THE WEALTH REDISTRIBUTION EFFECT OF INFLATION UPON BUSINESSES: A TEST OF THE KEYNES-FISHER HYPOTHESIS

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PREFACE

In large part, this thesis owes its existence to the various discussions of wealth redistribution, nominal and real rates of interest, and inflation which have appeared in the literature of the past decade. The study attempts to elucidate some of the more concealed aspects of wealth redistribution as related to the business population. More specifically, the Keynes-Fisher business gains hypothesis is investigated during the recent periods of moderate inflation from 1950-66.

The author wishes to express his appreciation to all who have shared in the preparation of this thesis. Special acknowledgment is given to Dr. Frank G. Steindl for directing the thesis and for his helpful suggestions at numerous points.

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CHAPTER I

INTRODUCTION

Many economists have studied the various facets of inflation. It is well recognized that the impact of a changing price level may have very subtle implications for the economic sectors of the economy. Subsequent to World War II, attention has increasingly centered upon the inflation problem. This turn of events is easily understandable in view of the upsurge in various price indices. In the 1945-67 period, the consumer price index has risen by approximately 86 per cent in the United States. It is frequently stated that such a sharp rise in prices redistributes income and wealth among economic units of the society. Such a redistribution is said to occur because prices of goods and services, productive factors, and monetary and real assets and liabilities are not equally sensitive to inflationary pressures.[1] Therefore, the owners of these items suffer from differential price changes, and as a result income and wealth redistribution occurs. Through this "unequal-price-change mechanism," inflation is said to injure several economic groups. The classical examples are economic units with relatively fixed money incomes and financial creditors.

The effect of inflation upon wealth redistribution has fascinated economists for several decades. Much has been written about the means by which such a redistribution might occur. Among the more prominent explanations are the "debtor-creditor hypothesis," the "wage-lag

hypothesis," and the "debt-equity hypothesis." It is usually acknowledged that for wealth transfer to result, inflation must be unanticipated. Unanticipated inflation is said to redistribute wealth from creditors to debtors, regardless of whether the creditors and debtors are businesses, governments, widows, old-age pensioners, or schoolteachers.[2]

Interest in the wealth redistribution argument has become much more intense in recent years for several reasons, not the least important of which is the persistence of moderate inflation. There is need for empirical information concerning the effect of moderate inflation upon various economic groups. The wealth redistribution aspect is one such area in which there is a recognized need for more complete information. Knowledge of the operation of the wealth redistribution mechanism is based to a large degree upon *a priori* reasoning. The need for more complete information has generated a number of studies having implications for the wealth redistribution consideration.

Selected Review of Literature on Wealth Redistribution

One such study bearing on wealth redistribution was performed by William E. Gibson in 1967.[3] The investigation attempted to verify the empirical operation of certain established theoretical effects of money on interest rates. The analysis covered the period 1869-1966, but placed major emphasis on the years after World War II. A major aspect of the study was centered upon how price expectations act to affect nominal interest rates.

Gibson related nominal rates of interest to past rates of price change, using the price deflator for net national product as the price

index. He found that a one-percentage point increase in the rate of price increase raised short-term interest rates by about .07 percentage points in the current year, and by approximately .22 to .24 points within three more years. In ten years, short-term rates were found to rise by about .33 percentage points. For the one-percentage point price increase, it was found that there was virtually no current effect on long-term interest rates and that within ten years they had risen by only .06 percentage points. It was observed that interest rates were affected very little by price expectations over periods as short as three to nine months. The expectations effect of changes in current prices was found to be spread over long periods, and a given effect was spread over a longer period the longer the term of the interest rate. This suggested that long-term price expectations were based more heavily on less recent price behavior than were short-term interest rates.

In addition, Gibson found that there appeared to be a cyclical factor in the formation of price expectations. He also noted that the cyclical movement suggested that price expectations are influenced by the stage of the business cycle in which the economy is. He stated that the cyclical factor in the formation of price expectations indicated a higher-order weighting for past price changes.[4]

These findings indicate that economic units do in part anticipate price level changes and that to a certain degree interest rates reflect these price expectations. The implications of such findings for the wealth redistribution argument are important in view of the role which price expectations and interest rates play in the redistributive hypothesis.

Additional investigations of this nature have been carried out by economists. The study performed by Tibor and Anne Scitovsky is another investigation.[5] This study examined a number of points with respect to the impact of inflation, one of which was the effect of inflation upon the distribution of wealth. They noted that most wealth is held in the form of "variable price or real assets." The prices of such assets were said to move more or less in step with the general price level. Therefore, the owners of such wealth were thought to be largely unaffected by inflation. Likewise, the owners of "variable price or real liabilities" were thought to be largely immune to inflation. On the contrary, however, the owners of "fixed price or monetary assets" were said to be harmed by inflation, but owners of "fixed price or monetary liabilities" were thought to gain from inflation. They further observed that these gains and losses would not occur if the interest paid on such assets and liabilities would rise in times of inflation by as many percentage points as the annual rise in the price level.

It was noted that the available empirical evidence indicated that the main creditors in the economy were households and the primary debtor was the government. The evidence indicated that individuals under the age of 35 were virtually immune to inflation since they held approximately the same amount of "fixed price assets" as "fixed price liabilities." For individuals over the age of 55, vulnerability to inflation-caused-wealth transfer was the largest. As for government gain due to its debtor position, it was pointed out that this would accrue to the taxpayer. Thus, the taxpayer's gain might be realized in the form of lower taxes or additional government services.

The evidence accumulated by these investigators was interpreted to mean that other than deteriorating the position of the aged and temporarily deteriorating that of fixed-income earners, moderate inflation seemed to have a relatively small impact on redistribution among the social and economic groups.

A third study concerned with gathering empirical evidence on the wealth redistribution mechanism was performed by Joseph W. Conard.[6] It was observed that there were two ways in which the wealth transfer effect could result. The first of these transfer methods was said to be due to the fact that many assets and liabilities are "fixed in price." This method of transfer was pointed out in the Scitovsky study. The second major way for wealth transfer to operate was said to be through its effect on the prices of those assets which do not have a fixed money value. It was noted if these assets were affected by inflation, it would be important to know whether their prices tend to rise more or less than the general price level in order to determine the effect of inflation on the distribution of real wealth. However, the study did not concentrate attention upon this second possible means of wealth transfer since it was considered to be of very minor importance in relation to the first transfer mechanism. Conard stated that, in general, his findings were that the burden of rising prices had fallen with approximately equal weight on the real wealth holdings of both small and large wealth holders.

The Business Gains Hypothesis

The present investigation was concerned with wealth redistribution as it relates to business enterprises. The hypothesis considered

closely incorporates the debtor-creditor hypothesis. More specifically, attention centered upon testing the business gains hypothesis enunciated by J. M. Keynes and Irving Fisher.[7] These two economists felt that inflation enables business firms to discharge their debts with money of less purchasing power than that which was borrowed. The businesses gain from the transaction, being the creditor's loss.

The business gains hypothesis depends upon two propositions: (1) that interest rates do not reflect adequately price level changes, and (2) that business firms on the average are debtors. Both of these propositions are discussed in detail in Chapter II. The first proposition forms the basis for the debtor-creditor hypothesis. The implication of the second proposition is that most business firms should benefit in periods of inflation since they are composed of debtors primarily. Both propositions taken together form the Keynes-Fisher hypothesis that the majority of business firms benefit during periods of inflation.

Review of Literature on the Business Gains Hypothesis

At numerous points in their works dealing with money, interest, and the price level, Keynes and Fisher made it clear that they felt the majority of businesses benefit from inflation. In his Monetary Reform, Keynes stated:

> It has long been recognized, by the business world and by economists alike, that a period of rising prices acts as a stimulus to enterprise and is beneficial to business men.
>
> In the first place there is the advantage which is the counterpart of the loss to the investing class which we have just examined. When the value of money falls, it is evident that those persons who have engaged to pay fixed sums of money yearly out of the profits of active business must benefit, since their fixed money outgoings will bear a smaller proportion than formerly to their money turnover. This benefit persists not only during the transitional

> period of change, but also, so far as old loans are concerned, when prices have settled down at their new and higher level....[8]

In The Purchasing Power of Money, Fisher stated:

> As prices rise, profits of business men, measured in money, will rise also, even if the costs of business were to rise in the same proportion. Thus, if a man who sold $10,000 of goods at a cost of $6000, thus clearing $4000, could get double prices at double cost, his profit would be double also, being $20,000 - $12,000, which is $8000. Of course such a rise of prices would be purely nominal, as it would merely keep pace with the rise in price level. The business man would gain no advantage, for his larger money profits would buy no more than his former smaller money profits bought before. But, as a matter of fact, the business man's profits will rise more than this because the rate of interest he has to pay will not adjust itself immediately. Among his costs is interest, and this cost will not, at first, rise. Thus the profits will rise faster than prices. Consequently, he will find himself making greater profits than usual, and be encouraged to expand his business by increasing his borrowings....[9]

Thus, the business gains hypothesis can be dated from at least the early 1920's when Keynes and Fisher first gave a formal analysis of the problem. Until rather recently, the hypothesis has been largely accepted on the basis of casual empiricism. As Boulding notes, the hypothesis that redistribution occurs rests on the observation that

> ...it seems to be a historical fact changes in the price level seldom are expected. The faith of the ordinary man in the stability of prices is remarkable, in view of the absence of any foundation for this belief.[10]

However, in 1954 Reuben A. Kessel completed a study in which he gave considerable emphasis to the business gains hypothesis.[11] Along with this hypothesis, he also considered two other explanations of wealth redistribution which he called the "debt-equity" and the "lag of wages to prices" explanations. He tested each of the three explanations as possible mechanisms for wealth redistribution during inflation. The data for the experiment were changes in the real value of

bank stock shares during German, French, Austrian, Chilean, and American inflations. Kessel concluded that only the business gains hypothesis showed significant wealth redistributive capacity. The other explanations were not found to be significant in this respect.

Kessel noted that banks are usually considered to be very large debtors. From this consideration, one would expect the owners of bank stocks to benefit during inflation--due to a wealth transfer in their favor. Yet the available evidence indicated that such share owners typically lost during inflation. That is, the real value of bank shares (stock price divided by a price index) declined during inflation. However, Kessel observed that despite the large debts owed by banks to depositors, there existed offsetting credits that were even larger. These credits were in asset forms such as money, notes, and other obligations owed to banks by private customers and the government. Thus, on net balance the banks could be classified as creditors. Such a classification reconciled the debtor-creditor hypothesis with the observed stock price movements.

Thus, Kessel concluded that one should examine more than merely creditor asset holdings or debtor liability holdings. Both items should be considered in determining the net status. Furthermore, he concluded that both assets and liabilities should be categorized into "monetary" and "real" elements. He stated:

> A real asset is implied to be an asset whose real value, that is money value divided by the price level, is independent of price level changes; a monetary asset is an asset whose money value is independent of price level changes. Similarly, a real liability is implied to be a liability whose real value is independent of price level changes; a monetary liability is a liability whose money value is independent of price level changes....[12]

Only the monetary elements were considered in determining net debtor

or creditor status of banks since only monetary items indicate susceptability to inflation-caused-wealth transfer. That is, if monetary assets exceeded monetary liabilities then a bank was considered to be a net creditor and conversely for a net debtor. This net status was examined in connection with movements in the prices of bank stocks and the wholesale price index. From a sample of 16 banks, stock prices rose by 47 per cent from the end of 1942 to the end of 1948 while the wholesale price index rose by 60 per cent. Since all 16 banks were determined to be net creditors, this result confirmed the debtor-creditor aspect of the business gains hypothesis. Since debtors did not predominate in this sample, Kessel noted that the business gains hypothesis may underestimate the frequency of creditors in the population.[13] To give the hypothesis a more thorough test, Kessel drew three additional samples from industrial corporations listed on the New York Stock Exchange.

The first such sample consisted of 30 corporations which were examined from the end of 1942 to the end of 1948. It was found that 15 firms were net debtors and 15 firms were net creditors. It was also found that the shares of the 15 creditors declined in real value by 13 per cent, and the shares of the 15 debtors increased in real value by 81 per cent. A Spearman rank correlation coefficient was employed to measure the relationship between net status and stock price movements.[14] A significant correlation coefficient of .47 was obtained. For this sample, Kessel also obtained similar results for the periods from the end of 1939 to the end of 1948 and from the end of June, 1942 to the end of June, 1948. For the 1939-48 period he obtained a correlation coefficient of approximately .55, which was

significant at the .0025 level. For the June, 1942 to June, 1948 period, the correlation was found to be approximately .35 and was significant at the .02 level.

The second sample contained 29 corporations which were studied from the end of 1942 to the end of 1945. The sample was composed of 12 creditors and 17 debtors. A rank correlation coefficient was computed for this sample, as in the first sample of 30 firms. This correlation was found to be .63 and was also determined to be significant.

The final sample consisted of 31 corporations which were examined during a period of deflation rather than a period of inflation. For such a period one would expect a complete reversal of the previous results. This deflation period was from the end of 1929 to the end of 1933. The sample contained 12 creditors and 19 debtors. It was observed that the real value of creditor shares increased by 6 per cent but that the real value of debtor shares declined by 34 per cent. A correlation coefficient, computed in the same manner as for the other samples was .32. This value was found to be significant at the .03 level.

From these three industrial corporation samples, Kessel concluded that the business gains hypothesis misrepresents the number of debtors in the business population. However, the debtor-creditor hypothesis (which is implicit in the business gains hypothesis) was found to be compatible with the results obtained and therefore it was accepted as valid.[15]

A second study dealing with the business gains hypothesis was published in the 1957 Review of Economics and Statistics by G. L. Bach

and Albert Ando.[16] As with the Kessel study, Bach and Ando did not exclusively devote their attention to the business gains hypothesis. The study can be broken into two rather distinct aspects: (1) an analysis of the various affects of inflation upon the household sector, and (2) an analysis of the effects of inflation upon industrial corporations. Of these two aspects, only the second was of concern to the present investigation.

With respect to the second aspect of the study, Bach and Ando investigated three inflations during the thirteen year period 1939-52. To explain redistribution of real wealth during the inflation periods, they compared net debtor and net creditor companies. As in the Kessel study, classification as net debtor or net creditor depended on whether a company's monetary assets exceeded its monetary liabilities. The procedure they employed was to draw a random sample of 100 companies from the 1939 Moody's industrial manual. The sample size was finally reduced to 52 companies because of mergers, failure, incomplete data, and other causes between 1939 and 1952. It was found that over the thirteen year interval about one-third of the companies switched status from debtor to creditor or vice versa. Thus, it was clear that an analysis of the entire thirteen year period on the basis of which companies were debtors or creditors in 1939 would have doubtful meaning.[17] From this consideration, Bach and Ando determined that the overall time period should be broken down into three sub-periods corresponding to the three recognized periods of inflation during the interval 1939-52.

The study employed two measures which the investigators felt might best indicate wealth transfer. They stated:

> We used two measures of performance. First, we compared the rise in the price of the common stock of each company with the others; the market valuation placed on a company's securities (adjusted for stock splits and other such changes) provides perhaps the useful measure of relative improvement in position over the inflation period. Second, we computed the net return on investment for each company at the beginning and end of each inflation period; and we then compared the relative profitability of debtor and creditor companies on both dates and the change in profitability over the period.[18]

Employment of these measures as described resulted in mixed results. The results did not confirm the business gains hypothesis that debtors gain at the expense of creditors during inflation. For the period 1939-46 the sample contained 35 debtors and 17 creditors; from 1946-49, 22 debtors and 30 creditors were found; and from 1949-52 there were 33 debtors and 17 creditors. During certain of the periods, it was found that creditor stock prices increased slightly more than for debtor companies and that the increase in rate of return was also greater for creditors.

The investigators computed Spearman rank correlation coefficients to measure the degree of association between rank within the debtor and creditor groups and rank by increase in rate of return and by increase in stock prices. Table I indicates the correlation values which were obtained. In no instance did the investigators find a significant correlation. To have been significant, such a correlation would have needed to be about .30. Thus, they concluded from their various methods of analysis that there was no strong or consistent relationship between debtor or creditor status and wealth transfer. For this particular aspect, they indicated that their results were in conflict with those of the Kessel study.[19] However, their results concerning the number of debtors and creditors in the business population were much the

same as for the Kessel investigation. Therefore, they also concluded that the business gains hypothesis underestimates the number of business creditors.

TABLE I

RANK CORRELATION COEFFICIENTS*

	1939-46	1946-49	1949-52	1939-52
Debtor-creditor rank correlated with:				
Increase in net rate of return	-.01	-.02	-.01	.04
Increase in stock prices	.23	.09	.18	.26

*Adapted from: Bach and Ando, p. 12.

