

**THE BEHAVIOR OF STOCK RETURNS AROUND  
N.B.E.R. TURNING POINTS: AN OVERVIEW**

**by**

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**13-91**

**(revision of 5-91)**

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Despite increasing criticism by economists and forecasters of the ability of the stock market to predict economic recessions, it is shown that 38 of the 41 measured recessions since 1802 have been preceded by an eight percent decline in the stock returns index. There have been twelve "false alarms" using this criterion, where stock declines have not been followed by recessions, and seven of these have occurred since World War II. Despite these faulty signals, there is a significant gain to stock investors from being able to predict turning points in the business cycle over all time periods. During the post-War period, a four month lead time in forecasting cycle turning points results in the 4.8% annual (risk-adjusted) excess return on a stock portfolio. Since World War II, stock returns have reacted three to four months earlier than during pre-War business cycles, indicating either an improvement in forecasting, or the mis-dating of earlier turning points.

This is the product of research funded in part by the New York Stock Exchange and the Rodney L. White Center for Financial Research at the Wharton School of the University of Pennsylvania. I wish to thank Peter Scherer and Ashish Shah for research assistance.

October, 1990.  
Revised, May 1991

# THE BEHAVIOR OF STOCK RETURNS AROUND

## N.B.E.R. TURNING POINTS: AN OVERVIEW

by

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The stock market has historically held the role of the most sensitive indicator of the business cycle and the most influential variable in the government's index of leading economic indicators.<sup>1</sup> Although many economists have extolled the virtues of the stock market as a leading indicator of the business cycle, the market has always been known to be prone to signal false alarms about future economic activity, the most dramatic of which was the strength of the economy after the record-breaking stock crash of October, 1987.<sup>2</sup> Nobel Prize winning economist Paul Samuelson has mocked those who claim the stock market as a reliable forecaster of the business cycle in his now famous line "The stock market has predicted nine out of the last five recessions."<sup>3</sup>

The tendency for the stock market to signal false alarms of an oncoming recession appears to be increasing over the post-war period. After the failure of the 1987 stock crash to predict an economic decline, several economists dealt a near fatal blow to the indicator value of the stock market by devising a new experimental index which removes equity prices as a predictive variable.<sup>4</sup>

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<sup>1</sup> The stock market has effectively the greatest weight because of its high variability compared to the other indicators. For earlier analyses of the correlations between the stock market and the business cycle, see Mitchell and Burns (1938) and Moore (1975).

<sup>2</sup> Stanley Fischer and Robert Merton (1984) have called the stock market the single best predictor of the business cycle. Robert Barro (1989) has echoed that sentiment. These conclusions were written before the failure of the great 1987 stock market crash to precede an economic downturn.

<sup>3</sup> Samuelson first wrote these words in his *Newsweek* column, "Science and Stocks," dated September 19, 1966.

<sup>4</sup> These experimental indices have been developed by James H. Stock and Mark W. Watson (1989) in conjunction with the National Bureau of Economic Research. By omitting the stock market, this index was one of the few which did not predict a recession after the October, 1987 crash.

Despite the current debate over the stock market's predictive qualities, it may seem reasonable that stock prices should be strongly impacted by the business cycle. This is because economic growth is the basis of corporate profits, and hence the earnings and dividends which flow to stockholders.<sup>5</sup> However, in theory, the effect of the business cycle on the valuation of equities may be swamped by changes in risk, interest rates, and other factors influencing the supply and demand for equities.<sup>6</sup> If this is so, then it may not be worthwhile for stock timers to expend resources predicting the business cycle, but instead pay attention to other fundamental and technical factors influencing equity valuation. This research suggests that despite the frequent dissociation between movements in the stock market and the business cycle, stock returns can be significantly enhanced by switching between short-term fixed-income securities and equities before turning points in the economic cycle.

## 1. The Stock Market and the Business Cycle

### a. Predicting Recessions

In recent years, economists have increasingly explored long economic time series in order to explore the durability of relations between economic variables. William Schwert (1990a) has compiled a monthly index of stock returns dating from January 1802. The cumulative returns index for stocks (which includes all capital appreciation plus dividends), as well as short-term interest rates,<sup>7</sup> are shown on Charts 1a, 1b, and 1c, where the shaded areas represent the economic recessions indicated by the National Bureau of Economic Research.<sup>8</sup> One can see that there is almost always a decline in the stock returns index before, or just after, the beginning of a recession. In fact, out of the forty-one recessions from 1802 through 1990, 38 of them, or 93%, have been preceded (or accompanied) by declines of 8% or more (based on monthly averages) in the stock returns index.<sup>9</sup> Only the

<sup>5</sup> Schwert (1990b) and Fama (1990) have confirmed that stock prices are correlated with future economic activity in statistical regressions. Their work does not attempt to isolate the predictive nature of the stock market for N.B.E.R. recessions.

<sup>6</sup> For example, a decline in interest rates, which frequently coincides with a recession, may offset the fall in expected future cash flows, causing the valuation of equities to rise.

<sup>7</sup> Treasury bills existed only since 1920. The historical short-term interest rate series is taken from Siegel (1991), using available commercial paper and other interest rate series.

<sup>8</sup> Heavily shaded areas indicate "severe" recessions. The National Bureau of Economic Research has only dated recessions since 1854. The earlier recessions were inferred from charts provided by Wesley C. Mitchell (1927).

