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The Impact of Inflation on ROE, Growth and Stock Prices

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Using the constant growth dividend discount model (DDM), it can be shown that the critical factor which determines whether common stocks will be able to be an inflation hedge is the growth rate of dividends. In turn, the growth of dividends is mainly impacted by the aggregate return on equity (ROE). Using the DuPont formula, it is clear that the main variable that drives the aggregate ROE in an inflationary environment is the profit margin.

Following from this background, this article updates and extends an earlier analysis that involves an analysis of ROE and its components for the 40-year period 1956-1995. The analysis demonstrates that the aggregate ROE is currently at about the same level as in the 1960's, but the components have changed, that is, there has been a decline in total asset turnover and profit margin, but a significant increase in financial leverage that has compensated for the declines in turnover and profit margin. It is further shown that there have been periods of high and low inflation since 1956, and the negative impact of inflation of the implied growth rate is confirmed, which helps explain why investigators find consistent empirical results that common stocks are poor inflation hedges.

I. INTRODUCTION

An article by Fuller and Petry (F&P, 1981) using data through 1979 considered the ability of common stocks to provide a hedge against inflation. Using the constant growth dividend discount model (DDM), it was shown that the critical factor which determined whether common stocks would provide the higher rates of return required of an inflation hedge is the growth rate of dividends (g). In turn, it is known from Babcock (1970) that g is a function of the retention rate and the return on equity (ROE). Finally, they employed the DuPont formula which shows that ROE is composed of: (a) the net profit margin (PM), (b) the total asset turnover (TAT), and (c) a financial leverage variable equal to assets/equity (LEV). It is shown that the critical variable that constrained the increase in ROE (and, therefore, the increase in g) was the profit margin. Having identified the profit margin as the culprit, the authors conclude the article on an optimistic note because they contend that management

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as of 1980 had recognized the importance of maintaining the profit margin. The concluding section of the article assumes stability for the profit margin and considers the effect of several scenarios where stocks sell at alternative price to book value ratios (P/BV).

This paper extends this interesting analysis in several ways. First, we include the 16 years since the original presentation, second we expand the analysis of the profit margin, and finally, we analyze the ROE using a five part analysis suggested by Cohen, Zinbarg and Zeikel (1987). The five part analysis of ROE provides additional insights into what has caused the changes in ROE during the past 19 years and indicates what might transpire in the years ahead with and without changes in the rate of inflation.

The first section contains a brief review of the dividend discount model (DDM) and its implications related to inflation and stock prices. The second section considers the DuPont formula breakdown and analyzes changes in the three components for the Fortune 500–S&P 400 since 1956 with an emphasis on the period since 1979. In the third section, we discuss the five part breakdown of ROE and examine these five components for the S&P 400 during the period 1977-1995 (the data were not available prior to 1977). Section four contains an analysis of the relationships among inflation, rates of return on stock, ROE, and the components of ROE. In section five, we consider what happens to stock returns, ROE components and earnings growth during periods of high and low rates of inflation. We conclude with a discussion of the outlook for ROE and growth in an environment of low and high rates of inflation.

II. THE DIVIDEND DISCOUNT MODEL (DDM)

Readers are familiar with the reduced form of the dividend discount model as it would apply to the aggregate stock market:[1]

$$P = \frac{D_1}{k-g}, \tag{1}$$

where

P = the price of stocks;
D_1 = expected dividend in period 1 [D_0 (1+g)];
k = the required rate of return on stocks; and
g = the expected growth rate of dividends for common stocks.

Using this model, it is possible to consider: (a) what will happen if expectations change regarding the rate of inflation, and (b) what must happen if common stocks are to be a complete hedge against inflation.

A *hedge* is a transaction intended to safeguard against loss on another investment. A hedge against inflation, then, is the acquisition of an asset that will safeguard against an increase in the general price level. In the case of common stocks, the *expected* rate of return should increase in line with the *required* rate of return that includes the expected rate of inflation. The point is, we know that the required rate of return (k_i) *is determined by a real risk free rate, the expected rate of inflation, and a risk premium.*[2] *Therefore, given a change in the expected rate of inflation, there will be an increase in k* for all risky assets including common stocks. Given a change in k, the crucial question becomes: What will happen to the value

of the asset to ensure that the investor will receive the higher nominal required rate of return (k)? One way to view this is to transform the DDM valuation model as follows:

If

$$P = \frac{D_1}{k-g},$$

then

$$k = \frac{D_1}{P} + g. \tag{2}$$

Given this specification, if there is an increase in the expected rate of inflation and nothing happens to the expected growth rate of dividends of firms (i.e., there is no change in g or D_1), *we can see that stock prices must decline—that is, the* P must decline until there is an increase in the D_1/P term to compensate for the increase in the required return. This scenario is similar to a bond where the price of the bond must necessarily adjust to increase the expected yield because there is no change in the expected cash flows (interest payments). Clearly, during such a period of price adjustment, the investor who owns stocks (or bonds) will experience large negative returns.

Another possibility is that the growth rate of dividends (g) will increase by approximately the increase in the rate of inflation. If this occurs, stock prices will not change, because the spread between k and g will change only slightly. The expected return on stocks (k) will increase because of the increase in g and an increase in the dividend yield because of an increase in D_1 which equals $D_0(1 + g)$. Therefore, in this scenario the investor's *expected* rate of return (k) has increased in line with a change in expected inflation, and common stocks will be a complete inflation hedge. The point is, g *must increase by almost the change in the expected rate of inflation if common stocks are to be a complete inflation hedge without stock prices declining.* Such an increase in g is the implicit assumption made by observers who contend that common stocks should be an inflation hedge. For example, when Jahnke (1975, p. 74) employs the dividend model to explain changes in stock prices, he states, "Thus common stocks should serve as a hedge against inflation to the extent that changes in the rate of inflation are mirrored in the dividend growth rate."

III. A SECULAR ANALYSIS OF ROE AND ITS DUPONT COMPONENTS

As noted, the crucial factor affecting the growth of dividends is the aggregate ROE. In turn, we can analyze ROE using the traditional DuPont formulation which includes three components as follows:

$$\frac{Net\ Income}{Equity} = \frac{Sales}{Total\ Assets} \times \frac{Net\ Income}{Sales} \times \frac{Total\ Assets}{Equity} \tag{3}$$

As noted by Fuller and Petry, these ratios are not available for the Standard & Poor's series prior to 1977. Alternatively, they are available for the Fortune 500 industrial series which

