in a speech in Pennsylvania on October 27 in which he proclaimed the tariff bill to be dead. Existing tariff levels, he went on to explain, were preferred to those advocated by the Insurgent Republican-Democrat coalition. All hope was gone, and the market crashed a second time.

The upshot of all of this is relatively simple, namely that the stock market boom and bust was not a bubble, but rather the result of a legislative episode that was predicated on hope, and one which witnessed it die at the hands of insurgents from within the Republican party. In short, it is the story of how the Republican Party came together and then fell apart, of fusion and then fission, the main victim of which was the stock market.

Running through all of the contributions in this volume is the view that improvements in America’s power drive technology were the key factor behind the stock market boom. Fisher emphasized purchased power, while Beaudreau pointed to the introduction of electric unit drive. The penultimate article, Harry Jerome’s “*Measures of Changes in Mechanization*,” a chapter in *Mechanization in Industry*, published by the National Bureau of Economic Research is perhaps the best period (1934) piece on the profound changes that resulted from the introduction of electric unit drive, running

from greater machine speed, to reduced machine downtime. Both contributed to increasing output with what essentially was the same capital. The role of electrification in the stock market boom of 1928-1929 is echoed in the last contribution, namely Charles Amos Dice's "The Electrical Age" which is taken from his 1929 book entitled "New Levels in the Stock Market." In short, he viewed electric power as the single most important cause of the industrial revolution of the 1920s.

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2. THE STOCK MARKET CRASH AND AFTER¹

IRVING FISHER

2.1 Preface

This book is the outgrowth of several years' study of the stock market consequent on the publication by me, in the newspapers, of weekly and daily index numbers of stock prices, sales and values. In trying to appraise the market crash during the autumn of 1929, I have made use of all sources of information available to me to date.

Readers will doubtless find some inconsistencies between my previous writings and the present book, as I have modified my opinions from time to time with the march of events and with the unfolding of evidence. I may, and probably shall, further modify them with subsequent developments.

The book is in no sense, therefore, an attempt to justify opinions hitherto expressed. It has been written without reference to any previous expressions. I had stated my opinion in September, preceding the panic, that the market had reached its peak, as proved to be the case. I also expressed the view that the recession would not be in the nature of a serious crash, in which I was mistaken. I also predicted that the new plateau of stock prices would survive any recession. This has proved true (see Chart 4).

I have also tried in this book to set forth the chief opinions held by others, whether or not they agree with my own conclusions, past or present, in the hope that the reader will in this way have before him all the chief points of view that it is practicable to assemble.

To publish the book now may seem audacious, but there is an advantage in writing tentative conclusions while impressions and memories are still fresh. Someone has said that the "true perspective" of the historian really means he waits until everyone who could contradict him has died.

It is, of course, too early to reach any absolutely sure conclusions; nothing is more difficult to analyze and understand thoroughly than a panic; especially, a panic so great and so peculiar as that which has visited the American stock market. It stands unique in the annals of finance. But even

¹ Fisher, I. *The Stock Market Crash—and After*. New York, NY: Macmillan, 1930.

if some of the views here expressed should later be found in need of revision, I trust this book will have served its purpose by contributing somewhat toward a better eventual understanding of the problem. The ordinary explanations now finding the greatest currency seem to me far too simple and naive.

Irving Fisher
Yale University
December 15, 1929.