<sup>9</sup> A decline is measured as the maximum cumulative fall in the returns index over a period which does not exceed twelve months. The recession must have begun within twelve months after this recorded fall or no more

1829-30, 1945, and 1953 recessions were not accompanied by a fall in stock returns of this magnitude.

Table 1A summarizes the return behavior for the nine post-World War II recessions. One can see that the returns index peaked from zero to fourteen months before the beginning of a recession. The 1990-91 recession was the only one in the post-war period, and one of the few in U.S. history, where the stock market gave no advance warning of the economic downturn.

Since a "peak" in stock prices is only recognized in retrospect, one needs some criterion to judge when a market decline has begun. During the postwar period, if one waits until the returns index has declined by eight percent before signaling a recession, then the stock market *leads* the business cycle by an average of only 2.3 months, ranging from a lead of 11 months in the 1970 recession to a *lag* of two months in the 1990-1 recession. It should be noted that in all but two of the post-war recessions, an eight percent decline in the returns index led the business cycle peak by less than one month, giving little advance warning of an impending recession. The 1953-54 recession, as noted above, was one of the few in history, and the only one since World War II, that was not accompanied by an 8% decline in the returns index.<sup>10</sup>

The stock market is also prone to false alarms, and these false alarms appear to have increased in the post-War period. Excluding the war years, when declining stock markets have coincided with an expanding war economies, there have been twelve episodes since 1802 when the cumulative returns index has fallen by eight percent or more, but this fall has not been followed by a recession within the next twelve months. This occurred five times in the nineteenth century and seven times in the twentieth century. All those this century occurred since World War II (1946, 1956, 1962, 1966, 1978, 1984 and 1987).<sup>11</sup> Table 2 lists declines of greater than 8% in the stock index during the post-War period

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than four months before. Since the returns index include dividends, declines in stock indices, such as the S&P 500 Index, which do not include dividends, will generally exceed the eight percent criterion. For example, a fall of 8% in the returns index over a twelve month period is equivalent to a 13% fall in a stock index if dividends average 5%. Declines over shorter periods of time would show proportionately less discrepancy between standard and cumulative return indices.

<sup>10</sup> Means are computed both including and excluding the 1980 recession, which some economists rank as part of the 1981-82 general recession.

<sup>11</sup> The 1956 decline was followed by a business cycle peak 14 months later, but the returns index subsequently hit an all time high before turning down in August of 1957. The 1956 decline might, therefore, be considered a precursor to the 1957-58 recession. The stock declines of 1946 and 1966 preceded economic slowdowns, which may, in the pre-War period, been classified as recessions.

which were not followed by recessions. The 1987 decline of 29% (from August through November) is the largest decline in the nearly two century history of stock market returns after which the economy did not fall into a recession.<sup>12</sup>

#### b. Predicting Recoveries

The ability of the stock market to predict recoveries is far better than its ability to predict recessions. Table 1B compares the trough in the stock return index and the trough in the N.B.E.R. business cycle. The average lead time has been 5.1 months, with a standard deviation of 1.62 months, compared to a 6.4 month lead time for a recession, with a 4.6 standard deviation. If one waits for an 8% rise in the returns index, the average is 3.0 months with a standard deviation of 1.3 months.<sup>13</sup>

Given the nine economic recessions from 1946-1990, the seven false alarms, and the two late signals, one could update Samuelson's 1966 remark to "Declines in the stock market have predicted fifteen of the last nine recessions, missed one downturn and called two others late!" With such a poor record one might conclude that it does not pay to invest resources in predicting the business cycles. However, as the analysis below shows, this is definitely not the case.

## 2. Stock and Bond Returns During Business Cycles

Table 3 shows summary data on recessions and the average arithmetic returns from investing in stocks and bonds over the business cycle. Over the entire period, 1802-1990, the forty recessions (not including the one begun in 1990) have averaged 17.8 months in length and expansions have averaged 37.7 months, so that almost one-third of the time the

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<sup>12</sup> If one increases the filter from 8%, in order to reduce the number of false alarms, the probability that a recession might be missed is significantly increased. The tradeoff between the filter size, false alarms, and correct signals is not analyzed in this paper.

<sup>13</sup> During the 1990-91 recession, the stock market hits its trough in October 1990. As of May, 1990, the bottom of the business cycle has not yet been reached.

economy has been in a recession. However, from 1945 to 1990, there have been eight recessions, averaging 10 months in length, while the expansions have averaged 50 months.<sup>14</sup>

Table 3 reports the average return from investing in the stock market over various time periods. From 1802 through 1990, the average annual (arithmetic) nominal return from investing in the stock market is 9.0%, while the average return is 4.3% from investing in risk-free short-run bonds. In the post-War period, the average return on stocks is 12.5%, while it is 4.8% from investing in bonds. A risk adjusted return, termed the "benchmark" return, is defined as the weighted average of the overall stock and bond return for the period, weighted by the time the economy is in an expansion (for stocks) and a recession (for bonds). The benchmark return, found in row 8, is used to calculate excess returns from various timing strategies, as described below.

