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Reduced Consumer Spending?

Federal Deficits and the Stock Market

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Has the Stock Market Crash Reduced Consumer Spending? 3

By C. Alan Garner

Some forecasters expected that the October 1987 stock market collapse would seriously lower **GNP** growth by curtailing consumer spending. After declining in October, however, consumer spending has grown moderately. This relatively small effect is consistent with empirical studies showing that the stock market has only a modest impact on consumer spending.

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Empirical evidence shows that federal budget deficits have historically tended to increase stock market prices. Because deficits rose to unprecedented levels in the **1980s**, however, increasing concern about their impact on interest rates and inflation may have contributed to the October 1987 decline in stock prices.

Has The Stock Market Crash Reduced Consumer Spending?

By C. Alan Garner

The stock market crash of October 1987 was one of the most dramatic events in U.S. financial history. Stock prices fell more on October 19 than on any previous day, including the famous 1929 stock market crash. The sharp drop in stock prices caused most forecasters to project slower economic growth for 1988.¹ A major reason for the more pessimistic outlook was the belief that the stock market crash and the resulting decline in household wealth would curtail consumer spending.

Forecasters differed, however, on how much the crash would reduce consumer spending. Most

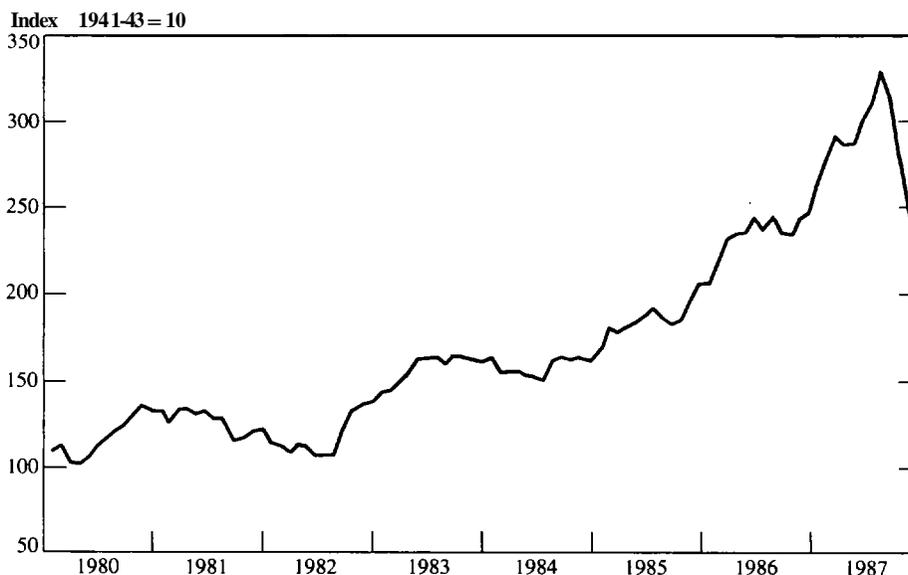
analysts thought the crash would slow the growth of consumer spending by lowering wealth and by increasing uncertainty about future economic conditions. A few forecasters even expected consumer spending to collapse because of the sharp decline in stock market values. But others argued that the effect on consumer spending would be weak, in part because stock ownership is heavily concentrated among the wealthiest households.

This article examines the effect of stock market fluctuations—and the 1987 crash, in **particular**—on consumer spending. The evidence suggests that the stock market crash has reduced consumer spending, although the effect has been relatively **small**. The first section describes the stock market crash and surrounding economic events. The second section explains how the loss of household wealth caused by the crash affects consumer spending and saving decisions. The third section examines possible effects of the crash on spending through consumer confidence about future economic conditions. Finally, the fourth section shows that consumer spending after the crash has been slightly lower than would be projected based on economic conditions before the crash.

¹ The Blue Chip forecast of real GNP shows the downward revision in economic projections caused by the stock market crash. The Blue Chip forecast is the average prediction by a group of business economists. Just before the crash, the Blue Chip forecast for real GNP growth was 2.8 percent from the fourth quarter of 1987 to the fourth quarter of 1988. By early November, the average forecast had declined to 1.9 percent growth. See Robert J. Eggert, *Blue Chip Economic Indicators*, Capitol Publications, October 10 and November 10, 1987.

