The Predictive Power of Stock Market Indicators

Ben Branch

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Empirical research has cast so much doubt on chart readers that most
capital theorists have about as much faith in charts as astronomers have in
astrology. Certainly there is overwhelming evidence that attempting to predict
future price changes on the basis of past price behavior is unproductive.
There is, however, another aspect of technical analysis which has received much
less attention from academicians. In its narrow form technical analysis seeks
to forecast the direction of price movements of individual securities from past
price and volume data. A second and somewhat broader type of technical analy-
sis concentrates on the prediction of general market movements and trends rely-
ing on a broader set of information. Various market indicators are said to
offer signals useful in forecasting future prices. One type seeks to measure
investor sentiment through what might be called *mood variables*. A second type
of indicator is more closely related to fundamental factors affecting future
supply and demand for securities. Both types of indicators, however, are de-
signed to be used in predicting future market movements rather than the move-
ments of individual stock prices. This is to be contrasted with fundamental
analysis which is concerned with predicting future prices of individual securi-
ties by analyzing the underlying factors related to the firm's future profit-
ability. Most of the prior work with market indicators takes one or another
proposed market indicator and examines the historical relation between the in-
dicator and some market index such as the Dow Jones Industrial Average. The
analysis has tended to be *ad hoc*, casual and impressionistic with little or no
attempt to integrate various market indicators into a functional system. This
paper represents an attempt to overcome these past shortcomings. First a number
of suggested market indicators are introduced and their theoretical underpin-
nings examined. Then a means for testing the indicators simultaneously is ex-
plained and the results of these tests are presented, interpreted, and analyzed.

I. Suggested Market Indicators

Various writers and analysts have claimed that quite a number of market indicators have predictive content. Since there have been so many different indicators proposed and data on some indicators are difficult to obtain, not all market indicators are included in this analysis. It should be noted, however, that the reported results cover all indicators tested. There has been no prior prescreening.[1] The mood indicators include the total odd-lot short ratio, short selling by floor traders, a composite price earnings ratio, and *Barron's* confidence index. The fundamental indicators used were specialist short selling, secondary distributions, mutual fund cash positions, the treasury bill rate, the rate of growth of the money supply, and the inflation rate.

This division into mood and fundamental indicators is somewhat arbitrary but the issue is not crucial to the analysis. The reader is free to reclassify indicators as he likes. Let us examine the arguments underlying the use of each of these ratios. First short selling and the total odd-lot short ratio will be considered.

The reader will recall that short selling involves the sale of borrowed securities at the current market price in the hopes that the price will fall so that the position can be covered at a lower price. In other words, the short seller hopes to profit from a price decline. If short sellers are generally sophisticated market analysts, a rise in short interest would be expected to forecast a downturn. On the other hand, short sales create potential demand for the shorted stock. When the short seller covers, he must buy the stock on the market. Thus it might be expected that a rise in short interest forecasts an increase in stock prices. Neither expectation, however, is supported by the evidence. Both Smith and Mayor found no significant relation between gross short interest and subsequent market moves.[2] Furthermore McDonald and Barron found that short sellers on balance earned either negative or very low positive

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[1]There is one minor exception to this statement. In some earlier work the premium and discount on closed-end mutual funds was tested on a somewhat different data set than employed here. Because it worked poorly and data were difficult to obtain, it was dropped from the list of independent variables in this study. For discussion of this index see, M. Zweig, "An Investor Expectation Stock Rise Prediction Model Using Closed-End Premiums," *Journal of Finance* (March 1973), pp. 67-78.

[2]T. Mayor, "Short Trading Activity and the Price of Equities: Some Simulative and Regressive Results," *Journal of Financial and Quantitative Analysis* (September 1968), pp. 283-298; and R. Smith, "Short Interest and Stock Market Prices," *Financial Analysts Journal* (November-December 1968), pp. 151-154.

returns.[3] Thus it appears from previous research that gross short interest is not a useful indicator.

It is alleged, however, that short selling by odd lotters, specialists, and floor traders may have some predictive content. Odd lot trades involves less than one hundred shares. Thus the odd lot trader is typically a small investor. According to Wall Street lore the small investor is very unsophisticated. The least sophisticated of the small investors is the odd-lot short seller. When odd-lot short selling is abnormally high, a bottom and subsequent rise in the market is forecast. In other words, when the little guy is selling, it is time to buy. Studies by Raihall and Jepson, Gup, and Zweig all tend to confirm the accuracy of odd-lot indicators.[4] Zweig's index based on odd-lot short sales as a percentage of total odd-lot purchases and sales appears to be the most promising indicator.

