

Stock Prices and the Economy

By Douglas K. Pearce

Common stock prices have climbed dramatically in the United States since the summer of 1982, with broad-based indexes rising more than 50 percent. Increases in stock prices also have been substantial in other industrial countries over this period. At first blush, the rise in stock prices might appear paradoxical, since stock prices began rising while unemployment rates in many of these countries were high. It has long been believed, however, that stock prices are a reliable leading indicator of economic activity, and the increase in stock prices in the United States has, indeed, been followed by a strong economic recovery.

While stock prices may signal future changes in the economy, they may also have direct effects on economic activity. The recent rise in U.S. stock prices has increased household wealth about a half trillion dollars, which many analysts believe should induce consumers to raise spending significantly and should speed the recovery. Investment spending on plant and equipment also is likely to be positively affected

since higher share prices reduce the cost of raising funds and increase the incentive to expand productive capacity. New equity funding has been substantial during the stock market rally, ending a decade in which corporations relied almost exclusively on debt finance. The resulting lowering of debt-equity ratios of corporations is viewed as improving corporate stability.¹

In view of the economic importance often ascribed to the stock market, this article reviews the theoretical and empirical literature on the relationship between stock prices and real economic activity. The first section discusses the stock market as a leading indicator and analyzes its record in predicting business cycle turns in the United States and other countries. The second section investigates the link between stock prices and the consumption decisions of households and examines the relevant empirical evidence. The third section considers the connection between stock prices and the investment decisions of firms and reviews the related empirical work. The fourth section looks at the estimated effect of the stock market rally on the

Douglas K. Pearce is an associate professor of economics at the University of Missouri-Columbia and a visiting scholar at the Federal Reserve Bank of Kansas City. Terry Fitzgerald provided research assistance. The views expressed here are those of the author and do not necessarily reflect the opinions of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

¹ For a discussion of this issue, see Karlyn Mitchell, "Trends in Corporation Finance," *Economic Review*, Federal Reserve Bank of Kansas City, March 1983, pp. 3-15.

economy according to a large econometric model. The final section summarizes the findings of the article.

Stock prices as a leading indicator of business cycles

Business cycles refer to the irregular pattern of expansions and contractions that characterizes the time path of aggregate economic activity. The end of an expansion and start of a contraction is the cycle peak, while the end of a contraction and start of an expansion is the cycle trough. No mechanical formula is used to pick the months corresponding to peaks and troughs. Instead, a large number of indicators are used, based on historical experience. In the United States, the National Bureau of Economic Research is the authority that dates the turning points of the cycle. Economic agents and policymakers would benefit greatly if they could forecast these cycle turning points. Thus, it is not surprising that much effort goes into the search for reliable predictors, referred to as leading indicators.

Reasons for stock prices being a leading indicator

One time series that has long been used, either by itself or in combination with others, is an index of corporate stock prices. There are several views as to why movements in stock prices generally precede changes in real economic activity. According to the traditional model of stock prices, the price of a stock equals the present or discounted value of expected future dividends. In this model, stock prices rise because of higher expected corporate earnings or because of a lower required rate of return used by investors to discount future earnings. According to this model, stock prices should fall immediately if market participants

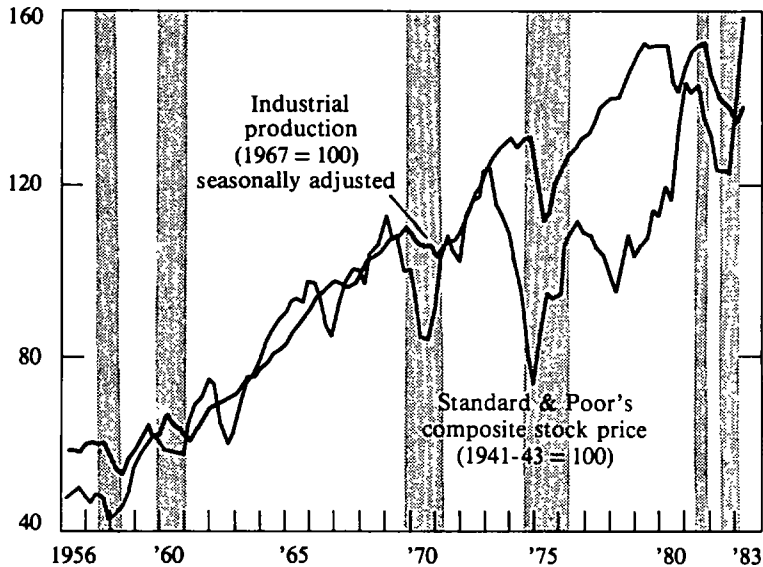
lower their near-term expectations of corporate profits because of a prospective economic downturn. Stock prices would then decline before the actual fall in corporate earnings and general economic activity. The price decline would occur even if stock prices have no direct effect on the economy. Because expectations of future corporate profits can be erroneous, however, the stock market could send false signals about future economic fluctuations.

A rise in the rate used to discount future earnings also would lead to an immediate fall in stock prices because it would lower the present value of expected earnings. The higher discount rate might result from more uncertainty about future corporate profits or from higher returns on other assets, such as a rise in the real interest rate on bonds. The fall in stock prices would be followed by an economic downturn if the source of the higher discount rate, say, a rise in the real rate of return on corporate bonds, also depressed the economy with some time lag or if lower stock prices had a direct negative effect on the economy. In either case, the stock market would act as a leading indicator of business fluctuations.²

Another view of why stock prices may lead economic activity emphasizes psychological elements. According to this interpretation, stock prices are not determined by the tradi-

² The discussion above assumes that changes in expected corporate earnings or changes in the required rate of return used to discount future earnings do not simply reflect changes in expected inflation. If market participants abruptly raise their expectations of inflation, both expected nominal corporate earnings and the nominal rate of discount would rise immediately but stock prices would not change initially. Nominal stock prices would rise subsequently with inflation and real stock prices would be unaffected. This result depends on inflation being neutral in the sense of leaving expected real corporate earnings and the real rate of discount unchanged. For a more detailed treatment of this issue, see Douglas K. Pearce, "The Impact of Inflation on Stock Prices," *Economic Review*, Federal Reserve Bank of Kansas City, March 1982, pp. 3-18.