A third and more recent study has been carried out by Armen A. Alchian and Reuben A. Kessel.[20] This investigation was largely an extension of Kessel's earlier work. The sample of corporations studied included industrials traded on the New York Stock Exchange between 1915 and 1952. For the years 1933 to 1952, industrials traded on the American Stock Exchange were also examined. In addition, four specific industries were studied for the period 1940-52. These were chemicals, steel, retailing, and textiles. The number of firms observed during any one year ranged from a minimum of 71 to a maximum of 885. One of their more important findings was that the distribution of firms by net monetary debtor and creditor status changed rather drastically over the 1915 to 1952 time span. They observed a shift from predominantly debtor status around the time of World War I, to a ratio of approximately 50:50 in 1952.[21] Further, individual firms usually did

not shift net monetary status frequently. That is, if a firm was a debtor (or creditor) in one year, it was usually a debtor (or creditor) for a number of following years. However, gradual shifts in status were observed for the samples over the various time periods investigated.

Alchian and Kessel did not report specific findings for the majority of their samples, rather, they summarized the results briefly. They reported that in every instance debtor stock prices increased significantly more than creditor stock prices during the inflation periods. The converse result was observed during deflation periods. Finally, during periods of price stability, no significant difference was observed between debtor and creditor stock price increases. These results confirmed the debtor-creditor hypothesis.

Louis De Alessi[22] has completed a study which has additional implications for the debtor-creditor hypothesis. The study utilized data drawn from the United Kingdom for the period from December, 1948 to December, 1957. His methods for testing the hypothesis were quite similar to those utilized by the previous three studies. The Kessel technique of monetary classification was used to determine debtor and creditor status of business enterprises. In addition, relative changes in wealth position were measured by the relative change in the market price of the common stock for the firms investigated. It was noted that the relative change in the nominal wealth position of firms could be measured as

$$\frac{P_t^*}{P_o} = r_t + \frac{I_t}{I_o} + \beta\left[\left(\frac{I_t - I_o}{I_o}\right)\left(\frac{M'}{W'}\right)\right] + u_t \quad .$$

P_t^* is the market price of a share of a firm's common stock at time t

adjusted for shares outstanding and for cash dividends. P_o is the price of a share at time o . The real rate of interest at time t is represented by r_t, and the price index at times t and o is denoted by I_t and I_o. M' is the estimated monetary status as computed from the balance sheet. W' is the nominal wealth of the firm estimated by the number of outstanding shares of common stock multiplied by the market price of the firm's stock. The variable u_t represents a random error term. De Alessi stated that the error term allowed for such phenomena as changes in relative prices, technical innovations, changes in tax rates, fires, etc., that may occasion a change in the nominal wealth over time.[23] β is a measure of the degree that inflation is anticipated. It was defined in a manner such that if $\beta = 0$, this meant that inflation was anticipated correctly; if $0 < \beta < 1$, this meant that inflation was partially unanticipated; and if $\beta = 1$, this meant that inflation was wholly unanticipated.

Employing this model, De Alessi studied two samples of firms located in the United Kingdom. These samples were chosen from the Breweries, Distilleries (BD) and Commercial, Industrial (CI) sections of the Stock Exchange Daily Official List. De Alessi stated:

> The firms in each sample were then observed on each December 31 from 1948 to 1957. ...a firm was not observed beyond the time that (1) its common stock ceased to be quoted in the Stock Exchange Daily Official List, (2) it acquired foreign subsidiaries or properties, (3) it issued a new class of securities sharing residual rights with the ordinary stock outstanding.
>
> The size of the BD sample observed varied from 78 firms in 1948 to 59 firms in 1957, and the size of the CI sample varied from 199 firms in 1948 to 148 firms in 1957.[24]

Thus, for each year during the overall 9 year observation period, the sample sizes were allowed to vary. For each of the 9 years, five statistical measures were utilized to analyze the obtained data from

the samples.

By rearranging the model outlined above, De Alessi obtained the linear form

$$\frac{P_t^*}{P_o} - \frac{I_t}{I_o} = r_t + \beta\left[\left(\frac{I_t - I_o}{I_o}\right)\left(\frac{M'}{W'}\right)\right] + u_t \quad .$$

Under the null hypothesis that $\beta = 0$, a t test for the regression coefficient was performed. In addition, the Kendall rank correlation measure was used to obtain correlation coefficients in the same general procedure as Kessel, Bach and Ando, and Alchian and Kessel used. The third measure employed was a t test used to test the difference between the mean stock price changes for debtors and creditors. From the debtor-creditor hypothesis, it was expected that the average observed relative change in stock prices for debtors would be greater than for creditors. The t test was used to test the null hypothesis ($\beta = 0$) that relative changes in stock prices for debtors and creditors were equal. An additional statistical measure was computed to test this same hypothesis. The nonparametric Mann-Whitney U-test was used in this instance. Finally, a "portfolio test" was applied to the data. This test was utilized to determine if stock prices of extreme debtors increased relatively more than for less extreme debtors and conversely for creditor status.

The study employed two alternative techniques for obtaining the ratio (M'/W'). As De Alessi stated:

> This study considers two alternative estimates of degree of net monetary position. According to set A, the net monetary position ($\bar{M}$) of a firm for the relevant calendar year is defined as the average of the net monetary positions observed at the beginning and at the end of that calendar year, where calendar year values are obtained by linear interpolation between the appropriate fiscal year values. Nominal wealth ($\bar{W}$) is defined as the average of the nominal

> wealth positions observed at the beginning and at the end of the calendar year.
>
> According to set B, the net monetary position (M) of a firm for the relevant calendar year is defined as the net monetary position obtained from the last balance sheet published during the previous calendar year. Nominal wealth (W) is defined as the nominal wealth observed at the beginning of the calendar year....[25]

Therefore, the statistics computed for "set A" employed the ratio $(\overline{M}/\overline{W})$, and those computed for "set B" utilized the ratio (M/W). Results for sets A and B computed for both the CI and BD samples are given in Table II and represent the levels of significance at which the null hypothesis was rejected.[26] Results of the portfolio test are given by the symbol Θ. The symbol Θ indicates that the debtor portfolio ranked highest. Two of the symbols together as $\Theta\Theta$ denote a rank of debtor, neutral, and creditor when ranked in that order with debtors given higher ranks and creditors given lower ranks. As can be observed in Table II, the levels of significance at which the null hypothesis was rejected are often quite high for the various statistical tests. For both the CI and BD samples, the statistical measures computed using the (M/W) ratio--set B--generally allowed rejection of the null hypothesis at lower levels of significance than for the statistics computed using the $(\overline{M}/\overline{W})$ ratio--set A. As can be observed, the levels of significance at which the null hypothesis was rejected are in general higher than the conventional .05 significance level. This indicates that the evidence for the acceptance of the debtor-creditor hypothesis is not particularly strong. De Alessi, however, interpreted his results as evidence in support of the debtor-creditor hypothesis, but noted that his findings were not in complete agreement with the results one would expect based upon the hypothesis.

TABLE II

SIGNIFICANCE LEVELS AT WHICH THE NULL HYPOTHESIS WAS REJECTED*

Commercial, Industrial Sample						
	1949	1950	1951	1952	1956	1957
Set A ($\overline{M}$, $\overline{W}$)						
t Test, Reg. Coeff.	.13		.35	.38	.13	.33
Kendall Rank			.30			.20
t Test, Two Means	.49		.08		.30	
Mann-Whitney U			.12		.38	
Portfolio Test	⊖⊖		⊖⊖		⊖⊖	
Set B (M, W)						
t Test, Reg. Coeff.	.06	.18	.13	.03	.0001	.47
Kendall Rank			.07		.14	.12
t Test, Two Means	.40	.27	.04		.17	
Mann-Whitney U		.46	.03		.17	
Portfolio Test	⊖		⊖⊖		⊖	⊖

Breweries, Distilleries Sample								
	1950	1951	1952	1953	1954	1955	1956	1957
Set A ($\overline{M}$, $\overline{W}$)								
t Test, Reg. Coeff.		.40	.12					.24
Kendall Rank			.17		.40		.45	.19
t Test, Two Means			.19				.31	.40
Mann-Whitney U			.21				.27	.28
Portfolio Test		⊖						⊖
Set B (M, W)								
t Test, Reg. Coeff.	.34	.21	.03		.45		.29	.09
Kendall Rank		.42	.05		.23		.25	.08
t Test, Two Means			.08	.38		.35	.25	.26
Mann-Whitney U			.10		.44	.40	.30	.11
Portfolio Test		⊖					⊖	⊖

*Adapted from: Louis De Alessi, pp. 121-22.

Table III presents the Kendall rank correlation coefficients and the probability levels at which each coefficient is significant for both the CI and BD samples based upon use of the ($\overline{M}/\overline{W}$) and (M/W) ratios. These correlation coefficients are in general agreement with those reported in the Bach and Ando study. Thus, the rank correlation

results of both the Bach and Ando study and the De Alessi study appear to be consistent and indicate little basis for acceptance of the debtor-creditor hypothesis.

TABLE III

KENDALL RANK CORRELATION COEFFICIENTS AND PROBABILITY SIGNIFICANCE LEVELS*

	Commercial, Industrial Sample								
	1949	1950	1951	1952	1953	1954	1955	1956	1957
Set A ($\overline{M}$, $\overline{W}$)									
Correlation	-.02	-.10	.03	-.06	-.11	-.15	-.05	-.00	.05
Probability	-.36	-.02	.30	-.12	-.01	-.01	-.16	-.50	.20
Set B (M, W)									
Correlation	-.01	-.02	.07	-.04	-.06	-.09	-.03	.06	.07
Probability	-.41	-.34	.07	-.24	-.12	-.04	-.27	.14	.12
	Breweries, Distilleries Sample								
	1949	1950	1951	1952	1953	1954	1955	1956	1957
Set A ($\overline{M}$, $\overline{W}$)									
Correlation	-.15	-.14	-.01	.08	-.12	.02	-.09	.01	.08
Probability	-.03	-.03	-.47	.17	-.07	.40	-.15	.45	.19
Set B (M, W)									
Correlation	-.12	-.08	.02	.13	-.08	.06	-.06	.06	.12
Probability	-.06	-.14	.42	.05	-.17	.23	-.24	.25	.08

*Adapted from: Louis De Alessi, pp. 124-127.

The above has been a review of four studies which have implications for the business gains hypothesis. These investigations constitute the major body of empirical information concerning this hypothesis. Thus, due to the dearth of information in this area and the differing results obtained in the various studies, there appears to be a significant need for further study.

Scope and Purpose of the Study

All investigations derive certain benefits from earlier studies. The present investigation was no exception to the rule. Several techniques employed by previous researchers were adapted in order to improve the design of the study. The study was explicitly designed to test the validity of the Keynes-Fisher business gains hypothesis. Although there may exist other sources of data and methods of analysis for obtaining a verification or rejection of the hypothesis, the study was carried out in a manner designed to conform as closely as possible to ideas stated by Keynes and Fisher.

Neither of these noted economists furnished a means by which one might determine whether a business is actually a net debtor or a net creditor. On this point, therefore, an adaptation was made of the Kessel technique of "monetary" and "real" classification of assets and liabilities contained on the business balance sheet. Hence, firms were classified as debtor or creditor depending upon whether monetary liabilities exceeded monetary assets or vice versa.

The aspect of the means of wealth redistribution was considered more fully by Keynes and Fisher. They felt that since the prices of certain goods could not adjust in accordance with the price level that the prices of other goods must adjust much more than in proportion to the increase in the price level. Fisher stated.

> The term 'goods,' as previously explained, is a collective term comprising all wealth, property, and services, these being the magnitudes designated in sales. The chief subclasses under these three groups, which occur in actual sales, may be indicated as follows:--
>
> Wealth { Real estate
> { Commodities

Property	Stocks
	Bonds
	Mortgages
	Private notes
	Time bills of exchange
Services	Of rented real estate
	Of rented commodities
	Of hired workers
	Of some or all these agencies combined

> The prices of these various classes of goods cannot all move up and down in perfect unison. Some are far more easily adjustable than others. Only by extremely violent hypotheses could we imagine perfect adjustability in all. The order of adjustability from the least to the most adjustable may be roughly indicated as follows:--
>
> 1. Contract prices of properties and services, especially where the contracts are for a long time; these include bonds, mortgage notes, use of real estate by leases.
> 2. Contract prices of properties and services, where the contracts are for a shorter time; these include bills of exhange, use of rented real estate and commodities, services of workmen, etc.
> 3. Prices of commodities made of the money metal.
> 4. Prices of substitutes for said commodities.
> 5. Prices fixed by law, as court fees, postage, tolls, use of public utilities, salaries, etc.
> 6. Prices fixed by custom, as medical fees, teachers' salaries, etc., and to some extent wages.
> 7. Prices of real estate.
> 8. Prices of most commodities at retail.
> 9. Prices of most commodities at wholesale.
> 10. Prices of stocks.[27]

Fisher, therefore, went on to note that stock price changes should correspond reasonably well to the value of the purchasing power transferred from a creditor to a debtor via inflation.[28] Hence, the present investigation employed stock price changes as an indicator of wealth transfer in order to conform as closely as possible to the hypothesis as stated by Keynes and Fisher.

The study was designed to extend the period of investigation closer to the present time. Although this examination was carried out with certain procedures which differed from those employed by previous investigators, there is great similarity in most respects.

Therefore, the results and their interpretation can be compared and contrasted in the light of previous findings. In addition, the analysis and conclusions serve to extend the research literature in this area.

The investigation was concerned with the recent periods of inflation and stability extending from 1950 to 1966. During this seventeen year period there occurred three recognized periods of inflation, one period of moderate inflation, and a period of relatively stable prices.

FOOTNOTES

[1]Martin Bronfenbrenner and Franklyn D. Holzman, Surveys of Economic Theory: Money, Interest, and Welfare, A Survey of Inflation Theory, Vol. I (New York: St Martin's Press, 1966), p. 94.

[2]Reuben A. Kessel and Armen A. Alchian, "Effects of Inflation," The Journal of Political Economy, LXX (December, 1962), p. 525.

[3]William E. Gibson, Effects of Money on Interest Rates, Staff Economic Studies, XLII (Washington, D.C.: Board of Governors of the Federal Reserve System, 1968).

[4]Ibid. The above two paragraphs were paraphrased from pp. 48-70.

[5]Tibor Scitovsky and Anne A. Scitovsky, "Inflation Versus Unemployment: An Examination of Their Effects," in Inflation, Growth, and Employment, ed. by Commission on Money and Credit (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964).

[6]Joseph W. Conard, "The Causes and Consequences of Inflation," in Inflation, Growth, and Employment, ed. by Commission on Money and Credit (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964).

[7]See for example John Maynard Keynes, Monetary Reform (New York: Harcourt, Brace and Company, 1924), pp. 3-45, and Irving Fisher, The Purchasing Power of Money (New York: The Macmillan Company, 1922), pp. 55-73, 190-91.

[8]Keynes, p. 21.

[9]Fisher, pp. 58-59.

[10]Kenneth E. Boulding, Economic Analysis (New York: Harper & Bros., 1948), p. 321.

[11]Reuben A. Kessel, "Inflation and Wealth Redistribution: An Empirical Study," (unpublished Ph.D. dissertation, University of Chicago, 1954).

[12]Ibid., p. 6.

[13]Reuben A. Kessel, "Inflation-Caused Wealth Redistribution: A Test of a Hypothesis," American Economic Review, XLVI (March, 1956),

[14]Ibid. See pp. 45-52 for an explanation of the procedure employed for arranging the data to obtain the correlation coefficient.

[15]Ibid., pp. 128-41.

[16]G. L. Bach and Albert Ando, "The Redistributional Effects of Inflation," The Review of Economics and Statistics, XXXIX (February, 1957), pp. 1-13.

[17]Ibid., p. 10.

[18]Ibid.

[19]Ibid., p. 11.

[20]Armen A. Alchian and Reuben A. Kessel, "Redistribution of Wealth Through Inflation," Science, CXXX (September, 1959), pp. 535-39.

[21]Ibid., p. 537.

[22]Louis De Alessi, "The Redistribution of Wealth by Inflation: An Empirical Test with United Kingdom Data," Southern Economic Journal, XXX (October, 1963), pp. 113-27.

[23]Ibid., p. 115.

[24]Ibid., pp. 117-18.

[25]Ibid., pp. 119-20.

[26]Ibid. See Appendix Tables A, B, C, and D, pp. 124-27 for the values obtained for each of the statistics computed.

[27]Fisher, pp. 185-87.

[28]Ibid., pp. 187-94.

CHAPTER II

THE MODEL AND METHODOLOGY OF ANALYSIS

This chapter presents the theoretical foundation of the business gains hypothesis. Further, it includes a description of the techniques employed to test the hypothesis and a breakdown of the time period investigated. Finally, the source, collection, and treatment of data are considered.