2.2 Introduction

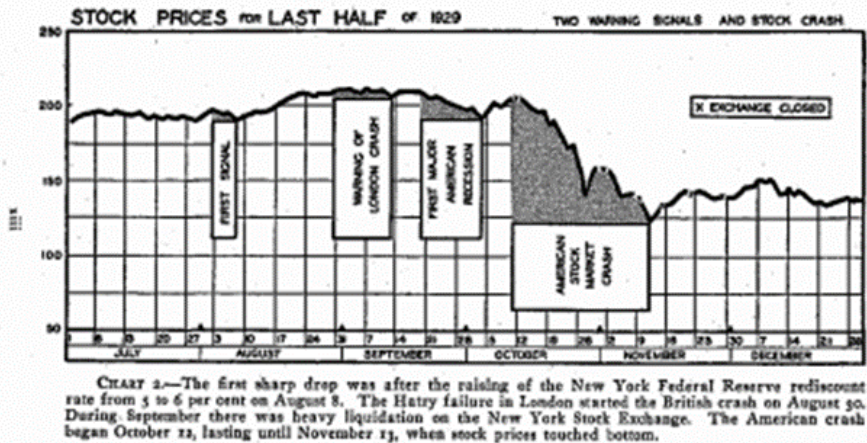
Many causes have been assigned for the stock-market crash of 1929. These usually take the form of putting the blame on different individuals or groups. United States Senator Robinson of Arkansas blames President Hoover, Secretary Mellon and Ex-President Coolidge for their “unduly optimistic statements” about business conditions, which he says, worked the country into a fever of speculation. But United States Senator Robinson, Republican, of Indiana, praises the Administration and holds that John Raskob, Chairman of the Democratic National Committee, was among those who were “psychologically” responsible for the collapse, by urging people to buy stocks.

Senator Glass blames the “stock gamblers.” The Reverend John Haynes Holmes holds the brokers and their unholy ways responsible. A prominent banker ascribes the Wall Street crash largely to the blocking of the Tariff Bill in Congress. New York State Senator Hastings finds the cause in those who “sold short.” Congressman Clyde Kelly blames “this nation-wide gambling house which is called the New York Stock Exchange.”

Mr. Daniel W. Blumenthal finds implicated in the panic certain brokers “who successfully carried out a well-defined wash-sale conspiracy and false circulation campaign.” Mr. Durant declares that the President paid no attention to his warning of an approaching crash, and blames the Federal Reserve Board for causing it. He says the Federal Reserve Board should have put down the rediscount rate to 3 per cent, while Mr. H. Parker Willis blames the Reserve Board for not having drastically raised the rediscount rate.

Sir George Paish says that the crash came because the bankers had gotten everybody into debt. The Investment Trusts have been blamed for “dumping” on the market. The New York Times praises the banks, but excoriates the “nation-wide army of speculators, large and small, who had engaged in the two-year bubble-blowing.” Mr. Babson has been blamed for

saying that a crash would come “sooner or later.” Dr. John H. Gray blames Mr. Mellon, Mr. Coolidge, and myself for “always insisting that all was well and talking of prosperity, a new era, and increased efficiency of production.” In this catalogue of wholesale and particular blamings one is reminded of that old panic of 1837, in Van Buren’s administration, when the Associated Merchants of New York City published a resolution asking, “On what constitutional or moral grounds can Martin Van Buren defend himself for having caused all the disasters under which the American people are suffering?”



Doubtless, there is some truth in almost all of these allocations of responsibility for the panic. But rather than appraising such a disaster in terms of praise and blame, an unemotional assessment of it in terms of cause and effect might yield much in public benefit by way of preventing the recurrence of such crises.

2.2.1 Intimations of the Panic

“Hindsight” is always clearer than foresight. Looking backward now and putting the events of the panic in perspective, we find that there were definite foreshadowings of its coming. As early as April 18, 1929, the National City Bank of New York said in a special circular: “If the rate of credit increase rises above the rate of business growth, we have a condition of inflation which manifests itself in rising prices in some departments of

the business structure, over-confidence, excessive speculation, and an eventual crash.”

This statement was followed by an analysis that notes a yearly increase in the total volume of business in this country, taking business in all its forms, at a fairly uniform rate of 4 per cent; and that for the year 1928 the total production and the exchange of goods in the United States increased over 1927 at a rate somewhat below this, or about 3 per cent. As against this growth of business and production, the statement measured the growth of credits—5.1 per cent for the year 1928. This did not appear to be greatly in excess of the normal growth of business requirements. But the statement added:

“Taking account of the extraordinary growth of brokers’ loans ‘for account of others’ as reported by both the New York banks and the stock exchange, from \$1,627,000,000 at the end of 1927 to \$3,361,000,000 at the end of 1928, we find the total increase of credit, as represented by the bank figures and the loans ‘for others’ combined, to have been from \$57,077,000,000 to \$61,627,000,000, or 8 per cent, a difference as compared with the estimated increase of business which can only spell inflation.”