The next panel of Table 3 reports returns from being 100% long in equities during economic expansions and 100% long in (short-term) bonds during economic contractions.<sup>15</sup> These returns, which assume the investors switches from stock to bonds exactly at business cycle peaks and bonds to stocks at business cycle troughs, are listed in the row marked "concurrent." Table 3 also displays the returns available to investors who can *time* their investment strategy in relation to the peaks and troughs in *economic* activity. These returns are calculated assuming an investor who *leads* the business cycle switches out of stocks a given number of months before the peak of the business expansion and switches into stocks the same number of months before the trough of the recession. In contrast, an investor who *lags* the business cycle switches out of, and then into, stocks an equal number of months *after* the peak and trough of the business cycle has occurred.<sup>16</sup> One can see that over every sub-period, investors increased their returns by switching into cash before the peak of the business cycle and into stocks before the business cycle trough. The gain from switching between stocks and bonds six months before the business cycle turning points,

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<sup>14</sup> Of interest is that despite the change in the length of expansions and contractions, the length of the entire business cycle (summing the expansion with the subsequent contraction) has remained remarkably constant -- about five years.

<sup>15</sup> Recessions are dated from the month the N.B.E.R. designated the peak of the business cycle to the month labeled the trough. Conversely, expansions are measured from business cycle troughs to cycle peaks.

<sup>16</sup> Since the National Bureau of Economic Research often does not report the turning points until six months (or more) after they have occurred, such "lagging" behavior is quite plausible. The assumption that switching between stocks and bonds is implemented an identical number of months before or after the business cycle turnings points is relaxed in Table 4.

compared to six months after, is almost 600 basis points per year from 1802-1990, and over 700 basis points in the post-War period.

The final panel of Table 3 calculates the *excess* returns from timing stock investing around business cycle turning points. The excess return is the weighted average return shown in the previous panel minus the benchmark, or risk-adjusted return. Excess returns were positive for every time period if one switches from stocks to bonds exactly at business cycle peaks and back to stocks exactly at the trough. This gain, however, was minimal over the post-War period. In fact, if an investor switched into bonds just one month after the business cycle peak and back into stocks just one month after the business cycle trough, he would have lost 0.5% compared to a buy and hold benchmark strategy.

What is so remarkable is that the gain by leading the business cycle turning points and loss by lagging these points appears in *every* sub-period studied. In the post-War period, the maximum excess return of 4.8% is obtained by investing in bonds four months before the business cycle peak and into stocks four months before the business cycle troughs. The strategy of switching between bonds and stocks gains about 30 basis points in average annual return for each week (up to four months) the investor is able to predict the business cycle turning points.

Table 4 reports the average annual returns and excess returns in the post-War period from switching between stocks and bonds at various times around business cycle peaks and troughs. The columns indicate timing around business cycle peaks, where an investor switches from stocks to bonds. The rows indicate timing with respect to business cycle troughs, where an investor switches from bonds to stocks. The diagonal entries in each panel are identical to those found in Table 3, where our hypothetical investor moves in and out of stocks an identical number of months before and after business cycle turning points.

It can be seen that excess returns are more responsive to the ability to forecast *troughs* of the business cycle than *peaks*. If an investor buys stocks four months before the business cycle trough and sells at the peak, he obtains a 3.3% excess annual return. In contrast, selling stocks four months before the peak at buying at the trough creates only a 1.9% excess return. It is also of note that the excess returns are maximized at 4.8% with an identical four month lead before both the peaks and troughs of the business cycle. Asterisks indicate that there is a statistically significant difference at the 95% level in the mean excess returns between the lead and lag time periods and the excess return (+0.5%)



found concurrently with business cycle peaks and troughs. Most of these differences in returns due to market timing are found to be statistically significant.

### 3. Theoretical Interpretation of Results

If investors could perfectly forecast the effect of business cycles on the future cash flows from owning stock, and the discount rate were constant, then stock returns would be independent of the cyclical behavior of corporate earnings. The popular indices would change little over a business cycle, moving only enough to compensate shareholders for the small cyclical pattern of dividends. The fact that stocks fall significantly before recessions and rise before expansions must measure the degree to which future corporate earnings, or changes in the discount rate, are a "surprise" to investors.

After World War II, an improved ability to forecast could provide an explanation for the lack of excess returns on stocks from switching *coincidentally* with the business cycle. If the N.B.E.R. turning point dates are accepted, then prior to World War II, stockholders were able to earn a better return than "buy and hold" by recognizing the business cycle turning points as they occurred, or even up to three months *after* they occurred. Since World War II, one had to be able to respond *before* the official cycle turning points to gain a significant investment edge. If forecasting continues to improve, one might expect to find that an investor would have to forecast business cycle turning point several months in advance to secure a better than average return.

An alternative explanation of the difference in the post-War data is that the business cycle turning points have been mis-measured in the earlier, pre-War data because of the poor quality of real economic data. If one accepts that financial data is of better quality than the real data, then it may be advisable to use financial markets in dating the historical business cycle.<sup>17</sup> In any case, the gains from forecasting the business cycle appears very significant in *every* time period studied.

### 4. Conclusions

The stock market remains an important indicator of the business cycle although since World War II it has peaked anywhere from zero to fourteen months before the

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<sup>17</sup> Matthew Shapiro (1988) has questioned the reduced volatility of post-War real economic data by noting the relatively unchanged variability of stock returns over longer periods.

business cycle. The market has also registered an increasing number of false alarms. Since 1946 there have been seven episodes where the cumulative returns index for stocks has fallen by at least eight percent and a recession did not occur, while this happened only five times in the previous one hundred forty-three years. The stock market has been a better indicator of coming economic expansions, turning upwards an average of five months before business cycle troughs. The standard deviation of the lead time of the stock market before business cycle troughs is only 1.6 months, one-third of that before business cycle peaks.