Unlike the odd lotter one might expect the floor trader to be a rather sophisticated investor. Floor traders have seats on the exchange and buy and sell for their own accounts. Normally their trading is for the short run as membership permits very low transaction costs so that small gains on large volume trades are not wiped out by commissions. Thus one might expect short selling by floor traders to forecast a fall and vice versa. Not so, says Zweig. He asserts that floor traders are subject to the same overemotional pressures which lead odd lotters to sell at bottoms and buy at peaks. His own analysis tends to support this view.[5] Even if this is a useful indicator, the eventual elimination of floor traders will eliminate this index's value.

While not formally touted as an indicator in the literature, the price earnings ratio (PE) of the market or some market index is often used as if it were an indicator. Too high or too low a PE or Dow on Standard and Poor's 500 may be taken as an indication of a reversal. Certainly there are those in the financial press who call attention to the market PE when they feel it is out of line.

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[3] J. McDonald and D. Baron, "Risk and Return on Short Position on Common Stocks," *Journal of Finance* (March 1973), pp. 97-107.

[4] D. Raihall and J. Jepson, "The Application of Odd Lot Buy Signals to Dividend Stocks," *Mississippi Valley Journal of Business and Economics* (Winter 1972-73), p. 19-30; B. Gup, "A Note on Stock Market Indicators and Pricing," *Journal of Financial and Quantitative Analysis* (September 1973), pp. 673-682; and M. Zweig, "Stalking the Bear: A New Odd Lot Indicator Has Just Turned Bullish," *Barrons* (July 23, 1973), p. 11.

[5] M. Zweig, "Uncanny Floor Traders," *Barron's* (April 22, 1974), p. 11.

. The final mood indicator considered in this study is computed and pub-
lished by *Barron's* and called the confidence index. It is based on differences
between interest rates on high and low risk bonds. According to Ring the smart
money will move from speculative to quality bonds when the market outlook is
depressing and back when the outlook is more favorable.[6] Ring's own survey
tends to support this view though he concedes that the index is a better fore-
caster of tops than bottoms.

In addition to the mood indicators, there are indicators which are claimed
to be related to the fundamental factors affecting future prices. Rather than
trying to capture investor sentiment, such indicators relate to informed opinion,
buying power, or economic policy likely to affect future prices. Two indicators
of informed opinion are specialist's short sales and secondary distributions.
First consider specialist short selling.

Unlike the odd lotter and floor trader, the specialist is presumed to be
among the most sophisticated of traders. It is the specialist who "makes a
market" in the relevant security. He buys and sells for his account on the
floor of the exchange in an attempt to smooth out temporary market imbalances
and profit from the difference between his buy price (bid) and sell price (ask).
He is also responsible for exercising limit orders and keeping the book on un-
exercised limit orders. As such he has access to substantial trading informa-
tion unavailable to the market in general. Since he is responsible for a group
of stocks, one would expect him to follow these companies with considerable
interest. If any group in the market is more sophisticated than the average
investor, the specialists would be expected to constitute such a group. In
trading for his account the specialist will normally buy and sell using his
own inventory as a buffer against temporary market imbalances. At times, how-
ever, the specialist will have depleted his inventory and will be forced to go
short or let the stock's price rise to the lowest unexercised sell limit order.
If he chooses to short the security, this is evidence that he expects the price
to fall. Kent relates specialists' short sales to total short sales.[7] When
specialists' short sales are an above average fraction of total short sales,
the market may be poised for a decline and vice versa. Kent's own investiga-
tion tends to confirm this expectation.

While specialists' trading represents informed trading opinion, secondary
distributions may be a useful index of informed corporate opinion. Just as

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[6]J. Ring, "Confidence Index, It Works Better at Tops than at Bottoms,"
Barron's (March 25, 1974), p. 11.

[7]W. Kent, *The Smart Money* (Garden City, N.Y.: Doubleday, 1972).

specialists have access to the book of unfilled limit orders--non-public infor-
mation useful to a trading--corporate officials responsible for secondary dis-
tributions have access to all of the corporation's financial records, back
orders, and interim operating results--non-public information useful to an in-
vestor. Such corporate officials do not wish to sell stock if the price is too
low relative to their firm's prospects. Therefore Merjos contends that second-
ary stock distributions may provide useful signals.[8] The companies which might
be making a secondary offering want to sell at a favorable price. If their
corporate officials think prices are low, most companies withhold their offer-
ings since higher prices increase the number of offerings. Thus secondary of-
ferings give useful market signals if corporate officials tend to be correct
in their analysis.