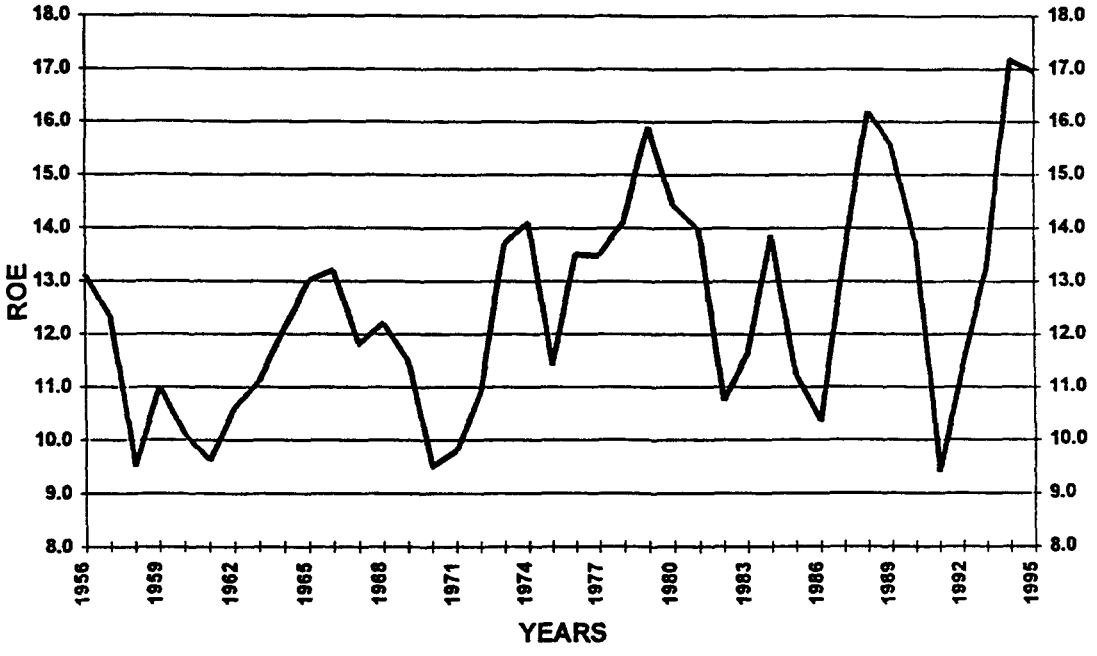

Figure 1. Time Series Plot of Return on Equity (ROE) for Fortune 500 - S&P 400: 1956-1995.

is correlated very highly to the S&P 400 industrial series. Table 1 contains the data and the ratios for the 40-year period 1956-1995 wherein the data are for the Fortune 500 during the period 1956-1976 and for the S&P 400 for the period 1977-1995. Figure 1 shows that the ROE ranged from about 10 to 17 percent, but began at about 13 percent and was at 13 percent in 1993 prior to a spurt to about 17 percent in 1994 and 1995. The significant question is: "How did the three components of ROE contribute to this performance?" We know that

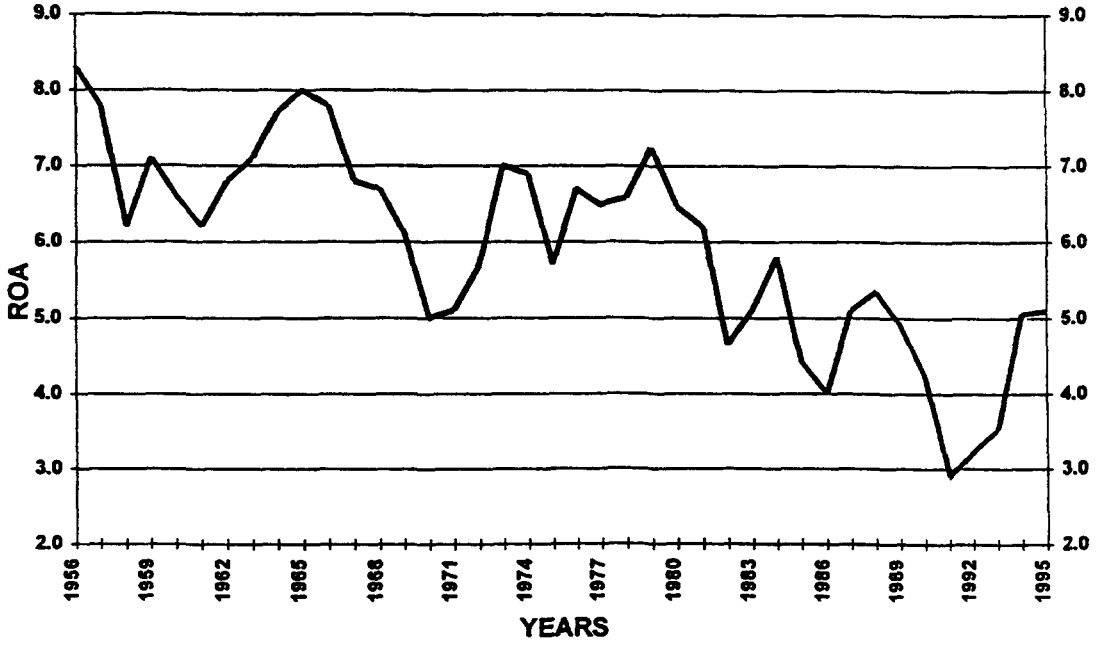

Figure 2. Time Series Plot of Return on Assets (ROA) for Fortune 500 - S&P 400: 1956-1995.

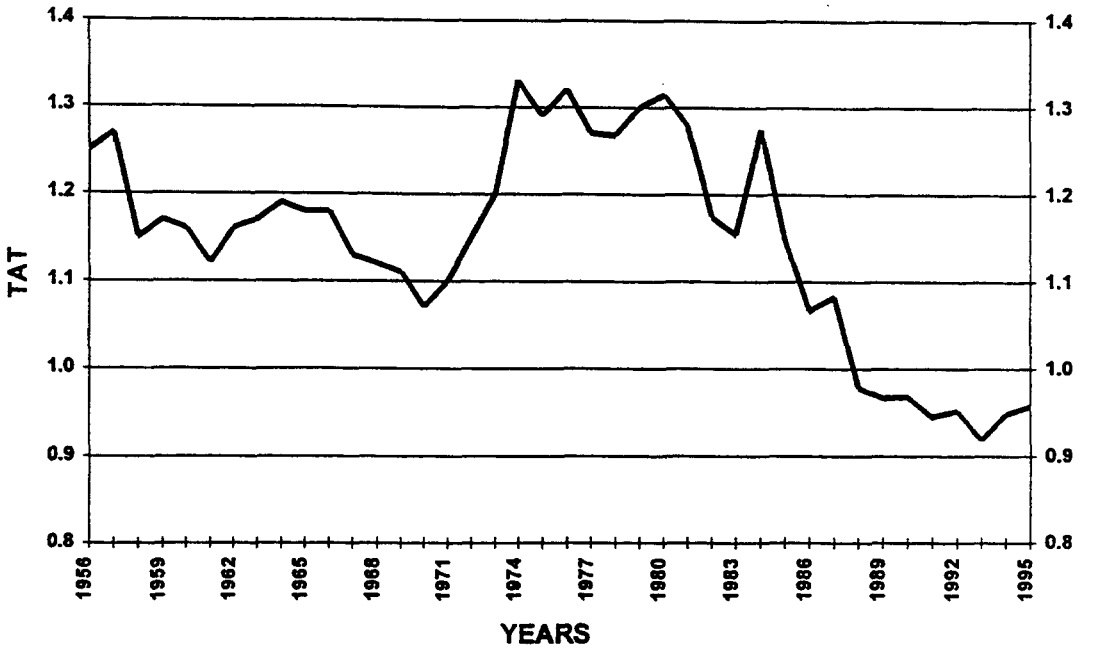

Figure 3. Time Series Plot of Total Asset Turnover (TAT) for Fortune 500 - S&P 400:1956-1995.