CHART 1
Stock prices and industrial production
in the United States



tional model. Rather they move with the general level of optimism or pessimism, or what Keynes called “animal spirits.” Stock prices begin to rise when people decide the economy is improving and are thus willing to make financial investments in such risky assets as common stocks. In this case, it is the state of confidence rather than a forecast of higher corporate earnings that moves share prices. However, since changes in optimism may result in changes in the required rate of return, the traditional model of stock prices does allow for such psychological events. Again, to the extent such optimism or pessimism is unfounded, stock price movements may prove poor indicators of business cycle turning points.³

³ Another view has been advocated by Beryl Sprinkel, *Money and Stock Prices*, Irwin, 1964, who argues that both stock prices and the economy are reacting to movements in the money supply but that stock prices react more quickly

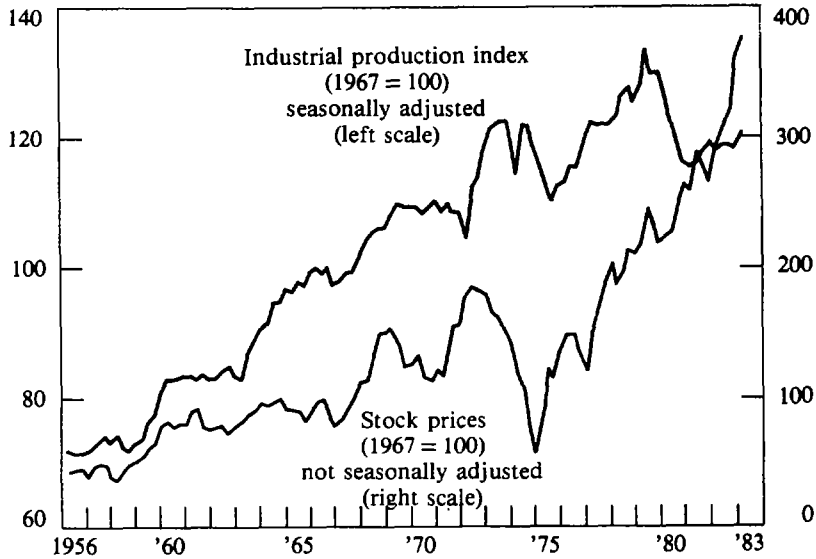
Evidence on the reliability of stock prices as a leading indicator

A relevant question is how good a guide have stock prices been in predicting economic upturns and downturns. Chart 1 plots the level of stock prices, as measured by Standard and Poor’s Composite Index of 500 of the largest stocks, and the index of industrial production since 1956. The index of industrial production is classified as a “coincident indicator.” This means that turning points in industrial production are thought to be synchronous with turning points in the general economy. The shaded areas in the chart represent periods of economic recession. The chart illustrates several points. First, stock prices generally started to decline before recessions began. A notable exception

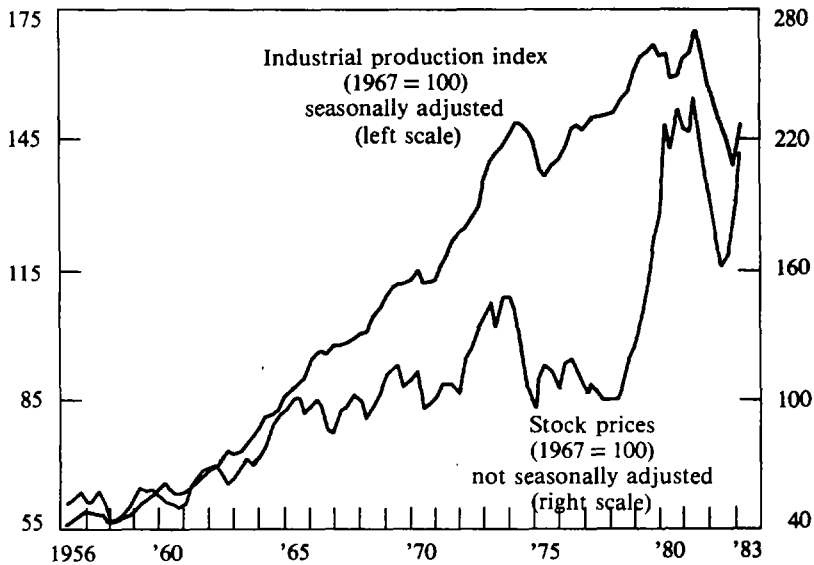
to the change in the money supply and thus lead the subsequent change in real economic activity.