Despite these failures at turning points, it is profitable to predict the business cycle for timing stock market investments. Over the postwar period, holding stock during economic expansions and bonds during contractions does not yield any significant excess return to an investor, although significant excess returns were realized by this strategy before World War II. Nonetheless, by switching from stocks to bonds before business cycle peaks and, even more importantly, back into stocks before business cycle troughs, the average annual return on the market can be significantly enhanced. The analysis shows that an investor can increase the returns over a "buy and hold" strategy of equivalent risk by over one percentage point for *each month* by which an investor leads the business cycle. An ability to predict N.B.E.R. business cycle turning points will therefore enhance returns from investing in stocks.

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**TABLE 1A**  
**RECESSIONS AND STOCK RETURNS**

| RECESSION              | PEAK MONTH<br>OF STOCK<br>INDEX<br><br>(1) | PEAK MONTH<br>OF BUSINESS<br>CYCLE<br><br>(2) | LEAD TIME<br>BETWEEN<br>PEAKS<br><br>(3) | DECLINE IN<br>STOCK INDEX<br>FROM (1) TO (2)<br><br>(4) | MOS. BETWEEN<br>8% STOCK INDEX<br>DECLINE AND (2)<br><br>(5) | MAXIMUM 12<br>MONTH DECLINE<br>IN STOCK INDEX<br><br>(6) |
|------------------------|--|---|--|---|--|--|
| 1948 - 49              | May 1948                                   | Dec 1948                                      | 7  | -7.98%  | 1  | -8.19%   |
| 1953 - 54              | Dec 1952                                   | Aug 1953                                      | 8  | -7.18%  | n.a.   | -7.18%   |
| 1957 - 58              | Jul 1957                                   | Sep 1957                                      | 2  | -10.45%   | 0  | -13.90%  |
| 1960 - 61              | Dec 1959                                   | May 1960                                      | 5  | -5.10%  | 1  | -8.20%   |
| 1970                   | Nov 1968                                   | Jan 1970                                      | 14                                       | -19.78%   | 11   | -25.50%  |
| 1973 - 75              | Dec 1972                                   | Dec 1973                                      | 12                                       | -16.93%   | 8  | -40.10%  |
| 1980                   | Jan 1980                                   | Feb 1980                                      | 1  | -0.34%  | -1   | -8.90%   |
| 1981 - 82              | Nov 1980                                   | Aug 1981                                      | 9  | -8.77%  | 0  | -14.20%  |
| 1990 -                 | Jul 1990                                   | Jul 1990                                      | 0  | 0.00%   | -2   | -13.92%  |
| <b>AVERAGE</b>         |  |   | <b>6.4</b>                               | <b>-8.50%</b>   | <b>2.3</b>   | <b>-15.56%</b>   |
| Std. Dev.              |  |   | (4.6)                                    | (5.95%)   | (4.4)  | (10.17%)   |
| <b>AVERAGE</b>         |  |   | <b>7.1</b>                               | <b>-9.52%</b>   | <b>2.7</b>   | <b>-16.44%</b>   |
| (EXCL. 1980 recession) |  |   | (4.4)                                    | (5.91%)   | (4.5)  | (10.50%)   |
| Std. Dev.              |  |   |  |   |  |  |

**TABLE 1B**  
**EXPANSIONS AND STOCK RETURNS**

| RECESSION      | TROUGH MONTH<br>OF STOCK<br>INDEX<br>(1) | TROUGH MONTH<br>OF BUSINESS<br>CYCLE<br>(2) | LEAD TIME<br>BETWEEN<br>TROUGH<br>(3) | RISE IN<br>STOCK INDEX<br>FROM (1) TO (2)<br>(4) | MOS. BETWEEN<br>8% STOCK INDEX<br>RISE AND (2)<br>(5) |
|----------------|--|---|---------------------------------------|--|---|
| 1948 - 49      | May 1949                                 | Oct 1948                                    | 5                                     | 15.59%   | 3   |
| 1953 - 54      | Aug 1953                                 | May 1954                                    | 9                                     | 29.13%   | 5   |
| 1957 - 58      | Dec 1957                                 | April 1958                                  | 4                                     | 10.27%   | 1   |
| 1960 - 61      | Oct 1960                                 | Feb 1961                                    | 4                                     | 21.25%   | 2   |
| 1970           | Jun 1970                                 | Nov 1970                                    | 5                                     | 21.86%   | 3   |
| 1973 - 75      | Sep 1974                                 | Mar 1975                                    | 6                                     | 35.60%   | 5   |
| 1980           | Mar 1980                                 | Jul 1980                                    | 4                                     | 22.60%   | 2   |
| 1981 - 82      | Jul 1982                                 | Nov 1982                                    | 4                                     | 33.13%   | 3   |
| 1990 -         | Oct 1990                                 | *   | *                                     | *  | *   |
| <b>AVERAGE</b> |  |   | <b>5.1</b>                            | <b>23.68%</b>                                    | <b>3.0</b>  |
| Std. Dev.      |  |   | (1.62)                                | (8.04%)  | (1.3)   |