One important source of buying power is the liquidity positions of insti-
tutional investors. While data on the cash positions of most institutional
investors are not readily available, data of mutual funds are available. Mutual
fund assets may be invested in the stock or bond market or held in liquid
form in varying degrees. Cash constituting a major share of total fund assets
indicates there is a substantial reservoir of buying power. If mutual funds
and other institutional investors tend to behave in a similar fashion, the mu-
tual fund cash position can be employed usefully as an index of institutional
cash. Thus a high mutual fund cash position would forecast a market rise while
a low ratio is bearish. Gup's study tends to confirm this relation.[9]

One type of market indicator may have substantially greater appeal for
economists than others. That indicator is monetary policy. For reasons too
complicated to go into here it is widely believed that, when the Federal Reserve
Board loosens monetary policy, the economy will tend to expand while a tighten-
ing will constrain the economy's growth. Stock market behavior generally re-
sponds to the overall health of the economy. Thus tight monetary policy tends
to depress stock prices while loose money is likely to cause prices to rise.
Thus far monetary tightness and looseness have not been defined. There are,
however, several measures which may be used. The rate of growth of the money
supply has considerable appeal. Various interest rates might also be used.
When interest rates are high, one might expect investors to find bonds appealing
vis a vis stocks, causing stock prices to fall. Sprinkel and quite a few other
researchers have investigated a monetary policy stock market link with

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[8]A. Merjos, "Few Big Sellers; The Dearth of Secondary Distributions Is
Bullish," *Barron's* (October 15, 1973), p. 5.

[9]Gup, "Note on Stock Market Indicators."

conflicting results.[10]

In this study three monetary policy indicators are used. The treasury bill rate is designed to pick up the overall tightness or easiness of Fed policy. High interest rates, *ceteris paribus*, are an index of tight money while low interest rates relate to looser monetary policy. The rate of growth of the money supply is an index of the current direction of Fed policy. A rapidly growing money supply suggests an easing while slower or negative growth indicates a tightening. Future monetary policy, however, may be related to the rate of inflation. A rapid current rate of inflation is likely to forecast a future tightening of monetary policy while a slower rate may permit an easing of monetary policy. There is of course substantial literature on stock market-inflation relations. Most of this work refers to the hedge value of equity.[11] Therefore we should be cautious in interpreting the coefficients of an inflation variable if they prove significant.

In addition to the indicators considered in this study there is a host of others that might be tried. Among these indicators are insider trading, premiums

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[10]B. Sprinkel, *Money and Markets: A Monetarist's Vice,* Homewood, Ill.: (Irwin 1971); K. Homa and D. Jaffee, "The Supply of Money and Common Stock Price," *Journal of Finance* (December 1971), pp. 1045-1066. Two other studies reached the same conclusion as H. & J. M. Hamberger, and L. Kochin, "Money and Stock Prices: The Channels of Influence," *Journal of Finance* (May 1972), p. 231, 249; B. Malkiel and R. Quandt, "Selected Economic Indicators and Forecasts of Stock Prices," Research Memorandum #9, Finance Resource Center, Princeton University (1971). Using both Canadian and U.S. data Pesando reached similar conclusions as M & Q. See J. Pesando, "The Supply of Money and Common Stock Prices: Further Observations on the Econometric Evidence." Working Paper #7215, Institute for the Quantitative Analysis of Social and Economic Policy, University of Toronto, Toronto, Canada (November 1972). Malkiel and Quandt tone down the thrust of their point in: B. Melkiel and R. Quandt, "The Supply of Money and Common Stock Prices: Comment," *Journal of Finance* (September 1972), pp. 921-926; and J. Rudolph, "The Money Supply and Common Stock Prices," *Financial Analyst Journal* (March/A ril 1972), pp. 19-25; R. Cooper, "Efficient Capital Markets and the Quantity Theory of Money," *Journal of Finance* (June 1974), pp. 887-908.