CHART 2
Stock prices and industrial production
in selected countries

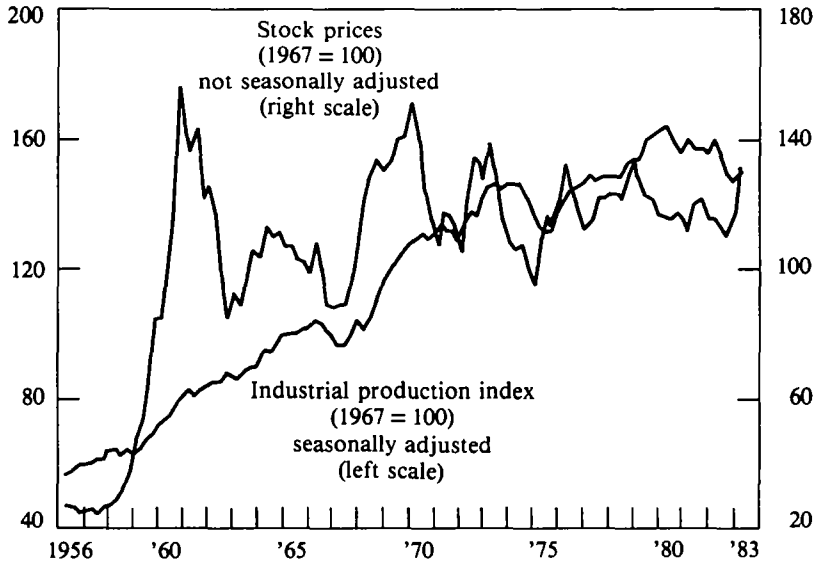
United Kingdom



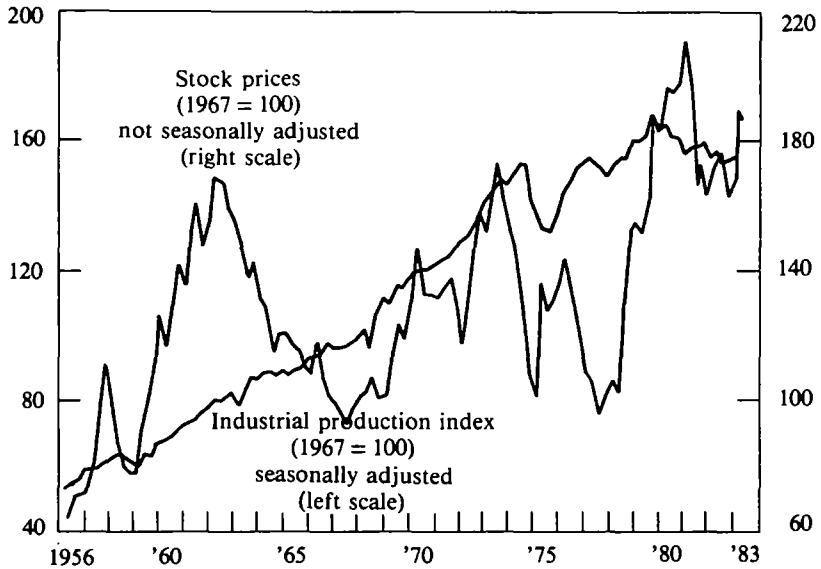
Canada



West Germany



France



was the short contraction in 1980, when stock prices were trending upward before and during the recession. Second, stock prices began to rise in all cases before the beginning of an economic expansion, usually about midway through the contraction. The recent steep climb in stock values, then, is characteristic of historical patterns. Third, the stock market occasionally gave false signals of contractions, particularly in the long expansion of the 1960s. Stock prices fell sharply in 1962 and in 1966, but no downturn in the general economy followed. Growth was slower, however, after each of these stock price downturns. Stock prices also declined from mid-1976 through 1977 with no subsequent contraction in economic activity. The record in the United States, therefore, indicates that while the stock market is not an infallible guide to turning points, it usually has moved downward before the contractions and always has risen before expansions.

The value of stock prices as an indicator of cyclical movements is less clear in other industrial economies. Chart 2 presents the history of stock prices and industrial production for several countries. Periods of recession are not indicated because business cycle peaks and troughs are not available for these countries. In the United Kingdom, stock price movements have been comparatively smooth, except for the 1969-76 period. Share values declined before the no-growth period of mid-1969 through 1972, and they fell sharply before the 1975-76 downturn, but they did not predict the recession that began in the first quarter of 1979. Upturns in stock prices have usually preceded upturns in the economy, so the rise in prices in the United Kingdom over the last two years would be consistent with a recovery.

Similar patterns appear in the Canadian data. However, the sharp decline in industrial production from the second quarter of 1980 to the second quarter of 1982 was accompanied

rather than preceded by a slide in stock prices. For both West Germany and France, there seems to be little connection between stock price movements and industrial production. Several instances of sharp declines in stock prices were not followed by economic contractions. On the basis of this somewhat casual evidence, it appears that stock prices are much less reliable leading indicators in these countries than in the United States.

The stock market and consumption decisions

One reason the stock market is a leading indicator of the general economy is that fluctuations in stock prices may have direct effects on aggregate spending.⁴ Movements in stock prices may affect both consumption spending by households and investment spending by firms. This section examines the connection between stock price movements and the consumption-saving decision of households.

The main channel by which stock prices are thought to influence consumption is through a wealth-consumption relationship. An increase in stock prices, with no change in consumer prices, raises the real net wealth of households. There is a debate, however, about whether the resulting real wealth fluctuations have a predictable effect on real consumption.

Wealth and consumption

The influence of wealth on the consumption decisions of households has long been an issue among economists. Although Keynes mention-

⁴ As discussed above, stock prices could be a leading indicator of economic activity without a direct connection between the two. Both stock prices and the economy may be influenced by a common factor but stock prices may react faster.

ed that wealth changes would likely affect consumption, the emphasis in Keynesian consumption functions has been on the effect of disposable income rather than wealth.⁵ In such models, saving is viewed as a residual rather than as part of a longer range plan. Subsequent research, however, has given a prominent role to wealth.

The most influential analysis in recent research is the life-cycle theory of saving.⁶ According to this theory, households project their resources over their expected lifetimes and decide on the consumption flows that best suit their preferences. The constraint on households is that the present value of their planned consumption over the years must equal the present value of their expected incomes.⁷ Part of households' expected incomes comes from their holdings of such tangible assets as real estate, stocks, and bonds, with the remainder being their expected labor incomes. The present value of future income from assets should equal the market price of the assets. Thus, household wealth is considered an important determinant of current consumption spending.