the product of the first two ratios [total asset turnover (TAT) and net profit margin (PM)], equals return on assets (ROA). The plot in Figure 2 shows that the ROA has generally *declined* from about 8 percent in 1956 to 5 percent in 1994-1995 after a trough of 2.9 percent in 1991. The fact is, both TAT and PM contributed to the overall decline. As shown in

TABLE 1
Nominal and Real Rates of Return for the S&P; 500 Return on Equity and DuPont Components for Fortune 500 and S&P 400: 1956-1995

	S&P 500 Total Return	*U.S. Inflation Rate*	*Infl Adj S&P 500 % TR*	*Total Asset Turnover**	*Profit Margin**	*Return on Assets**	*T. Assets to Equity**	*Return on Equity**
1956	6.56	2.86	3.59	1.25	6.6	8.3	1.59	13.10
1957	-10.78	3.02	-13.40	1.27	6.2	7.9	1.57	12.30
1958	43.36	1.76	40.88	1.15	5.4	6.2	1.53	9.50
1959	11.96	1.50	10.30	1.17	6.1	7.1	1.55	11.00
1960	0.47	1.48	-0.99	1.16	5.7	6.6	1.53	10.10
1961	26.89	0.67	26.04	1.12	5.6	6.2	1.54	9.60
1962	-8.73	1.22	-9.83	1.16	5.9	6.8	1.55	10.60
1963	22.80	1.65	20.81	1.17	6.1	7.1	1.56	11.10
1964	16.48	1.19	15.11	1.19	6.5	7.7	1.58	12.10
1965	12.45	1.92	10.33	1.18	6.7	8.0	1.63	13.00

(continued)

TABLE 1 (continued)

	S&P 500 Total Return	*U.S. Inflation Rate*	*Infl Adj S&P 500 % TR*	*Total Asset Turnover**	*Profit Margin**	*Return on Assets**	*T. Assets to Equity**	*Return on Equity**
1966	-10.06	3.35	-12.98	1.18	6.6	7.8	1.69	13.20
1967	23.98	3.04	20.32	1.13	6.0	6.8	1.74	11.80
1968	11.06	4.73	6.05	1.12	5.6	6.7	1.82	12.20
1969	-8.51	6.11	-13.77	1.11	5.5	6.1	1.87	11.50
1970	4.01	5.49	-1.41	1.07	4.7	5.0	1.90	9.50
1971	14.31	3.36	10.60	1.10	4.7	5.1	1.90	9.80
1972	18.98	3.41	15.05	1.15	5.0	5.7	1.90	10.90
1973	-14.66	8.80	-21.56	1.20	5.8	7.0	1.96	13.70
1974	-26.47	12.20	-34.47	1.33	5.2	6.9	2.03	14.10
1975	37.20	7.01	28.21	1.29	4.9	6.5	2.23	14.43
1976	23.84	4.81	18.16	1.32	5.1	6.7	2.01	13.50
1977	-7.18	6.77	-13.07	1.27	5.1	6.5	2.08	13.47
1978	6.56	9.03	-2.26	1.27	5.2	6.6	2.15	14.11
1979	18.44	13.31	4.53	1.30	5.6	7.2	2.20	15.90
1980	32.16	12.40	17.81	1.31	4.9	6.5	2.23	14.43
1981	-4.91	8.94	-12.71	1.28	4.9	6.2	2.25	13.97
1982	21.41	3.87	16.88	1.17	4.0	4.6	2.31	10.73
1983	22.51	3.80	18.03	1.15	4.4	5.1	2.28	11.63
1984	6.27	3.95	2.22	1.27	4.6	5.8	2.39	13.86
1985	32.16	3.77	27.36	1.15	3.8	4.4	2.54	11.21
1986	18.47	1.13	17.15	1.07	3.7	4.0	2.58	10.33
1987	5.23	4.41	0.79	1.08	4.7	5.1	2.62	13.35
1988	16.81	4.42	11.87	0.98	5.5	5.3	3.03	16.19
1989	31.49	4.65	25.65	0.97	5.1	4.9	3.17	15.56
1990	-3.17	6.11	-8.75	0.97	4.4	4.2	3.26	13.74
1991	30.55	3.06	26.67	0.94	3.1	2.9	3.24	9.39
1992	7.67	2.90	4.64	0.95	3.4	3.2	3.55	11.45
1993	9.99	2.75	7.05	0.92	3.8	3.5	3.76	13.25
1994	1.31	2.68	-1.33	0.95	5.3	5.0	3.40	17.18
1995	37.43	2.54	34.03	0.96	5.3	5.1	3.32	16.95

Notes: * The ratios for the period 1956-1976 are for the Fortune 500 Industrials; for the period 1977-1995 for the S&P 400.

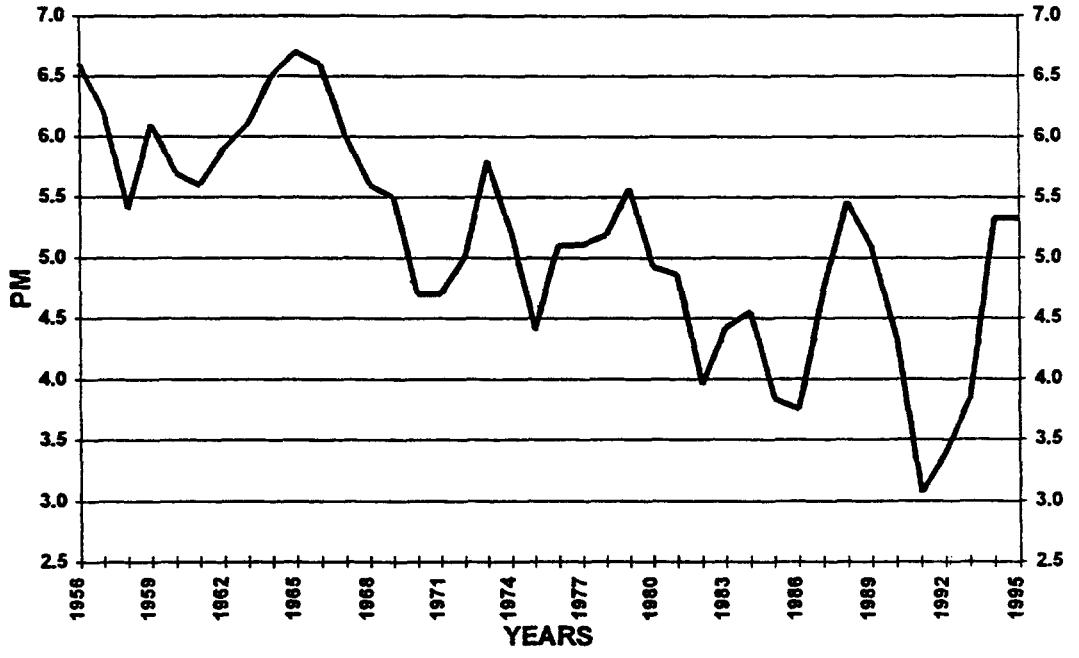

***Figure* 4.** Time Series Plot of Profit Margin (PM) for Fortune 500 - S&P 400: 1956-1995.

Figure 3, the TAT ratio started at about 1.25, peaked during the period 1974-1980 (when the F&P article was published) and subsequently declined to 0.96 in 1995. Notably, this decline was not envisioned by F&P. Specifically they note that one should expect a *positive bias* for the TAT ratio during periods of inflation because sales should be affected by infla-

