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CURRENT PROBLEMS IN RESEARCH

Redistribution of Wealth through Inflation

Contrary to the generally accepted view, business firms do not necessarily gain through inflation.

Armen A. Alchian and Reuben A. Kessel

Economists have long speculated about the effects of inflation upon the economic welfare of the owners of business enterprises. This speculation has almost invariably led to the conclusion that business firms gain through inflation. This conclusion has been reached through two independent arguments. One, enunciated by both J. M. Keynes and I. Fisher, is that inflation enables business firms to discharge their debts with depreciated money, the creditors' losses being the debtors' gains (*1*). Strictly speaking, the validity of this conclusion depends upon two propositions: (i) that business firms are debtors, and (ii) that interest rates reflect biased estimates of the future course of prices when prices are rising. The other argument, advanced by E. J. Hamilton and W. C. Mitchell, is that inflation causes prices to rise faster than wage rates (*2*). Consequently workers are systematically underpaid during inflation, this loss by the working class being a gain for the entrepreneurs (*3*). This explanation rests upon special assumptions about the character of labor markets that are generally regarded as invalid in other markets.

Practical men of affairs, in particular investment advisers, have been much less confident than professional economists that the owners of business enterprises gain through inflation. They have generally concluded that investors can maintain their capital intact during inflation by investing in common stocks, such an investment being roughly equivalent to an investment in inventories. (Common stocks are ownership or equity shares in a corporation, while bonds represent debt obligations of the corporation.) In other words, an investor in common stock could expect neither to increase nor to decrease his wealth, whereas an investor in bonds and other cash-type investments would suffer a real loss.

This cautiousness of investment counselors is traceable to the experience of investors in equities during the great inflations that have occurred in countries with organized stock markets. It was found during the German runaway inflation following World War I, during the Austrian and French inflations of the 1920's, and more recently during the inflation in Chile that the owners of business firms did not obtain the gains that might have been expected on the basis of the hypotheses set forth by Keynes and Fisher, on the one hand, and Hamilton and Mitchell on the other. These observations are also consistent with the behavior of stock price indexes in the United States during the inflations associated with world wars I and II.

What was especially puzzling was the fate of the owners of banks. Banks are typically enormous debtors, larger debtors, in fact, than most business firms by an order of magnitude. Furthermore, banks employ relatively more labor per dollar of invested capital than is characteristic of business firms generally. Consequently, it is an implication of both hypotheses that banks ought to be enormous gainers through inflation. Yet the available evidence suggests that one of the regular results of inflation is that the owners of bank shares suffer. The experience of the owners of bank shares in the United States, Germany, Austria, Chile, and France suggests that the real value of bank shares declines during inflation. (Real value is simply price divided by an index number reflecting changes in the price level. Consequently, if the price of an asset rises more than the price level, then its real value has increased, and conversely.)

Reconciling Hypotheses with Experience

How can this evidence be reconciled with either of these hypotheses? A step toward reconciling the Keynes-Fisher reasoning with the lessons of experience as revealed by the stock market was taken by Kessel when he showed that, despite the enormous debts owed by banks to depositors, there exist offsetting credits that are even larger than these debts (*4*). These credits are bank assets which are almost entirely (with the exception of bank buildings and business machines) either money or money-type assets such as notes and other obligations payable to banks by either private customers or the government. The existence of these credits led Kessel to argue that one should do more than merely look at the credit that business firms have extended to their customers. What business firms gain from bondholders may be lost to those to whom these firms have extended credit and may never redound to the interests of the owners.

From his analysis emerged a classification for determining whether or not a business firm is, on *net* balance, a debtor

Dr. Alchian is professor of economics at the University of California, Los Angeles. Dr. Kessel is assistant professor of economics at the University of Chicago, Chicago, Ill.