[11]A. Alchian and R. Kessel, "Redistribution of Wealth through Inflation," *Science,* vol. 130, no. 3375 (September 4, 1959), p. 538; F. K. Reilly, G. L. Johnson, and R. E. Smith, "Inflation, Inflation Hedge, and Common Stocks," *Financial Analysts Journal,* vol. 28 (January-February 1970), pp. 104-10; M. W. Keran, "Expectations, Money, and the Stock Market," unpublished (Saint Louis: Federal Reserve Bank of Saint Louis, January 1971), pp. 16-31; B. Oudet, "The Variation of the Return in Periods of Inflation," *Journal of Financial and Quantitative Analysis,* vol. 8 (March 1973), pp. 247-58; G. P. Brinson, "The Synergistic Impact of Taxes and Inflation on Investment Return," *Financial Analysts Journal,* vol. 30 (March-April 1973), pp. 74-75; Ben Branch, "Common Stock Performance and Inflation: An International Comparison," *Journal of Political Economy* (January 1974), pp. 48-52.

and discounts on closed and investment companies,[12] consumer sentiment, Zweig's indicator of Fed policy[13] and Turov's short-term trading ratio.[14] At some future time it may be possible to include them but the difficulty of obtaining data foreclosed their use in this study. It should be noted, however, that most of these indicators would tend to overlap the variables used. For example, insider trading and secondary distributions are both indices of informed corporate opinion; Zweig's Fed policy indicator and our monetary policy variables seek to capture money-stock market relations; and the other variables are all general mood indicators that seek to measure the same phenomena as the included mood variables. Thus the exclusion of these variables should not be considered a major problem.

II. The Model to Be Tested

In summary there may be some reason to believe that future market movements are related to a variety of different indicators. Previous testing of these indicators has tended to be very unsophisticated. Generally each indicator is tested separately with some sort of modified filter rule.[15] Some arbitrary level for the indicator is supposed to be a buy or sell signal, and then the investigator considers subsequent market performance. If the market eventually moves in the desired direction, the signal is judged successful. Such testing obviously leaves a great deal to be desired. One would like to test the indicators simultaneously and constrain the investigator's freedom to call an eventual market move an indicator of success. Multiple regression analysis permits such a test. First, however, one needs to center on a proper dependent variable. From the investor's viewpoint the important thing is to be able to forecast future price changes. A reasonable index of such changes is the percentage change in one of the market averages over some forward-looking time period. For example, the percentage change over a month or year might be a useful dependent variable. Thus current values of the indicators will be used to predict future changes in the index.

In order to set up an equation to be tested, one needs to define the

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[12] Zweig, "Investor Expectation Stock Rise Prediction Model."

[13] M. Zweig, "Fed Indicator," *Barron's* (January 20, 1975), p. 11.

[14] D. Turov, "Buy Signal? A New Technical Indicator Is Flashing One," *Barron's* (December 9, 1974), p. 11.

[15] Gup is an exception here though he only examined three indicators simultaneously.

independent and dependent variables precisely. First, the dependent variable
will be considered. As has been noted the percentage change in some market in-
dex over some period will be used as the dependent variable. The Dow Jones In-
dustrial Average, Standard and Poor's 500, and the NYSE composite index are all
reasonable choices for the index. Because they were currently available to
the author on tape, both the Dow and Standard and Poor's 500 were tried with
almost identical results. Since it is the broader based of the two indexes,
the results for Standard and Poor's 500 will be reported. The NYSE composite
index is somewhat broader based than Standard and Poor's 500, but any differences
in performance are likely to be slight. The next decision to be made involves
the length of time for prediction. Since the received theory is not consistent
on the predictive length of the forecaster, it appears useful to consider
several alternative lengths. Percentage changes over one, three, six, nine,
and twelve months are used. This gives the indexes a chance to reveal their
value over several different adjustment periods. Five dependent variables
$(X_1, X_3, X_6, X_9,$ and $X_{12})$ were tested on monthly data for 1960-1974 period.
Ease of collection dictated this time period.

The independent variables were defined as follows:

T = Total Odd Lot Short Ratio: the ratio of odd-lot short sales to
    a ten-day moving average of total odd-lot purchases and sales.

F = Floor traders' short sales as a percentage of total short sales.
mood
variables $(F_1$ is variable up to July 1964, F_2 is August 1964-1972)[16]

E = Price earnings ratio of Standard and Poor's 500 index using most
    recent 12 months' earnings and current price.

C = *Barron's* confidence index: Ratio of yields on 10 high-grade
    bonds to yield on 40 bonds.

informed S = Specialist short sales as a percentage of total short sales.
opinion
variables Sc= Secondary stock sales as percentage of total stock sales.

Potential M = Mutual fund cash position as percentage of total assets of funds
demand
variable   for sample of funds.

economic R = 90-day treasury bill rate.
policy M_1= percentage change (one month) in money supply (narrowly defined).
variables I = percentage change (one month) in consumer price index.

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[16]In August 1964 the NYSE changed the rules making floor trading much
more restrictive. The most important change required that floor trades must
be stabilizing; that is, purchase must occur when the stock is declining or
sales when the stock is rising. For this reason the floor trade data pre-
August 1964 must be handled differently from later data.