Theoretical Considerations

When debt instruments are stated in fixed dollar terms, it is generally assumed to be an inevitable result that inflation redistributes real wealth from creditors to debtors. The mechanism by which this is accomplished is well understood by economists and is largely accepted on *a priori* grounds. Clearly, this redistribution effect rests on the proposition that the interest charge fails to reflect adequately price level changes during inflation.

To illustrate this point, assume that an enterprise borrows some dollar amount, denoted by A. The annual nominal interest rate on the loan is designated as *i*. To allow for compounding of the annual rate of interest, *n* is employed to represent the number of years for which the loan is negotiated. The price index at the time the loan is made is represented by P_o. Therefore, at the end of *n* years the creditor receives ζ dollars, where

$$\zeta = \frac{A(1 + i)^n}{P_o} \quad .$$

ζ is the dollar amount which the debtor enterprise must repay regardless of what happens to the price level between the time the loan is incurred and the time it is repaid.

If, however, inflation should occur and the price index rises to P_1, the real purchasing power value of the loan repayment would be the value of η. In this instance,

$$\eta = \frac{A(1 + i)^n}{\frac{P_o}{P_1}} = \frac{A(1 + i)^n}{P_o P_1} \quad .$$

It is clear that η is less than ζ by the real purchasing power value of γ, where

$$\gamma = \frac{A(1 + i)^n}{P_o}\left(1 - \frac{1}{P_1}\right) = \frac{A(1 + i)^n\left(1 - \frac{1}{P_1}\right)}{P_o} .$$

γ represents the real wealth which inflation redistributes from the creditor to the debtor enterprise. The value of γ is seen to be clearly dependent upon the price index, P_1. This is evident since

$$\frac{\partial \gamma}{\partial P_1} = \frac{A(1 + i)^n}{P_o P_1^2} > 0 \quad .$$

It is clear that because of inflation the nominal rate of interest $\underline{i}$ and the real rate of interest are no longer equal. The real rate of interest is a function of both the nominal interest rate and the rate of change of the price level. If the real rate of interest is denoted as $\underline{r}$, this functional relationship may be expressed as

$$r = f\left(i, \frac{dP}{dt}\right)$$

where $\frac{dP}{dt}$ is the rate of change of the price level over time. When $\frac{dP}{dt}$ is zero, the nominal and real interest rates are equal. However,

when $\frac{dP}{dt}$ increases, the nominal and real rates of interest diverge from one another.[1] In such inflation periods, the nominal interest rate always exceeds the real rate of interest with the result that real wealth redistribution occurs between debtors and creditors. As Fisher noted, price inflation during the period of a loan imposes a capital loss on the lender by lowering the real value of his principal and interest.[2]

To elucidate the operation of the wealth redistribution mechanism, one may simply substitute values in the formulas for ζ, η, and γ. Assume that an enterprise borrows \$1000 at a nominal interest rate of 4 per cent compounded annually. The period of the loan is for two years, and, thus, $\underline{n}$ equals 2. Further, assume that P_o equals an index of 100 and that at the time of loan repayment the price index has risen by 9 per cent so that P_1 equals 109. Therefore,

$$\zeta = \$1000(1 + .04)^2 = \$1081.60 \text{ and,}$$

$$\eta = \frac{\zeta}{P_1} = \frac{\$1081.60}{1.09} = \$992.29 \quad .$$

As noted above, the value of γ represents the real purchasing power transferred from the creditor to the debtor and is the difference between ζ and η--\$89.31 in this instance. γ may, of course, be computed by the formula, and again

$$\gamma = \zeta\left(1 - \frac{1}{P_1}\right) = \$1081.60\left(1 - \frac{1}{1.09}\right)$$

$$= \$1081.60 - \$992.29 = \$89.31.$$

Thus, in this example, inflation has caused the creditor to receive less in real purchasing power than he originally loaned--less by the amount of \$7.71. The creditor's interest charge was not large enough to hedge against inflation. If he had expected the price level

to rise by 9 per cent, then a nominal rate of 4 per cent on the $1000 plus an additional 9.36 per cent on the $1000 (9 per cent of $1040) would have prevented purchasing power from shifting to the debtor.

The proposition that debtors benefit at the expense of creditors during inflation is therefore clearly dependent for its validity upon the assumption that nominal interest rates reflect an underestimate of the future price rise. As Kessel states:

> The debtor-creditor hypothesis is based on the postulate that interest rates reflect an implicit biased estimate of the future course of prices. It is because this estimate is assumed to be low that the conclusion--debtors gain and creditors lose during inflation--follows.[3]

Creditors may accurately predict upward price movements but be restrained from charging higher interest rates for various reasons. Factors such as government regulation of interest rates and competition[4] may serve as restraining elements on nominal interest rates. Thus, the inflationary mechanism of debtor-creditor wealth redistribution may or may not operate at its full redistributive capacity, depending upon creditor expectations and whether it is possible to incorporate these into the interest rate.

The Composite Hypothesis

The debtor-creditor hypothesis has provided economists with a foundation upon which to build the complementary hypothesis that business firms gain through inflation. These hypotheses are largely attributed to J. M. Keynes and Irving Fisher. As noted in Chapter I, the Keynes-Fisher hypothesis--incorporating the debtor-creditor hypothesis--of wealth redistribution as it relates to businesses is the hypothesis under consideration in this study. Both Keynes and

Fisher felt that the interest rate would not adequately adjust to price level movements and that inflation would redistribute real wealth from creditors to debtors--and in depression from debtors to creditors.[5] Keynes and Fisher were obviously quite aware that business firms possess both monetary and real assets and liabilities. Further, they understood that if businesses were net monetary debtors, they would benefit during inflation at the expense of net monetary creditors. However, since they stated that inflation benefits businesses, they apparently felt that the majority of businesses were net monetary debtors.

If one assumes that debtors benefit in inflation, and if the majority of businesses were debtors, then these firms would invariably gain from inflation. If, however, a number of business firms were creditors, then one would expect them to lose during such inflation periods. If the Keynes-Fisher hypothesis is accepted, then one would predict that during inflation, wealth increases as debtor status intensifies and, similarly, wealth decreases as creditor status intensifies.

Debtor or Creditor Status

The foregoing considerations quite logically led to certain methodological aspects of the study. The first undertaking was to determine how to measure debtor or creditor status and business wealth. First, consider how a business firm was classified as either a debtor or a creditor. The balance sheet of the business enterprise was, of course, the logical source of data for such a classification. The items on the balance sheet were categorized into

"monetary" and "real" components. This breakdown was necessary since only monetary components indicate susceptability to wealth transfer during inflation. A monetary component was defined--according to Kessel's criterion--as a balance sheet item whose money value is independent of price level changes. A real component was defined as a balance sheet item whose real value is independent of price level changes.[6] Items such as cash and accounts payable are typical of the monetary components since their market value is independent of changes in the price level. Items such as inventories and plant equipment typify the real components since their market value does not appreciate or depreciate in real terms. Thus, in the determination of which businesses were debtors and which were creditors, the concern was with monetary components on the business balance sheet. Debtor status was assigned to businesses whose monetary liabilities exceeded their monetary assets, and, conversely, creditor status was assigned to those firms for whom monetary assets were in excess of monetary liabilities.[7]

If one accepts the preliminary hypothesis that debtors benefit at the expense of creditors during inflation, then how much does the debtor gain and the creditor lose over some specified inflation period? This depends upon the size of the monetary asset and liability holdings, the nominal rate of interest, and the rate of change of the price level over the period. To compute the redistribution of wealth, one must (1) determine the wealth transfer that occurs for each instant of time over the inflation period, and (2) sum these individual transfers to obtain the total change in wealth distribution. This procedure can be expressed in a familiar mathematical notation.

Assume that monetary assets and liabilities, the nominal rate of interest, and the rate of change of the price level are all functions of time. That is, $A = f(t)$ where $\underline{A}$ denotes monetary asset accumulation; $L = g(t)$ where $\underline{L}$ is monetary liability accumulation; $i = h(t)$ where $\underline{i}$ is the nominal rate of interest; and $\frac{dP}{P} = j(t)$ where $\frac{dP}{P}$ is the rate of change of the general price level. Thus, the real transfer of wealth for any instant of time during an inflation period is equal to ΔW where

$$\Delta W = \frac{(A - L)(1 + i)\left(\frac{dP}{P}\right)}{1 + \frac{dP}{P}} = \frac{[f(t) - g(t)]\,[1 + h(t)]\,[j(t)]}{1 + j(t)} \quad .$$

The total change in wealth distribution over some finite inflation period from t_1 to t_2 is

$$\int_{t_1}^{t_2} \frac{[f(t) - g(t)]\,[1 + h(t)]\,[j(t)]}{1 + j(t)}\, dt \quad .$$

For the individual business firm, wealth transfer during inflation should thus be dependent upon the holdings of monetary assets and liabilities, since the firm acting alone cannot appreciably affect the nominal rate of interest or the rate of change of the general price level. This consideration leads to the specific practical problem of the particular items on a business balance sheet which were classified as monetary assets and monetary liabilities. The listing in Table IV identifies the monetary items appearing on a balance sheet. These monetary items conform to the proposition that their value be independent of changes in the price level.

Thus, these monetary asset and liability items served as the guide in classifying the balance sheet components of individual businesses examined. As noted above, if a firm's monetary assets exceeded

its monetary liabilities, then it was determined to be a creditor. If, on the contrary, the firm possessed monetary liabilities in excess of monetary assets, then it was determined to be a debtor.

TABLE IV

MONETARY CLASSIFICATION OF ASSETS AND LIABILITIES

Monetary Assets	Monetary Liabilities
Cash	Accounts Payable
Marketable Securities	Notes Payable
U.S. Government Securities	Tax Liability Reserves
Corporate Bonds	Insurance Reserves
Accounts Receivable	Pension Reserve
Litigation Settlement Receivable	Accruals
Time Deposits	Accrued Taxes
Due from Sale of Property	Accrued Wages
Unreimbursed Expenditures	Accrued Interest
Due from Officers & Employees	Corporate Bonds
Notes Receivable	Mortgages
Tax Refunds Receivable	Debt Due Within One Year
Life Insurance	Debentures
Prepayments	Bank Loans
Prepaid Taxes	Preferred Stock
Prepaid Insurance	
Pension Reserves	
Life Insurance Reserves	

Business Wealth

Now that debtor and creditor classification has been examined, attention may be focused upon the measurement of individual business wealth. What indicator should be used to measure such business wealth? Fisher supplied a great deal of the necessary insight into the problem. He stated:

> The fact that wages, salaries, the price of gold in non-monetary forms, etc., and especially the prices of bonded securities, cannot change in proportion to monetary fluctuations, means, then that the prices of other things, such as commodities in general and stocks, must change much

> more than in proportion. This supersensitiveness to the influence of the volume of currency (or its velocity of circulation or the volume of business) applies in a maximum degree to stocks. Were a railroad to double in money value, the result would be, since the money value of the bonds could not increase appreciably, that the money value of the stock would more than double. Stocks are shares in physical wealth the value of which, in money, can fluctuate. Since the money price of bonds is relatively inflexible, that of stocks will fluctuate more than the price of the physical wealth as a whole. The reason is that these securities not only feel the general movement which all adjustable elements feel, but must also conform to a special adjustment to make up for the rigid nonadjustability of the bonds associated with them.[8]

The sentence "Stocks are shares in physical wealth the value of which, in money, can fluctuate." provided the key to the problem. What Fisher was saying was that stock prices are an indicator of business wealth. In other words, the market price of a stock multiplied by the number of shares outstanding is an aggregate measure of the wealth.

To illustrate Fisher's statements, consider the following example. Assume that a corporation is established with $200,000 of financing. The financing is one-half in the form of a ten year loan and one-half equity financed by the sale of common stock. Also, assume that interest on the $100,000 loan is at the rate of 4 per cent compounded annually. Further, assume that the corporation repays the principal plus the accumulated interest amount in a lump sum at the end of the ten year period when the loan matures. During the period between the time the loan is incurred and the time it is repaid, the general price level doubles. However, regardless of the price level, the corporation merely pays the fixed principal plus interest amount due on its matured loan. The amount of this payment is $148,110 and represents the value of ζ, as computed above. The creditor now finds that this repayment actually is equivalent in purchasing power to

$74,055 when the loan was made--the value of η. The additional $74,055 in real wealth has been distributed to the debtor corporation--the value of γ.

Since the corporation was originally financed at $200,000, a doubling of the price level has increased this value to $400,000. Additionally, however, the firm must have been able to retain at least $48,110 from its operations in order to make an interest payment for such an amount. Therefore, before the loan repayment, the value of the corporation could be placed at $448,110 in inflated prices. After the $148,110 loan repayment, there still remained $300,000 of equity stock value in the corporation. This $300,000 is equivalent to $150,000 in original prices, but this is $50,000 more than the original equity value. That is, the additional market price of $100,000 placed on the outstanding stock is equivalent to $50,000 in real value and accounts for approximately 68 per cent of the real wealth transferred from the creditor. The remaining 32 per cent of the transfer was performed by means of the inflated interest payment. Thus, in real terms the corporation paid only $24,055 in interest and retained the other $24,055 to make a total wealth transfer of $74,055.[9] It is evident that the market price of the debtor corporation's outstanding stock has more than kept up with the increase in the price level. Instead of increasing by 100 per cent as the general price level did, it increased by 200 per cent (or by 50 per cent in constant real prices).

The conclusions drawn from this simple illustration have been largely verified in an empirical study by Dulan for the years 1939-46. He stated:

> ...while the purchasing power of the dollar declined about 35 per cent, corporate earnings rose from $5 billion to $12.5 billion, or 150.5 per cent. This is excellent earnings performance, and, as a composite picture, it implies that, as the investor's dollar shrank to 65 per cent of its former purchasing power value, he received 2½ times as many dollars as he had received in 1939 for a current purchasing power equal to about 163 per cent of what it was in 1939. In other words, if total 1946 corporate earnings were received as dividends by the common stockholder, he was more than compensated for the decline in the real value of his dollar.
>
> However, the investor in common stock did not receive all these earnings as dividends. Corporate dividends rose only from $3.8 billion to $5.6 billion, or 47.9 per cent. This increase did offset, quite considerably, the decline in purchasing power, since his goods demand in 1946 was therefore equivalent to about 96 cents of his 1939 dollar. Thus from an income standpoint this represents an almost perfect inflation hedge....[10]

Thus, in actuality, one would expect that the stock price of the corporation in the illustration would increase by a greater amount than the example indicates, since the complete wealth transfer would be operating to bring about this price increase. That is, the total wealth transfer should be reflected in the stock price since a business' wealth holdings form a basis for its current income or earnings. And in turn, these earnings affect stock prices.

The nexus between wealth and income has long been recognized by economists. The return arising from the use of wealth is defined as income or earnings. Evidence of this well established definition can be found with little difficulty. Fisher, for example stated:

> The two ways of obtaining the total social income which have just been outlined--(1) by summing the net incomes of individual persons as <u>owners</u>, and (2) by summing the net incomes from individual articles of wealth as sources--may be illustrated...[11]

The definition is made perfectly clear by Fisher in <u>The Purchasing Power of Money</u>. He noted that:

> A stock of goods, whether wealth or property, existing at an instant of time is called capital. A flow of benefits from such capital during a period of time is called 'income'....[12]

Thus, knowledge of the tie between wealth and income can easily be dated back to the early 1920's.

The connection between business income and stock prices has not been acknowledged as readily as that between wealth and income. However, the proposition has been empirically investigated. Professor Friend stated:

> Thus for individual securities I have found that the average 1960-62 price-earnings multiples for each of 64 Moody's stocks (included in the income, growth, and utility indexes) were fairly strongly correlated with the annual compound rate of growth in earnings from 1946-48 to 1960-62 (R = .82 for all stocks combined and .63 for utilities alone)....[13]

In the published results of his investigation of stock prices, Christy noted that:

> Consequently, as measured empirically through price-earnings ratios, investors' expectations emerge as a lagged, step function of past earnings experience. It is this relationship that provides a systematic link between movements of economic variables and movements of common stock prices.[14]

Thus, it should be expected that as business income (earnings) increases, stock prices will also increase. This view is clearly evident in the following statement:

> What people are willing to pay for a particular stock is largely determined by one factor: the company's earnings. That includes what the company has earned (its past record), what it is earning (its present state of health), and what it may earn (its prospects for the future)....[15]

Therefore, if the debtor corporation's wealth increases--as a result of inflation redistribution--and this in turn increases earnings, one would expect that the outstanding stock would sell for a higher price relative to what the price would have been if these increases had not

occurred. Likewise, if real wealth decreases and this in turn decreases earnings, then one would expect the stock to sell for a lower price. This latter circumstance would be applicable to the case of the creditor whose real wealth declined due to inflation. For a business enterprise to be classified as a creditor in the present context, however, the enterprise need not be in the business of lending. To be classified as a creditor requires only that the business' monetary assets exceed its monetary liabilities. A creditor business so classified would lose during inflation based upon the same principles as would a creditor who was strictly in the business of lending.