Other observers had noted symptoms of unusual inflation of credit, denoting that the market had reached its high and might be on the verge of decline. Among these were Malcolm C. Rorty, of the International Telephone & Telegraph Company; Paul Clay, of United States Shares Corporation, and Emerson Wirt Axe. In an article in *The Annalist* of October, 18, 1929, Mr. Axe observed that “no really sustained advance is to be expected” because of the “systematic distributive campaign.” On September 5th, in an address at his Annual National Business Conference, Mr. Babson said: “I still, repeat what I said at this time last year and the year before²; namely, that sooner or later a crash is coming which will take the leading stocks and cause a decline of from 60 to 80 points in the Dow-Jones Barometer.” On the same day, in an interview with *The Hartford Courant*, I stated that while none of us was infallible, “there may be a recession of stock prices.” But I did not at that time believe that there would be anything in the nature of a serious crash.

I had said, in an article published in many newspapers, May 12, 1929, that the so-called “Hoover boom” in the stock market had about reached its climax. The “Hoover market” had risen above the forecast line, calculated by the Karsten Statistical Laboratories in New Haven, by from 12 to 25

² At that time (1927), the Dow-Jones average was 194; 60 points below which would be 134. The lowest point reached after the crash (Nov. 13, 1929) was 199.

percent from the time of Mr. Hoover's election to his taking of the oath of office on March 4th, after which, up to the close of April, it receded to 18 percent above the line. In this article, I remarked that all previous departures from the Karsten so-called "line of fundamentals" had returned within a short period to this forecast line, and added:

"The 'Hoover Market' can hardly go much further above the forecast line. It may fall below, but in that case, it will fall to a higher level than the peaks of the previous booms."

This opinion was fulfilled. As the Karsten chart shows (with the white zone bounding the recorded average of the market each month) the continuous forecast line, based on previous records of various items of business conditions, represents with fair accuracy the long swings of the market. The departures from the line, up or down, represent the "psychological" short swings, as shown on the accompanying chart. These characterized the collapse of the stock market at the onset of the war in 1914; the war boom of 1915-1916; the marked depression of 1917, during the period of Federal financing through higher taxes and the sale of bonds; the post-war depression of 1920-1921; the recovery and the "Coolidge boom" of 1923-1924, and the second "Coolidge boom" of 1925-1926.

The "Hoover boom" fluctuated more violently above the Karsten forecast line than any previous fluctuation, either up or down. In the retrospect, it is easy to appreciate that preliminary symptoms of the crash were not lacking.