\* Undetermined as of May 1991

## TABLE 2 FALSE ALARMS BY STOCK MARKET

Periods when stock index fell by 8% and no recession followed within 12 months  
Ranked by severity of decline

| YEAR OF FALSE ALARM | PEAK MONTH STOCK INDEX | LOW MONTH STOCK INDEX | % DECLINE IN MARKET |
|---------------------|------------------------|-----------------------|---------------------|
| 1987                | Aug 1987               | Nov 1987              | -29.1%              |
| 1946                | May 1946               | May 1947              | -24.0%              |
| 1962                | Dec 1961               | Jun 1962              | -23.1%              |
| 1966                | Jan 1966               | Sep 1966              | -15.5%              |
| 1978                | Aug 1978               | Oct 1978              | -10.8%              |
| 1956 - 57           | Jul 1956               | Feb 1957              | -8.3%               |
| 1984                | Nov 1983               | May 1984              | -8.2%               |

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# TABLE 3 STOCK AND BOND RETURNS IN RECESSIONS AND EXPANSIONS

1802 - 1990

(AVERAGE ANNUAL ARITHMETIC RETURNS)

|  | 1802-1990 | 1834-1990 | 1872-1926 | 1926-1990 | 1946-1990 |
|--|-----------|-----------|-----------|-----------|-----------|
| (1) Average length of recession (months)   | 17.8      | 16.7      | 20.5      | 12.8      | 10.0      |
| (2) Average length of expansion  | 37.7      | 34.5      | 24.1      | 47.7      | 50.3      |
| (3) Average length of business cycle   | 55.6      | 51.2      | 44.6      | 60.4      | 60.3      |
| (4) % of time economy in recession   | 31.5%     | 32.1%     | 44.2%     | 19.8%     | 15.0%     |
| (5) % of time economy in expansion   | 68.5%     | 67.9%     | 55.8%     | 80.2%     | 85.0%     |
| (6) Average Annual Return for Stocks   | 9.0%      | 9.8%      | 8.4%      | 11.9%     | 12.5%     |
| (7) Average Annual Return for Bonds  | 4.3%      | 4.2%      | 3.9%      | 3.6%      | 4.8%      |
| (8) Bench Mark Returns (6) X (5) +<br>(7) X (4)  | 7.5%      | 8.0%      | 6.4%      | 10.3%     | 11.4%     |
| <b><u>(9) AVERAGE RETURNS: Invested in<br/>stocks during expansions<br/>and cash during recessions</u></b> |           |           |           |           |           |
| 6 month lead   | 12.0%     | 13.4%     | 12.8%     | 15.5%     | 15.5%     |
| 5 month lead   | 12.2%     | 13.7%     | 12.9%     | 15.7%     | 15.5%     |
| 4 month lead   | 12.4%     | 14.0%     | 13.3%     | 16.2%     | 16.1%     |
| 3 month lead   | 12.2%     | 13.7%     | 13.3%     | 15.5%     | 14.6%     |
| 2 month lead   | 11.7%     | 13.1%     | 12.4%     | 15.0%     | 14.1%     |
| 1 month lead   | 11.2%     | 12.5%     | 11.4%     | 14.6%     | 13.2%     |
| concurrent   | 10.5%     | 11.6%     | 10.3%     | 13.2%     | 11.8%     |
| 1 month lag  | 9.3%      | 10.2%     | 9.4%      | 11.4%     | 10.8%     |
| 2 month lag  | 8.4%      | 9.1%      | 8.5%      | 10.2%     | 9.7%      |
| 3 month lag  | 7.6%      | 8.2%      | 7.2%      | 9.5%      | 9.4%      |
| 4 month lag  | 7.2%      | 7.7%      | 6.3%      | 9.1%      | 9.1%      |
| 5 month lag  | 6.3%      | 6.7%      | 5.2%      | 8.2%      | 8.4%      |
| 6 month lag  | 5.9%      | 6.3%      | 4.1%      | 8.1%      | 8.0%      |
| <b><u>(10) Excess Returns (9) - (8)</u></b>  |           |           |           |           |           |
| 6 month lead   | 4.5%      | 5.4%      | 6.4%      | 5.2%      | 4.1%      |
| 5 month lead   | 4.7%      | 5.7%      | 6.5%      | 5.4%      | 4.1%      |
| 4 month lead   | 4.9%      | 6.0%      | 6.8%      | 5.9%      | 4.8%      |
| 3 month lead   | 4.7%      | 5.7%      | 6.8%      | 5.2%      | 3.3%      |
| 2 month lead   | 4.2%      | 5.1%      | 6.0%      | 4.7%      | 2.8%      |
| 1 month lead   | 3.7%      | 4.5%      | 4.9%      | 4.3%      | 1.8%      |
| concurrent   | 3.0%      | 3.6%      | 3.8%      | 2.9%      | 0.5%      |
| 1 month lag  | 1.8%      | 2.2%      | 3.0%      | 1.1%      | -0.6%     |
| 2 month lag  | 0.9%      | 1.1%      | 2.1%      | -0.1%     | -1.7%     |
| 3 month lag  | 0.1%      | 0.2%      | 0.8%      | -0.8%     | -2.0%     |
| 4 month lag  | -0.3%     | -0.3%     | -0.1%     | -1.2%     | -2.2%     |
| 5 month lag  | -1.2%     | -1.3%     | -1.2%     | -2.0%     | -2.9%     |
| 6 month lag  | -1.6%     | -1.7%     | -2.3%     | -2.2%     | -3.3%     |