It should be expected that as debtor status of corporations becomes more extreme (i.e., the greater monetary liabilities exceed monetary assets) stock price increases would become greater. Conversely, as creditor status becomes more extreme, stock price increases would become smaller or negative in value. Thus, if the general price level is considered, as debtor status becomes more extreme the real value of stock price increases would become greater, and, conversely, as creditor status becomes more extreme the real value of stock price increases would become smaller. This result follows from the proposition that the debtor's stock price should increase relatively more than the general price level and the creditor's stock price should increase relatively less than the general price level. That is, the price of debtor's securities should increase more rapidly than the price level in order that the real value increase during inflation. Similarly, the price of creditor's securities should increase less rapidly than the price level in order that the real value decline during inflation. It is clear, of course, that both creditor and

debtor stock prices may increase during inflation, but that stock prices of debtor firms will increase relatively more than creditor stock prices and also ahead of the price level so as to increase in real value. If businesses were actually evenly distributed between debtor and creditor status, then one would expect stock prices in general to just keep pace with increases in the price level.

Hence, it is evident that stock market prices may serve as an indicator of business wealth holdings. Market determined stock prices offer a means of gauging individual business wealth.

Time Period for Investigation

The measurement aspects of monetary status and business wealth were treated in the preceding sections. Attention is now focused upon additional problems that were encountered in testing the Keynes-Fisher hypothesis on business gains. One of the most important of these was the time period considered for study. It was pointed out in Chapter I that the investigation was concerned with the more recent periods of inflation in the economy. The period 1950 to 1966 was selected. It can be observed in Table V, that the sub-periods 1950-52, 1955-58, and 1965-66 were years of relatively strong inflationary pressures. Confusion need not arise as to the meaning of the term inflation as employed here. The term inflation should be taken to mean a rising general level of prices. Generally, it is agreed that a rise in the price index by roughly 1.5 per cent or more, above the previous year's index, constitutes inflation. The sub-period 1953-54 was characterized by little change in the index. The 1959-64 sub-period represented one in which there occurred a moderate inflationary

price movement. Thus, the entire seventeen year span from 1950-66 was broken down into these five distinct sub-periods for individual investigation. This classification tried to take account of the most significant breaks that occurred over the span.

TABLE V

CONSUMER PRICE INDEX*
(1957-59 = 100)

Period	Index	Change	Percent Change	
1949	83.0			
1950	83.8	+0.8	+.96%	
1951	90.5	+6.7	+7.99%	Inflation
1952	92.5	+2.0	+2.21%	
1953	93.2	+0.7	+.75%	
1954	93.6	+0.4	+.43%	Stability
1955	93.3	-0.3	-.32%	
1956	94.7	+1.4	+1.50%	
1957	98.0	+3.3	+3.48%	Inflation
1958	100.7	+2.7	+2.14%	
1959	101.5	+0.8	+.79%	
1960	103.1	+1.6	+1.57%	
1961	104.2	+1.1	+1.06%	Moderate
1962	105.4	+1.2	+1.15%	Inflation
1963	106.7	+1.3	+1.23%	
1964	108.1	+1.4	+1.31%	
1965	109.9	+1.8	+1.66%	
1966	113.1	+3.2	+2.91%	Inflation

*Consumer price indices were compiled from Federal Reserve Bulletins.

Source and Collection of Data

The next consideration was the source of data for testing the business gains hypothesis. Two types of information were needed. First, business balance sheet information was necessary to determine debtor or creditor status. Second, stock price information was required to measure the wealth aspect. The first of these types of

information was obtained from Moody's industrial manuals.[16] These annual publications contain consolidated balance sheets for approximately 8,000 American business firms. The second type of information was obtained from The Wall Street Journal and The New York Times. These newspapers list stock prices for the New York Stock Exchange, American Stock Exchange, and the over-the-counter market.

To collect the needed information involved the necessity of selecting from among the businesses which were represented in both of these information sources. The procedure employed was to select randomly 50 businesses from this universe--with the aid of a table of random numbers. These 50 businesses had their balance sheets and stock prices examined for each of the five distinct periods over the time span of seventeen years being considered. This, therefore, involved the analysis of 250 balance sheets and 500 stock price sets. The balance sheets were examined at the beginning of a time period and the stock prices were examined at both the beginning and end of a period. The reason for this procedure was to determine debtor or creditor status at the beginning of a period and to measure the stock price change from the beginning to the end of a period. That is, debtor or creditor status at the beginning of a period indicated susceptibility to inflation-caused-transfer of wealth. Stock price changes over the period gauged such a transfer.

It was anticipated that more than 50 businesses would have to be selected initially in order to obtain a final sample of this specified size. Thus, the procedure initially employed was to select 120 firms from Moody's industrial manual. Each firm was then subjected to the first criterion for elimination listed in Table VI. For the

firms which remained in the sample, the balance sheets were then examined to determine debtor or creditor status. If in this examination it was found that a firm fell under one of the additional classifications for elimination, the firm was discarded from the sample and the next firm that was selected randomly was considered. After 50 firms had been selected, the additional firms--which were randomly chosen after the 50th selected firm--were discarded from the sample.

TABLE VI

CLASSIFICATION FOR ELIMINATION FOR THE 50 FIRM SAMPLE

1.	A business which was not listed in the stock transaction tables of either The Wall Street Journal or The New York Times for the dates March 31, June 30, September 30, and December 31, for the following years: 1950, 1952, 1953, 1954, 1955, 1958, 1959, 1964, 1965, and 1966.
2.	A business which was not listed in Moody's industrial manual for all of the following years: 1954, 1956, 1960, and 1966.
3.	A business which was not incorporated under the laws of a state of the United States, i.e., a Canadian or other foreign company.
4.	A business which had the asset account of "investment in other companies" on any of its balance sheets during the period 1950-66.
5.	Holding and investment companies.

In addition to obtaining this 50 firm sample, a 26 firm sample was also obtained. This sample was actually contained within the 50 firm sample. Since monetary status was measured at the beginning of a sub-period, it would be possible for a firm to change status during the sub-period, and, therefore, stock price movements would not correspond to the status assigned. Thus, only firms of consistent status were selected for this second sample. Within the 50 firm sample, it

was found that 26 firms met this final criterion, and, therefore, they composed the second sample.

As mentioned previously, Table VI provided the classification for eliminating firms in order to obtain the 50 firm sample. As indicated by the first criterion, the representative stock price of a business was derived by taking the average of the quarterly market prices. Rather than using a single price, which might be an exceptionally high or low one, it was determined that the best measure would be this average of the quarterly prices. The following statement makes the need for such a procedure clear:

> If a number of people conclude at about the same time that a particular stock is overpriced, they may decide to sell it, and then the price of the stock will probably fall. Or a number of people may think a stock is selling at bargain prices and decide to buy it. Their combined orders may cause the price of the stock to rise.
>
> That's why stock prices sometimes fluctuate sharply. Instead of changing by an eighth or a quarter of a point (which means an eighth or a quarter of a dollar), prices may change by several dollars, either up or down, in a short time.[17]

In the process of obtaining the quarterly market prices, the effects of stock splits, stock dividends, warrants, and ex dividend considerations were taken into account. These effects were held constant and did not influence the measurement of stock prices. Stock splits and stock dividends increase the number of shares of common stock without changing the total investment whereas warrants (rights offerings) entitle existing shareholders to increase the total corporate investment. The normal effect of each of these items is to lower the market price of the stock. Where such items were encountered the appropriate adjustment was made in the market price. The ex dividend aspect means that stock sold between the dividend

declaration date and the date of payment is sold "without dividend." This item normally has a slight price lowering effect upon the stock. Again, this price effect was taken into account in determining the appropriate market price of the stock when such an item was encountered.

The additional criteria of Table VI pertains to information obtained from Moody's industrial manuals. Information given in Moody's is always lagged one year. That is, to obtain a 1950 balance sheet it was necessary to consult a 1951 Moody's. The initial sample of 120 firms was drawn from the 1951 manual. A firm must have been listed at the beginning and end of each of the five periods under consideration in order to have been included in the sample. This explains the second criterion. The third classification was intended to eliminate foreign concerns whose stock may not be traded in the United States and whose financial operations were not subject to the same interest rate structure, etc., as were American concerns. The fourth criterion eliminated those firms which had investment in other companies. Even if the balance sheet listed the other companies involved, this would require that their balance sheets also be examined to detect their influences on the original investing company being considered. Since such companies were not listed, this automatically precluded such action and thus firms making such investments were also eliminated from the sample. Lastly, both holding and investment companies were eliminated to avoid the complexity and arbitrary classification of items on their balance sheets and those of attached companies.

Statistical Considerations

Gathering of the data was, of course, only one part of the procedure in the investigation. How these data were manipulated and analyzed must now be considered in some detail.

As indicated previously, the hypothesis of business gains stated that during inflation, as debtor status of corporations becomes larger, increases in stock prices would also become larger. Further, the debtor-creditor hypothesis stated that if creditors exist in the business population, then as creditor status becomes larger stock price increases would become smaller. These aspects may be designated as the nominal relationships. Furthermore, this means that if the general price level is taken into account, the real value of stock price increases would become greater as debtor status becomes larger, and the real value of stock price increases would become smaller as creditor status becomes larger. These considerations may be designated as the real relationships.

To measure the degree of either the nominal or real relationships, a rank correlation coefficient may be computed. However, with some reflection on the matter, one concludes that such a correlation would be the same for both relationships. This conclusion follows since the only difference between the nominal and real relationships results from the division of the nominal stock prices by the general price index. Therefore, for the purposes of rank correlation, the results would be the same since the division of all nominal prices by the same general price index would not change the rank correlation value. Thus, to obtain the correlation coefficient, only the nominal relationship was considered. By taking changes in the general price level

and changes in stock prices into account, it was also possible to determine the percentage rise or decline in the real value of stocks for debtors and creditors.

Before considering the procedure for computing the correlation coefficient, an examination needs to be made of how the data were manipulated and arranged. First, consider a problem pointed out by Alchian and Kessel. They stated:

> A net monetary debtor was then defined as a firm whose monetary liabilities exceeded its monetary assets; and conversely for a net monetary creditor. The net monetary status would indicate the magnitude of the gain or loss a firm would incur from a given amount of inflation. However, firms with the same amount of indebtedness but of unequal size, where size is measured by the aggregate value of the equity of the owners, would have unequal movements in absolute stock prices. Therefore, in order to compare corporations of unequal size, the ratio of net monetary debt to equity, as measured by the market prices of shares times the number of shares outstanding, is used as the measure of net monetary debtor or creditor status....[18]

The measure of debtor or creditor status on the basis of the amount by which monetary liabilities exceed monetary assets, or vice versa, is an accurate measure of the amount a firm would gain or lose during inflation. The problem is in making any comparison among firms of different sizes with respect to their debtor or creditor status and their stock price movements.

Thus, to compensate for this problem the procedure employed was to divide the monetary status by the average market price of the stock times the number of shares of common stock outstanding. The ratio was used as the measure of debtor or creditor status.

To obtain a measure of stock price movements, the ratio of the average stock price in the last year of a period to the average stock price in the first year of the period was employed. This ratio gave

a relative measure for comparison with the debtor or creditor status ratio observations.

Thus, the measure of debtor or creditor status used was the ratio

$$\frac{\text{monetary assets} - \text{monetary liabilities}}{\text{average market stock price} \times \text{no. of shares outstanding}}.$$

The measure of change in stock prices employed was the ratio

$$\frac{\text{average market stock price in the last year of the period}}{\text{average market stock price in the first year of the period}}.$$

These two sets of observed ratios could have been used to obtain a Pearson product-moment correlation coefficient. There are, however, several problems which present themselves if one simply correlates these direct observations. If a specific relationship holds for a majority of these observations but does not hold for several observations having very large values, then a simple product-moment correlation coefficient would tend to reduce the average relationship to an insignificant value. Kendall discussed this problem in terms of obtaining a measure of relationship between a country's population and its volume of foreign trade.

> It often happens, with economic data such as these, that the magnitude differs widely from one individual to another; Norway, for example, having a population of 2.9 million against China's 410 million. In any discussion of relationship based on these variate-values we have to be careful that one or two large items do not swamp the effect of the smaller ones. By ranking the individuals we do something to restore the balance and to give each country a more equal voice, as it were, in the discussion....
> ...The effect of including Russia and China in the calculations has been to reduce the average relationship to practically zero, the average being heavily weighted by the size of the populations of these two countries.[19]

Aside from this consideration is the fact that little is known about the underlying distribution of the population from which these

observations were drawn. As Friedman points out,

> This is especially apt to be the case with social and economic data where the normal distribution is likely to be the exception rather than the rule. This difficulty can be obviated, however, by arranging each set of values of the variate in order of size, numbering them 1, 2, and so forth, and using these ranks instead of the original quantitative values. In this way no assumption whatsoever need be made as to the distribution of the original variate.[20]

By using nonparametric or distribution free methods, one avoids the assumption that roughly 99 per cent of the observed values fall within three standard deviations of the population mean.

Therefore, in dealing with the correlation problem, a rank correlation coefficient was employed. Specifically, the measurement of rank correlation developed by Kendall was utilized. The formula for computing the coefficient is

$$\tau = \frac{2P}{\frac{1}{2}n(n-1)} - 1 \quad ,$$

where, after having ranked one series of observations sequentially, $\underline{P}$ is the sum of the positive scores of the associated series of observations and $\underline{n}$ is the number of pairs of rankings.[21] A score is, for each $R_i (i = 1,\ldots,n)$, the number of subsequent rankings whose rank value exceeds R_i, where R_i is the $\underline{i}$ th rank. As with the product-moment correlation coefficient, the τ correlation coefficient may take on values $-1 \leq 0 \leq 1$.

Upon computing the rank correlation coefficient, the next step was to test the significance of τ. That is, the procedure employed was to test the null hypothesis that the population correlation coefficient ρ is equal to zero (H_o: $\rho = 0$) against the alternative hypothesis that ρ is not equal to zero (H_1: $\rho \neq 0$). In order to accomplish this, several steps were required. First, the value of

S was computed, where

$$S = 2P - \tfrac{1}{2}n(n - 1) \quad .$$

Second, the standard error of S was determined by the formula

$$\sigma_S = \left[\frac{1}{18} n(n - 1)(2n + 5)\right]^{\frac{1}{2}} \quad .$$

These two values were then utilized to obtain Ψ, where

$$\Psi = \frac{S - 1}{\sigma_S}$$

Ψ is a specified deviate used to obtain the tabular values for areas (probability) under the normal curve. The probability value was then used to derive the value of ϵ, where

$$\epsilon = 2(1 - \text{Prob}) \ ,$$

and the probability is determined on the basis of Ψ. The value of ϵ represents the probability associated with acceptance of the null hypothesis. If ϵ was less than or equal to the significance level chosen for the test--.05 in this instance--, then the τ correlation coefficient was considered to be significant. That is, the alternative hypothesis was accepted. Conversely, if ϵ was greater than the significance level, then τ was not considered to be significant, and the null hypothesis was accepted. It should be noted, that if one rejects the null hypothesis that $\rho = 0$ and accepts the alternative hypothesis that $\rho \neq 0$, then this implies that either $\rho > 0$ or that $\rho < 0$.

Another factor considered was whether or not any observed differences in the real value of stock price changes for debtors and creditors were due simply to sampling variation or were representative of this phenomenon for the population. The samples were examined to determine the average percentage change in the real value of stocks.

To obtain these percentage figures required several steps. First, the average stock price for both debtors and creditors was determined for the first and last year of a sub-period. This average stock price for the first and last year of a sub-period was then divided by the consumer price index for the first and last year, respectively. Finally, these real average stock prices were employed to determine the percentage rise or decline in the real value of the average stock from the first to the last of a period. The entire procedure can be summarized in the following formula:

$$\frac{\dfrac{\text{average stock price for the last year of a sub-period}}{\text{consumer price index for the last year of a sub-period}}}{\dfrac{\text{average stock price for the first year of a sub-period}}{\text{consumer price index for the first year of a sub-period}}} - 1 .$$

The value obtained from the formula was, of course, the percentage change in the real value of the average stock.