Suppose, for example, that a household has an expected lifetime of 25 years and wants the

same level of consumption every year. The life-cycle model predicts that the household would allocate any increase in wealth evenly among the 25 years. Thus, for example, an increase in the household's net wealth of \$1,000 would increase the household's consumption spending by \$40 [= \$1,000/25 years] every year over its lifetime.⁸

Household stockholdings and consumption

A substantial proportion of household wealth is held in the form of corporate stock, although equities have become a significantly smaller fraction over the past decade. Chart 3 shows the percentage of households' total assets and financial assets comprised by corporate stock over the last 25 years. These percentages steadily declined from 1969 to 1981, falling to less than a sixth of total wealth and a third of total financial assets.⁹ Households were net sellers of corporate stock throughout the 1970s, probably because of the low returns on equities relative to such assets as owner-occupied housing.¹⁰ Since June 1982, however, households have seen the market

⁵ John Maynard Keynes, *The General Theory of Employment, Interest and Money*, Harcourt, Brace, 1936, pp. 92-3.

⁶ Albert Ando and Franco Modigliani, "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests," *American Economic Review*, March 1963, pp. 55-84.

⁷ Formally, the constraint faced by the household is:

$$\sum_{t=0}^n \frac{C_t}{(1+r)^t} = \sum_{t=0}^n \frac{Y_t}{(1+r)^t}$$

where C_t = real consumption in period t
 Y_t = real income in period t
 r = discount rate
 n = number of years expected to live.

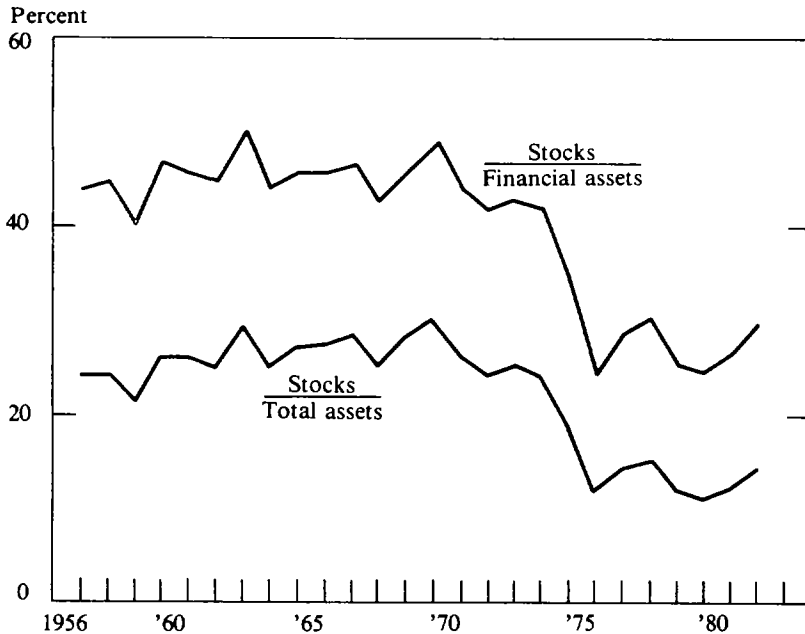
This ignores bequests, B , but these can be accounted for by adding the present value of bequests, $B/(1+r)^n$, to the left-hand side.

⁸ This assumes, for simplicity, that the interest rate is zero. If the interest rate is positive, consumption would rise more than \$40 a year.

⁹ For descriptions and sources of the underlying asset data, see Laurence Kantor, "The Impact of Inflation Uncertainty on Households and the Neutralizing Effect of Inflation Hedging," *Economic Review*, Federal Reserve Bank of Kansas City, September/October 1983. Chart 3 slightly overestimates the decline in the share of assets held in stocks because long-term bonds are evaluated at par rather than at market value as are the other assets. While bond prices fell over the 1970s as interest rates rose, the share of bonds in total assets was always less than 4 percent. Over the 1969-81 period, household stockholdings rose in nominal value about 44 percent while total assets rose 188 percent.

¹⁰ The rise in the nominal value of household stockholdings over this period reflects capital gains rather than new stock purchased. The buyers of stock were institu-

CHART 3
Percentage of household assets in stocks



value of their stocks rise about \$500 billion. A pertinent question is whether this capital gain has led to an increase in consumption as predicted by the life-cycle model.

Analysts have raised several issues regarding the relationship between stock market gains or losses and household consumption. One issue is whether gains realized from selling stock have a greater impact on consumption than gains accrued on stocks not sold. Some researchers argue that realized gains have a larger effect because households are in some way constrained from borrowing or reducing their saving from other sources to finance consumption. Other investigators, who say that realized gains have a greater effect, believe households view

accrued capital gains as partly transitory.¹¹

A second issue in the stock market-consumption relationship concerns the distribution of stockholders across wealth classes. Although about 33 million U.S. residents hold corporate stock directly, wealthy people own the vast majority of stock. One analyst estimates that, in 1973, households in the top 1 percent of the wealth distribution (net wealth in excess of \$500,000) owned about 60 percent of the total corporate stock held by households, while the

¹¹ The belief that consumers treat capital gains as partly transitory has led to consumption functions in which an average of current and past gains appears. This specification implies past market values are used to form "expected" or "permanent" stock market wealth. This approach conflicts with the notion of an efficient stock market in which past stock price changes do not help to predict future movements. For a discussion and assessment of this theory, see Eugene F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, May 1970, pp. 383-417.

tions, such as insurance companies and pension funds. For a discussion of why corporate stocks had low returns in the 1970s, see Pearce, "The Impact of Inflation on Stock Prices."

top 5 percent of the wealth distribution (net wealth in excess of \$137,000) held about 85 percent.¹² To the extent that the wealthiest investors have low marginal propensities to consume out of wealth, large stock price movements may have only a small effect on aggregate consumption. This reservation is somewhat offset, however, by a large number of households owning stock indirectly through private pension funds. If the life-cycle model is correct, an increase in the value of pensions should raise current consumption because pensions also raise total lifetime resources and reduce the need to save for retirement.