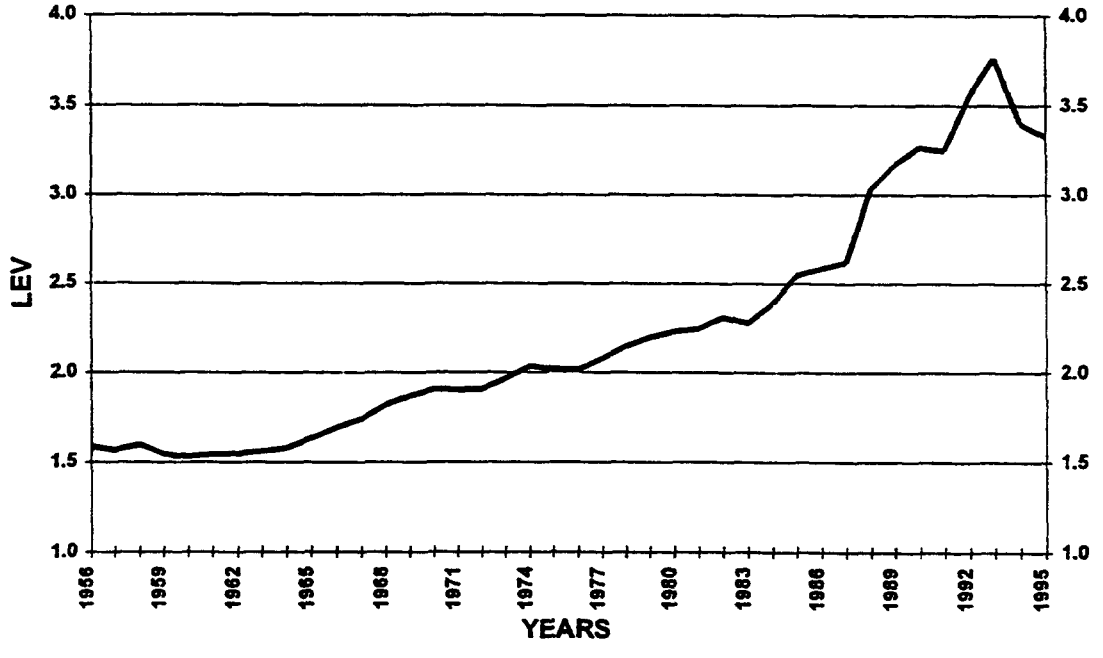

***Figure* 5.** Time Series Plot of Leverage (LEV) for Fortune 500 - S&P 400: 1956-1995.

tion (i.e., sales are in current dollars), while most asset values are based on historical costs which are not adjusted for higher prices.

As shown in Figure 4, the PM also declined from 6.6 percent in 1956 to a low of 3.1 percent in 1991 followed by a recovery to 5.3 percent in 1994-1995. Again, this ratio should be constant or possibly increase during inflation because sales (revenue) are in current dollars, while many costs such as depreciation do not fully reflect the inflation. As of 1980, F&P felt that management recognized the problem regarding declining profit margins and was responding to it. Unfortunately, the results in Figure 4, for the subsequent period 1979-1993 do not support this expectation. Specifically, the PM declined sharply as expected during the 1981-1982 recession, recovered to over 5.5 percent in 1988, but declined to 3 percent in 1991 and finished at 5.3 percent in 1995. Clearly, the overall secular decline shown in Figure 4 extended through 1993.

We know from the prior equations that ROA times the leverage ratio (T. Assets/ Equity) equals ROE. Given the overall declines in TAT, PM and ROA, and an ROE that did not experience a secular decline, it is obvious that there must have been a *significant increase* in the financial leverage multiplier (LEV) that offset the decline in ROA. The graph of the financial leverage ratio in Figure 5 clearly confirms that financial leverage more than doubled from 1.59 in 1956 to a peak of 3.76 in 1993 prior to finishing at 3.32 in 1995. Clearly, the overall increase in this leverage ratio offset the decline in ROA.

In summary, these results show that the U.S. economy maintained and even increased its ROE over the period 1956-1995, but the values for the three DuPont components have changed. Specifically, we have *lower* operating efficiency as reflected by TAT, and *lower* profit margins, but these declines have been offset by substantially *higher* financial leverage which implies higher financial risk.

IV. EXTENDED DUPONT ANALYSIS OF ROE

As noted, beyond the three component DuPont analysis, some authors have suggested a more extended breakdown that provides insights into the effect of interest expense and the tax rate on the ROE. The presentation in Table 2 begins with an operating profit margin (EBIT/Sales) and multiplies by the TAT to derive EBIT/T. Assets (operating return on total assets). To consider the income effect of financial leverage, you subtract: Int. Exp./ T.Assets. This interest expense ratio reflects the effect of fixed income debt on the balance sheet, but also the level of interest rates. The result is NBT/T. Assets. The next column reflects the balance sheet leverage or the financial leverage multiplier (similar to the basic DuPont analysis). The product of these ratios generates a before tax return on equity (NBT/ Equity). The next column is referred to as the "after-tax retention rate" and reflects the impact of changing tax rates over time (1 – (Tax/NBT)). Multiplying by this ratio generates ROE (Net Inc/Equity). In summary, the breakdown is as follows:

$$\frac{EBIT}{Sales} \times \frac{Sales}{T.\,Assets} - \frac{Int.\,Exp.}{T.\,Assets} \times \frac{T.\,Assets}{Equity} \times \left(1 - \frac{Tax}{NBT}\right) = ROE \qquad (4)$$

This analysis can only begin in 1977 when these data are available for the S&P 400 series. The time series plot of ROE for 1977-1995 is contained in Figure 6. The operating profit