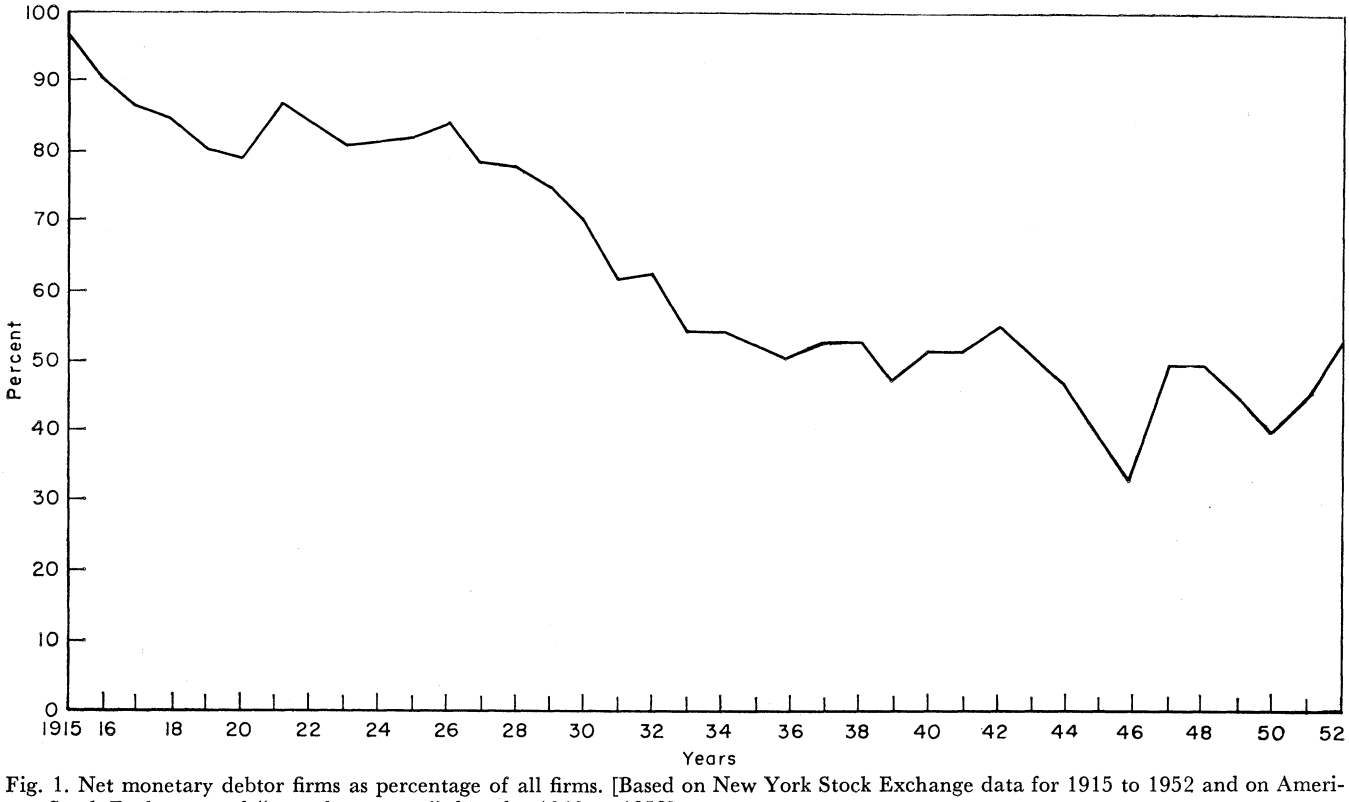

Fig. 1. Net monetary debtor firms as percentage of all firms. [Based on New York Stock Exchange data for 1915 to 1952 and on American Stock Exchange and "over-the-counter" data for 1940 to 1952]

or creditor. Kessel classified assets and liabilities into categories, monetary and real. A monetary asset was defined as an asset whose market value is independent of changes in the price level. These would include money, accounts and notes receivable, government and corporate bonds, life insurance, prepaid taxes, and so on. A monetary liability was defined as a liability whose amount is independent of changes in the price level; these would include accounts payable, notes payable, mortgages, bonds, preferred stock, and so on. Preferred stock, although called a stock, is typically corporate debt rather than equity. 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 price of shares times the number of shares outstanding, is used as the measure of net monetary debtor or creditor status (*5*). The effects of stock dividends, stock splits, and rights offerings were held constant and did not affect measurements of changes in stock prices. "Stock dividends" and "splits" increase the number of shares of common stock without changing the total investment, whereas "rights" entitle existing stockholders to increase the investment in the corporation by purchasing new shares at a price below existing market prices, thereby also involving some dilution in per-share value. And it was assumed that dividends were continuously reinvested in the shares of the companies that issued them, because this would eliminate variations caused by differences in the extent to which profits were reinvested.