C. Alan Garner is a senior economist at the Federal Reserve Bank of Kansas City. Thomas Bennett and Richard Wurtz, research associates at the bank, helped prepare the article.

CHART 1
Standard and Poor's 500 composite stock index



The crash and its consequences

The crash of 1987 was the result of a complex set of domestic and international factors, though analysts still do not agree on the relative importance of these factors. But whatever the causes, the stock market crash had a major impact on other financial markets, as well as on consumer wealth and confidence. The immediate effects of the crash were expected by some to reduce consumer spending and business investment.

The sharp decline of stock prices in October 1987 came after five years of generally advancing prices (see Chart 1). The Standard and Poor's index of 500 common stock prices rose 39 percent from December 31, 1986, to August 25, 1987. Stock prices then dropped 16 percent from August 25 to October 16 before falling a record 20 percent on October 19.² Although the market

has recovered moderately since the crash, stock prices are still well below their August highs.

Other financial markets first felt the effect of the stock market crash. Some investors sold stocks and invested the proceeds in Treasury securities, which are free of default risk. As a result of the shift out of stocks, yields on Treasury securities decreased. Yields on riskier securities, such as junk bonds, declined much less, however, as investors sought safe havens for their funds.

Another major effect of the crash was to reduce the net worth of the household sector. By one estimate, the drop in stock prices between August 25 and October 19 cut the value of household assets by \$1 trillion.³ Although higher govern-

Jones Industrial Average by 23 percent, nearly twice the largest daily percentage decline in the 1929 crash.

³ David A. Wyss and Robert DeAngelis, "This Is Not 1929," *Review of the U.S. Economy*, Data Resources, November 1987, p. 11.

² The stock market crash on October 19, 1987, reduced the Dow

ment bond prices helped maintain household wealth, consumers were affected adversely through direct stock ownership and investments in mutual funds and pension funds.

The stock market crash also brought a drop in consumer confidence about future economic conditions. The Conference Board and the University of Michigan's Survey Research Center conduct monthly surveys of households to determine the degree of consumer optimism about personal finances and general business conditions. Both organizations found a sharp drop in consumer confidence after the October crash. Even though later surveys showed consumer confidence recovering, households remained more concerned about the general business outlook.

The declines in consumer wealth and confidence may have contributed to the sluggishness that developed in consumer spending in the fall of 1987. But consumer spending had begun to weaken before the crash, and weak real income growth and reduced incentives to buy automobiles might have slowed consumer spending even without the crash. As a result, further analysis and empirical evidence are needed to judge the effects of the crash on consumer spending.

Wealth effects on consumer spending

Although stocks are an important household asset, consumer wealth also includes money, government bonds, real estate, and tangible assets. And yet, over time, stock market fluctuations account for much of the variation in household wealth because stock prices are so volatile. Economic theory and statistical evidence suggest that these fluctuations in wealth have a small but important effect on consumer spending.

The life-cycle hypothesis

Economic theory implies that consumer spending depends both on wealth and on current and

future income. According to a leading theory of consumer behavior, the life-cycle hypothesis, the household plans its present and future consumption based on expected lifetime **resources**.⁴ The household's lifetime resources include its current and future labor income, its current financial assets, and its nonfinancial assets. The typical household saves during the working years in order to accumulate the assets needed to finance consumption during retirement as well as any planned bequests to other family members or charities.

The life-cycle hypothesis implies that a decline in stock prices has a small negative effect on current consumer spending. A decline in stock prices reduces the financial wealth available to the household for consumption and bequests, forcing a reduction in planned consumption over the life cycle. (See the box on the next page for an example of the life-cycle hypothesis.) With no change in expected future labor income, the household must save more during its working years to provide for retirement and bequests. The effect of lower stock prices on current consumption should be relatively small, however, because the decrease in planned consumption is spread over the whole life cycle. In contrast, a decrease in household income that is expected to persist would cause a larger cutback in consumption. Generally, a decrease of one dollar in household wealth should reduce current consumption much less than a dollar.

Empirical evidence

Several empirical studies test the predictions of the life-cycle hypothesis. Most of the studies

⁴ Franco Modigliani and R. E. Brumberg, "Utility Analysis and the Consumption Function." in *Post-Keynesian Economics*, K. K. Kurihara, ed.; Rutgers University Press, New Brunswick, N.J., 1954. Similar ideas about consumer behavior are found in Milton Friedman, *A Theory of the Consumption Function*, Princeton University Press, Princeton, N.J., 1957.