A test of significance was performed on the percentage change values obtained for debtors and creditors. The procedure utilized was to test the null hypothesis that no significant difference existed between real stock price changes for debtors and creditors $\left[H_0: \ F(X_1) = F(X_2)\right]$ against the alternative hypothesis that debtor real stock price changes were significantly different than creditor real stock price changes $\left[H_1: \ F(X_1) \neq F(X_2)\right]$. To perform this test, the Wilcoxon-Mann-Whitney test was applied.[22] This test is based upon rank summation. The ranked column of stock price changes was divided into two samples, one of debtors and the other of creditors. The creditor sample had n_1 observations and the debtor sample had n_2 observations. Next, $\underline{R}$ and $\underline{R}'$ were computed, where $\underline{R}$ equals the sum of the ranks for the sample whose size is n_1 and

$$R' = n_1(n_1 + n_2 + 1) - R \ .$$

Then R_z was computed, where

$$R_z = \frac{n_1(n_1 + n_2 + 1)}{2} - Z\left[\frac{n_1 n_2(n_1 + n_2 + 1)}{12}\right]^{\frac{1}{2}}$$

The value of Z in this instance indicates the significance level of the test. The .05 significance level was chosen for this test and, therefore, Z was equal to 1.96. The final step was to compare the values of R and R' against R_z. If both R and R' were larger than R_z, then the null hypothesis was accepted. If however, either R or R' were smaller than or equal to R_z, then the alternative hypothesis was accepted.

The various statistical measures described briefly above are given further descriptive explanations in Chapter III where they are employed for each of the five sub-periods comprising the seventeen years that were investigated.

FOOTNOTES

[1]Fisher formulated an equation which explains the nominal rate of interest in terms of the expected rate of change of prices over time. He gave the formula as

$$i = r + \left(\frac{1}{P}\frac{dP}{dt}\right) + r\left(\frac{1}{P}\frac{dP}{dt}\right),$$

where i is the nominal rate of interest, r is the real rate of interest which would prevail if the general price level were expected to remain stable, and $[(1/P)(dP/dt)]$ is the expected rate of change of prices. See Irving Fisher, Appreciation and Interest (Cambridge, Mass: American Economic Association, 1896).

[2]Irving Fisher, The Theory of Interest (New York: The Macmillan Company, 1930), pp. 399-451.

[3]Reuben A. Kessel, "Inflation-Caused Wealth Redistribution: A Test of a Hypothesis," American Economic Review, XLVI (March, 1956), p. 128.

[4]Such competition may exist since there is no reason to expect that creditors will all have the same expectations regarding price movements.

[5]See for example Irving Fisher, The Purchasing Power of Money (New York: The Macmillan Company, 1922), pp. 55-73, 190-91; and J. M. Keynes, Monetary Reform (New York: Harcourt, Brace and Company, 1924), pp. 3-45.

[6]See Reuben A. Kessel, "Inflation and Wealth Redistribution: An Empirical Study," (unpublished Ph.D. dissertation, University of Chicago, 1954), p. 6.

[7]Ibid., see pp. 6, 25-26; and also G. L. Bach and Albert Ando, "The Redistributional Effects of Inflation," The Review of Economics and Statistics, XXXIX (February, 1957), p. 6.

[8]Fisher, The Purchasing Power of Money, pp. 190-91.

[9]For an illustration of this type see Lester V. Chandler, The Economics of Money and Banking (New York: Harper & Brothers Publishers, 1948), pp. 36-37.

[10]Harold A. Dulan, "Common-Stock Investment as an Inflation Hedge, 1939-46," Journal of Business, XXI (October, 1948), p. 231.

[11]Irving Fisher, The Nature of Capital and Income (New York: The Macmillan Company, 1923), p. 142.

[12]Fisher, The Purchasing Power of Money, p. 7.

[13]Irwin Friend, "Equity Yields, Growth, and the Structure of Share Prices: Comment," American Economic Review, LIV (December, 1964), p. 1031.

[14]George A. Christy, "Economic Developments, Investor Expectations, and the Trend of Stock Prices," The Western Economic Journal, II (Summer, 1964), p. 226.

[15]Merrill Lynch, Pierce, Fenner & Smith Inc., About This Stock and Bond Business (New York: Merrill Lynch, Pierce, Fenner & Smith Inc., 1964), p. 8.

[16]Moody's Investors Service, Moody's Industrials (New York: Moody's Investors Service).

[17]Merrill Lynch, Pierce, Fenner & Smith Inc., p. 9.

[18]Armen A. Alchian and Reuben A. Kessel, "Redistribution of Wealth Through Inflation," Science, CXXX (September, 1959), p. 536.

[19]Maurice G. Kendall, Rank Correlation Methods (3rd ed.; New York: Hafner Publishing Company, 1962), pp. 16-17.

[20]Milton Friedman, "The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance," Journal of the American Statistical Association, XXXII (1937), p. 675.

[21]See Kendall, pp. 3-7, for the technique of computing T.

[22]See U.S., Department of Commerce, Experimental Statistics, by Mary Gibbons Natrella, National Bureau of Standards Handbook 91 (Washington, D.C.: Government Printing Office, 1966), pp. 16-9 to 16-10; Frank Wilcoxon, "Individual Comparisons by Ranking Methods," Biometrics Bulletin, I (1945), pp. 80-83; and H. B. Mann and D. R. Whitney, "On a Test of Whether One or Two Random Variables is Stochastically Larger than the Other," Annals of Mathematical Statistics, XVIII (March, 1947), pp. 50-60.

CHAPTER III

PRESENTATION AND ANALYSIS OF THE DATA

This chapter is concerned with presentation and analysis of the data accumulated in the investigation. At this point, no interpretation is given to the results obtained from the various analyses. This is reserved for Chapter IV.

As has been pointed out previously, the period of investigation was broken into five sub-periods for individual examination. For each sub-period, data were collected which were ultimately employed in computing rank correlation coefficients. Certain of the data are presented in this chapter in order to make it clear how the correlation coefficients and other statistical measures were derived. The additional data of the study are contained in the Appendix. For each of the five sub-periods the correlation coefficients obtained were tested for significance. Also, for each sub-period the average percentage rise or decline in the real value of stocks was computed for both debtors and creditors. In addition, the samples were tested to determine whether any observed differences in the real value of stock price changes for debtors and creditors were due simply to chance or were representative of this phenomenon for the parent population of business firms. Each of these aspects will be considered in turn. First, however, certain of the data from which these measures were derived are presented and considered.

Tabulated Data

As was noted in Chapter II, the measure of debtor or creditor status employed was the ratio,

$$\frac{\text{monetary assets - monetary liabilities}}{\text{average market stock price X no. of shares outstanding}},$$

which was obtained for the first year of each sub-period examined. The individual elements which were used to obtain this ratio are tabulated in the Appendix, Tables XIII-XV. This measure was computed for each corporation in the sample for each of the five distinct periods. These ratios are presented in tabular form in Table VII. Under the term "corporation," the reader will note that the sample of 50 corporations is listed. Under each "sub-period," the ratio measuring debtor or creditor status is given for each of these corporations. A positive sign (+) preceding a value means that the corporation was a monetary creditor. Conversely, a negative sign (-) preceding a value indicates debtor status. The positive values range from small to large indicating a "small" or "large" creditor, respectively. Likewise, the negative values range from small to large and indicate a "small" or "large" debtor, respectively.

Table VII provided the basis for determining the distribution of corporations between debtor and creditor status. The distribution between statuses for each of the sub-periods is given in Table VIII. For the 50 firm sample, debtors dominated over creditors in every sub-period with the exception of 1950-52. In this instance, the distribution between debtor and creditor status was evenly divided. For the 26 firm sample debtors again dominated over creditors. For this sample the statuses were maintained throughout the entire seventeen year

TABLE VII

DEBTOR OR CREDITOR MONETARY STATUS

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
Abbott Laboratories	+.102539	+.049623	+.046411	+.038937	+.017845
Adams-Millis Corp.	+.277138	+.396739	+.276832	+.082212	-.116935
American Chain & Cable Co., Inc.	+.428499	+.395702	+.051115	+.181846	+.165517
American Cyanamid Co.	+.061688	-.119982	-.031503	-.029798	+.011010
Babbitt (B. T.), Inc.	+.098862	+.350214	+.283278	-.186111	-.338487
Bausch & Lomb, Inc.	-2.031484	-2.946875	-.836537	-.396223	-.163803
Bethlehem Steel Corp.	-.342100	-.322911	+.030519	-.008752	-.119128
Buffalo Forge Co.	+.306828	+.118797	+.252835	+.211035	+.011689
Champion Papers Inc.	-.388631	-.326323	-.136276	-.223693	-.386426
Clopay Corp.	-.788730	-.037890	-.046087	+.169378	-.301870
Continental Baking Co.	-1.946320	-1.510665	-.545558	-.460102	-.271179
Crown Cork & Seal Co., Inc.	-1.483927	-2.149912	-1.430071	-.757997	-.455311
Crucible Steel Company of America	-4.308654	-3.327946	-.425429	-.268523	-.597694
Cutler-Hammer, Inc.	+.205327	+.141363	+.082559	+.025554	-.075274
Dana Corp.	+.145787	-.293095	+.006196	+.011064	+.009085
Douglas Aircraft Co., Inc.	+.178352	-.081169	-.061278	-.913299	-1.075451
Eastman Kodak Co.	+.084521	+.074089	+.073185	+.056604	+.032239
Eversharp, Inc.	+.317036	+.101528	+.208229	+.168637	-.286824
Ferro Corp.	-.339467	-.185221	-.115493	+.020720	-.117863
General Instrument Corp.	+.194596	+.015772	+.147816	-.016601	-.104669
General Tire & Rubber Co.	-.185044	-.713249	-.614011	-.149002	-.275766
Glidden Co.	+.007527	+.144684	+.055238	-.093670	-.091438
Great Western Sugar Co.	-.623218	-.719907	-.000785	-.432034	-.340216
Holly Sugar Corp.	-1.865695	-1.918827	-1.204878	-.642947	-1.534932
Hupp Corp.	+.050850	+.020084	-.265196	-.102275	-.710814
Joy Manufacturing Co.	+.173182	-.040892	-.038405	-.055030	+.065574
Kennecott Copper Corp.	+.291333	+.247572	+.185424	+.094687	+.102042
Kimberly-Clark Corp.	-.575813	-.232463	-.000938	-.023790	-.100863
Kroger Co.	-.203704	-.204135	-.389785	-.264386	-.417725
Lily-Tulip Cup Corp.	-.620383	-.135412	+.007462	-.009350	-.011987
Mack Trucks, Inc.	-.564192	-.545692	-.186402	-.109119	-.768875
May Department Stores Co.	-.036508	-.031305	-.111387	+.037868	-.079591
Maytag Co.	-.093195	-.123343	-.071030	+.075835	+.128918
Moore Drop Forging Co.	-.565498	-.447068	+.123973	-.032847	-.201986
National Can Corp.	+.463911	-.126974	-1.715345	-1.150306	-.332881
New York Air Brake Co.	+.213827	+.653717	+.095607	-.004529	+.114298
Norwich Pharmacal Co.	+.008359	+.055174	+.065972	+.064060	+.072093
Owens-Illinois, Inc.	+.025439	-.040681	-.007038	-.129456	-.116280
Pittsburgh Forgings Co.	+.239507	+.323933	+.393914	+.459003	-.275873
Pittsburgh Steel Co.	-.726402	-3.218648	-1.552195	-1.930008	-1.833329
Quaker State Oil Refining Corp.	+.384824	+.111530	+.074811	+.251863	+.023653
Reynolds Metals Co.	-2.202905	-2.565017	-.382616	-.370766	-.711954
Safeway Stores, Inc.	-1.384014	-1.357518	-1.482816	-.249151	-.173188
Scott Paper Co.	-.081021	-.093665	-.109751	-.162074	-.062435
Tobin Packing Co., Inc.	-.700237	-.120281	+.111601	+.014266	+.093260
United States Gypsum Co.	+.265220	+.320087	+.026691	+.098743	+.121622
United States Plywood Corp.	-.080980	-.302423	-.236120	-.257835	-.389803
Waukesha Motor Co.	+.493688	+.301201	+.182557	+.006523	+.307192
Wheeling Steel Corp.	-.666664	-1.732463	-.690331	-.314403	-3.162329
Zenith Radio Corp.	+.121376	+.344419	+.385995	+.132492	+.031885

period since this was the criterion for selection of the sample.

TABLE VIII

DISTRIBUTION OF DEBTOR AND CREDITOR STATUS

Sample	Status	Sub-period				
		1950-52	1953-54	1955-58	1959-64	1965-66
50 Firms	Creditor	25	19	23	20	16
	Debtor	25	31	27	30	34
26 Firms	Creditor	9	9	9	9	9
	Debtor	17	17	17	17	17

The ratio measures of debtor and creditor status, given in Table VII, were only one of two sets of measures necessary to compute correlation coefficients. An additional set of ratios was obtained to measure change in stock prices. This ratio was

$$\frac{\text{average market stock price in the last year of the period}}{\text{average market stock price in the first year of the period}}.$$

The average market stock prices used to compute this ratio are given in the Appendix, Table XIV. The ratios obtained for each corporation during the sub-periods are given in Table IX. In the table, a value of less than unity indicates that the corporation's stock declined in money value; a value of unity indicates no change in price; and a value in excess of unity indicates that the corporation's stock increased in money value.

Rank Correlation

Tables VII and IX taken together comprise the observations made on the sample of corporations. To obtain rank correlation coefficients, it was necessary to rank these original observations. For

TABLE IX

STOCK PRICE RATIOS

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
Abbott Laboratories	1.11583	1.07402	1.41410	1.83451	.91467
Adams-Millis Corp.	.93867	.96000	.94402	.73143	.97474
American Chain & Cable Co., Inc.	1.14389	1.19132	1.14121	1.08459	1.03663
American Cyanamid Co.	1.69391	1.03524	1.02618	1.10674	.89968
Babbitt (B. T.), Inc.	.50435	1.12903	1.17568	.46494	1.09924
Bausch & Lomb, Inc.	1.34076	1.15000	1.13499	1.12140	1.65266
Bethlehem Steel Corp.	1.30370	1.57250	1.22843	.69568	.83209
Buffalo Forge Co.	.92893	1.10423	1.08922	.97371	1.16310
Champion Papers Inc.	1.39574	1.51512	1.37100	.77942	.93456
Clopay Corp.	1.10853	.95639	.73214	.54676	1.82903
Continental Baking Co.	1.07037	1.12357	1.16230	1.15850	.86562
Crown Cork & Seal Co., Inc.	1.06458	1.20896	1.32981	3.75668	1.16815
Crucible Steel Company of America	1.34097	1.12393	.90082	.81370	.96265
Cutler-Hammer, Inc.	1.34286	1.44326	1.483.8	.93426	1.02566
Dana Corp.	1.62984	1.18040	1.02916	1.22605	.93833
Douglas Aircraft Co., Inc.	1.46134	2.53705	.75796	.60122	1.15468
Eastman Kodak Co.	.97448	1.40722	1.55277	1.49003	1.31632
Eversharp, Inc.	1.11111	.97950	1.28862	1.00546	.87534
Ferro Corp.	1.61661	1.05764	.67374	1.16743	1.14586
General Instrument Corp.	.91212	.87671	1.10836	.50413	2.05132
General Tire & Rubber Co.	2.11334	1.32821	1.54737	.95762	1.35438
Glidden Co.	1.31264	1.20526	.89294	1.10668	.95928
Great Western Sugar Co.	.87191	1.14554	1.25689	1.34406	.95542
Holly Sugar Corp.	1.00313	1.24183	1.01920	1.62822	.97461
Hupp Corp.	1.07207	.86239	.59746	.95339	.79612
Joy Manufacturing Company	1.22796	1.08619	1.12903	.77648	1.05567
Kennecott Copper Corp.	1.27198	1.31799	.80615	.87251	1.09734
Kimberly-Clark Corp.	1.21192	1.63081	1.23436	.90425	.96320
Kroger Co.	1.13746	1.07607	1.94160	1.09305	.66453
Lily-Tulip Cup Corp.	1.46146	1.53123	1.11098	.60875	.86119
Mack Trucks, Inc.	.96617	1.44010	1.43274	.97602	.94984
May Department Stores Co.	.80998	1.14363	1.07431	2.01472	.71507
Maytag Co.	1.10730	1.22546	1.10914	2.11084	.80601
Moore Drop Forging Co.	1.18662	1.23066	.80707	1.72521	.94850
National Can Corp.	1.46522	1.27855	1.00477	1.68210	1.02028
New York Air Brake Co.	1.28889	1.09917	.76364	1.27449	1.04354
Norwich Pharmacal Co.	1.42275	1.28406	2.22222	.96281	1.13265
Owens-Illinois, Inc.	1.11029	1.19810	1.23587	1.06295	1.03632
Pittsburgh Forgings Co.	.97426	1.08745	.86941	1.99425	.94944
Pittsburgh Steel Co.	1.56501	1.24206	.72579	.70972	.79424
Quaker State Oil Refining Corp.	1.13375	1.04749	.86111	2.00198	1.15998
Reynolds Metals Co.	1.96374	1.76515	1.24357	.56840	1.19985
Safeway Stores, Inc.	.98032	1.21173	2.24481	1.96210	.76832
Scott Paper Co.	1.29429	1.60099	1.01525	1.41476	.81129
Tobin Packing Co., Inc.	.94286	1.35161	1.11504	1.35249	.79240
United States Gypsum Co.	1.00384	1.60584	1.50211	.86524	.74848
United States Plywood Corp.	1.00607	1.16086	.88003	1.61053	.94251
Waukesha Motor Co.	1.17672	1.20930	1.32903	.88706	1.05291
Wheeling Steel Corp.	1.19859	1.20235	.79966	.57531	.90821
Zenith Radio Corp.	1.38973	1.08069	1.97667	1.34308	1.35057

each sub-period the values of Table IX were ranked in order of increasing size from smallest to largest. The values of Table VII were ranked in the opposite manner in which a number line is ranked. That is, the largest creditor was given the first rank, and the largest debtor was given the fiftieth rank. If the debtor-creditor hypothesis is valid--given the assumptions made in the study--, then a significant positive correlation should result from such a ranking. For the large creditor, stock price increases should be small, relatively speaking; for the smaller creditor, stock price increases should be somewhat larger. For the small debtor, stock price increases should be proportionally larger yet; and for the large debtor, stock price increases should be even greater. The values of τ computed from the 50 corporation sample for each of the five sub-periods are given in Table X. This table also gives the values of τ obtained by computing the correlation coefficients for the 26 corporations which did not change status during the seventeen years investigated.[1] These corporations are those listed in Table VII for which either all positive or all negative values were obtained for the five periods examined. As was noted in Chapter II, since monetary status was measured only at the beginning of a sub-period, it would be possible for a firm to change status during the sub-period, and, therefore, stock price movements would not correspond to the status assigned. Only corporations of consistent status were employed in this second set of correlations. Such a procedure reduced the sample by 24 corporations. It was found that for this reduced sample, there existed 9 creditors and 17 debtors. The method of computing τ from the ranked ratio values was the same as that described for the sample of 50 corporations. The rankings necessary to derive

these τ values for both the 50 and 26 firm samples are tabulated in the Appendix, Tables XVI-XIX.