For the United States, Kessel found in his preliminary study that banks were typically net monetary creditors, and that the real value of their shares actually did decline during the World War II inflation, in accordance with the Keynes-Fisher hypothesis. Furthermore, the real value of bank shares seems to have gone down during inflation for every country for which data are available.

Kessel also examined the balance sheets of a small random sample of industrial firms whose stock is traded on the New York Stock Exchange. (Railroads, utilities, and investment companies were omitted. Railroads and utilities were not included because it was supposed that their very close regulation might conceal the effects of inflation upon their stock prices. Investment companies were omitted because of the magnitude of the problems encountered in evaluating the debtor-creditor status of their assets.) In 1939, about 40 percent of the observed firms were creditors and could be expected to lose through inflation, according to the Keynes-Fisher reasoning. After the firms had been divided into the two categories, debtor and creditor, and after the changes in share prices between 1939 and 1946 had been examined, a significant difference was detected between the rise of share prices in the two categories. The share prices of net monetary debtor firms rose significantly more than the prices of net monetary creditor firms. For a period of deflation, 1929–1933, the reverse was found to be true. The share prices of net monetary creditors fell significantly less than the share prices of net monetary debtors.

The behavior of the stock prices of bank shares during the inflation associated with World War II was indistinguishable from the behavior of the shares of equivalent industrial creditors. Other evidence indicates that banks were characterized by large amounts of labor per dollar of invested capital as compared with enterprises generally. This evidence casts doubt upon the validity of the Hamilton-Mitchell reasoning, that infla-

tion causes real wages to fall. If the wage lag had been operative, the value of bank shares would have risen more than the value of the shares of equivalent industrial creditors.

This evidence validated the proposition that during inflation interest rates are systematically lower than they ought to be if inflation is not to transfer wealth from creditors to debtors, but it also challenged the assumption that business firms are, in large part, debtors. The mechanism for redistribution that Keynes and Fisher envisaged was correct, but their assumption that business firms were generally debtors was wrong, and it was this that led them to the erroneous conclusion that business firms gain through inflation. This evidence also explains the behavior of stock-price indexes during inflation. If a substantial fraction of all business firms were net monetary creditors, then an index number of stock prices that was composed of both net monetary debtors and net monetary creditors would not necessarily rise in real value during inflation. Indeed, if the debtors just balance out the creditors, one would expect stock prices generally to keep pace pretty closely with the general price level. These results led to a much larger-scale investigation, designed both to provide stronger evidence of the validity of the mechanism for redistribution envisaged by Keynes and Fisher and to enlarge our empirical knowledge of stock prices (*6*).

New Evidence for Mechanism of Redistribution

The population of firms investigated includes all of the industrials whose common stock was traded on the New York Stock Exchange at any time between 1914 and 1952. For 1933–1952, the American Stock Exchange was also included. Furthermore, four separate industries were studied for the period 1940–1952—chemicals, steels, retailing, and textiles—in order to hold constant any industry differences. The period of the study, 1915–1952, includes two inflations (world wars I and II), two deflations (1921–22 and 1928–1933), and two periods of relative price stability (1923–1930 and 1933–1940). The number of firms observed in a year ranged from a minimum of 71 to a maximum of 885. In all, nearly 14,000 firm-years of data were observed and analyzed.

What do these data show? The distribution of firms by net monetary debtor and net monetary creditor status has changed spectacularly since 1914. The percentage of firms in each category is shown in Fig. 1. These data are based on the New York and the American Stock Exchange samples. The shift from predominantly 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.