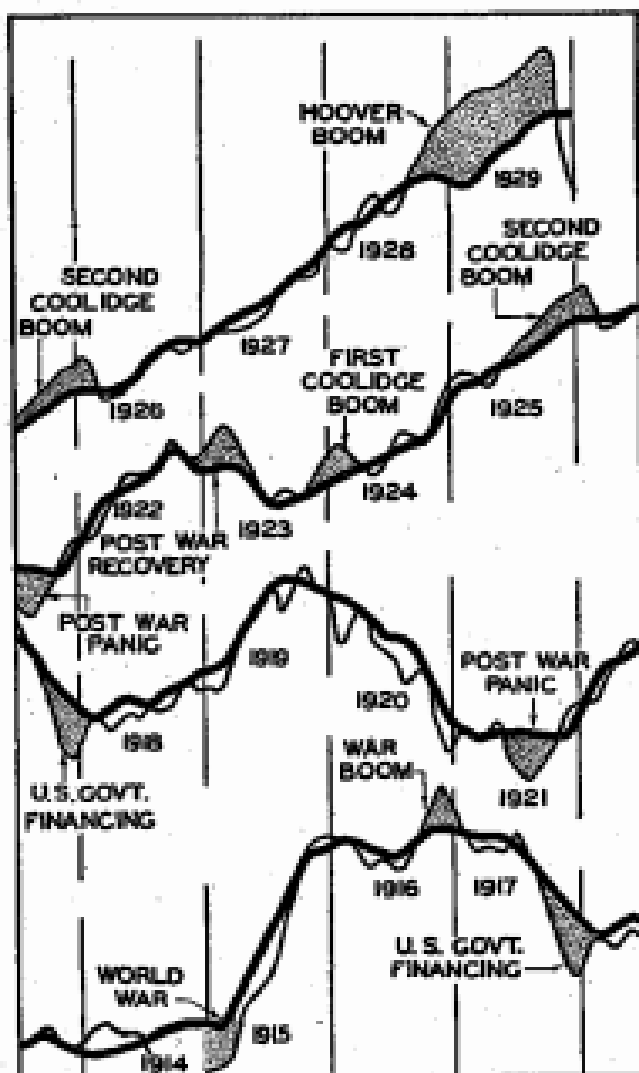


CHART 1.—Booms, recoveries and panics are here represented by departures from the Karsten "line of fundamentals" which is used to predict the course of stock prices. The Hoover boom and collapse represent the most serious departures from the line since 1913.

2.2.2 Two Sides of the Picture

But it is not so easy to see in the foregoing picture the underlying factors of the panic, and to judge whether it sprang from vital defects of the business structure or from more superficial causes relating to credit and finance.

The avalanche came so swiftly, spreading such immediate and widespread disaster, that careful consideration of its origin is requisite.

The first symptomatic recession in the stock market in August and early September attracted comparatively little attention. Almost every recession during the course of the long bull market had been followed by recovery equal to the recession, and then progress upwards. But the decline of September 1929, although followed by an upward recovery, was renewed in October, and developed into terrific crashes lasting into November. Between the 5th of September and the 13th of November, the vast bear movement had carried stocks down by about 4.2 per cent, and reduced the value of stocks listed on the New York Stock Exchange by an estimated \$26,000,000,000.

In the bull market stocks had reached a level more than double that of 1926—that is, the prices on the average of stocks on the New York Exchange had risen by more than 100 per cent in three short years. Before the November panic, the stock price level was not only twice the level of 1926, but nearly four times the level of 1913, before the war.

And that is not all. What has just been said applies to stocks, which were simply “held,” so to speak. If an investor had bought stocks in 1913 and held them in his strong-box until September 1929, he would have had \$400 for every \$100 invested sixteen years before, and he would have had \$200 for every \$100 invested in 1926. Moreover, while stocks “held” in this way increased on average at a tremendous rate, stocks in active tradings among the market leaders increased still faster. To be specific, if in 1926 a trader, as distinguished from a strong-box holder; had bought stocks—which were then market favorites and had changed his holdings from week to week, so as each week to possess those which had proved most popular that week, instead of having merely the \$200 for every \$100 invested in 1926, as the strong-box holder had, he, the trader, would have \$1,000 for every \$100 of his original investment. These statements are evidenced by my two weekly indexes of stocks held and stocks traded—called the Investors’ Index and the Traders’ Index.

The public utilities stocks reached such a height that the average yield was only 3 per cent. Allied Chemical & Dye, one of the “blue chips,” was selling so that the yield was only 1 3/4% per cent, and there were other stocks higher priced than that, and with correspondingly smaller yields. In

many companies, the common stocks had lower yields than the bonds in those same companies.

Now with all these facts before us, we are tempted to conclude that such an advance in stock prices was thoroughly unsound, if not that deflation should go on until the level of 1926 should again prevail, or even that of 1913. Based on such a diagnosis, the prognosis would show the business of the country to be in a very bad way.

During the rise of the market, brokers' loans reached the unprecedented total of more than \$8,000,000,000, and of this total \$3,000,000,000 were cut off within a few weeks. Investment trusts, genuine and so-called, had become the fashion. They had absorbed \$3,000,000,000 of investors' money, \$1,000,000,000 of it during the rise of the market in 1929. They had had a rapid mushroom growth, rising from under 200 in number in January 1929, to 400 or more by the time of the panic.

The Federal Reserve Board had issued its warning of an inflated stock market back in March 1929, with a resultant shutting off of stock market credit that at once precipitated a near-panic. This was alleviated through the action of Charles E. Mitchell, Chairman of the National City Bank of New York, who made \$100,000,000 available to the market at high rates. For this accommodation Mr. Mitchell was severely criticized by Senator Carter Glass, a co-author of the Federal Reserve Act, and by other financial authorities. President Hazlewood, of the American Bankers' Association, in his annual address before that body, September 1, had complained about the high stock market and the enormous total of brokers' loans, so that the bankers passed a resolution condemning the situation as dangerous and asking for a thorough-going investigation of brokers' loans.