**TABLE 4**  
**INVESTED RETURNS AROUND BUSINESS CYCLE TURNING POINTS**  
 1946-1990

| Average Annual Returns: Invested in stocks in expansions and bonds in recessions |         |         |         |         |         |         |       |         |         |         |         |         |         |
|--|---------|---------|---------|---------|---------|---------|-------|---------|---------|---------|---------|---------|---------|
| Columns = Month stocks switched to bonds around business cycle peak              |         |         |         |         |         |         |       |         |         |         |         |         |         |
| Rows = Month bonds switched to stocks around business cycle trough               |         |         |         |         |         |         |       |         |         |         |         |         |         |
|  | LEAD    |         |         |         |         |         | peak  | LAG     |         |         |         |         |         |
|  | 6 month | 5 month | 4 month | 3 month | 2 month | 1 month |       | 1 month | 2 month | 3 month | 4 month | 5 month | 6 month |
| LEAD   | 15.5%   | 15.5%   | 15.8%   | 15.2%   | 15.5%   | 15.4%   | 14.8% | 14.3%   | 14.2%   | 14.2%   | 14.2%   | 14.2%   | 13.5%   |
|  | 15.5%   | 15.5%   | 15.8%   | 15.2%   | 15.5%   | 15.4%   | 14.8% | 14.3%   | 14.2%   | 14.2%   | 14.2%   | 14.2%   | 13.2%   |
|  | 15.8%   | 15.8%   | 16.1%   | 15.5%   | 15.8%   | 15.8%   | 15.1% | 14.6%   | 14.2%   | 14.3%   | 14.2%   | 13.5%   | 13.2%   |
|  | 14.9%   | 15.0%   | 15.3%   | 14.6%   | 14.9%   | 14.9%   | 14.3% | 13.7%   | 13.3%   | 13.5%   | 13.4%   | 12.9%   | 12.8%   |
|  | 14.1%   | 14.1%   | 14.4%   | 13.8%   | 14.1%   | 14.1%   | 13.4% | 12.9%   | 12.5%   | 12.7%   | 12.7%   | 12.3%   | 11.9%   |
|  | 13.2%   | 13.3%   | 13.6%   | 12.9%   | 13.3%   | 13.2%   | 12.6% | 12.1%   | 11.7%   | 11.9%   | 11.9%   | 11.5%   | 11.1%   |
| trough   | 12.5%   | 12.5%   | 12.8%   | 12.2%   | 12.5%   | 12.4%   | 11.8% | 11.3%   | 10.9%   | 11.1%   | 11.1%   | 10.7%   | 10.6%   |
| LAG  | 11.9%   | 12.0%   | 12.3%   | 11.7%   | 12.0%   | 11.9%   | 11.3% | 10.8%   | 10.4%   | 10.6%   | 10.6%   | 10.2%   | 10.1%   |
|  | 11.2%   | 11.3%   | 11.5%   | 11.0%   | 11.2%   | 11.2%   | 10.6% | 10.1%   | 9.7%    | 9.9%    | 9.9%    | 9.5%    | 9.4%    |
|  | 10.7%   | 10.7%   | 11.0%   | 10.4%   | 10.7%   | 10.7%   | 10.1% | 9.6%    | 9.2%    | 9.4%    | 9.4%    | 9.0%    | 8.8%    |
|  | 10.4%   | 10.5%   | 10.8%   | 10.2%   | 10.5%   | 10.4%   | 9.8%  | 9.3%    | 8.9%    | 9.1%    | 9.1%    | 8.7%    | 8.6%    |
|  | 10.0%   | 10.1%   | 10.4%   | 9.8%    | 10.1%   | 10.0%   | 9.4%  | 8.9%    | 8.5%    | 8.7%    | 8.8%    | 8.4%    | 8.2%    |
|  | 9.7%    | 9.9%    | 10.1%   | 9.6%    | 9.9%    | 9.8%    | 9.2%  | 8.7%    | 8.3%    | 8.5%    | 8.5%    | 8.1%    | 8.0%    |
| Excess Returns: Average Annual less benchmark returns                            |         |         |         |         |         |         |       |         |         |         |         |         |         |
|  | LEAD    |         |         |         |         |         | peak  | LAG     |         |         |         |         |         |
|  | 6 month | 5 month | 4 month | 3 month | 2 month | 1 month |       | 1 month | 2 month | 3 month | 4 month | 5 month | 6 month |
| LEAD   | 4.1%    | 4.0%    | 4.2%    | 3.5%    | 3.7%    | 3.5%    | 2.7%  | 2.2%    | 1.9%    | 1.9%    | 1.8%    | 1.3%    | 1.1%    |
|  | 4.2%    | 4.1%    | 4.3%    | 3.6%    | 3.8%    | 3.6%    | 2.9%  | 2.2%    | 2.0%    | 2.0%    | 1.9%    | 1.2%    | 0.8%    |
|  | 4.7%    | 4.6%    | 4.8%    | 4.0%    | 4.2%    | 4.1%    | 3.3%  | 2.7%    | 2.1%    | 2.2%    | 1.9%    | 1.2%    | 0.9%    |
|  | 3.9%    | 3.8%    | 4.0%    | 3.3%    | 3.5%    | 3.3%    | 2.6%  | 1.9%    | 1.4%    | 1.5%    | 1.3%    | 0.7%    | 0.5%    |
|  | 3.2%    | 3.1%    | 3.3%    | 2.6%    | 2.8%    | 2.6%    | 1.9%  | 1.2%    | 0.7%    | 0.8%    | 0.7%    | 0.1%    | -0.3%   |
|  | 2.5%    | 2.4%    | 2.5%    | 1.8%    | 2.0%    | 1.8%    | 1.1%  | 0.5%    | 0.0%    | 0.1%    | 0.0%    | -0.6%   | -1.0%   |
| trough   | 1.8%    | 1.7%    | 1.9%    | 1.2%    | 1.4%    | 1.2%    | 0.5%  | -0.2%   | -0.7%   | -0.6%   | -0.7%   | -1.2%   | -1.5%   |
| LAG  | 1.4%    | 1.3%    | 1.5%    | 0.8%    | 1.0%    | 0.8%    | 0.1%  | -0.8%   | -1.1%   | -1.0%   | -1.1%   | -1.6%   | -1.9%   |
|  | 0.8%    | 0.7%    | 0.9%    | 0.2%    | 0.4%    | 0.2%    | -0.5% | -1.1%   | -1.7%   | -1.6%   | -1.7%   | -2.2%   | -2.5%   |
|  | 0.4%    | 0.3%    | 0.5%    | -0.2%   | 0.0%    | -0.2%   | -0.9% | -1.5%   | -2.1%   | -2.0%   | -2.1%   | -2.6%   | -2.9%   |
|  | 0.3%    | 0.2%    | 0.3%    | -0.4%   | -0.2%   | -0.3%   | -1.1% | -1.7%   | -2.2%   | -2.1%   | -2.2%   | -2.7%   | -3.0%   |
|  | 0.0%    | -0.1%   | 0.1%    | -0.6%   | -0.4%   | -0.6%   | -1.3% | -1.9%   | -2.4%   | -2.3%   | -2.4%   | -2.9%   | -3.2%   |
|  | -0.2%   | -0.2%   | 0.0%    | -0.7%   | -0.5%   | -0.7%   | -1.4% | -2.0%   | -2.5%   | -2.4%   | -2.5%   | -3.0%   | -3.3%   |