An Example of the Wealth Effect

A simple version of the life-cycle hypothesis illustrates the wealth effect on consumer spending. The example assumes that savings yield no interest return and the consumer plans no bequests. The consumer has R years left before retirement and earns a constant labor income of Y dollars a year. The consumer expects to live $L - R$ years beyond retirement so that L is the expected lifetime. Constant **annual consumption** of C is planned over the lifetime. The consumer initially has assets of A from previous saving or inheritance.

Total lifetime consumption is thus expected to be $C * L$ and must be paid for out of expected labor income, $Y * R$, and initial assets, A . This relationship can be written as:

$$(1) C * L = Y * R + A$$

Alternatively, equation 1 can be rearranged to give:

$$(2) C = (R/L)Y + (1/L)A$$

Equation 2 shows that annual consumption is related positively to labor income and initial assets. Note that the coefficient on Y is R times as large as the coefficient on A , showing that a dollar drop in income affects consumption more than does a dollar drop in wealth.

As a numerical example, suppose the consumer has 25 years of life remaining, of which 20 years will be spent in the work force. Annual labor income is \$11,000 and initial assets are \$30,000. Annual consumption can

be obtained by substituting into equation 2:

$$C = (20/25)(\$11,000) + (1/25)(\$30,000) = \$10,000$$

The consumer spends \$10,000 out of the \$11,000 annual income. The annual savings of \$1,000 will build to a sum of \$20,000 at retirement. These savings plus the initial assets of \$30,000 provide the \$50,000 of wealth needed to pay for consumer spending of \$10,000 a year over the five years of retirement.

Consider the effects of a decrease in labor income and a decrease in initial assets, **respectively**. With no change in initial assets, a decrease in annual labor income to \$10,000 would have a large effect on consumption:

$$C = (20/25)(\$10,000) + (1/25)(\$30,000) = \$9,200$$

The \$1,000 reduction in annual income would decrease consumption by \$800. In contrast, a decrease of \$1,000 in initial assets with annual income kept at \$11,000 would have a much smaller effect on consumption:

$$C = (20/25)(\$11,000) + (1/25)(\$29,000) = \$9,960$$

The \$1,000 reduction in initial assets would decrease consumption by only \$40. The wealth effect of the stock market crash would be similar to this second case, decreasing current consumption by a small fraction of the drop in wealth.

use data that show how aggregate income and consumption have varied over time. Many studies define consumption as consumer purchases of nondurable goods and services plus the value of services from consumer durable goods. Purchases of consumer durable goods are considered an investment that yields a return to households in the form of consumer services. Some determinants of consumer spending such as the household sector's assets are included directly in the consumption relationship. However, expected future income cannot be included directly because expectations about income are not observable. As a result, economists use observable variables to represent household expectations. A common simplification is to suppose that households base their expectations about future labor income largely on 'previous labor income. Thus, empirical studies often relate consumer spending to previous labor income.

Estimates of the life-cycle consumption relationship show that stock market fluctuations affect consumer spending. In most studies, stock market wealth is represented by a weighted average of previous stock values. Households do not incorporate a change in stock prices into their wealth estimates immediately, it is argued, because stock prices are extremely volatile. However, household wealth estimates will reflect the change in stock prices fully if the change persists. One recent estimate of the life-cycle relationship finds that a dollar decrease in stock market wealth reduces consumption five cents.⁵ As a result, a \$1 trillion loss of wealth in the 1987 crash would reduce consumption by \$50 billion.

⁵ Flint Brayton and Eileen Mauskopf, "Structure and Uses of the MPS Quarterly Econometric Model of the United States," *Federal Reserve Bulletin*, February 1987, pp. 93-109. Other studies obtain estimates of the life-cycle wealth effect ranging from three cents to seven cents for each one dollar change in household wealth. See Douglas K. Pearce, "Stock Prices and the Economy," *Economic Review*, Federal Reserve Bank of Kansas City, November 1983, pp. 7-22.