Here is a picture that portended-and predicted the disaster that came. In the rapidly mounting aggregate of margin accounts the unsoundness of the situation stands revealed. From it, many have hastily concluded that the new plateau of stock prices was wholly unwarranted and merely the result of insane speculation.

But there is another side of the picture. Of course, a judge is not fitted to pronounce judgment until he has heard both sides. There is the story of the Irish justice of the peace who heard one side of the case which was so convincingly presented that he said: "Stop. My decision is made." Whereat the opposing attorney cried, "Your Honor, you have not yet heard my side." To this, the learned judge answered: "I don't want to hear the other side. It might have a tendency to confuse the court. The case is perfectly clear to me now."

However confusing it may be to study this intricate problem, those legislators and leaders of business and finance, to whom the nation looks

for guidance, owe it to themselves and their country to function as a fair court and to hear the other side.

To begin at the beginning: Since every stock price represents a discounted value of the future dividends and earnings of that stock, there are four reasons that may justify a rise in the price level of stocks:

- (1) Because the earnings are continually plowed-back into business instead of being declared in dividends, this plowing-back resulting in an accumulation at compound interest, so to speak;
- (2) Because the expected earnings will increase on account of technical progress within the industry;
- (3) Because less risk is believed to attach to those earnings than formerly;
- (4) Because the “basis” by which the discounting is made has been lowered.

When the situation is calmly examined, it is found that all four of these causes were at work, tending to raise the prices on the stock market during the years preceding the panic of 1929.

2.3 Chapter VIII: Scientific Research and Invention

A prime reason for expecting future earnings to be greater was that we in America were applying science and invention to industry as we had never applied them before.

Inventing is now a profession. Invention is today recognized as having a high cash value and is eagerly sought after by progressive corporations. The contrast with the past, even with a few years ago, is very great, and the contrast is enormous with a generation or a century ago.

We still talk about the wonderful innovations—power looms, steam engines and locomotives and the various elements in the English “industrial revolution” of the eighteenth century—which had such a profound effect on business and banking. But let us see who invented these inventions.

James Watt, inventor of the steam engine, was not a professional inventor. He was a maker of mathematical instruments. Richard Arkwright, who invented the spinning jenny was a barber. Edmund Cartwright, who invented the power loom, was a clergyman. Robert Fulton, who invented the steamboat, was a portrait painter. Invention was not then a vocation and was seldom appreciated until the inventor was dead and not even, then unless the invention was important.

Even within the memory of men now living the business world, looked askance upon inventors and upon scientific work in general, which was largely confined to the universities. The self-made business man would in such times say that he would have nothing to do with a college-bred man in his establishment; On the other hand, the university man of the academic type, was equally contemptuous of the man who was merely making money. It is said of Professor Louis Agassiz that when he was asked why he did not use his brains to build up a fortune, he replied that he was too busy to make money. Willard Gibbs, the greatest scientist America ever produced, the Isaac Newton or Einstein of America, lived out his days obscure and unappreciated except among a small group of specialists. It is now said of Gibbs that unlike any other scientist, none of his work has ever been undone. It is also said that in the metallurgical industry alone, billions of dollars have been made, thanks to Willard Gibbs. But it probably never crossed his mind that he was laying the foundations for others to make money. His studies were made from the hope of pure science alone.

But after 1919, something happened. The implications of it are not yet sufficiently gauged. It was of enough significance to cause President Hoover's Committee on Recent Economic Changes to remark that "acceleration rather than structural change is the key to an understanding of our recent economic developments." The committee added: "But the breadth and scale and 'tempo' of recent developments gives them new importance."

What has happened is indicated by the fact that in the United States, eight million three hundred thousand workers produced in 1925 one-quarter more than nine million wage workers turned out during 1919.

The new indexes of the Federal Reserve Board measuring industrial production record this gratifying advance which reflects an increase in the American standard of living. The indexes cover, directly and indirectly, four-fifths of the industrial production of the nation—directly in about thirty-five industries, and collaterally in many more. They were occasioned by the striking increase in recent years of the output of many industries; Thus the quantity of automobiles increased by 204 per cent between 1919 and 1925; the output of petroleum refining advanced by 108 per cent; rubber goods by 59 percent; glass by 78 per cent; cement by 101 per cent; brick, pottery and other clay products by 68 percent; chemicals and acids by 36 per cent; paints and varnishes by 40 per cent; carpets and rugs by 38 per cent; silk goods by 37 per cent; iron, steel and non-ferrous metals by 32 per cent; and various items of food, drink, and tobacco by from 6 to 51 per cent.