TABLE X

τ RANK CORRELATION COEFFICIENTS AND VALUES OF ϵ FOR TESTING SIGNIFICANCE

Sample	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
50 Firms	$\tau = +.07$ $\epsilon = .47$	$\tau = +.18$ $\epsilon = .07$	$\tau = -.003$ $\epsilon = .976$	$\tau = -.05$ $\epsilon = .58$	$\tau = -.04$ $\epsilon = .67$
26 Firms	$\tau = +.13$ $\epsilon = .38$	$\tau = +.05$ $\epsilon = .69$	$\tau = -.08$ $\epsilon = .57$	$\tau = -.009$ $\epsilon = .928$	$\tau = -.13$ $\epsilon = .33$

Significance of the Rank Correlation Coefficients

Each of the rank correlation coefficients in Table X was tested for significance. This required testing the null hypothesis that the population correlation coefficient ρ is equal to zero (H_o: $\rho = 0$) against the alternative hypothesis that ρ is not equal to zero (H_1: $\rho \neq 0$). This test was made for each of the τ values at the .05 significance level. The results are also reported in Table X. If the value of ϵ was greater than the significance level chosen for the test--.05 in this instance--, then the τ value was not considered to be significant.[2] This means that the null hypothesis of zero correlation in the population is accepted. In no instance was a τ value significant. Thus, the null hypothesis was accepted for the 50 corporation and 26 corporation samples for each of the five sub-periods.

Percentage Change in the Real Value of Stocks

In addition to obtaining the rank correlation values and testing these for significance, the samples were also examined to determine the average percentage rise or decline in the real value of stocks for both debtors and creditors. The formula utilized to obtain the percentage change was:

$$\frac{\dfrac{\text{average stock price for the last year of a sub-period}}{\text{consumer price index for the last year of a sub-period}}}{\dfrac{\text{average stock price for the first year of a sub-period}}{\text{consumer price index for the first year of a sub-period}}} - 1 .$$

The percentage values obtained by applying the formula to the data of the samples is given in Table XI. In addition, the percentage change in the consumer price index from the first to the last year of a sub-period is given in the table. The percentage change in the consumer price index serves as an indicator of the degree of inflation or stability which occurred during a sub-period.

By carefully examining Table X and Table XI, one notes that the results are in agreement. In order to have obtained positive correlations in the 1950-52 and 1953-54 sub-periods, it was necessary that stock price increases (and the real value of stock price increases) for debtors be greater than for creditors. The converse was necessary in order to obtain the negative correlations in the sub-periods 1955-58, 1959-64, and 1965-66.

Although these tables are in agreement, they are by no means substitutes for one another in terms of information provided. The rank correlation values indicate the degree of association between the percentage change in stock prices and the degree of debtor and creditor status. The percentage change in the real value of stocks for debtors

TABLE XI

PERCENTAGE CHANGE VALUES

	Sample	Sub-period				
		1950-52	1953-54	1955-58	1959-64	1965-66
Percent Change in Debtor Real Stock Prices	50 Firms	+13.72%	+31.40%	+8.14%	-27.82%	-1.75%
	26 Firms	+15.00%	+35.48%	+17.94%	+9.41%	-1.83%
Percent Change in Creditor Real Stock Prices	50 Firms	+9.56%	+24.52%	+21.66%	+19.46%	+5.42%
	26 Firms	+.86%	+28.32%	+30.48%	+17.15%	+11.42%
Percent Change in Consumer Price Index		+10.38%	+.43%	+7.93%	+6.50%	+4.63%

and creditors gives no association measure of how well a ranking of stock price changes agrees with a ranking of the intensity of debtor and creditor status. However, the average percentage change values provide information as to how much difference exists between real stock price changes for debtors and creditors during a sub-period and how this difference changed from one sub-period to another. For example, in Table XI examination of the 50 firm sample for the 1950-52 sub-period indicates that debtor real stock prices increased by 4.16 percentage points (13.72% - 9.56%) more than creditor real stock prices. For the 1953-54 sub-period, debtor real stock prices increased by 6.88 percentage points (31.40% -24.52%) more than for creditors. This means that in the 1953-54 sub-period the debtor-creditor real stock price differential increased by an additional 2.72 per cent over the 1950-52 differential.

Application of the Wilcoxon-Mann-Whitney Test

To determine whether these differences between real stock price changes for debtors and creditors were due simply to chance or because actual differences existed in the parent population, an additional test was made. As indicated previously, the measure employed was the Wilcoxon-Mann-Whitney Test.[3] The null hypothesis that no significant difference existed between real stock price changes for debtors and creditors $\left[H_o: \quad F(X_1) = F(X_2)\right]$ was tested against the alternative hypothesis that debtor real stock price changes were significantly different than creditor real stock price changes $\left[H_1: \quad F(X_1) \neq F(X_2)\right]$. The application of the test required using the ranks which had previously been assigned to the stock price ratios. The rank numbers

were then separated on the basis of debtor or creditor status. The rankings for both the 50 and 26 firm samples are given in the Appendix, Tables XVII and XIX. The creditor rank column contained n_1 observations and the debtor rank column contained n_2 observations. The values of $\underline{R}$ and $\underline{R}'$ were computed for the debtor and creditor observations on the basis of the formulas given in Chapter II. The test was made at the .05 significance level, and $R_{.05}$ was computed on this basis in accordance with the formula which was also given in Chapter II. The values obtained by this procedure are presented in tabular form in Table XII. The test specifies that if either $\underline{R}$ or $\underline{R}'$ is equal to or smaller than $R_{.05}$ the conclusion should be that the averages of the two items being examined are significantly different. If, however, both $\underline{R}$ and $\underline{R}'$ are larger than $R_{.05}$ then the averages of the two items should not be considered significantly different. As can be observed in Table XII, the latter circumstance applies in every instance with the exception of the 1953-54 sub-period for the 50 firm sample. Therefore, only in this instance was the alternative hypothesis accepted. The null hypothesis of no significant difference was accepted for the 26 firm sample in all sub-periods and for the 50 firm sample in all sub-periods except 1953-54. By comparing the ϵ values in Table X and the values given in Table XII, it can be observed that there is agreement in results. For example, the ϵ value in Table X for the 50 firm sample in the 1953-54 sub-period indicated that T was very close to being significant. Such a T value corroborates the significant difference between creditor and debtor real stock price changes found by the Wilcoxon-Mann-Whitney test for the same sample and sub-period.

TABLE XII

RESULTS OF THE WILCOXON-MANN-WHITNEY TEST

Sample		Sub-period				
		1950-52	1953-54	1955-58	1959-64	1965-66
50 Firms	R	646	381	626	579	446
	R'	629	588	547	441	370
	$R_{.05}$	536.48	386.44	485.81	411.02	313.76
26 Firms	R	104	99	131	130	147
	R'	139	144	112	113	96
	$R_{.05}$	88.90	88.90	88.90	88.90	88.90

This chapter has centered attention upon presentation and analysis of the data accumulated in the investigation. No attempt has been made to interpret and draw conclusions from the results of the analysis. As indicated previously, this subject is reserved for Chapter IV.

FOOTNOTES

[1]See M. G. Kendall, Rank Correlation Methods (3rd ed.; New York Hafner Publishing Company, 1962), pp. 3-7, for the procedure of computing T.

[2]Ibid. See pp. 52-55 for the procedure of testing the significance of T.

[3]See U.S. Department of Commerce, Experimental Statistics, by Mary Gibbons Natrella, National Bureau of Standards Handbook 91 (Washington, D.C.: Government Printing Office, 1966), pp. 16-9 to 16-10.

CHAPTER IV

EVALUATION AND CONCLUSIONS

The present chapter is primarily concerned with drawing inferences and conclusions from the statistical analyses of the previous chapter. In addition, these conclusions are examined in the light of previous findings of certain investigators.

Appraisal of the Business Gains Hypothesis

The evidence accumulated from balance sheet analysis of business firms clearly indicates that the business population is composed of both net monetary debtors and net monetary creditors. The sample results were presented in Chapter III, Table VIII. In the 50 firm sample, debtors were dominate in all but the 1950-52 sub-period. For the 26 firm sample, debtors were also dominate. Of course, this sample maintained its status throughout the seventeen years, since this was the criterion for selection from the 50 firm sample. Therefore, on the basis of the samples, one may conclude that the business gains hypothesis tends to underestimate the number of creditors in the business population. However, it should be noted that the hypothesis was by no means found to be completely invalid since debtors dominated over creditors in every sub-period for both samples with the exception of the 50 firm sample in the sub-period 1950-52. This conclusion and its basis are in complete agreement with those of Kessel,[1] Alchian

and Kessel,[2] and Bach and Ando.[3]

An additional interesting aspect to note in the light of a previous finding is that the 50 firm sample for the 1950-52 sub-period was found to be evenly divided between debtors and creditors. Alchian and Kessel found this same result for the year 1952. They state:

> The shift from predominately net monetary debtor status, around the time of World War I, to a ratio of approximately 50:50 in 1952 may explain why Keynes and Fisher made the assumption they did about business firms being debtors.[4]

Although the 1950-52 observations on the 50 firm sample did indicate even distribution between the statuses, this distribution did not maintain intself. As indicated, debtor corporations did dominate in a majority of the sub-periods.

Appraisal of the Debtor-Creditor Hypothesis

The additional analyses of the investigation were primarily designed to evaluate the debtor-creditor hypothesis, since it is an integral part of the business gains hypothesis. The first such analysis was made in the form of a number of rank correlations. If the hypothesis is valid, then one should expect that as debtor status becomes more extreme, increases in stock prices should become more extreme during inflation. The converse should hold as creditor status becomes more extreme. Therefore, a rank correlation based upon debtor-creditor status and changes in stock prices--which are ranked as indicated in Chapter III--should exhibit positive correlation values for inflation periods. Further, not only should positive correlations be found, but also these values should be significant in order to make the hypothesis acceptable on empirical grounds.

For periods in which prices are stable, the debtor-creditor hypothesis implies that wealth redistribution will not occur. That is, based upon the hypothesis, one should expect that during "stability periods" stock price changes of debtors and creditors would not be significantly different. Thus, no significant correlation should be found for a debtor-creditor ranking and a ranking of stock price ratios during a period of price stability.

For the periods of inflation which were examined, none of the rank correlation coefficients was significantly different from zero. Thus, the null hypothesis of zero correlation in the parent population was accepted. In addition, since the statistical examination revealed a zero correlation for the parent population in each case, little import could be attached to the negative and positive correlations obtained from the samples. Statistically speaking, one must assume that each of the non-zero τ values resulted merely by chance.

For the sub-period 1953-54, a period of price stability, the rank correlations were found not to be significant. Since the hypothesis implies that such non-significant correlations should be found for periods of price stability, this result meant confirmation of the debtor-creditor hypothesis. That is, in a period of price stability, there was no wealth redistribution between creditors and debtors.

Based upon use of the consumer price index as the indicator of price movements, the correlation results for inflation periods appear to represent a direct contrast to the findings of Kessel[5] and Alchian and Kessel.[6] Their investigations found significant correlations for the various samples during periods of inflation. Therefore, they

accepted the hypothesis that debtors benefit during inflation at the expense of creditors.

For the present study, the consumer price index was used to indicate stability and inflation periods. If, however, the wholesale price index had been employed rather than the consumer price index, the sub-period 1959-64 would have been judged one of price stability. For the sub-period, the average annual percentage change in the wholesale price index was zero. Therefore, based upon use of this price index, the non-significant correlations for the 1959-64 sub-period implied a confirmation of the debtor-creditor hypothesis. Thus, for this sub-period, the findings could be interpreted as evidence in support of the Kessel and Alchian and Kessel results. It is quite likely that moderate inflation did not occur for this sub-period and that stability of prices did exist. This conclusion follows since it is generally acknowledged that the consumer price index is biased upward. That is, the index overstates the degree of price rise.

If the correlations are viewed in terms of the price level movements indicated by the consumer price index, the conclusions must, of course, be that the results are in contrast with the Kessel and Alchian and Kessel findings. Several possible explanations exist to explain the difference in correlation results. For the study which Kessel completed in 1954, the time periods investigated were each several years longer than those of the present study. The samples taken during inflation periods were observed for the years 1939-48, 1942-45, and 1942-48. Thus, the observation periods were 10, 4, and 7 years, respectively. For the present study, the five sub-period breakdown represented five observation periods of 3, 2, 4, 6, and 2 years in duration. In addition,

the percentage change in the consumer price index over the observation periods was considerably greater in the Kessel study than in the present study. For the years 1939-48, 1942-45, and 1942-48, the average annual increase in the consumer price index was 6.2 per cent, 3.2 per cent, and 6.6 per cent, respectively. The average annual percentage increase in the consumer price index in the present study was 5.0 per cent, .10 per cent, 2.2 per cent, 1.1 per cent, and 2.2 per cent for the sub-periods 1950-52, 1953-54, 1955-58, 1959-64, and 1965-66, respectively.

From these considerations it is quite apparent that a great deal of difference existed between the Kessel study and the present investigation in terms of duration of the observation period and the percentage change of the consumer price index over the period. Quite obviously, these differences could account for some of the difference in correlation results obtained.

This same type of differential in observation period and consumer price index change is noted if one compares the study performed by Alchian and Kessel. The time period investigated extended from 1915 to 1952 and was broken into larger observation periods than for the present investigation. In addition, examination of the changes in the consumer price index reveals fairly large changes for their various observation periods. Again, these considerations may account for different correlation results.

Based upon use of the consumer price index, the rank correlation results of the present study are largely in agreement with those obtained by Bach and Ando[7] for periods of inflation. Although the years examined were from 1939 to 1952, the findings were quite similar. In no case did they find a significant correlation based upon procedures similar to

those employed in this investigation. They concluded that the debtor-creditor hypothesis could not be firmly accepted since their data offered no statistical basis for its acceptance. A possible explanation of the similar results of this study and the Bach and Ando investigation rests upon the selection of the sample. For both studies, a group of firms was selected randomly and this sample was observed throughout the overall time period studied. That is, the same firms were examined for the entire investigation. For the studies of Kessel and Alchian and Kessel, a new sample of firms was selected for each observation period. These different methods of sample selection represent an additional factor which could have influenced the correlation results obtained. It is quite likely that the difference in sampling methods resulted in selection of firms of quite different "stability" as measured in terms of financial framework and ability to withstand the rigors of business competition. That is, the sampling technique utilized by this study and the Bach and Ando study, probably resulted in the selection of "more stable" firms since they must have met the criteria for remaining in the sample over the entire period studied. The Alchian and Kessel sampling technique did not require the firms to meet prescribed criteria except for individual sub-periods studied.

The statistical results of the De Alessi[8] study appear to be in general agreement with the results of the present study and those of the Bach and Ando study for periods of inflation. The rank correlation coefficients obtained in all three investigations were not significant at the .05 level with the single exception of the correlation coefficient obtained for the year 1952 in the BD sample of the De Alessi study based upon the (M/W) ratio (see Chapter II, Table III).