(1) $X_i = a + bT = c_1 F_1 + c_2 F_2 + dE + fC + gS + h \, Sc + iM + kR + m \, M_1 + nI$

Thus the model to be tested is:

for j = 1, 3, 6, 9, and 12.

Coefficients are expected to have the following signs:

$b>0$; $c_1>0$; $c_2>0$; $d<0$; $f>0$

$g<0$; $h<0$; $k>0$; $m>0$; $n<0$

III. Results

Fitting equation 1 to the data produced Table 1. Dropping the insignificant variables (using a 90% confidence level) produces the results of Table 2.

It is useful at this point to interpret and compare these results. Among the mood variables the confidence index is by far the most successful and is significant for each adjustment period. The TOLSR has the expected sign for each adjustment period but is only significant for the six- and nine-month periods. The floor trading variables fail to be significant for any adjustment period while having inconsistent signs in the shorter periods. The PE ratio variable is significant only for the longest (12-month) adjustment period. This is not particularly surprising, since one would expect that it would take time for any reversal from a very low PE to occur . A low PE ratio may well decline even lower before reversing field. This is indicated by the incorrect signs on the one-, three-, and six-month adjustment periods. It should be noted that the other three mood variables (T, F, and C) are all attempts to gauge investor sentiment and thus tend to overlap. While the confidence index works best, the other variables tend to work when it is excluded. For example, the floor trading variables turn significant with the correct signs when the confidence index is dropped from the regression.

Between the two informed opinion variables, specialist short selling performs best since it has the expected sign and is significant for each adjustment period. Secondary distributions are only useful for the intermediate term three- and six-month periods.

Mutual fund cash is quite successful having the correct sign with a significant coefficient for each adjustment period. This suggests that the potential demand represented by institutional liquidity is a useful index of price movements.

Regarding the economic policy variables, the bill rate and percentage change in the CPI work well while the percentage change in the money supply does

TABLE 1

REGRESSION RESULTS FOR EQUATION (1) WITH ALL
VARIABLES INCLUDED 1960-74

	Variable	1-month	3-month	6-month	9-month	12-month
	intercept	-0.076 (-0.6)	-0.149 (-0.85)	-0.378 (-1.62)	-0.440 (-1.56)	-0.384 (-1.23)
	TOLSR	0.859 (1.03)	0.530 (0.46)	3.284 (2.08)	3.374 (1.76)	2.296 (1.08)
	FLR TRAD SHT S	-0.183 (-1.57)	-0.192 (-1.19)	-0.030 (-0.14)	0.188 (-.72)	0.441 (1.52)
mood variable	FLR TRAD '64 ON	-0.074 (-1.18)	0.055 (-.64)	0.152 (1.3)	0.171 (1.18)	0.221 (1.36)
	S & P 500 P/E	0.0005 (1.04)	0.0008 (1.29)	0.002 (1.66)	-0.0008 (-0.65)	-0.003 (-1.95)
	CONFIDENCE	0.001 (1.11)	.003 (2.22)	.006 (2.81)	0.008 (3.36)	0.010 (3.7)
informed opinion variable	SPEC SHT SALES	-0.103 (-1.38)	-0.287 (-2.77)	-0.337 (-2.47)	-0.317 (-1.92)	-0.462 (-2.54)
	SECONDARY/NYSE V	-0.062 (-0.45)	-0.506 (-2.64)	-0.619 (-2.43)	-0.299 (-0.97)	-0.014 (-0.04)
potential demand variable	MF CASH/ASSETS	0.944 (2.8)	2.561 (5.48)	3.723 (4.96)	4.554 (4.72)	5.086 (4.77)
	BILLRATE	-0.012 (-2.5)	-0.045 (-6.78)	-0.068 (-6.86)	-0.088 (-7.13)	-0.100 (-7.36)
economic policy variable	% CHG M1	0.663 (0.59)	0.701 (0.45)	-1.499 (-0.73)	-3.070 (-1.23)	-2.344 (-0.85)
	% CHG CPI	-2.887 (-1.68)	-3.955 (-1.66)	-5.259 (-1.66)	-6.321 (-1.64)	-7.578 (-1.75)
	$\bar{R}^2$	0.078	0.364	0.464	0.466	0.494
	Durbin-Watson Stat.	2.38	1.05	0.899	0.567	0.442
	D.F.	166	166	163	160	157