A third issue is that it may be difficult to separate the effects of stock price changes on consumption from the effect of interest rate changes on consumption. According to the traditional model of stock prices, a decline in the real interest rate (the nominal rate less expected inflation) should raise stock prices because it increases the present value of expected real corporate earnings. A fall in the real interest rate also may simultaneously raise consumption directly if, as some analysts argue, households save less of their income when the real interest rate declines. An increase in total consumption, therefore, may accompany rising share prices even if there is no causal link between wealth and consumption. The fall in the real interest rate may cause both real wealth and consumption to increase.

A fourth issue also concerns the existence of a causal connection between stock price movements and changes in household consumption. Some investigators suggest that the stock market serves as a barometer of consumer confidence and the stock price-consumption association merely reflects the influence of

greater confidence rather than greater wealth as implied by the life-cycle model.

Empirical evidence

Several studies have estimated the effect of stock market gains on aggregate consumption. The original tests of the life-cycle saving hypothesis found that household wealth had a significant effect on consumption, with an increase in wealth of one dollar leading to an increase in consumption of about six cents.¹³ This work did not directly address the issue of whether capital gains from higher stock prices raise consumption, however, since wealth was not disaggregated by type. Thus, the separate influence of stocks was not examined.

Two subsequent studies of the relationship between stock market gains and aggregate consumption from the end of World War II to the mid-1960s reached conflicting conclusions. The results of the first study indicated that stock market gains had no discernible effect on consumption.¹⁴ The author attributed this finding to the highly skewed distribution of stockholdings, arguing that the wealthy disregarded fluctuations in the stock market when making consumption decisions. The second study, however, obtained a significant estimated impact of capital gains on consumption over essentially the same period, with the magnitude of the effect being compatible with the life-cycle model.¹⁵ This study also found that realized capital gains had a substantially larger effect than accrued gains. Several differences between the two studies may account for the disparity in

¹² Daphne Greenwood, "An Estimation of U.S. Family Wealth and Its Distribution from Microdata, 1973," *Review of Income and Wealth*, March 1983, pp. 23-44.

¹³ Ando and Modigliani, "The 'Life Cycle' Hypothesis."

¹⁴ John J. Arena, "Postwar Stock Market Changes and Consumer Spending," *Review of Economics and Statistics*, November 1965, pp. 379-91.

¹⁵ Kul B. Bhatia, "Capital Gains and the Aggregate Consumption Function," *American Economic Review*, December 1972, pp. 866-79.

results. The first analyst defined consumption to include the purchase of consumer durable goods while the second added only an estimate of the services from durables. The second study also employed a broader measure of capital gains and allowed for a longer time lag in the effect of market gains on consumption.

Further support for a positive relationship between stock market gains and consumption has appeared in more recent research. One analyst concluded that household expenditures on nondurables and services are strongly related to movements in the real value of stockholdings but that durable purchases are unrelated to gains on stock.¹⁶ His results indicated that previous capital gains also raised current consumption, suggesting that households average past gains when making consumption decisions rather than simply using current gains. A more recent study also found a statistically significant positive effect of current stock market gains on aggregate consumption over the period 1960-77, an era of substantial stock market swings.¹⁷ Finally, evidence on consumption behavior of individual households from survey data indicated that capital gains on stocks raise consumer expenditures.¹⁸

The weight of the empirical evidence supports a significant association between stock market gains and consumption. Households appear to spend from 3 to 7 percent of such

gains. It is less clear whether realized gains have more impact than accrued gains or whether households use an average of past gains rather than current gains when planning consumption.¹⁹

The stock market and investment decisions

In addition to affecting household consumption, fluctuations in stock prices also are thought to influence the level of investment spending by firms. Higher stock prices are believed to encourage firms to acquire new equipment and structures, leading to an increase in the aggregate capital stock. This section discusses two major views of how stock prices may affect business fixed investment and then reviews the empirical evidence on the stock price-investment relationship.

Theoretical views of stock prices and corporate investment

The two views of how stock price movements influence corporate investment are usually referred to as the market-valuation approach (also known as Tobin's q approach) and the cost-of-capital approach. Both assume that

16 Barry Bosworth, "The Stock Market and the Economy," *Brookings Papers on Economic Activity*, 2:1975, pp. 257-90.

17 J. Walter Elliott, "Wealth and Wealth Proxies in a Permanent Income Model," *Quarterly Journal of Economics*, November 1980, pp. 509-35.

18 Irwin Friend and Charles Lieberman, "Short-Run Asset Effects on Household Savings and Consumption: The Cross-Section Evidence," *American Economic Review*, September 1975, pp. 624-33. Bosworth, "The Stock Market and the Economy," however, found only weak evidence of a consumption-capital gains effect for an alternative data set on individual households.

19 The cited empirical studies do not shed light on the issue of whether the effects of stock price changes and interest rate changes on consumption are confounded, nor do they investigate whether stock price fluctuations are proxying changes in consumer optimism. On this latter issue, Saul H. Hymans reported that consumer attitude measures and stock prices are close substitutes in explaining automobile expenditures in his paper, "Consumer Durable Spending: Explanation and Prediction," *Brookings Papers on Economic Activity*, 2:1970, pp. 173-99. Franco Modigliani, on the other hand, found that a measure of consumer sentiment had only a negligible effect on consumption when wealth was accounted for. See "Monetary Policy and Consumption," in *Consumer Spending and Monetary Policy: The Linkages*, Federal Reserve Bank of Boston, June 1971, pp. 9-84.

managers seek to maximize the value of their firms when making investment decisions. In the market-valuation model, there is a simple, direct relationship between stock prices and investment. In the cost-of-capital model, stock prices affect investment indirectly by changing the cost of financing new capital expenditures, with other explanatory variables playing important roles in the investment decision.