Apparently individual firms usually did not shift their net monetary status frequently. A firm that was a net monetary debtor in one year was very likely to be one in the next year, despite a gradual shift of the population as a whole. A classification of firms during

Table 1. Observed stock price values (with reinvested dividends) for episodes of inflations, deflations, and stable prices, by exchanges and industries. [From *Moody's Industrials* (1914–1953); *Commercial and Financial Chronicles* (1921–1953); *Bank and Quotation Journals* (1928–1953); and New York *Times* (1915–1953)]

Population sampled	Kind and No. of firms*		Mean resulting equity value† ($)	Mean of debtor minus creditor‡ ($)	t§	p‖
		Inflations				
1915–1920:						
New York Stock Exchange	Debtors	78	2.66	+1.06	3.27	.001
New York Stock Exchange	Creditors	22	1.60			
1940–1952:						
New York Stock Exchange	Debtors	29	5.93	+1.47	1.80	.05
New York Stock Exchange	Creditors	35	4.46			
American Stock Exchange	Debtors	57	11.30	+3.25	1.65	.05
American Stock Exchange	Creditors	70	8.05			
Over-the-counter	Debtors	22	9.38	+2.93	1.19	.12
Over-the-counter	Creditors	45	6.45			
Steel industry	Debtors	29	6.92	+0.25	.15	.44
Steel industry	Creditors	27	6.67			
Chemical industry	Debtors	19	7.17	+2.53	1.24	.12
Chemical industry	Creditors	19	4.54			
Textile industry	Debtors	29	16.33	+6.67	1.45	.07
Textile industry	Creditors	22	9.66			
Department stores	Debtors	29	8.96	+4.81	2.64	.007
Department stores	Creditors	22	4.15			
New York Stock Exchange wage firms	Debtors	50	7.85	+2.07	1.76	.04
New York Stock Exchange wage firms	Creditors	32	5.78			
		Deflations				
1921–1922:						
New York Stock Exchange	Debtors	118	1.48	−0.30	−1.73	.045
New York Stock Exchange	Creditors	24	1.78			
1928–1933:						
New York Stock Exchange	Debtors	63	.49	−0.60	−3.17	.001
New York Stock Exchange	Creditors	35	1.09			
		Stable prices				
1923–1930:						
New York Stock Exchange	Debtors	50	2.78	+0.45	1.08	.14
New York Stock Exchange	Creditors	15	2.33			
1933–1940:						
New York Stock Exchange	Debtors	56	4.31	−0.80	−.89	.81
New York Stock Exchange	Creditors	54	5.11			
American Stock Exchange (curb)	Debtors	17	6.44	+1.72	+.71	.52
American Stock Exchange (curb)	Creditors	20	4.72			

* Number of firms that maintained debtor (or creditor) monetary status during at least ⅔ of the episode.
† Mean price plus reinvested dividends at the end of the episode, per dollar of 1940 stock prices.
‡ Mean equity value for net monetary debtors minus mean value for net monetray creditors.
§ Student's t test coefficient:

$$t = d \Big/ \left(\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}\right)^{1/2}$$

‖ Sampling probability of t (one-tailed) based on Welch approximation. [B. L. Welch, "The generalization of student's problem when several different population variances are involved," *Biometrika* 34, 28 (1947). Two-tailed test is used for periods of price stability]

the 1915–1920 inflation according to net monetary status shows that 78 of the firms were net monetary creditors during at least 4 years of the 6-year span, while 22 were net montary debtors during at least 4 of the 6 years. A few did not retain their status for as long as 4 years. According to Keynes and Fisher the net monetary debtors should have had an increase in the values of their stocks relative to the net monetary creditors. The observed data show that $1 of equity of the net monetary debtors increased to $2.66, while the net monetary creditors' dollar increased to only