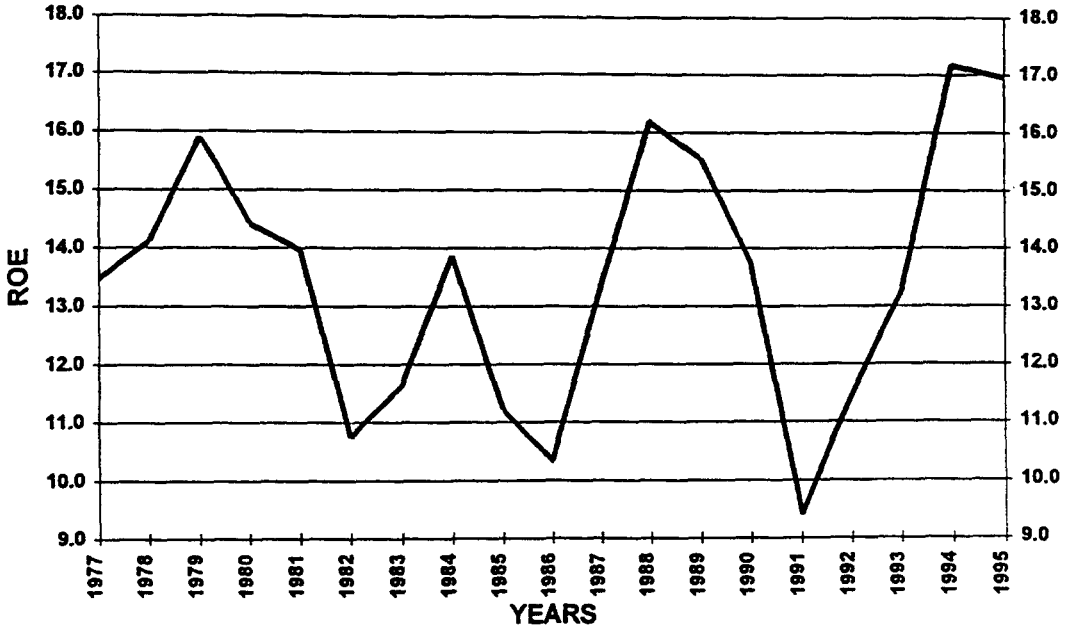

Figure 6. Time Series Plot of Return on Equity (ROE) for S&P 400: 1977-1995.

margin (Figure 7) generally declined from 11.5 percent to a low of about 8 percent prior to a recovery in 1994, 1995. As noted previously, the TAT (Figure 8) declined steadily from about 1.30 to 0.96. The debt effect in terms of interest expense (Figure 9) increased steadily from 1.84 to 3.35 in 1989 (the peak in financial leverage) and then declined to 2.03 in 1995 mainly due to lower interest rates but also a decline in balance sheet debt. This reduction in debt on the balance sheet was not adequately reflected in the T. Assets/Equity ratio (Figure 10) because of reduced equity due to numerous share repurchase programs (i.e., total common equity for the S&P 400 was 188.25 in 1990 and 188.88 in 1994 implying that

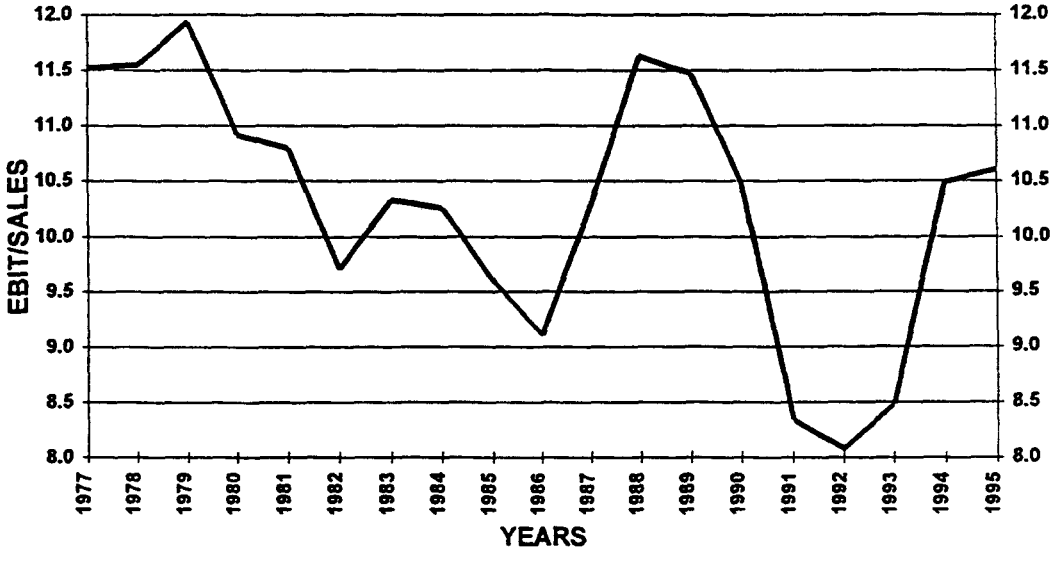

Figure 7. Time Series Plot of EBIT/SALES for S&P 400: 1977-1995.

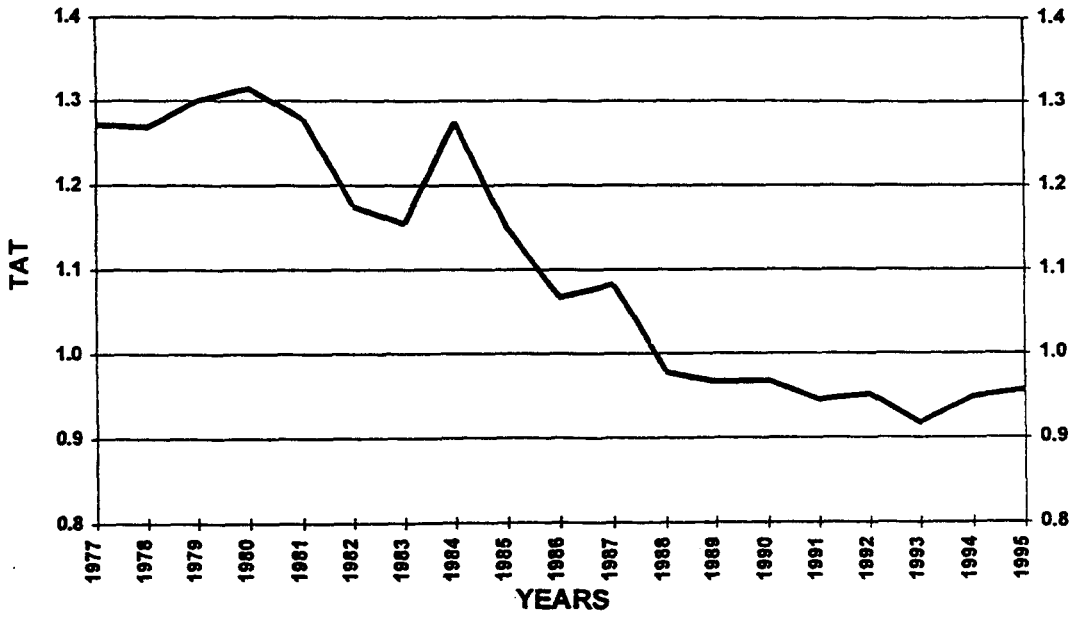

Figure 8. Time Series Plot of Total Asset Turnover (TAT) for S&P 400: 1977-1995.

increases in retained earnings were offset by share repurchases). Overall, the financial leverage multiplier increased from 2.08 to a peak of 3.76 in 1993 and 3.32 in 1995.

Finally, the after-tax retention ratio (Figure 11) indicated a very accommodative tax policy. Specifically, the after-tax retention rate went from about 50 percent in 1977 to a peak of over 64 percent in 1994. This reduction in the effective tax rate (from 50 percent to 36 percent) was a significant factor contributing to the peak ROE in 1994.