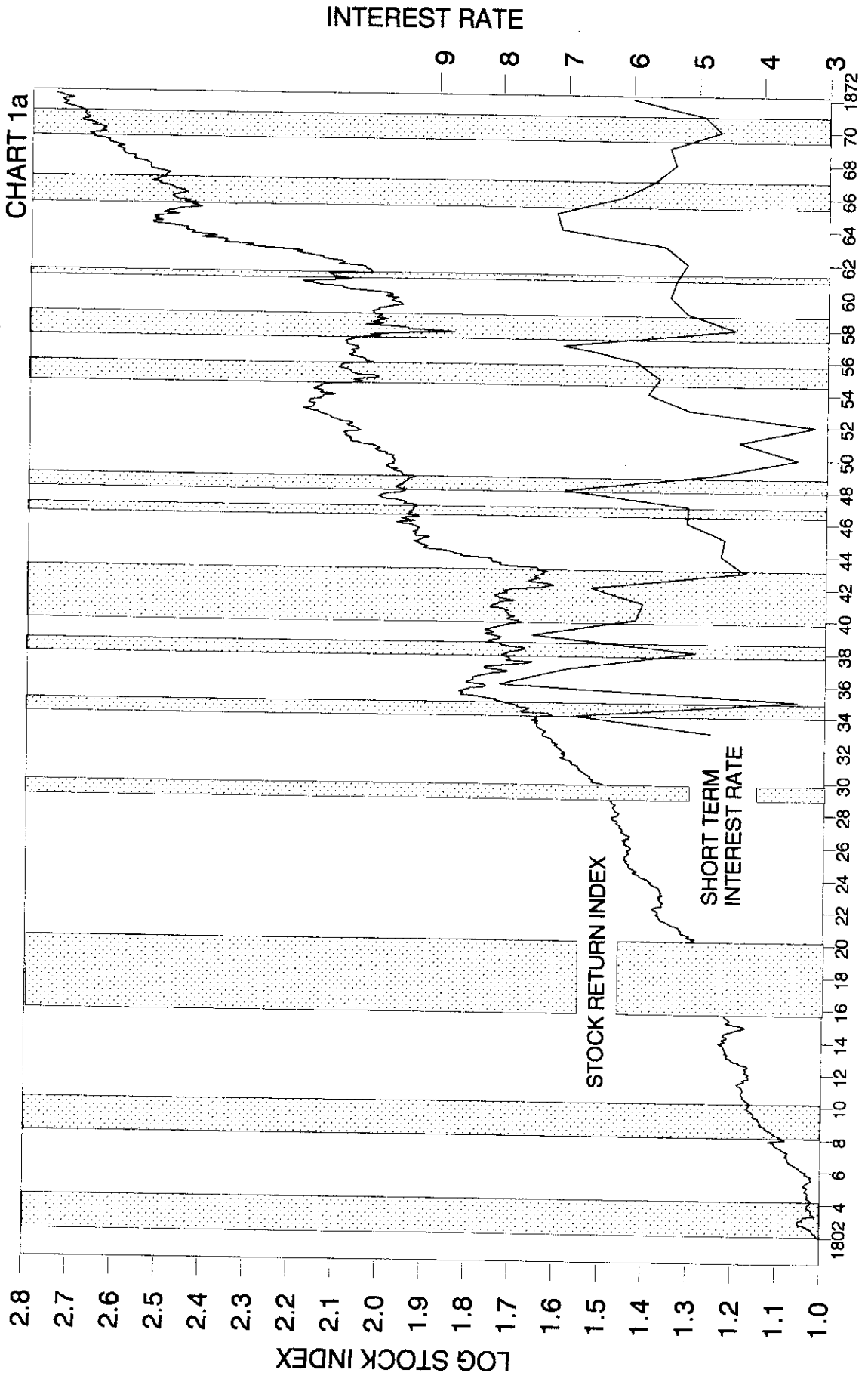
\* Indicates statistically different from 0.5% at peak/trough at 95% confidence level.