TABLE 2

REGRESSION RESULTS FOR EQUATION (1) WITH
INSIGNIFICANT VARIABLES DELETED 1960-74

	1-month	3-month	6-month	9-month	12-month
Intercept	-0.092 (-1.03)	-0.257 (-2.05)	-0.386 (-2.2)	-0.492 (-2.33)	-0.158 (-0.62)
TOLSR			3.108 (2.01)	3.930 (2.12)	
CONFIDENCE	0.002 (1.79)	0.005 (3.54)	0.007 (3.59)	0.008 (3.8)	0.010 (4.05)
S & P 500 P/E					-0.003 (-3.57)
SPEC SHT SALES	-0.095 (-.167)	-0.226 (-2.75)	-0.274 (-2.09)	-0.379 (-2.49)	-0.642 (-4.43)
SECONDARY/NYSE V		-0.441 (-2.3)	-0.534 (-2.11)		
MF CASH/ASSETS	0.775 (2.62)	2.506 (6.02)	3.882 (5.4)	5.058 (5.61)	5.881 (6.18)
BILLRATE	-0.012 (-2.64)	-0.041 (-6.7)	-0.067 (-7.27)	-0.085 (-7.59)	-0.108 (-8.71)
% CHG. CPI	-2.786 (-1.69)	-4.556 (-1.96)	-6.770 (-2.19)	-7.288 (-1.94)	-8.597 (-2.02)
$\bar{R}^2$	0.082	0.351	0.455	0.467	0.493
Durbin-Watson Stat	2.404	0.940	9.779	0.537	0.453
DF	172	171	167	165	162

not work at all. The bill rate has highly significant coefficients while the
inflation rate's coefficients tend to have significant but lower t ratios.
The failure of the money growth variable is consistent with some other research,
indicating that any lag between change in monetary policy and stock market re-
action is very short. In fact, the market appears to anticipate changes in
monetary policy.[17]

Comparing the results for the different adjustment periods, we see that
$\bar{R}^2$ for the one-month period is rather low but rises from .082 to .351 in the
three-month period with a further rise to .455 in the six-month period. There
are slight further rises in the nine- and twelve-month periods. Apparently
market indicators are of modest value in predicting one-month price changes
but of significantly greater value for longer periods.

For all periods except the one-month the Durbin Watson is well below 2,
indicating a serious degree of autocorrelation in the errors terms. This is not
unexpected. If the indicators miss in one three-month period, it is to be anti-
cipated that they would miss in the same direction in three month beginning
with the next month. The same would be true for other adjustment periods.
Since we have no way to predict the direction of error, it would be meaningless
to apply one of the autoregression techniques.

A question that arises here involves a comparison of the forecasting power
of the indicators jointly with their use alone. This question can be approached
by reference to the simple correlation coefficients between the independent
variables and the dependent variables. Table 3 presents these correlation co-
efficients.

By squaring these correlation coefficients, we obtain the R^2 which would
obtain in a one-variable regression. Since the highest correlation is .41, the
largest $\bar{R}^2$ would be less than .17 compared with a considerably higher $\bar{R}^2$ for
the corresponding multiple regression. Clearly the joint usage of the market
indicators improves the fit for the 1960-74 period. This is not surprising
given their diversity, and it might not be surprising if joint usage of mood
variables offered little additional explanatory power. There should, however,
be considerable nonoverlapping information in the other types of indicators.
If they work individually, they should work better in a joint framework.

A second question that Table 3 addresses is the time pattern of the rela-
tionship. Are there different lag structures for the different variables? It
appears that there are. In general the strength of the relationship tends to

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[17] Refer to sources in footnote 10.

TABLE 3

CORRELATIONS BETWEEN INDICATORS AND
SUBSEQUENT CHANGE IN INDEX

Variable	1-month	3-month	6-month	9-month	12-month
TOLSR	0.12	0.20	0.29	0.30	0.33
FLR TRADER	0.03	0.21	0.41	0.51	0.59
FLR TRADER '64	0.01	0.17	0.17	0.17	0.20
S & P 500 P/E	0.08	0.07	0.16	0.10	0.02
CONFIDENCE	-0.05	-0.12	-0.18	-0.20	-0.21
MF CASH/ASSETS	0.01	0.06	-0.03	-0.05	-0.01
SPEC SHT SALES	-0.11	-0.23	-0.25	-0.25	-0.32
SECONDARY/NYSE V	-0.06	-0.21	-0.18	-0.13	-0.12
BILLRATE	-0.15	-0.26	-0.37	-0.41	-0.40
% CHG. MI	0.01	-0.04	-0.14	-0.19	-0.19
% CHG. CPI	-0.18	-0.25	-0.34	-0.36	-0.35

rise with the adjustment period. There are monotonically increasing correla-
tion coefficients for TOLSR, floor trader short sales confidence index, and
specialist short sales. The bill rate and inflation rate correlations reach
their highest value at nine months while declining slightly in the 12-month
period. The secondary distribution correlation reaches a peak in the 3-month
period declining thereafter. This suggests that corporate officials may have
rather short time horizon in the timing of their distribution decisions. The
other variables do not appear to have a consistent pattern of correlation co-
efficients. The PE ratio has the incorrect sign for each adjustment period
while the mutual fund cash position has an incorrect but insignificant sign in
the longer adjustment periods.