In summary, this extended analysis is consistent with the traditional DuPont analysis wherein it reflects the decline in TAT, some weakness in the operating profit margin, and it highlights the increase in financial leverage on the income statement as well as the bal-

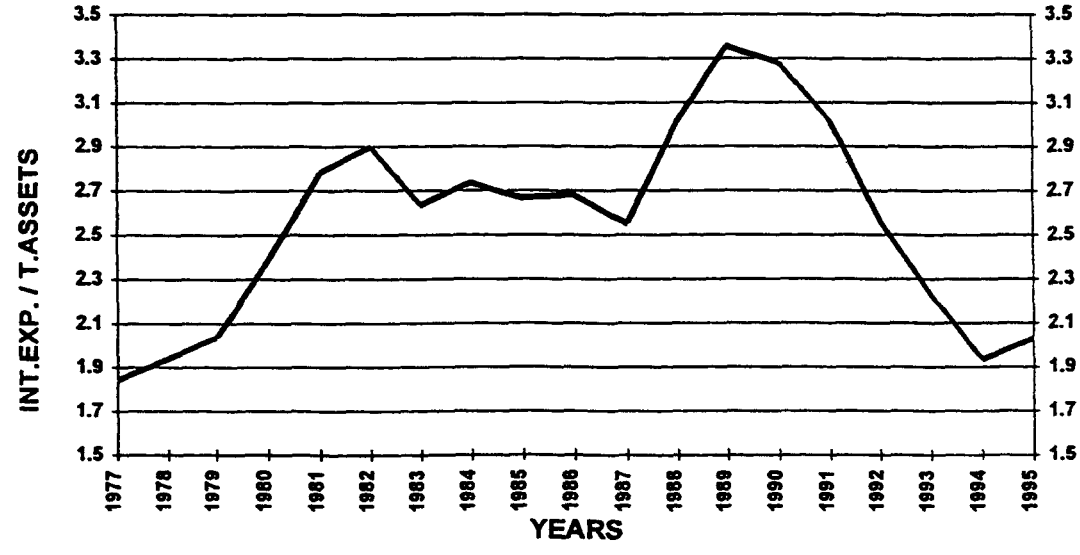

Figure 9. Time Series Plot of Int. Exp./T. Assets for S&P 400: 1977-1995.

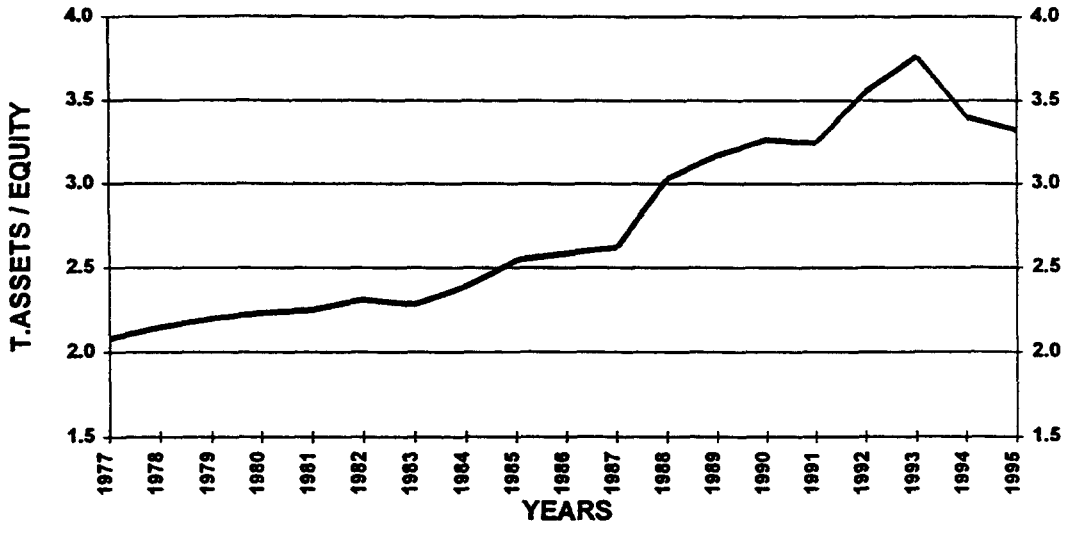

***Figure* 10.** Time Series Plot of T. Assets/Equity for S&P 400: 1977-1995.

TABLE 2
Extended DuPont Analysis of Return on Equity S&P 400 Industrial: 1977-1995

Year	*EBIT/ Sales*	*Sales/T. Assets*	*EBIT/T. Assets*	*Int. Exp./ T. Assets*	*NBT/ T.Assets*	*T. Assets/ Equity*	*NBT/ Equity*	$1-\frac{Tax}{NBT}$	*Net. Inc./ Equity*	*Net. Inc./ Sales*
1977	11.52	1.27	14.65	1.84	12.80	2.08	26.58	50.69	13.47	5.11
1978	11.55	1.27	14.64	1.94	12.70	2.15	27.25	51.79	14.11	5.19
1979	11.93	1.30	15.51	2.04	13.47	2.20	29.58	53.74	15.90	5.57
1980	10.92	1.31	14.35	2.39	11.96	2.23	26.67	54.11	14.43	4.92
1981	10.80	1.28	13.81	2.78	11.02	2.25	24.77	56.38	13.97	4.86
1982	9.70	1.17	11.39	2.90	8.50	2.31	19.63	54.66	10.73	3.95
1983	10.33	1.15	11.92	2.63	9.29	2.28	21.19	54.91	11.63	4.42
1984	10.26	1.27	13.08	2.74	10.34	2.39	24.69	56.14	13.86	4.55
1985	9.59	1.15	11.02	2.67	8.35	2.54	21.25	52.76	11.21	3.84
1986	9.10	1.07	9.71	2.68	7.03	2.58	18.16	56.91	10.33	3.75
1987	10.29	1.08	11.14	2.55	8.61	2.62	22.54	59.23	13.35	4.71
1988	11.62	0.98	11.37	3.02	8.36	3.03	25.32	63.93	16.19	5.46
1989	11.48	0.97	11.09	3.35	7.74	3.17	24.51	63.47	15.56	5.08
1990	10.48	0.97	10.14	3.28	6.86	3.26	22.39	61.39	13.74	4.35
1991	8.34	0.94	7.88	3.02	4.86	3.24	15.76	59.59	9.39	
1992	8.08	0.95	7.69	2.56	5.12	3.55	18.20	62.91	11.45	3.39
1993	8.48	0.92	7.78	2.23	5.55	3.76	20.89	63.43	13.25	3.84
1994	10.49	0.95	9.94	1.93	8.01	3.40	27.22	64.32	17.18	5.33
1995	10.60	0.96	10.14	2.03	8.12	3.32	26.97	63.79	16.95	5.33

ance sheet. The most significant new insight provided is the very positive effect of a decline in the tax rate during this period.

Beyond an analysis of the secular trend for ROE and its components, because we are interested in the effect of inflation on ROE, growth and the rate of return on common stock, it is important to analyze the specific relationship of inflation to stock returns, ROE and the components of ROE.