The market-valuation model can be traced at least as far back as Keynes, who summarized the argument as follows:

There is no sense in building a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased; whilst there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated off on the Stock Exchange at an immediate profit.²⁰

In other words, firm managers operating in the interests of the shareholders should only buy new equipment or structures when the market value of the firm is expected to rise more than the cost of the additional physical capital.²¹ This is more likely to be the case when stock prices are relatively high. In a period of depressed stock prices, a firm that wants to expand its capacity may find it cheaper to buy an existing business's outstanding equity shares than to buy new capital. Investment does not increase in this case since ownership of existing capital changes but no new capital is forthcoming.

James Tobin formalized this approach by postulating that aggregate investment is

positively related to the ratio of the total market value of firms to the replacement cost of their capital stock.²² This ratio is known as Tobin's q . The market value of firms, the numerator of q , is the sum of the market value of outstanding equity and net debt. The replacement cost, the denominator of q , is the cost of replacing the existing capital stock at current prices. If the market value equals replacement cost, q equals one. In this case, firms have no incentive to change their capital stocks, and they would only replace worn-out equipment. Net investment, gross investment less depreciation, would be zero. If q exceeds one, say, because of a rise in stock prices, firms would want to increase their capital stocks and net investment would be positive. If q is less than one, firms would want to decrease their capital stocks and net investment would be negative.²³

Several problems arise in the implementation of the market-valuation model. First, the q -ratio refers to all of a firm's capital, with no distinction made between new and old capital. If existing capital equipment becomes obsolete, the average q may be less than one while the q on new capital equipment exceeds one. In this case, the average q , which unlike the q on new equipment is observable, would likely be a misleading guide to investment spending.²⁴ Second, since the simple version of the market-valuation model ignores tax policy, modifica-

²⁰ Keynes, *General Theory*, p. 151.

²¹ The term capital is used in several contexts. Physical or real capital refers to the equipment and structures firms use to produce output. Financial capital refers to the funds firms raise—by selling bonds, borrowing at financial intermediaries, or selling equity—in order to purchase real capital.

²² James Tobin, "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit, and Banking*, February 1969, pp. 15-29.

²³ It is assumed that expansions (reductions) in the capital stock, all else constant, reduce (increase) the return on physical capital and hence reduce (increase) its market value so that q will move towards its equilibrium value of one. Adjustment costs prevent instantaneous adjustment.

²⁴ For a discussion of the relationship between average q and q for new equipment, see Fumio Hayashi, "Tobin's Marginal q and Average q : A Neoclassical Interpretation," *Econometrica*, January 1982, pp. 213-224.

tions are required to take into account such factors as investment tax credits and differences in tax rates on dividends and capital gains. It has been shown that the equilibrium value of q —the value for which desired net investment is zero—is likely to be less than one when these tax considerations are incorporated in the model.²⁵ A third problem is the difficulty in calculating the replacement cost of existing physical capital because of the lack of well developed markets in used equipment and structures. An additional problem is that the denominator of q includes only reproducible capital while the numerator—the market value of the firm—presumably reflects not only physical capital but also managerial talent, patents, and other intangible assets. Fluctuations in the value financial investors place on these other factors may have little connection with the firm's decision to acquire new equipment.²⁶

The cost-of-capital model also assumes that investment decisions are made to maximize the value of the firm, but in this framework investment involves a two-step process.²⁷ Firms first decide on the stock of real capital they want, based on expected sales and the prices of labor and capital services. The rate of investment is then determined by how fast firms want to reach the desired capital stock given significant

adjustment costs. Unlike the market-valuation approach, this model gives fluctuations in expected sales, and hence planned output, an explicit role in affecting investment. Sales increases that are expected to continue lead to increases in investment even if stock prices remain constant.²⁸

Changes in stock prices influence investment by changing the cost of physical capital services, usually referred to as the user cost of capital. In computing the cost of new physical capital, firms must consider the price of the new equipment or structure, the relevant tax laws, and the financial cost of the required funds. Consideration of this last factor is where stock prices appear. The financial cost of capital is generally measured by a weighted average of the cost of bond finance and equity finance, with the weights reflecting the proportions of the firm's assets financed by debt and equity. The cost of bond finance is measured by the after-tax corporate bond rate (since interest payments are tax deductible) less expected inflation. The cost of equity finance is the real rate of return required by shareholders, typically measured by the ratio of corporate earnings (dividends plus retained profits) to stock prices. A rise in stock prices with no increase in earnings reflects a lower required return, a lower cost of finance, and hence a lower user cost of capital. This lower cost should, in turn, encourage firms to acquire more physical capital and should increase net investment.

Problems also arise in the implementation of the cost-of-capital model. Unlike the market-valuation model, it requires explicit assumptions about the relationship between aggregate production in the economy and the amounts of

²⁵ For discussions of the effect of taxes on the appropriate measure of q , see George von Furstenberg, "Corporate Investment: Does Market Valuation Matter in the Aggregate?" *Brookings Papers on Economic Activity*, 2:1977, pp. 347-97; Lawrence H. Summers, "Taxation and Corporate Investment: A q -Theory Approach," *Brookings Papers on Economic Activity*, 1:1981, pp. 67-127; and Hayashi, "Tobin's Marginal q and Average q ."

²⁶ Von Furstenberg, "Corporate Investment: Does Market Valuation Matter in the Aggregate?" examines these and other measurement problems.

²⁷ This approach, often called the neoclassical model, is generally attributed to Dale W. Jorgenson. See, for example, his paper, "The Theory of Investment Behavior," in Robert Ferber, ed., *Determinants of Investment Behavior*, Columbia University Press, 1967, pp. 120-55.