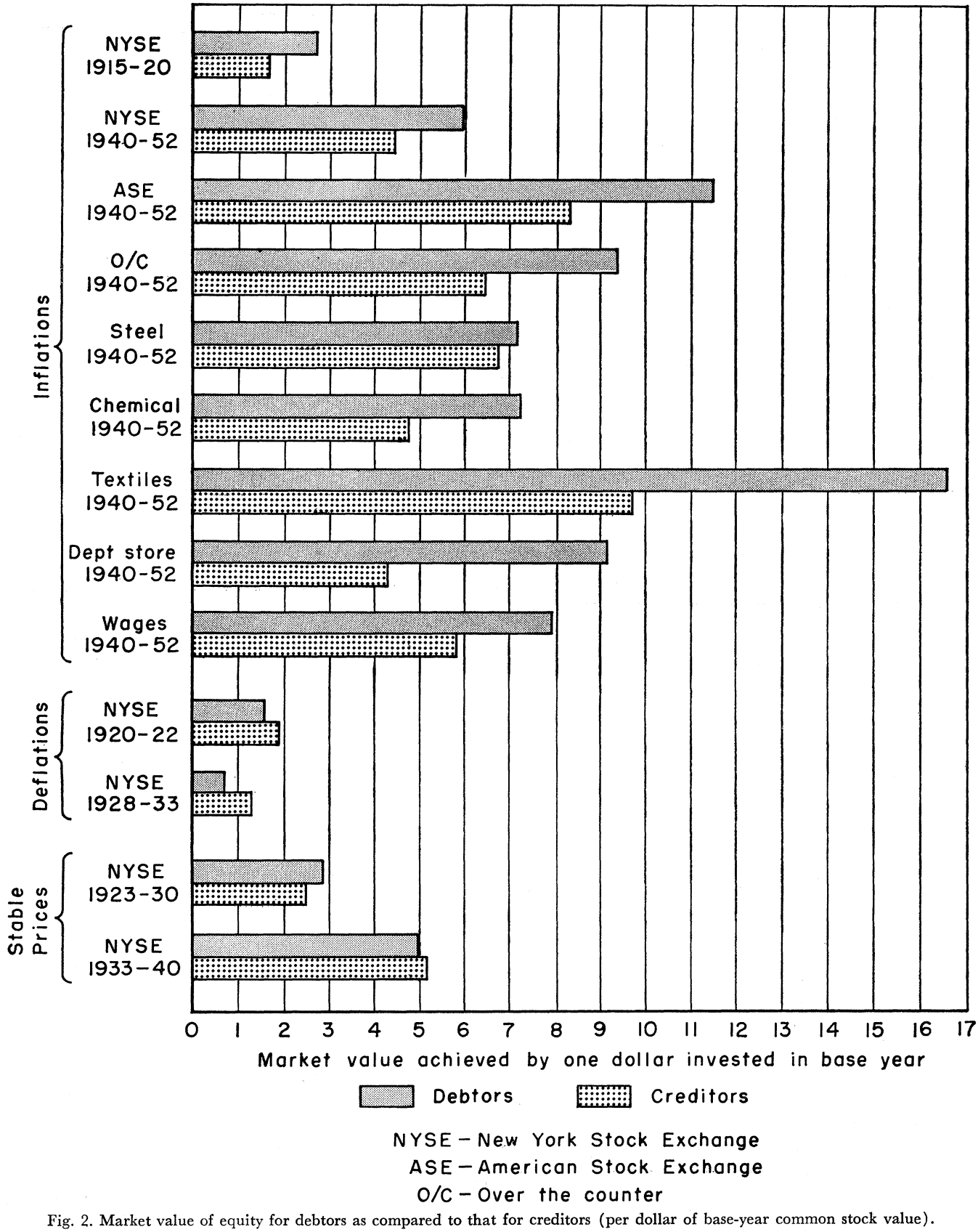

Fig. 2. Market value of equity for debtors as compared to that for creditors (per dollar of base-year common stock value).

$1.60; the superiority is 57 percent and one which would have less than 1 chance in 1000 of occurring by an unusually favorable random selection of firms if there really were no transfers of wealth from creditors to debtors.

Table 1 contains more details, as well as the results for the inflation of 1940–1952, for each of the populations of firms studied. In every instance the net monetary debtors did better. In Fig. 2 these results are given in the form of a graph. The probability sampling levels are sufficiently small to make it extraordinarily difficult to attribute such results to random sampling. And when the probability levels are combined by the R. Fisher chi-square method, the sampling probability falls to below 1 chance in 10,000.

To test whether the results are attributable to inflation rather than to a hidden factor which makes the better firms become net monetary debtors, the deflationary episodes were also considered. In the two deflations of 1921–22 and 1928–1933, the firms were again classified according to whether they were persistently net monetary debtors or creditors. In the short deflation of 1921–22, each firm in the sample maintained its monetary status during the entire period. In the 1928–1933 episode, one deviation was permitted. In both deflations the net monetary creditors did better than the net monetary debtors—just the opposite of the finding for inflations and in conformance with the predictions of the Keynes-Fisher model. The sampling probability levels are small, being less than 5 percent for the short deflation of 1920–22 and less than 0.1 percent for 1929–1932. The combined sampling probability is less than 0.01. Finally, for the periods of price stability of 1923–1930 and 1933–1940, a similar classification of firms revealed no difference in performance between the net monetary creditors and the net monetary debtors, again in conformance with the Keynes-Fisher hypothesis as modified here. These results are also given in Table 1.