These estimates imply that stock market fluctuations have a small but important effect on consumer spending.⁶ Although a \$50 billion decline in consumer spending is large in dollar terms, this decrease represents only about 2 percent of personal consumption expenditures in 1987. But such an effect would be a much larger fraction of the typical annual change in consumer spending and could thus substantially affect the growth of GNP. The \$50 billion decrease in consumption is only a rough estimate of the wealth effect, however, because stock prices recovered somewhat after October 19 and because households may have considered some of the stock market gains before August 25 to be temporary. Moreover, consumers may not have responded to the crash in a typical fashion because the October decline in stock prices was unusually severe.

Although studies find that stock market wealth affects aggregate consumer spending, they differ regarding the effects on the components of consumer spending. One study concludes that stock market fluctuations affect consumer purchases of nondurable goods and services but do not affect purchases of durable goods.⁷ That study does not seem to support the view that the 1987 stock market crash would primarily reduce discretionary purchases of durable goods. In contrast, another study finds a significant stock market effect on purchases of durable goods.⁸ Thus,

⁶ Additional support for the view that stock market fluctuations affect consumer spending comes from a study of survey data showing how income, consumption, and wealth varied across households in 1963. See Irwin Friend and Charles Lieberman, "Short-Run Asset Effects on Household Saving and Consumption: The Cross-Section Evidence," *American Economic Review*, September 1975, pp. 624-633.

⁷ Barry Bosworth, "The Stock Market and the Economy," *Brookings Papers on Economic Activity*, 1975:2, pp. 257-290.

⁸ Frederic S. Mishkin, "What Depressed the Consumer? The Household Balance Sheet and the 1973-75 Recession," *Brookings Papers on Economic Activity*, 1977:1, pp. 123-164.

empirical evidence supports the life-cycle view that stock market fluctuations affect total consumer spending. But the evidence regarding the effect of stock prices on durable goods purchases is mixed.

Criticisms of the empirical evidence

One criticism of the life-cycle empirical evidence is that the usual measure of stock market wealth may be inaccurate, thus causing economists to estimate incorrectly the effect of stock prices on consumer spending. If households really perceive their stock market wealth as an average of the current and past values of stock holdings, consumers would not have incorporated all the stock market gains during the first eight months of **1987** into their personal wealth estimates by the time of the crash. The crash, then, may not have reduced perceived household wealth as much as some calculations suggest.

In contrast, other analysts say the entire drop of stock prices in October was perceived as a loss of household wealth. The weighted-average measure of stock market wealth is said to be inconsistent with modern financial market theory. A leading academic theory, the efficient markets theory, implies that stock prices fluctuate randomly so that the best estimate of future stock prices is given simply by current **prices**.⁹ In this view, households based their wealth perceptions before the crash on prevailing stock prices that were near historical peaks. After the crash, household wealth perceptions were based solely on the new lower stock prices. This efficient markets view of stock market wealth implies a larger decline in perceived wealth than does the weighted

average measure. These differing views about stock market wealth cannot be settled easily, however, because perceived household wealth cannot be directly observed.

Another criticism of the life-cycle empirical estimates is that stock market fluctuations should not have a significant effect on consumer spending because stocks are owned mostly by wealthy households. Wealthy households, it is argued, would not curtail their spending when stock prices fall because such households have many other financial assets and large borrowing capacity. Indeed, stock ownership is heavily concentrated among households with high net worths (Table 1). Households with net worths of **\$250,000** or more accounted for less than 6 percent of U.S. households in **1984**, but for more than **70** percent of the value of personal stock holdings.

Despite the high concentration of stock ownership, however, stock market fluctuations may affect consumer spending. Even households with high net worths may reduce their spending when stock prices drop sharply. Some wealthy households may have invested large proportions of their assets in corporate stocks so that the stock market crash brought a sharp fall in their net worths. Other wealthy households may have most of their nonstock assets in such investments as real estate, unincorporated businesses, and collectibles that cannot be converted quickly into cash to pay for consumer purchases. Moreover, many **middle-income** households may be affected indirectly by stock market fluctuations through pension plans and **annuities**.¹⁰ For all these reasons, wealth

⁹ For further discussion of the efficient markets theory and recent research challenging this theory, see Douglas K. Pearce, "Challenges to the Concept of Stock Market Efficiency," *Economic Review*, Federal Reserve Bank of Kansas City, September/October 1987, pp. 16-33.