²⁸ If higher expected output implied higher earnings which, in turn, raise stock prices, the market-valuation model implicitly accounts for the effect of expected output. See Bosworth, "The Stock Market and the Economy," pp. 284-85, for a more detailed comparison of the two models.

capital and labor employed and about expected output. Regarding the financial cost of capital, it has been noted that the use of a weighted average of the cost of bond finance and equity finance to estimate the cost of financing is only appropriate if two conditions are satisfied. The risks of the new investments must be similar to the risks of the firm's existing capital stock and there must be no change in the firm's debt-equity ratio.

Empirical evidence

The empirical significance of stock price fluctuations on aggregate investment has not been resolved. Several early studies of business fixed investment found stock prices to be significant. Rather than estimating either of the models discussed here, however, these studies interpreted stock prices as a substitute for expected profits.²⁹

More recent investigations of the empirical performance of the market-valuation model have generally found that fluctuations in q explain much of the variation in gross investment. One analyst estimated that, based on data from the 1953-68 period, a permanent 10 percent rise in the market value of firms would lead to about an 18 percent rise in equipment expenditures and about a 13 percent rise in structure expenditures by the end of ten quarters.³⁰

²⁹ Michael Evans reviews these studies in his *Macroeconomic Activity*, Harper and Row, 1969, pp. 108-12.

³⁰ Charles W. Bischoff, "Business Investment in the 1970s: A Comparison of Models," *Brookings Papers on Economic Activity*, 1:1971, pp. 13-58. The investment elasticities of 1.8 and 1.3 reported in the text for equipment and structures with respect to stock prices were computed by the author from results reported in Bischoff's Table 3 plus data on the market value of firms reported by von Furstenberg, "Corporate Investment: Does Market Valuation Matter in the Aggregate?" The elasticity calculations are for 1971 data.

Another version of the market-valuation model, in which short-run stock price fluctuations are smoothed out and other economic variables are included, indicated that a 10 percent rise in stock prices would lead, in the long run, to an 8 percent rise in equipment expenditures and a 20 percent rise in structures expenditures.³¹ A recent study that adjusted the market-valuation approach to take account of tax complications reported somewhat less response, with a 10 percent increase in stock prices leading to about a 7 percent increase in total gross investment.³² Some researchers, on the other hand, have found little empirical support for the market-valuation model.³³

The cost-of-capital model also has tracked investment spending reasonably well. As discussed below, this approach has been incorporated into a large-scale econometric model. An estimate of this model indicates that a 10 percent decline in the dividend-price ratio—due, say, to an increase in stock prices—would over time raise business investment in equipment about 1.6 percent and investment in structures about 3.5 percent.³⁴ With no change in dividends, a 10 percent decline in the dividend-price ratio corresponds to a 10

³¹ Robert Engle and Duncan Foley, "An Asset Price Model of Aggregate Investment," *International Economic Review*, October 1975, pp. 625-47.

³² Summers, "Taxation and Corporate Investment: A q -Theory Approach."

³³ Von Furstenberg, "Corporate Investment: Does Market Valuation Matter in the Aggregate?" reported that a capacity utilization variable performed as well as q in investment equations and that the estimates of the market-valuation model exhibited serious statistical problems. A study updating the work of Bischoff found that stock price variables did not track the historical path of investment nearly as well as alternative models. See Peter K. Clark, "Investment in the 1970s: Theory, Performance, and Prediction," *Brookings Papers on Economic Activity*, 1:1979, pp. 73-113.

³⁴ Bischoff, "Business Investment in the 1970s," Table 5. The elasticity estimates were computed using data for the fourth quarter of 1970.

percent rise in stock prices. Thus, the cost-of-capital model yields a smaller direct effect from stock price fluctuations. This result is not surprising since in the market-valuation models stock prices are the main explanatory variable while in the cost-of-capital models output fluctuations play a dominant role.³⁵ Studies that compare the forecasting records of the two models of investment have produced no consensus on which model is better.³⁶

An estimate of the impact of the recent stock market rally

One way to estimate the impact of the recent stock market rally is by using an econometric model to simulate the likely time paths of the economy with and without the rise in stock prices. This section employs the FMP econometric model to perform such simulations.³⁷ Unlike most large-scale econometric models, the FMP model gives prominence to the stock market by including household net worth in the consumption equation and the financial cost of capital in the investment equation. This section briefly outlines how stock prices enter the model and then uses the model to estimate the aggregate impacts of the recent stock market rally.

Stock prices in the FMP model

The value of corporate equity is an endogenous variable in the FMP model so that stock market fluctuations are estimated rather than simply assumed to be exogenously given. The value of stock is estimated indirectly. First, total dividends are predicted largely on the basis of corporate profits. Second, the dividend-price ratio is estimated as a function mainly of the corporate bond rate and expected inflation. If the corporate bond rate rises, with expected inflation constant, the dividend-price ratio is expected to rise, reflecting the assumption that investors view stocks and bonds as substitutes. The total value of stocks is then calculated by dividing estimated dividends by the estimated dividend-price ratio.

Following the life-cycle model, consumption on nondurables and services is specified as depending on disposable real income and real wealth. Wealth is split into three categories: stocks, liquid assets, and real assets. It is assumed that stocks have less impact on consumption than the other two categories, since the coefficient on stocks is constrained to be only half that on the other two assets. The model predicts that an increase in the value of stock of, say \$10 billion would lead to an increase in consumption of about \$400 million with more than half the increase coming within two quarters. The model assumes, however, that wealth has no direct effect on the demand for consumer durables or housing.

Business investment in equipment and structures is modeled as a generalization of the cost-of-capital model discussed previously. The financial cost of capital for equipment is assumed to be a weighted average of the after-tax real interest rate on corporate bonds and the

³⁵ This point was noted by Bosworth, "The Stock Market and the Economy."