IV. Further Tests

While the above stated results are interesting, they are far from conclu-
sive. They suggest that some of the indicators have forecasting potential al-
though one can not be sure that the relations found will continue to hold in the
future. Since their degree of stability in the past may be an indication of
future stability, it is useful to split the sample into two separate time
periods. In this way we can compare the coefficients for the two sets of re-
gressions. First the data for 1960-74 and then 1968-74 are used in fitting the
equations used in Table 2. These results appear in Tables 4 and 5.

TABLE 4

REGRESSION RESULTS FOR 1960-67

Variable	1-month	3-month	6-month	9-month	12-month
intercept	-0.262 (-2.6)	-0.482 (-3.25)	-0.940 (-4.67)	-1.098 (-4.1)	0.070 (0.23)
TOLSR			0.290 (0.19)	-1.205 (-0.62)	
mood CONFIDENCE	0.003 (3.11)	0.007 (4.29)	0.013 (5.96)	0.014 (5.03)	0.009 (3.18)
S & P 500 P/E					-0.007 (-5.49)
informed opinion SPEC SHT SALES	-0.063 (-1.26)	-0.199 (-2.71)	-0.377 (-3.1)	-0.454 (-3.01)	-0.518 (-3.76)
SECONDARY/NYSE V		-0.494 (-2.97)	-0.482 (-2.21)		
demand MF CASH/ASSETS	1.445 (3.04)	3.567 (5.02)	7.533 (7.34)	10.408 (7.77)	7.297 (5.29)
economic policy BILLRATE	-0.025 (-2.94)	-0.062 (-4.88)	-0.123 (-7.25)	-0.139 (-6.31)	-0.134 (-5.58)
% CHG CPI	-3.233 (-1.61)	-2.649 (-0.91)	0.352 (0.09)	2.918 (0.58)	-0.973 (-0.19)
$\bar{R}^2$	0.139	0.433	0.612	0.578	0.662
Durbin-Watson	2.168	1.146	1.129	0.592	0.708
Degrees of Freedom	87	84	80	78	75

Comparing Tables 4 and 2 we find considerable consistency coupled with some inconsistency. TOLSR and the inflation rate do not work in the 1960-67 time period while they do for the full period. The other variables are uniformly significant for both time periods.

Unlike the 1960-67 results, the 1968-74 results differ substantially from both the 1960-74 and 1960-67 results. The billrate and mutual fund cash variables behave similarly for all three time periods. The other variables do not. For the 12-month period the confidence index and specialist short-sale variables are consistent but are not for other adjustment periods. While TOLSR and the inflation rate do not work for the 1960-67 period, they do for the more recent period. On the other hand, secondary distribution and market PE ratio variables do not appear to have predictive content for the 1968-74 period.

TABLE 5

REGRESSION RESULTS FOR 1968-74

Variable	1-month	3-month	6-month	9-month	12-month
intercept	0.292 (1.01)	0.505 (1.35)	0.895 (2.02)	0.415 (0.77)	-0.792 (-1.21)
TOLSR			8.250 (2.8)	9.314 (2.59)	
CONFIDENCE	-0.002 (- .67)	-0.003 (-0.76)	-0.009 (-1.77)	-0.001 (-0.24)	0.014 (2.04)
S & P 500 P/E					0.002 (0.9)
SPEC SHT SALES	-0.107 (-0.83)	-0.183 (-1.04)	0.120 (-0.48)	-0.196 (-0.67)	-0.870 (-3.05)
SECONDARY/NYSE V		-0.315 (-0.68)	-0.443 (-0.8)		
MF CASH/ASSETS	0.605 (1.38)	2.494 (4.34)	2.842 (3.02)	2.907 (2.45)	5.036 (4.03)
BILLRATE	-0.012 (-0.75)	-0.049 (-5.11)	-0.065 (-5.2)	-0.074 (-4.99)	-0.089 (-5.05)
% CHG CPI	-2.245 (-0.84)	-5.037 (-1.44)	-8.634 (-2.0)	-10.702 (-2.0)	-12.296 (-1.97)
$\bar{R}^2$	0.050	0.355	0.446	0.411	0.399
Durbin-Watson Stat.	2.604	1.113	1.051	0.737	0.563
D. F.	79	80	79	80	80