¹⁰ Some economic research finds that changes in private pension wealth affect consumer spending. For example, see R. Glenn Hubbard, "Pension Wealth and Individual Saving: Some New Evidence," *Journal of Money, Credit and Banking*, May 1986, pp. 167-178. However, stock market fluctuations may not have much effect on private pension wealth because most pension plans have defined benefits that do not vary with stock prices. See F. Thomas Juster, "Stock Prices and Consumer Spending: An Appraisal of the Great Crash," *Economic Outlook USA*, Winter 1987-88, pp. 16-19.

TABLE 1
Distribution of stock by level of net worth

<u>Household Net Worth</u>	<u>Percent of House-Holds</u>	<u>Percent of Group With Stock</u>	<u>Mean Dollar Value of Stock</u>	<u>Percent of Total Value</u>
Zero or less	11.0	2.6	\$2,207	0.1
\$1-\$4,999	15.3	3.5	\$1,105	0.1
\$5,000-\$9,999	6.4	9.9	\$1,812	0.2
\$10,000-\$24,999	12.4	11.9	\$2,852	0.8
\$25,000-\$49,999	14.5	16.6	\$3,523	1.6
\$50,000-\$99,999	19.3	25.2	\$6,878	6.2
\$100,000-\$249,999	15.3	41.8	\$16,026	19.0
\$250,000-\$499,999	4.0	54.9	\$46,572	19.0
\$500,000 or more	1.9	65.8	\$228,252	53.0

Sources: 1984 Survey of Income and Program Participation, Census Bureau, as reported by Shearson Lehman Economics.

effects on consumer spending may be important despite the high concentration of stock ownership.

Confidence effects on consumer spending

Even households that suffered no loss of wealth from the stock market crash may have reduced their spending if the crash increased uncertainty about future prosperity. Some households, for example, may have started saving more after the crash because they came to expect slower economic growth. Consumer confidence about future economic conditions is thus another channel through which the crash might affect consumer spending.

Some analysts believe that consumer confidence about future business and financial conditions is an important **determinant** of consumer spending. These analysts argue that consumption decisions depend not only on ability to buy but also on willingness to buy, with consumer optimism or pessimism being a key **determinant** of willing-

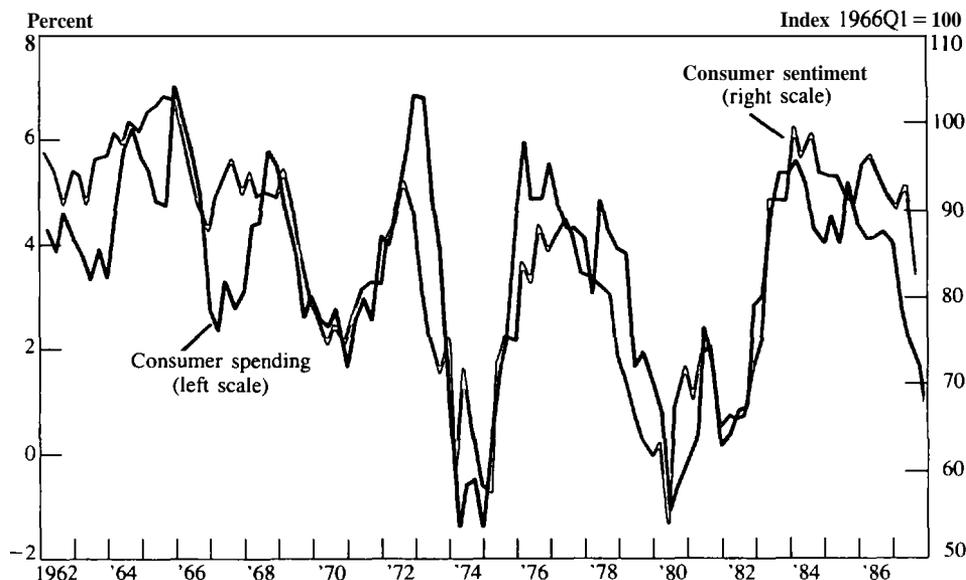
ness." As a result, these analysts use the indexes of consumer confidence constructed from the Michigan and Conference Board surveys to predict consumer purchases.