The general volume of production had increased between 1919 and 1927, inclusive, by 46.5 per cent; primary power by 22 per cent; and primary power per wage earner, by 30.9 per cent (between 1919 and 1925) and

productivity per wage worker by 53.5 per cent between 1919 and 1927. During this period (1919-1927), wage earners in factories had decreased by 2.9 per cent, but wages paid increased by 1.4 per cent (1919-1925). Prime cost increased (1919-1925) by 7.2 per cent, but unit prime cost decreased by 24.5 per cent. Productivity per wage earner, which had increased very slightly between 1899 and 1909 and actually diminished from 1909 to 1919, took an unprecedented leap after 1921, recording its increase by more than one-half from 1919 to and including 1927, at the same time that unit prime costs were diminishing (1919-1925) by nearly one-quarter.

The measurement of this astounding increase in production and in values, mainly during the course of the long bull market, is accurate. The new index of production of the Federal Reserve Board being worked by what is I have called the "Ideal Formula" in my book *The Making of Index Numbers*, shows how far, in this machine-power civilization, man is emancipating himself from the curse of Adam. From the hewing of wood and the drawing of water, the sweat and toil of the old slave population, man has thrust his burden upon the machine. He now watches the index gauges reveal their welcome increases in per capita output.

What are the reasons for this throbbing change since 1919, and especially since 1922?

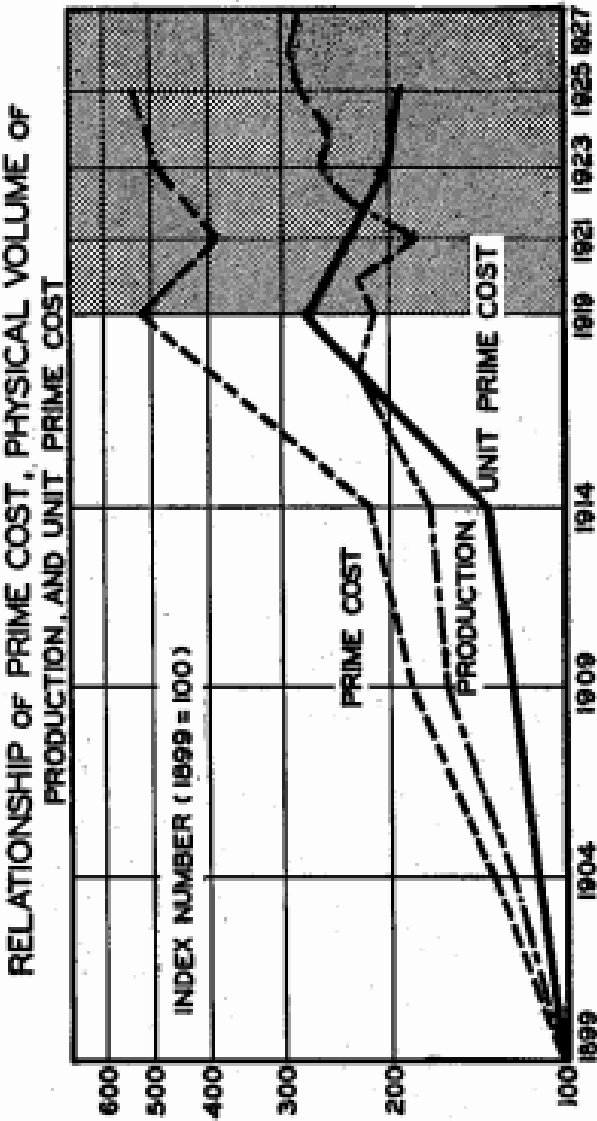


CHART 14.—By prime cost is meant the sum of labor and material costs. During the period 1909-1925, large scale production and sales combined with increased product per man to reduce sharply unit prime cost after it had risen for 20 years.