V. THE RELATIONSHIP AMONG INFLATION, STOCK RETURNS, ROE AND ITS COMPONENTS

Table 3 contains the correlation matrix among inflation, common stock returns, ROE, and the components of ROE for the 40 year period 1956-1995. The correlations among inflation and the other variables for the period 1956-1995 provide results generally consistent with past results. The negative relationship (-0.24) between inflation and stock returns is very consistent with almost all prior studies (Jaffe & Mandelker, 1976; Fama, 1981) which imply that common stock have been a poor inflation hedge. The positive correlation between inflation and TAT is consistent with the earlier discussion of a positive bias because sales are impacted by inflation, while the historical cost of assets are not. The negative correlation between inflation and the PM is consistent with past results, even though there is a tendency toward positive results. These results imply that firms are typically not able to pass cost increases along to customers. Leverage has almost no correlation with inflation because it displayed a constant increase doing a period when inflation was fairly volatile. The relationship between inflation and ROA was also very small reflecting the positive relationship with TAT and the negative correlation with PM. The significant positive correlation between inflation and ROE is somewhat surprising because of the mixed results with the components.

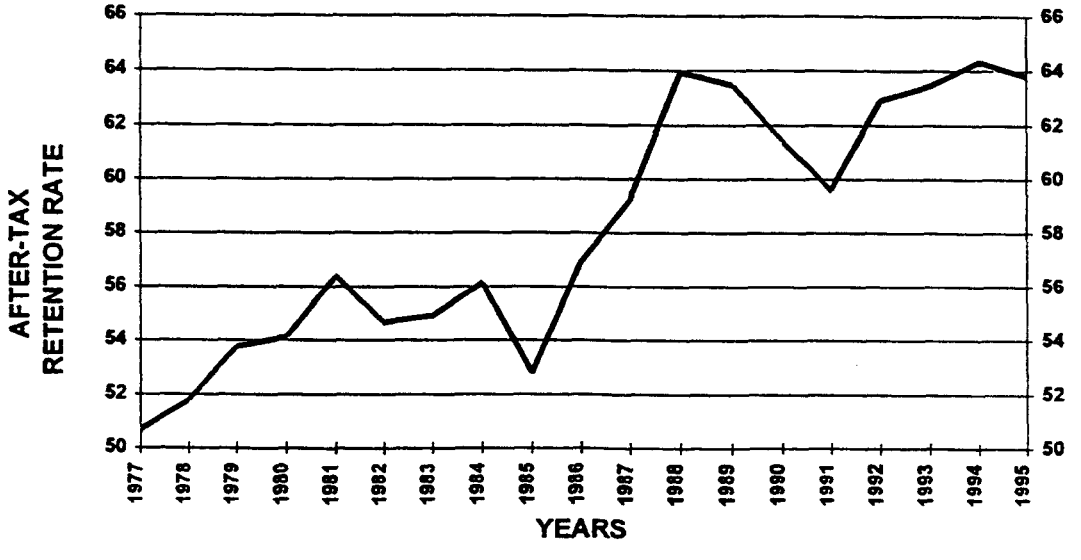

Figure **11.** Time Series Plot of $1 - \frac{Tax}{NBT}$ for S&P 400: 1977-1995.

TABLE 3
Correlation Matrix of Inflation, Equity Rates of Return and Components of the Return on Equity

	Inflation	*Stock TRT**	*TAT*	*PM*	*LEV*	*ROA*	*ROE*
A. Annual 1956-1995							
Inflation	—						
Stock TRT*	-0.24	—					
TAT	0.47	-0.19	—				
PM	-0.10	-0.26	0.37	—			
LEV	0.06	0.15	-0.69	-0.67	—		
ROA	0.13	-0.29	0.71	0.91	-0.80	—	
ROE	0.45	-0.15	-0.01	0.19	0.45	0.13	—

Note: * Total rate of return on the S&P 500 as computed by Ibbotson Associates.

In summary, inflation had a negative relationship with stock returns and profit margins although the profit margin had a significant relationship with ROA and ROE. The point is, inflation had a negative relationship with the profit margin which will, in turn, reduce ROE and expected growth. This implies that there should be a poor relationship between inflation and expected growth which is examined in the next section that considers periods of high and low inflation.

VI. ANALYSIS OF HIGH AND LOW INFLATION PERIODS

In the F&P article (1981) the authors examined the differential results during two separate periods including one of low inflation (1956-1967) and a subsequent period of high inflation (1968-1979) and showed that the operating and stock return results were very different. This analysis can be extended to the recent period by expanding the second period to include two additional years of high inflation (1968-1981) and by adding the recent period of relatively low inflation (1982-1995). Figure 12 contains a time series plot of inflation and the three periods are identified. The average results for the series in Table 1 during these three periods are in Table 4. Notably, the nominal returns for the S&P 500 are clearly higher during the periods of low inflation (11 and 17 percent) compared to the high inflation period (7.5 percent). The real difference was in inflation-adjusted returns where the returns on stock during the period of high inflation was basically zero compared to real returns of 9 and 13 percent during the periods of low inflation. The effect on ROE components was not as significant—the TAT moved up and down with inflation, the profit margin declined during the period of high inflation, but continued down during the subsequent period of low inflation. As a result, ROA showed a steady decline. As noted earlier, the leverage ratio increased steadily, which drove the ROE higher.

TABLE 4
Time Period Averages for Stock Returns ROE Components, and Nominal and Real Earnings Growth

	S& P % Total Return	*U.S. Inflation % Price Return*	*Infl Adj S&P 500 % Total Return*	*TAT*	*PM*	*ROA*	*LEV*	*ROE*	*Annual Growth Rate Nominal Earnings*	*Real Earnings*
1956-1967 (12 YRS)	11.28	1.97	9.18	1.18	6.12	7.20	1.59	11.45	4.40	2.46
1968-1981 (14 YRS)	7.51	7.60	0.08	1.22	5.12	6.28	2.02	12.75	8.11	0.52
1982-1995 (14) YRS)	17.01	3.57	13.02	1.04	4.36	4.52	2.96	13.20	5.34	1.80

The effect of inflation on the growth rate of nominal earnings showed a positive impact going from about 5 percent in 1958-1967 to almost 9 percent in 1968-1981, and down to about 5 percent in 1982-1995. Notably, there was a higher rate of growth for real earnings during the periods of low inflation, that is, about 3 percent growth during the periods of low inflation versus 1 percent growth during the high inflation period.