The growth of consumer spending has generally varied with consumer confidence, although decreases in consumer confidence have not always been a good leading indicator of a slowdown in consumer spending. Chart 2 shows a measure of consumer confidence and the growth rate of real consumer spending from 1962 to 1987. Consumer confidence is measured by the Index of Consumer Sentiment from the Survey Research Center at the University of Michigan. Large declines in the index have usually been associated with reduced growth of real consumer spending. However, declining consumer confidence has not always given advance warning of a slowdown in consumer spending. In 1976-77, for example, the

11 George Katona, *Psychological Economics*. Elsevier Scientific Publishing, New York, 1975.

CHART 2

Consumer sentiment and changes in real consumer spending



Sources: University of Michigan, Department of Commerce.

Index of Consumer Sentiment did not begin falling until after the growth rate of real consumer spending had peaked.

The stock market crash apparently did cause a large but temporary decline in consumer confidence. The Index of Consumer Sentiment fell from 93.6 in September to 83.1 in November. More than half the survey respondents in November mentioned the stock market crash as a reason for their more pessimistic outlook.¹² The survey suggested, however, that the respondents were concerned more about the effects of the crash on the general business outlook than on their own financial situations. And the index subsequently rebounded somewhat, reaching 93.6 in January

as stock prices recovered part of their earlier losses. The decline in consumer confidence after the crash is thus consistent with empirical studies showing that stock prices explain much of the variation in consumer confidence.¹³

Thus, the decline in stock prices and consumer confidence may have reduced consumers' willingness to buy because of greater uncertainty about the economic outlook and future earnings. In this way, consumer confidence may also have affected the spending plans of households that did not themselves own stocks.¹⁴ The decline in con-

¹² Richard T. Curtin, "The Crash and the Consumer," *Economic Outlook USA*. Winter 1987-88, pp. 20-23.

¹³ Saul H. Hymans, "Consumer Durable Spending: Explanation and Prediction," *Brookings Papers on Economic Activity*, 1970:2, pp. 173-199, and Michael C. Lovell, "Why Was the Consumer Feeling So Sad?" *Brookings Papers on Economic Activity*, 1975:2, pp. 473-479.

¹⁴ Although consumer confidence may be a transmission chan-

TABLE 2

Growth rates of real consumer spending and real disposable income
(percent change from a year earlier)

	Personal Consumption Expenditures	Durable Goods	Nondurable Goods	Services	Disposable Income
Sept. 1985	5.8	19.1	2.4	4.5	2.0
Sept. 1986	4.0	11.5	2.1	3.0	4.4
Sept. 1987	0.7	-5.9	-0.5	3.9	0.9

Source: Department of Commerce

sumer confidence after the 1987 crash is consistent, therefore, with at least a modest slowdown in consumer spending.

Consumer spending since the crash

Although the wealth and confidence effects of the crash have probably reduced consumer spending, the magnitude of these effects is uncertain. One reason for this uncertainty is that the 1987 crash was so unusual that historical estimates based on less severe stock market fluctuations may be unreliable. Another reason for uncertainty is that the growth of consumer spending might

nel, survey measures of confidence are not necessarily useful in predicting consumer spending. The evidence on the predictive usefulness of survey data is mixed. Empirical studies that find a useful role include Roger Brinner, Kurt Bmwn, and Joyce Yanchar, "The Consumption Sector," *Review of the U.S. Economy*, Data Resources, October 1985, pp. 15-24, and F. Thomas Juster and Paul Wachtel, "Anticipatory and Objective Models of Durable Goods Demand," *American Economic Review*, September 1972, pp. 564-579. In contrast, other studies find that consumer confidence is not useful in predicting consumer spending once such determinants as stock prices and income are taken into account. For example, see Susan W. Burch and Stephen E. Gordon, "The Michigan Surveys and the Demand for Consumers Durables," *Business Economics*, October 1984, pp. 40-44, and C. Alan Gamer, "The Predictive Usefulness of Consumer Sentiment Data," Research Working Paper 86-09, Federal Reserve Bank of Kansas City, December 1986.

have weakened in the second half of 1987 even without the crash. This section provides a preliminary assessment of the effects of the crash on consumer spending, recognizing that more accurate assessments will only become possible in time.

The slowdown in consumer spending

Growth in consumer spending slowed even before the stock market crash. The growth rate of real consumer spending fell from 4.0 percent over the year ending September 1986 to 0.7 percent over the year ending September 1987 (Table 2). Although much of this decline was due to wide swings in automobile sales caused by reduced manufacturers' incentives, other components of consumer spending also weakened. For example, consumer spending excluding automobile sales slowed from a 3.3 percent growth rate over the year ending September 1986 to a 2.0 percent rate over the year ending September 1987.