# STOCK RETURNS AND INTEREST RATES

1802 - 1872

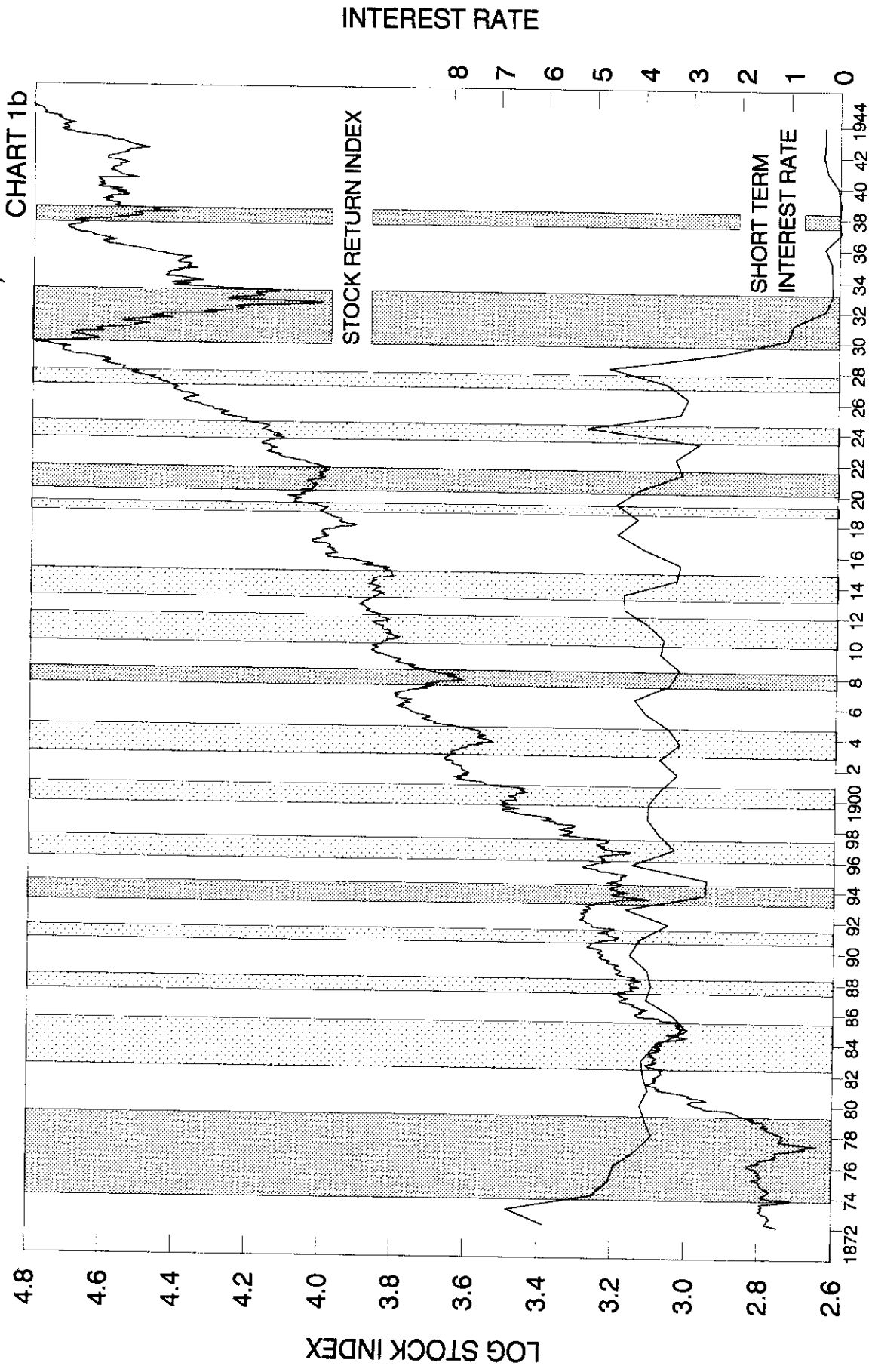
NBER RECESSIONS SHADED (DARK SHADING INDICATES SEVERE RECESSIONS)



# STOCK RETURNS AND INTEREST RATES

1872 - 1945

NBER RECESSIONS SHADED (DARK SHADING INDICATES SEVERE RECESSIONS)



# STOCK RETURNS AND INTEREST RATES

1945 - 1991