Again, the similarity in correlations may be accounted for in part by the sampling techniques used. The De Alessi study examined largely the same firms throughout the entire 9 year time period. From year to year the firms examined varied somewhat but there was not a complete selection of new firms for each individual observation period as in the Kessel and Alchian and Kessel studies. This method of sample selection may have resulted in "more stable" firms in the observed samples.

In addition, similarity in results may be accounted for in part by the length of the observation periods. For the De Alessi study the individual observation periods were only one year in duration. For the present study, the observation periods were also relatively short, as indicated previously. The observation periods of the Bach and Ando study were relatively short when compared with the present study and the studies of Kessel and Alchian and Kessel. The three observation periods employed by Bach and Ando were 8, 4, and 4 years.

As with the Bach and Ando study, the overall time period investigated by De Alessi was different than that of the present study. However, since the period was from December, 1948 to December, 1957, it corresponded more closely than the period investigated by Bach and Ando. In addition, the population of business firms sampled was for the United Kingdom and, of course, represented a different population than was used for any of the other studies. These differences may account for some of the slight differences obtained by Bach and Ando and De Alessi. However, for the most part, the results of these studies and the present study are in agreement concerning periods of inflation.

For the current investigation, the rank correlation coefficients

obtained during the "stability period" 1953-54 were accepted as a confirmation of the debtor-creditor hypothesis. The rank correlations obtained during periods of inflation, however, indicated the hypothesis should be rejected. Based upon use of the consumer price index, the correlations for the inflation periods were accepted as a tentative basis for rejection of the hypothesis since the results offered no basis for its acceptance.

An additional examination was made to determine the average percentage rise or decline in the real value of stocks for both debtors and creditors. As revealed in Chapter III, the results of this analysis were in agreement with the rank correlation results. In general, such a confirmation would be expected. However, the percentage change values of Table XI provide additional information which the correlation coefficients did not. As in the correlation results, the 26 firms of consistent status did not perform much differently than the 50 firm sample. This would seem to indicate that for the most part, firms did not change status during the sub-periods. Not only did debtor real stock prices not increase as much as creditor real stock prices in certain periods; in three instances they actually declined in real value.

However, a test was made to determine whether these differences between debtors and creditors were representative of the phenomenon for the parent population or were due simply to chance. The Wilcoxon-Mann-Whitney test indicated that no significant difference existed between debtor and creditor real stock price changes at the .05 level with the exception of the 50 firm sample in the 1953-54 sub-period. Therefore, with this exception, the observed differences were attributed to chance occurrence on the basis of the statistical findings. For the 50 firm

sample in the 1953-54 sub-period, the difference in the percentage change in the real value of debtor and creditor stocks was determined to be significant. However, on the basis of the debtor-creditor hypothesis, such a result should not have been found since the 1953-54 sub-period represented a period of stable prices. Therefore, no difference between debtor and creditor real stock price changes should be observed for this particular sub-period.

These findings in conjunction with the findings of the rank correlation analysis indicated mixed results. The rank correlations dictated against acceptance of the debtor-creditor hypothesis during periods of inflation and in favor of acceptance of the hypothesis during price stability. The percentage change results agree with rejection of the hypothesis during inflations. However, they do not completely agree with acceptance of the hypothesis during the price stability period indicated by the consumer price index. If the wholesale price index had been employed rather than the consumer price index the results for the sub-period 1959-64 would have been in favor of acceptance of the hypothesis since price stability was indicated by this index.

Plausible Implications

The implications of these results appear to impinge more upon the short-run validity of the debtor-creditor hypothesis than upon the long-run validity. Since the seventeen year time span was broken into five individual sub-periods, the analyses were made in terms of relatively short time periods. Over such short-run observation periods, the behavior of corporate stock prices may be such as to conceal the overall trend. As Fisher noted:

> It would be as idle to expect a uniform movement in prices as to expect a uniform movement for all bees in a swarm. On the other hand, it would be as idle to deny the existence of a general movement of prices because they do not all move alike, as to deny a general movement of a swarm of bees because the individual bees have different movements.[9]

Various factors such as the "speculative climate," political considerations, international conflicts, etc., may influence the overall trend of stock prices as well as the movement of individual stocks during the short-run. Thus, although stock prices may serve as a measure of business wealth during the short-run, as well as the long-run, wealth redistribution between debtors and creditors may be difficult to detect for such periods.

The nature of the results obtained have additional interesting implications in terms of resource allocation and behavior of business firms during inflations. Since the results indicate that wealth redistribution does not occur between debtors and creditors in the short-run, it seems reasonable to assume that debtors and creditors are equally adept at judging future price level increases. Therefore, if they are equally able to adjust their economic behavior, there is little reason to expect significant changes in relative product prices, relative resource prices, relative earnings shares, or the level of employment during periods of inflation. The more accurately inflation is anticipated, the better the economic bargins the individual firm is able to make. In addition, the more accurate the adjustment made by all business firms, the more the allocation of resources and the pattern of output conforms to society's wishes. This conclusion follows since the pricing system performs the function of transmitting economic information and thus coordinates business decisions to bring about an efficient

allocation of resources. Accurate adjustment to a changing price level would mean that resource allocation was not distorted from its original pattern.

The conclusion that business firms anticipate price increases finds some support in the Gibson study.[10] Gibson found that a price increase resulted in a slight upward adjustment in interest rates for periods in excess of three to nine months. In addition, it was observed that interest rate adjustments tended to work themselves out over a long-run period. Since the period of observation in the present study was never less than two years, it is conceivable that price expectations influenced the behavior of individual business firms. Adjustments in interest rates could have been working themselves out during the observation periods that were examined. Although the interest rate adjustment to a price increase may not have been completed within the time of an observation period, it would none-the-less be operating to keep the nominal and real rates closer together.

The results of both the Bach and Ando study and the De Alessi study are quite similar to those of the present investigation for periods of inflation. Bach and Ando found that "complete" interest rate adjustment occurred for observation periods as short as 4 years. De Alessi, however, using annual data, reported results which implied "complete" interest rate adjustment within a year. The present study, of course, indicates "complete" interest rate adjustment within a period of at least 2 years. Taken together, the results of these studies imply that business firms do anticipate price increases and that interest rate adjustments occur as a result of these price expectations.

FOOTNOTES

[1]See Reuben A. Kessel, "Inflation and Wealth Redistribution: An Empirical Study," (unpublished Ph.D. dissertation, University of Chicago, 1954), and "Inflation-Caused Wealth Redistribution: A Test of a Hypothesis," American Economic Review, XLVI (March, 1956), pp. 128-41.

[2]Armen A. Alchian and Reuben A. Kessel, "Redistribution of Wealth Through Inflation," Science, CXXX (September, 1959), pp. 535-39.

[3]G. L. Bach and Albert Ando, "The Redistribution Effects of Inflation," The Review of Economics and Statistics, XXXIX (February, 1957), pp. 1-13.

[4]Alchian and Kessel, p. 537.

[5]Kessel.

[6]Alchian and Kessel.

[7]Bach and Ando.

[8]See Louis De Alessi, "The Redistribution of Wealth by Inflation: An Empirical Test with United Kingdom Data," Southern Economic Journal, XXX (October, 1963), pp. 113-27.

[9]Irving Fisher, The Purchasing Power of Money (New York: The Macmillan Company, 1922), p. 194.

[10]See William E. Gibson, Effects of Money on Interest Rates, Staff Economic Studies, XLIII (Washington, D.C.: Board of Governors of the Federal Reserve System, 1968).

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APPENDIX

TABLE XIII

BALANCE SHEET ANALYSIS*

Corporation	Year				
	1950	1953	1955	1959	1965
Abbott Laboratories	+17482730	+7835282	+7385463	+9870601	+10450000
Adams-Millis Corp.	+1695186	+1879020	+1391878	+1949089	-1316797
American Chain & Cable Co., Inc.	+11707030	+11748842	+2200042	+10997659	+14057766
American Cyanamid Co.	+14681814	-48757776	-17121814	-36695880	+18932982
Babbitt (B. T.), Inc.	+1310741	+1948435	+2016667	-1950320	-1784006
Bausch & Lomb, Inc.	-12033461	-12340036	-11868053	-11900022	-17595564
Bethlehem Steel Corp.	-130215453	-154041088	+43274871	-21569189	-206970000
Buffalo Forge Co.	+4957761	+3948639	+4647830	+4725221	+243474
Champion Papers Inc.	-16985225	-21554916	-17606681	-41630742	-91836254
Clopay Corp.	-2225006	-78024	-115333	+541365	-706218
Continental Baking Co.	-35332023	-35611515	-28855453	-44206484	-28963497
Crown Cork & Seal Co., Inc.	-26884086	-32613824	-30606433	-24907000	-83957000
Crucible Steel Company of America	-51986104	-63455446	-37993863	-30299503	-65977000
Cutler-Hammer, Inc.	+3676525	+3545382	+3845808	+3041407	-12028922
Dana Corp.	+7938110	-24348887	+751761	+2393942	+2628801
Douglas Aircraft Co., Inc.	+18078422	-13576326	-17310345	-160353059	-259243746
Eastman Kodak Co.	+57574029	+56913113	+104949076	+194099200	+258008609
Eversharp, Inc.	+3442271	+1257746	+2889994	+3731980	-14001370
Ferro Corp.	-3049717	-2720957	-2516886	+631285	-4901434
General Instrument Corp.	+1220973	+147201	+2048189	-760639	-6300371
General Tire & Rubber Co.	-3025351	-24516110	-45364021	-56017474	-112539903
Glidden Co.	-410951	+10244855	+5107086	-9816525	-12365221
Great Western Sugar Co.	-22716303	-22871436	-30415	-21898961	-24893635
Holly Sugar Corp.	-16763273	-14679028	-16041233	-10156609	-38559779
Hupp Corp.	+1408215	+136643	-5161988	-2787323	-29271746
Joy Manufacturing Co.	+4437000	-1228476	-3658488	-4938313	+7268316
Kennecott Copper Corp.	+191621179	+176394504	+230316867	+105181618	+114062363
Kimberly-Clark Corp.	-43364095	-20441139	-351997	-13774211	-54068965
Kroger Co.	-27936000	-31795000	-62592000	-100268430	-203577996
Lily-Tulip Cup Corp.	-8809640	-6118190	+640191	-1692207	-1226424
Mack Trucks, Inc.	-12463664	-10276920	-8790795	-12840839	-87870597
May Department Stores Co.	-5551871	-5251492	-26064004	+12708929	-64095257
Maytag Co.	-2195392	-3558142	-3652201	+9425930	+33126808
Moore Drop Forging Co.	-1396051	-1386550	+646158	-167434	-2122290
National Can Corp.	+2426579	-1221628	-22725598	-16221404	-20108228
New York Air Brake Co.	+3428577	+8946461	+1915995	-97224	+7832808
Norwich Pharmacal Co.	+97369	+1047288	+2431356	+8747265	+13359813
Owens-Illinois, Inc.	+5266239	-9396277	-1452112	-89510233	-100439403
Pittsburgh Forgings Co.	+1993956	+2649469	+4289934	+4851623	-7380082
Pittsburgh Steel Co.	-8940885	-66245115	-60816567	-68898167	-77724000
Quaker State Oil Refining Corp.	+7879239	+2139283	+2107543	+5257009	+1362717
Reynolds Metals Co.	-87360097	-228859046	-203172048	-444656393	-505260611
Safeway Stores, Inc.	-130478794	-173187810	-234557374	-115106560	-150067601
Scott Paper Co.	-11910917	-18492574	-58590103	-101645517	-66939000
Tobin Packing Co., Inc.	-5160224	-992759	+1343175	+225828	+1944571
United States Gypsum Co.	+48287217	+56999368	+60142593	+80087832	+70879659
United States Plywood Corp.	-3602391	-12830187	-18733653	-30340487	-106345592
Waukesha Motor Co.	+4295088	+2671051	+2652919	+161824	+7699026
Wheeling Steel Corp.	-58854132	-85328293	-72800939	-38687056	-175240708
Zenith Radio Corp.	+3455504	+11771222	+22917101	+41105927	+58537033

*Values in the body of the table represent monetary assets minus monetary liabilities. A plus sign (+) indicates monetary assets exceeded monetary liabilites and conversely for a negative sign (-).

TABLE XIV

AVERAGE STOCK PRICES

Corporation	Year									
	1950	1952	1953	1954	1955	1958	1959	1964	1965	1966
Abbott Laboratories	45.59375	50.87500	42.21875	45.34375	42.56250	60.18750	66.46875	121.93750	44.31250	40.53125
Adams-Millis Corp.	39.20833	36.80357	30.35714	29.14329	32.22917	30.42500	48.32143	35.34375	14.84375	14.46875
American Chain & Cable Co., Inc.	25.84375	29.56250	28.09375	33.46875	40.71875	46.46875	52.90000	57.37500	34.12500	35.37500
American Cyanamid Co.	66.15625	112.06250	47.00000	48.65625	58.50000	60.03125	57.96875	64.15625	77.87500	70.06250
Babbitt (B. T.), Inc.	12.93750	6.52500	5.42500	6.12500	6.93750	8.15625	8.46875	3.93750	4.09375	4.50000
Bausch & Lomb, Inc.	9.81250	13.15625	12.50000	14.37500	22.68750	25.75000	34.75000	38.96875	53.53125	88.46875
Bethlehem Steel Corp.	39.71875	51.78125	49.78125	49.78125	78.28125	147.75000	181.50000	54.21875	37.71875	37.78125
Buffalo Forge Co.	49.75000	46.21429	51.16667	56.50000	28.30000	31.82500	34.46875	33.56250	35.60000	41.40625
Champion Papers Inc.	39.65625	55.35000	29.96875	45.40625	58.62500	80.37500	42.21875	32.90625	37.25000	37.25000
Clopay Corp.	4.03125	4.46875	2.87541	2.75000	3.50000	2.56250	4.34375	2.37500	2.37500	3.22917
Continental Baking Co.	16.87500	18.06250	21.91667	24.62500	35.81250	41.62500	49.09375	56.87500	51.62500	44.68750
Crown Cork & Seal Co., Inc.	15.00000	15.96875	12.56250	15.18750	17.71875	23.56250	33.90625	127.37500	45.53125	53.18750
Crucible Steel Company of America	24.68750	32.93750	25.46875	28.62500	49.46875	44.56250	29.18750	23.75000	25.93750	24.96875
Cutler-Hammer, Inc.	27.12500	36.42500	38.00000	54.84375	70.58333	104.68750	77.20000	72.12500	51.15625	52.46875
Dana Corp.	21.78125	35.50000	33.22500	39.21875	48.53125	49.94643	74.37500[a]	91.18750	44.59375	41.84375
Douglas Aircraft Co., Inc.	84.46875	123.43750	69.59375	176.56250	76.56250	58.03125	46.00000	27.65625	52.12500	60.18750
Eastman Kodak Co.	45.31250	44.15625	44.12500	62.09375	78.46875	121.84375	89.34375	133.12500	186.12500[b]	245.00000
Eversharp, Inc.	11.53125	12.81250	13.71875	13.43750	15.37500	19.81250	22.87500	23.00000	23.06250	20.18750
Ferro Corp.	19.56250	31.62500	24.93750	26.37500	34.17500	30.82500	40.68750	47.50000	23.78125	27.25000
General Instrument Corp.	10.31250	9.40625	11.40625	10.00000	10.09375	11.18750	26.46875	13.34375	22.53125	46.21875
General Tire & Rubber Co.	27.87500	58.91667	28.46875	37.81250	59.37500	91.87500	70.78125	67.78125	24.25000	32.84375
Glidden Co.	27.68750	36.34375	30.90625	37.25000	40.28125	35.96875	45.40625	50.25000	57.17200[c]	54.84375
Great Western Sugar Co.	20.25000	17.65625	17.65000	20.21875	21.53125	27.62500	28.15625	37.84375	40.65625	38.84375
Holly Sugar Corp.	17.96875	18.02500	15.30000	19.00000	21.15625	21.56250	23.30000	37.93750	38.15625	37.18750
Hupp Corp.	3.46875	3.71875	3.40625	2.93750	7.37500	4.40625	7.37500	7.03125	6.43750	5.12500
Joy Manufacturing Co.	29.06250	35.68750	33.71875	36.62500	53.28125	60.15625	48.09375	37.34375	61.75000	65.18750
Kennecott Copper Corp.	60.78125	77.31250	65.84375	86.78125	114.78125	92.53125	100.50000	87.68750	101.12500	110.96875
Kimberly-Clark Corp.	37.75000	45.75000	43.00000	70.12500	48.93750	60.40625	66.25000	59.90625	59.90625	52.65625
Kroger Co.	64.56250	73.43750	42.31250	45.53125	43.34375	84.15625	30.56250	33.40625	38.93750	25.87500
Lily-Tulip Cup Corp.	60.00000[d]	87.68750	67.04167	102.65625	143.41667[e]	159.33333	110.06250[f]	67.00000	31.96875	27.53125

TABLE XIV (Cont.)