But what about the Mitchell-Hamilton wage-lag hypothesis and its implications for business profits? Possibly labor intensiveness is correlated with net monetary status. Under these circumstances, the wage lag, while unrevealed, might yet be operative. To explore this possibility as well as the possibility that growth might be correlated with debtor-creditor status, a sample of 113 firms listed on the New York Stock Exchange was obtained. These firms were the entire population of industrials that reported wage bills some time during the interval 1940 to 1952. Three variables—(i) net monetary debtor or creditor status per dollar of equity, (ii) wages paid per year per dollar of equity, and (iii) yearly sales per dollar of equity—were evaluated for potential predictive content by means of partial correlation analysis. (Equity values were determined by the market price of shares.) And in order to avoid violating assumptions underlying probability tests of significance for correlation analysis, ranks for the three independent variables were used.

The results of this analysis revealed that *only* net monetary status was correlated with relative stock price changes, and that this correlation was in the predicted direction. Moreover, the chance that this observation would be produced by random sampling from a population characterized by an absence of this correlation is less than 1 in 1000. This evidence is completely consistent with the hypothesis that the wage lag is inoperative—that is, that the imperfection of the labor market postulated by the wage-lag theorists is nonexistent. Consequently, these results must be regarded as evidence against the hypothesis that a wage lag increases business profits during inflation. However, one must not lose sight of the fact that this is only partial evidence, from a nonrandom sample consisting of 113 firms.

Conclusion

These results, reported here for the first time, while constituting overwhelming evidence in support of the Keynes-Fisher reasoning about the bias in interest rates during inflation, fail to support their conclusion that business firms gain through inflation. The frequency of debtors in the business population is not great enough to justify Keynes and Fisher's sweeping statements about the gains of business enterprise through inflation. This evidence also suggests that the Keynes-Fisher theorizing about the effects of inflation is not specific to business enterprises; it is a general theory of wealth transfers caused by inflation and is equally applicable to individuals. What count are monetary asset and monetary liability positions and not the type of economic activity in which one engages.

Especially pertinent to much of the current discussion of the consequences of inflation is that the present evidence, by validating the wealth-transfer effect from monetary creditors to monetary debtors (and rejecting the wage-lag hypothesis), verifies the implication that inflation is basically a "tax" on creditors in favor of debtors. Inflation constitutes a tax on the wealth of individuals to the extent that they are holders of money-type assets rather than savers, wage-earners, businessmen, widows, orphans, or retired schoolteachers.

These results have implications for the adjustment of personal investment and wealth portfolios (including not only stocks, but bonds, life insurance, mortgages, charge accounts, cash holdings, and so on) in order to hedge against inflation or to profit if inflation comes. Similar reasoning applies to the management of investment, pension, and trust funds.

References and Notes

1. J. M. Keynes, *Tract on Monetary Reform* (London, 1923), p. 18; I. Fisher, *The Purchasing Power of Money* (New York, 1920), pp. 58–73, 190–191.
2. E. J. Hamilton, *J. Econ. Hist.* 12, 325 (1952); W. C. Mitchell, *A History of the Greenbacks* (Chicago, 1903), pp. 347–348; ———, *Gold, Prices, and Wages under the Greenback Standard* (Berkeley, 1908), pp. 275–276.
3. Some economists and noneconomists also contend that anyone who holds inventories gains through inflation. Since the price of inventories rises above their cost, this difference is regarded as a real gain in economic welfare. But holders of inventories cannot acquire with their inventories any more of the world's goods and services than they could in the absence of inflation.
4. R. A. Kessel, *Am. Econ. Rev.* 46, 130 (1956).
5. This is one of the respects in which the present study is an advance over Kessel's early work. While his concept of net debtor or net creditor was correct, his criterion of *intensity* of debtor or creditor status was wrong, and consequently the measurements based upon his criterion were also wrong.

6. This study was undertaken with the aid of a research grant from the Merrill Foundation for the Advancement of Financial Knowledge. The article, from this point on, constitutes the first statement of some of the results of this study.