³⁶ Bischoff, "Business Investment in the 1970s," and Clark, "Investment in the 1970s," find that the cost-of-capital model does a better job in *ex post* forecasting while the opposite conclusion is reached by Engle and Foley, "An Asset Price Model." Neither model appeared dominant in a recent comparison by Richard W. Kopcke, "Forecasting Investment Spending: The Performance of Statistical Models," *New England Economic Review*, Federal Reserve Bank of Boston, November/December 1982, pp. 13-32.

³⁷ FMP stands for Federal Reserve—M.I.T.—(University of) Pennsylvania representing the institutions sponsoring the model. An earlier version of the model is described in Frank De Leeuw and Edward Gramlich, "The Federal Re-

serve—MIT Econometric Model," *Federal Reserve Bulletin*, January 1968, pp. 11-40.

earnings-price ratio, which is approximated as twice the dividend-price ratio. The weights depend on the cost difference between the alternative financing methods, with the weight on equity rising when the dividend-price ratio falls. The financial cost of capital for structures differs somewhat, since a direct estimate of the earnings-price ratio is used and the weight on equity is constrained to be 0.7. Decreases in the cost of capital cause increases in the desired capital-output ratio, leading to higher levels of investment. Thus, if stock prices rise with no proportional change in dividends, investment spending is predicted to increase.

Impact of the recent stock market rally

To approximate the empirical significance of stock prices in the FMP model, two simulations were conducted with the model.³⁸ In both simulations, the actual values of policy variables and exogenous variables—the exchange rate, the price of oil, government expenditures, and the tax structure—were fed into the model for the first quarter of 1982 through the second quarter of 1983 and identical assumptions about these variables were made for the third quarter of 1983 through the first quarter of 1984. In particular, the federal funds interest rate was set at 9 percent over the period from the third quarter of 1983 through the first quarter of 1984. The difference between the two simulations is that in one the dividend-price ratio is fixed at its third quarter 1982 value of 6.1 from the fourth quarter of 1982 through the first quarter of 1984. In the other, though, the dividend-price ratio follows its actual

³⁸ Bosworth conducted a similar experiment using an antecedent of the FMP model to examine the impact of the stock price decline of 1973-74. See his "Stock Market and the Economy," pp. 289-90.

TABLE 1
Estimated effects of stock market rally within the FMP model
(Billions of 1972 dollars)

Time period	Difference In consumption	Difference In investment	Difference In GNP
1982:IV	+ 3.6	+ .6	+ 12.0
1983:I	+ 7.4	+ 3.5	+ 13.9
1983:II	+ 15.6	+ 7.1	+ 24.9
1983:III	+ 19.9	+ 11.7	+ 36.0
1983:IV	+ 24.3	+ 16.1	+ 45.4
1984:I	+ 27.4	+ 20.3	+ 53.7

downward path from the fourth quarter of 1982 to the second quarter of 1983 and is fixed thereafter at its second quarter 1983 value of 4.3. As a result, in the first simulation, the real value of common stocks was predicted to rise only \$78.6 billion (1972 dollars) from the third quarter of 1982 to the first quarter of 1984. In the second simulation, the corresponding increase was \$423 billion.

Table 1 presents the results of the simulation exercise. Differences are shown between the estimated values of GNP, consumption, and business fixed investment, with and without a stock market rally. These estimates depend on the assumptions made about the federal funds rate and the permanent decline in the dividend-price ratio.³⁹ The model predicts that, as a result of the stock market rally, real GNP would be \$53.7 billion (3.2 percent) higher by the first quarter of 1984. Consumption is estimated to be \$27.4 billion (2.6 percent) higher and investment \$20.3 billion (12 percent) higher, with the impact on investment appearing somewhat more slowly. The model also pre-

³⁹ Table 1 presents the differences between two sets of predictions rather than the differences between the actual values of the variables (known through the third quarter of 1983) and predictions that assume no rise in stock prices.

dicts that because of the stock market rally the unemployment rate would be 1.1 percentage points lower.

Thus, the FMP model indicates that, if maintained, the stock market rally should have substantial effects on the real economy. While these results depend on the particular assumptions about monetary and fiscal policy and on the absence of substantial shocks to the economy, they are consistent with the current recovery, which has followed the stock market rally. The results also suggest the recovery will continue in the absence of a stock market slump.

Summary and conclusions

The surge in stock prices which began in June 1982 has been followed by a strong economic recovery. There is considerable debate, however, on whether a systematic causal connection exists between stock prices and general economic conditions. This article has examined the past performance of stock prices as a leading indicator of business cycle turning points and reviewed the theoretical and empirical literature on the channels through which stock prices may influence the economy.

Stock price movements appear to be a valuable, but not infallible, leading indicator of business fluctuations in the United States. While occasionally giving false signals of economic downturns, stock prices since 1955 have always risen midway through an economic contraction. Thus, the recent stock market boom and subsequent economic recovery fit the historical pattern. Stock prices in other economies, on the other hand, have generally been poor guides to future economic developments.

The major effects of stock price changes are thought to be on the levels of household consumption and business investment spending.

An increase in stock prices is believed to increase consumption through the resulting rise in household wealth. The way stock price changes affect investment is less clear. One view is that firms compare the price of new physical capital with the value the stock market places on such capital. Rising stock prices thus encourage firms to purchase new capital instead of acquiring existing capital through mergers. Another view sees stock price increases leading indirectly to a rise in real investment by lowering the cost of financing capital expansion.

The empirical evidence generally supports the theoretical roles of stock prices. Most studies have found a significant positive relationship between stock market movements and consumption, although the effect may be stretched over several periods. Similarly, most investigators have concluded that stock price increases lead to increases in investment in real capital but the size of the effect appears more uncertain.

A large econometric model of the United States in which stock prices influence consumption and investment was used to simulate the effects of the recent stock market rally on the economy. The model suggests that real output, consumption, and investment would be substantially less if stock prices had not risen since mid-1982.