Corporation	Year									
	1950	1952	1953	1954	1955	1958	1959	1964	1965	1966
Mack Trucks, Inc.	14.78125	14.28125	12.00000	17.28125	26.40625	37.83325	43.00000	41.96875	39.25000	37.28125
May Department Stores Co.	52.25000	42.62500	28.71875	32.84375	39.53125	42.46675	48.84375	98.40625	57.25000	40.93750
Maytag Co.	14.56250	16.12500	17.82500	21.84375	31.78125	35.25000	75.56250[g]	159.50000	38.50000	31.03125
Moore Drop Forging Co.	8.87500	10.53125	10.70313	13.17188	15.46875	12.48438	15.12500	26.09375	29.12500	27.62500
National Can Corp.	7.18750	10.53125	11.21875	14.34375	13.09375	13.15625	10.12500	17.03125	24.65625	25.15625
New York Air Brake Co.	30.93750	39.87500	18.90625	20.78125	27.50000	21.00000	29.03125	37.00000	44.50000	46.43750
Norwich Pharmacal Co.	14.56250	20.71875	21.10000	27.09375	40.05000	89.00000	75.62500[h]	72.81250	48.53125	54.96875
Owens-Illinois, Inc.	67.71875	75.18750	75.56250	90.53125	121.62500[i]	150.31250	95.81250	101.84375	117.00000[j]	121.25000
Pittsburgh Forgings Co.	17.00000	16.56250	13.15000	14.30000	17.46875	15.18750	16.31250	32.53125	36.46875	34.62500
Pittsburgh Steel Co.	13.21875	20.68750	15.75000	19.56250	26.78125	19.43750	22.50000	15.96875	15.18750	12.06250
Quaker State Oil Refining Corp.	22.07813	25.03125	23.25000	24.35417	30.37500	26.15625	25.30000	50.65000	37.37500	43.35417
Reynolds Metals Co.	28.43750	55.84375	49.50000	87.37500	244.78125[k]	279.53125	98.79700[l]	56.15625	42.68750	51.21875
Safeway Stores, Inc.	33.34375	32.68750	36.75000	44.53125	45.18750	101.43750	37.37500	73.33333	34.12500	26.21875
Scott Paper Co.	84.31250	109.12500	62.96875	100.81250	67.62500	68.65625	79.18750	112.03125	37.09375	30.09375
Tobin Packing Co., Inc.	8.75000	8.25000	9.68750	13.09375	14.12500	15.75000	18.21875	24.64063	23.58333	18.68750
United States Gypsum Co.	113.81250	114.25000	111.31250	178.75000	281.68750	423.12500	100.87500	87.28125	72.06250	53.93750
United States Plywood Corp.	30.90625	31.09375	26.03125	30.21875	39.59375	34.84375	48.06250	77.40625	44.03125	41.50000
Waukesha Motor Co.	14.50000	17.06250	14.78125	17.87500	24.21875	32.18750	42.50000	37.70000	41.93750	44.15625
Wheeling Steel Corp.	62.00000	74.31250	34.59375	41.59375	55.21875	44.15625	58.71875	33.78125	25.87500	23.50000
Zenith Radio Corp.	57.81250	80.34375	69.40000	75.00000	120.56250	238.31250	314.25000[m]	422.06250	93.06250	125.68750

Notes:

Values in the table are adjusted for stock splits and stock dividends within each sub-period.

The following adjusted values should be used as the average stock price in the denominator of the measure of debtor or creditor status.
[a]43.130 [b]99.290 [c]22.060 [d]38.000 [e]54.875 [f]56.580 [g]38.000 [h]35.790 [i]33.750 [j]58.500 [k]52.810 [l]70.880 [m]105.000

TABLE XV

NUMBER OF SHARES OF COMMON STOCK OUTSTANDING

Corporation	Year				
	1950	1953	1955	1959	1965
Abbott Laboratories	3739814	3739819	3738970	3813815	13215685
Adams-Millis Corp.	156000	156000	156000	490650	758825
American Chain & Cable Co., Inc.	1057314	1057000	1057000	1143249	2488492
American Cyanamid Co.	3597344	8646261	9290696	21243916	22080689
Babbitt (B. T.), Inc.	1024597	1024597	1025797	1237230	1288640
Bausch & Lomb, Inc.	603821	620900	625259	864278	2006712
Bethlehem Steel Corp.	9582942	9582942	9597127	45455208	45987118
Buffalo Forge Co.	324786	649572	649572	649572	585072
Champion Papers Inc.	1102000	2204000	2204000	4408019	6380011
Clopay Corp.	700000	715000	715000	736450	724296
Continental Baking Co.	1075429	1075429	1477008	1957217	2068681
Crown Cork & Seal Co., Inc.	1207790	1207790	1207790	969005	4049967
Crucible Steel Company of America	488680	748624	1805280	3865631	4255434
Cutler-Hammer, Inc.	659998	659998	659998	1541672	3123556
Dana Corp.	2500000	2500000	2500000	5016584	6489541
Douglas Aircraft Co., Inc.	1200000	2403494	3689790	3816860	4634128
Eastman Kodak Co.	15033852	17407109	18277260	38382246	80602718
Eversharp, Inc.	941689	902924	902401	967231	2116879
Ferro Corp.	459296	589027	637580	748787	1748781
General Instrument Corp.	608573	817973	1373273	1730973	2675506
General Tire & Rubber Co.	586419	1207321	1244423	5311562	16828833
Glidden Co.	1971623	2290794	2295350	2307850	6130166
Great Western Sugar Co.	1800000	1800000	1800000	1800000	1800000
Holly Sugar Corp.	500000	500000	629186	677981	658320
Hupp Corp.	1995220	1995220	2637509	3692838	6394507
Joy Manufacturing Co.	881638	890924	1787908	1866050	1794992
Kennecott Copper Corp.	10821653	10821653	10821653	11053051	11053051
Kimberly-Clark Corp.	1994951	2044951	7670212	8739652	10179696
Kroger Co.	3673178	3681279	3705140	12410000	12515395
Lily-Tulip Cup Corp.	373693	673959	1563278	3198857	3200174
Mack Trucks, Inc.	1494668	1569402	1785699	2736696	2911712
May Department Stores Co.	2910466	5840927	5919454	6871677	14066460
Maytag Co.	1617921	1617921	1617921	3270930	6674309
Moore Drop Forging Co.	278008	289853	336916	336902	360697
National Can Corp.	727496	857496	1012102	1392085	2449579
New York Air Brake Co.	518240	723719	728741	739541	1540000
Norwich Pharmacal Co.	800062	899608	920208	3815252	3818551
Owens-Illinois, Inc.	3056874	3056874	6113748	7216692	14765290
Pittsburgh Forgings Co.	489720	621982	623385	648063	733528
Pittsburgh Steel Co.	931048	1306772	1463070	1586595	2790981
Quaker State Oil Refining Corp.	927305	825000	927305	825000	1541260
Reynolds Metals Co.	1394401	1802489	10055065	16920003	16624069
Safeway Stores, Inc.	2827703	3471478	3500414	12359422	25388294
Scott Paper Co.	1743696	3135341	7894815	7919636	28906293
Tobin Packing Co., Inc.	842200	851773	851773	868808	884268
United States Gypsum Co.	1599752	1599808	7999080	8040000	8087505
United States Plywood Corp.	1439185	1629835	2004034	2448480	6196209
Waukesha Motor Co.	600000	600000	600000	583746	597582
Wheeling Steel Corp.	1423897	1423897	1909780	2095528	2141232
Zenith Radio Corp.	492464	492464	492464	2954784	19728224

TABLE XVI

RANKS OF DEBTOR OR CREDITOR MONETARY STATUS

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
Abbott Laboratories	18	17	20	14	13
Adams-Millis Corp.	8	2	4	10	25
American Chain & Cable Co., Inc.	3	3	19	4	2
American Cyanamid Co.	21	26	28	26	15
Babbitt (B. T.), Inc.	19	4	3	35	37
Bausch & Lomb, Inc.	48	48	45	43	28
Bethlehem Steel Corp.	33	37	21	22	27
Buffalo Forge Co.	6	12	5	3	14
Champion Papers Inc.	34	36	35	36	39
Clopay Corp.	43	21	30	5	35
Continental Baking Co.	47	43	42	45	31
Crown Cork & Seal Co., Inc.	45	46	47	47	42
Crucible Steel Company of America	50	50	41	40	43
Cutler-Hammer, Inc.	12	11	14	16	19
Dana Corp.	16	34	26	19	16
Douglas Aircraft Co., Inc.	14	24	31	48	47
Eastman Kodak Co.	20	15	16	13	10
Eversharp, Inc.	5	14	6	6	34
Ferro Corp.	32	31	11	17	26
General Instrument Corp.	13	19	9	24	23
General Tire & Rubber Co.	30	40	43	33	32
Glidden Co.	25	10	18	29	21
Great Western Sugar Co.	39	41	24	44	38
Holly Sugar Corp.	46	45	46	46	48
Hupp Corp.	22	18	38	30	44
Joy Manufacturing Co.	15	23	29	28	9
Kennecott Copper Corp.	7	9	7	9	6
Kimberly-Clark Corp.	37	33	25	25	22
Kroger Co.	31	32	40	39	41
Lily-Tulip Cup Corp.	38	30	23	23	17
Mack Trucks, Inc.	35	39	36	31	46
May Department Stores Co.	26	20	34	15	20
Maytag Co.	29	28	32	11	3
Moore Drop Forging Co.	36	38	10	27	30
National Can Corp.	2	29	50	49	36
New York Air Brake Co.	11	1	13	21	5
Norwich Pharmacal Co.	24	16	17	12	8
Owens-Illinois, Inc.	23	22	27	32	24
Pittsburgh Forgings Co.	10	6	1	1	33
Pittsburgh Steel Co.	42	49	49	50	49
Quaker State Oil Refining Corp.	4	13	15	2	12
Reynolds Metals Co.	49	47	39	42	45
Safeway Stores, Inc.	44	42	48	37	29
Scott Paper Co.	28	25	33	34	18
Tobin Packing Co., Inc.	41	27	12	18	7
United States Gypsum Co.	9	7	22	8	4
United States Plywood Corp.	27	35	37	38	40
Waukesha Motor Co.	1	8	8	20	1
Wheeling Steel Corp.	40	44	44	41	50
Zenith Radio Corp.	17	5	2	7	11

TABLE XVII

RANKS OF STOCK PRICE RATIOS

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
Abbott Laboratories	22	9	41	44	16
Adams-Millis Corp.	6	4	15	10	28
American Chain & Cable Co., Inc.	25	24	29	26	32
American Cyanamid Co.	48	6	19	29	14
Babbitt (B. T.), Inc.	1	18	31	1	37
Bausch & Lomb, Inc.	36	21	28	30	48
Bethlehem Steel Corp.	34	45	32	8	10
Buffalo Forge Co.	5	15	22	22	42
Champion Papers Inc.	40	43	40	12	17
Clopay Corp.	19	3	4	3	49
Continental Baking Co.	16	16	30	31	12
Crown Cork & Seal Co., Inc.	15	28	39	50	43
Crucible Steel Company of America	37	17	14	13	25
Cutler-Hammer, Inc.	38	42	43	18	30
Dana Corp.	47	23	20	33	18
Douglas Aircraft Co., Inc.	42	50	5	6	40
Eastman Kodak Co.	10	40	46	39	45
Eversharp, Inc.	21	5	37	24	13
Ferro Corp.	46	8	2	32	39
General Instrument Corp.	4	2	23	2	50
General Tire & Rubber Co.	50	38	45	20	47
Glidden Co.	35	27	13	28	24
Great Western Sugar Co.	3	20	36	36	23
Holly Sugar Corp.	12	33	18	41	27
Hupp Corp.	17	1	1	19	7
Joy Manufacturing Co.	30	12	27	11	35
Kennecott Copper Corp.	31	37	8	15	36
Kimberly-Clark Corp.	29	48	33	17	26
Kroger Co.	24	10	47	27	1
Lily-Tulip Cup Corp.	43	44	25	7	11
Mack Trucks, Inc.	8	41	42	23	22
May Department Stores Co.	2	19	21	48	2
Maytag Co.	18	31	24	49	8
Moore Drop Forging Co.	27	32	9	43	20
National Can Corp.	44	35	16	42	29
New York Air Brake Co.	32	14	6	34	33
Norwich Pharmacal Co.	41	36	49	21	38
Owens-Illinois, Inc.	20	25	34	25	31
Pittsburgh Forgings Co.	9	13	11	46	21
Pittsburgh Steel Co.	45	34	3	9	6
Quaker State Oil Refining Corp.	23	7	10	47	41
Reynolds Metals Co.	49	49	35	4	44
Safeway Stores, Inc.	11	30	50	45	4
Scott Paper Co.	33	46	17	38	9
Tobin Packing Co., Inc.	7	39	26	37	5
United States Gypsum Co.	13	47	44	14	3
United States Plywood Corp.	14	22	12	40	19
Waukesha Motor Co.	26	29	38	16	34
Wheeling Steel Corp.	28	26	7	5	15
Zenith Radio Corp.	39	11	48	35	46

TABLE XVIII

RANKS OF DEBTOR OR CREDITOR MONETARY STATUS*

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
(+) Abbott Laboratories	11	2	19	23	8
(+) American Chain & Cable Co., Inc.	14	11	11	13	16
(-) Bausch & Lomb, Inc.	20	9	10	15	26
(+) Buffalo Forge Co.	2	5	9	11	20
(-) Champion Papers Inc.	23	22	18	4	9
(-) Continental Baking Co.	10	6	12	16	6
(-) Crown Cork & Seal Co., Inc.	9	13	17	26	21
(-) Crucible Steel Company of America	21	7	6	5	13
(+) Eastman Kodak Co.	4	20	23	20	23
(-) General Tire & Rubber Co.	26	19	22	10	25
(-) Great Western Sugar Co.	1	8	15	18	12
(-) Holly Sugar Corp.	6	16	8	22	15
(+) Kennecott Copper Corp.	17	18	3	7	18
(-) Kimberly-Clark Corp.	19	25	13	9	14
(-) Kroger Co.	13	3	24	14	1
(-) Mack Trucks, Inc.	3	21	20	12	11
(-) Pittsburgh Steel Co.	24	17	1	3	4
(+) Quaker State Oil Refining Corp.	12	1	4	25	19
(-) Reynolds Metals Co.	25	26	14	1	22
(-) Safeway Stores, Inc.	5	15	26	24	3
(-) Scott Paper Co.	18	23	7	19	5
(+) United States Gypsum Co.	7	24	21	6	2
(-) United States Plywood Corp.	8	10	5	21	10
(+) Waukesha Motor Co.	15	14	16	8	17
(-) Wheeling Steel Corp.	16	12	2	2	7
(+) Zenith Radio Corp.	22	4	25	17	24

*for the 26 firm sample

TABLE XIX

RANKS OF STOCK PRICE RATIOS*

Corporation	Sub-period				
	1950-52	1953-54	1955-58	1959-64	1965-66
(+) Abbott Laboratories	8	9	8	8	8
(+) American Chain & Cable Co., Inc.	2	1	7	3	2
(-) Bausch & Lomb, Inc.	24	24	22	21	12
(+) Buffalo Forge Co.	4	6	2	2	9
(-) Champion Papers Inc.	14	14	13	14	17
(-) Continental Baking Co.	23	19	19	23	14
(-) Crown Cork & Seal Co., Inc.	21	22	24	25	20
(-) Crucible Steel Company of America	26	26	18	18	21
(+) Eastman Kodak Co.	9	8	6	7	5
(-) General Tire & Rubber Co.	12	16	20	12	15
(-) Great Western Sugar Co.	17	17	10	22	16
(-) Holly Sugar Corp.	22	21	23	24	24
(+) Kennecott Copper Corp.	5	5	3	6	4
(-) Kimberly-Clark Corp.	16	12	11	10	11
(-) Kroger Co.	13	11	17	17	19
(-) Mack Trucks, Inc.	15	15	14	11	23
(-) Pittsburgh Steel Co.	19	25	26	26	25
(+) Quaker State Oil Refining Corp.	3	7	5	1	7
(-) Reynolds Metals Co.	25	23	16	20	22
(-) Safeway Stores, Inc.	20	18	25	15	13
(-) Scott Paper Co.	11	10	12	13	10
(+) United States Gypsum Co.	6	3	9	5	3
(-) United States Plywood Corp.	10	13	15	16	18
(+) Waukesha Motor Co.	1	4	4	9	1
(-) Wheeling Steel Corp.	18	20	21	19	26
(+) Zenith Radio Corp.	7	2	1	4	6

*for the 26 firm sample

VITA

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