These comparisons leave us with a mixed verdict. Only two of the variables appear to work consistently for all adjustment and time periods. It should be noted, however, that there was some consistency with some of the other variables. Furthermore when variables had an incorrect sign, they were generally insignificant. Is the modest amount of stability in the relationships sufficient to be useful in predicting future market movements? In an attempt to deal with this question the following test was performed: Using the coefficients of Table 4 a predicted value for X_i ($\hat{X}_i$) was determined for the 1968-74 period and these $\hat{X}_i$'s were compared with their actual values. One with the information available in 1967 could have actually followed such a policy. Correlation and F ratios were calculated for each adjustment period and are reproduced in Table 6.

TABLE 6

A COMPARISON OF PREDICTED AND ACTUAL
PRICE PERFORMANCE

	1-month	3-month	6-month	9-month	12-month
Correlation	.278	.577	.555	.497	.513
F	6.96	42.34	37.77	27.87	30.40
DF	1,83	1,85	1,85	1,85	1,85
Significance level	.0097	.00000005	.00000016	.000003	.0000014

The results of Table 6 are rather convincing evidence that there is suffi-
cient stability in the relationship for it to be meaningful. The F of the rela-
tion between the predicted and actual value of X is significant at the 1 percent
level for a one-month adjustment period. For the other adjustment periods the
relationship is significant at a much higher level.

Two points should be noted here. First it might well be possible to im-
prove the correspondence by deleting variables insignificant for the earlier
time period and refitting the regression for each prediction. For example, the
predictions for 1970 might be based on a regression fit to 1960-69 data. In
this way new information would be utilized as it becomes available. On the
other hand, the reader should be cautioned not to read too much into these re-
sults. By no means have they established that a trading rule based on market
indicators could outperform a buy-and-hold strategy with transaction costs con-
sidered. It should, however, be pointed out that requiring a signal to pass
such a comparison may be too strong a test. It is possible that, even if a
trading rule can not outperform a buy-and-hold strategy, it may be useful.
Consider an investor with funds to be committed. His alternatives include buy-
ing now and buying later. In either case he will incur transaction costs when
he commits his funds. If there are indications that the market is about to de-
cline (even if the expected value of the decrease is less than transactions
costs), he would tend to be better off waiting. Similarly one who plans to
sell but is able to wait may find useful a trading rule that is on balance cor-
rect but by less than enough to cover transactions costs. Until trading rules
are formulated and such a strategy compared with a buy-and-hold approach, we
will not know if these market indicators could be utilized to forecast well
enough to outperform the market. Such a test, however, is not the only test of
such indicators' usefulness.

V. Conclusion

Taken together these results appear to support the following conclusions.
In the past there has been a significant relationship between some market indi-
cators and subsequent stock market performance. The most successful indicators
appear to be the cash position of mutual funds and the treasury bill rate.
Other indicators that may have some forecasting ability include TOLSR, confi-
dence index, specialist's short sales, secondary distributions, and the infla-
tion rate. The stability of a relationship involving these last mentioned
variables, however, is subject to some doubt. In particular it may well be that
indicators with forecasting ability in an earlier time period may be losing
their value. This result would be expected to follow from increasing attention
given to the indicators. An indicator that works well in one period may there-
by attract enough attention to make it useless in a later period.

Further research might take several directions. One might add additional
indicators to the test sample. Such additional variables would be interesting
but it is not clear that they would add much explanatory power since they are
likely to overlap phenomena already covered by existing variables. A second
approach would involve playing around with the form of the independent vari-
ables. Mixed lag structures, distributed lags, nonlinear forms, and other ad-
justments to the independent variables could probably improve the fit. I was
very careful not to do this since it comes much too close to data mining. Im-
proving the $\bar{R}^2$ for one time period may or may not improve the forecasting
ability of the model. If enough variations are tried, some will work just by
chance. In all probability, however, they will not work in a future time period.
It would also be useful to construct trading rules based on market indicators
and then compare their use with a buy-and-hold strategy. Finally it would be
interesting to test the power of market indicators on groups of stocks. For
example, certain interest-sensitive stocks (savings and loans and other housing-
related companies for example) may be particularly susceptible to forecasts
based on monetary variables. Clearly this is a fertile ground for further work.