A) Inflation and Growth

The results in Tables 3 and 4 clearly indicate that the ultimate effect of inflation on stock returns is negative. We expected this because we envisioned using the DDM that the

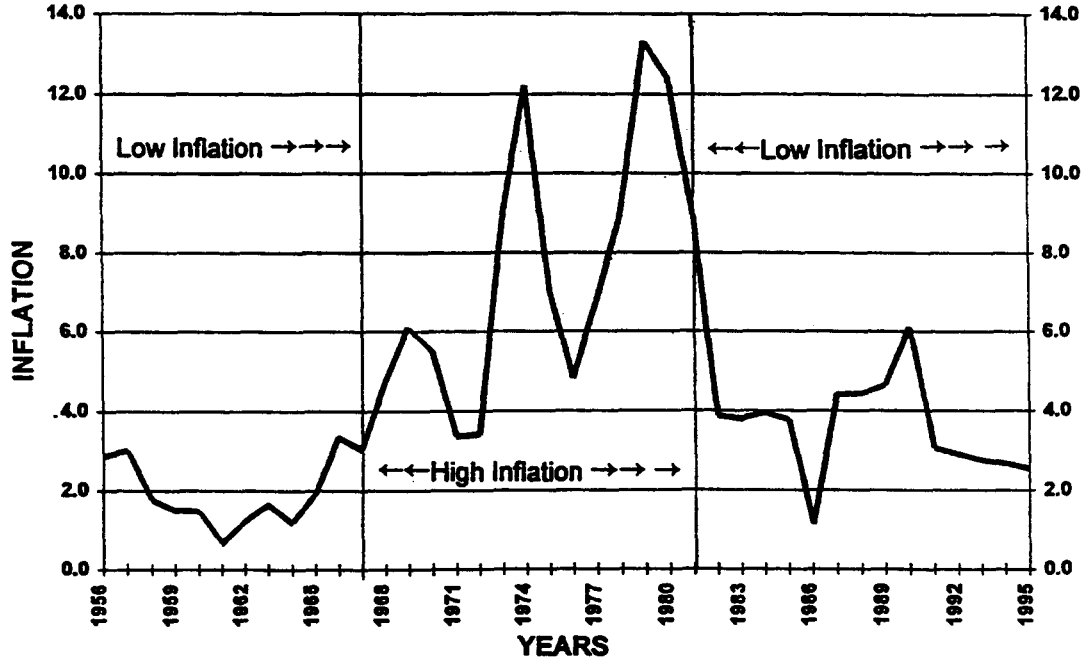

Figure 12. Time Series Plot of Inflation: 1956-1995.

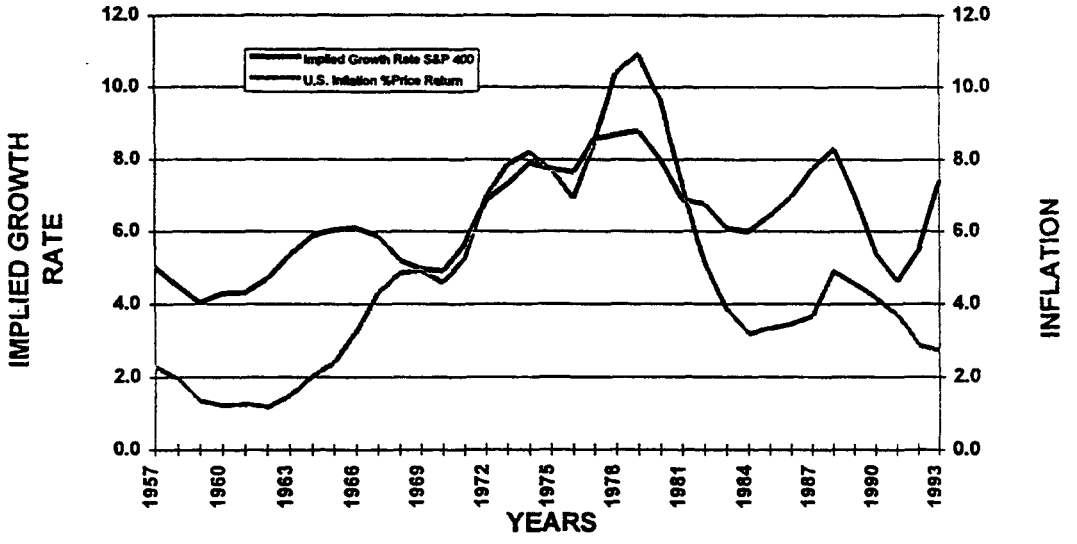

Figure 13. Time Series Plot of 4 Year Moving Averages of Inflation and Implied Growth Rate for S&P 400: 1956-1995.

growth rate of dividends (g) would generally not be able to adjust for changes in the required return (k) caused by changes in inflation. This implies an important direct comparison between g and inflation. Figure 13 contains such a comparison between a time series plot of four year moving averages for the two series. A moving average is used to help smooth two fairly volatile series, with the understanding that the four year averages should be plotted at its center point (the value for the four year period 1956-1959 is recorded at the end of 1957).

The two lines in Figure 13 demonstrate why stocks have done so much better during periods of low inflation. Specifically, during the two periods of low inflation that prevailed at the beginning and end of the period, the implied growth rate (equal to ROE times the retention rate) was substantially *larger* than the rate of inflation which implies a decline in the k-g spread and an increase in stock prices. In contrast, during the period of high inflation the two rates were *at best equal*, and during several years (1979-1983), the inflation rate *exceeded* the growth rate which implies an increase in the k-g spread. An example of the ultimate positive effect of low inflation is 1995 when the aggregate ROE and the *implied growth rate for the S&P 400 increased* while the *inflation rate declined.* The result was a return on stocks of over 37 percent.

VII. SUMMARY AND CONCLUSION

The purpose of this paper is to extend and expand the analysis of the relationship between inflation and stock returns by examining the effect of inflation on the factors that affect ROE and ultimately the growth of earnings and dividends. Following a brief review of the DDM and what needs to occur for stocks to be an inflation hedge, it was demonstrated that the critical variable was what happened to ROE, which was determined by what happened to the DuPont components and especially the profit margin during periods of inflation. An analysis of the secular trend over 40 years showed an overall decline in TAT and the PM,

with a secular increase in the financial leverage multiplier as an offset. The extended DuPont analysis for the recent period generally confirmed the long-run results, but also showed the positive effect of a lower effective tax rate during the recent 10 year period.

The correlation analysis confirmed prior results which showed a negative relationship between stock returns and inflation (stocks are a poor inflation hedge) and between profit margins and inflation which helps explain the stock return results. An analysis of stock returns and ROE results during periods of relatively low inflation (1956-1967 and 1982-1995) versus a period of high inflation (1968-1981) confirms these results because real stock returns were significantly higher during the periods of low inflation and there was clearly a higher growth rate of real earnings during periods of low inflation. Finally, the superior returns on stocks during periods of low inflation can be explained by the direct comparison of inflation and the implied growth rate of earnings. Specifically, during periods of low inflation the implied growth rate of earnings generally exceeds inflation, while during periods of high inflation, the implied growth rate of earnings is equal to or *less than* the rate of inflation.

In conclusion, the analysis in this paper confirms and extends the prior analysis which explains why inflation is detrimental to stock returns and demonstrates that this has continued through 1995. It is noteworthy that the U.S. stock market has generally benefited from relatively low inflation since 1982 and especially during 1995 when the implied growth rate increased while the inflation rate was declining, resulting in very high stock returns. It appears that 1996 will likewise be a good year due to a high ROE which implies continued growth and low inflation.

Although it is always difficult to project the future, these results should help investors understand the importance of concentrating on inflationary expectations and the relationship between inflation, ROE, and growth. There is obviously a large difference in stock returns during periods of high versus low inflation or during years when the rate of inflation experiences a large increase or decline and these results help explain the reason for this difference.

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NOTES

1. For a detailed derivation of this reduced form model, see Reilly and Brown, 1997, chapter 13.
2. For a discussion of this, see Reilly and Brown, 1997, chapter 1.

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