The slower growth of consumer spending reflected weaker purchases of various goods. Real purchases of durable goods declined 5.9 percent over the year ending September 1987, partially reflecting manufacturers' incentive programs that strengthened automobile sales in September 1986 but weakened them in September 1987. However,

real spending on nondurable goods was also weak, decreasing 0.5 percent over the year ending September 1987. Only real consumer spending on services increased, growing 3.9 percent over the year ending September 1987. Consumption of services is least vulnerable to an economic downturn because services include such essentials as electricity, medical care, and housing.

Several factors contributed to the slowdown in consumer spending. A major contributor was the sluggish growth of disposable income during much of 1987. Disposable income is income households have available to spend after adjusting for personal taxes and transfer payments. Table 2 shows that growth of real disposable income slowed to 0.9 percent over the year ending September 1987, down from 4.4 percent in the previous year. Rising interest rates and heavy consumer debt also may have contributed to the slowdown in consumer spending. The **constant-maturity** yield on ten-year Treasury securities rose 2.3 percentage points from January to September 1987. Higher interest rates may have encouraged saving and also raised the cost of borrowing to finance purchases of consumer durable goods. Moreover, household debt has increased substantially relative to income in the 1980s. Heavily indebted households may have avoided purchases of durable goods rather than increase their debt and the possibility of financial distress.

These factors, together with the stock market crash, continued to weaken consumer spending in the final quarter of 1987. Real consumer spending dropped in October as purchases of both durable and nondurable goods **declined**.¹⁵

¹⁵ Weak consumer spending in October and stronger disposable income growth have raised the **personal** saving rate since the crash. Conversely, the saving rate **was** very low in the summer of 1987 when stock prices and consumer **wealth** were at high levels. Thus, movements of the personal saving rate over the past year have been consistent with the view that consumption spending is directly related, and thus personal saving is inversely related, to stock prices.

Reduced manufacturers' incentives caused sales of domestic automobiles to fall from an annual rate of 7.8 million units in September to 5.8 million in October. The decline in consumer spending during October was not followed by further cutbacks, however, as real consumer spending expanded rapidly in December after sluggish growth in November.

Comparison of actual and projected consumer spending

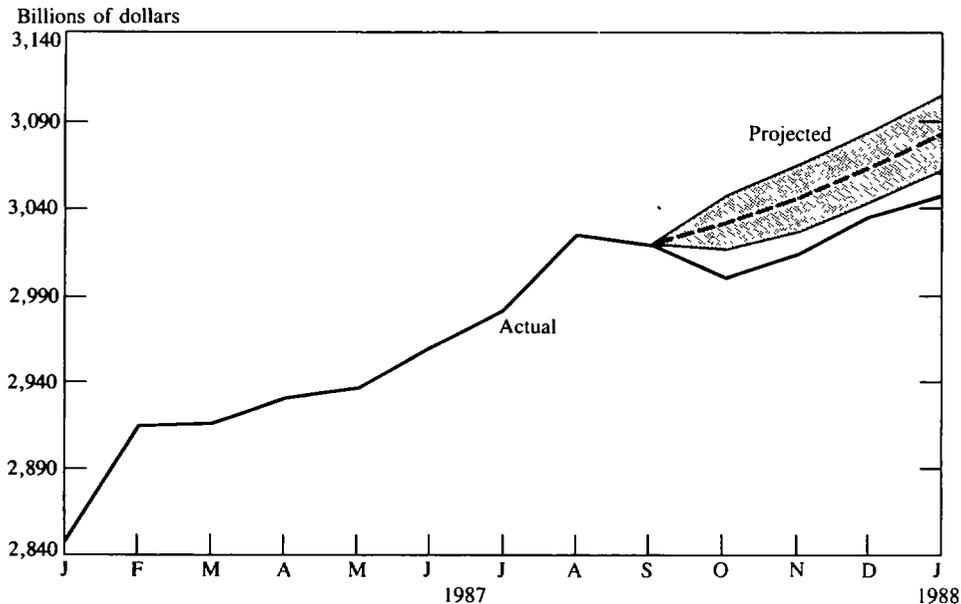
Because various factors influence consumer spending, the effects of lower stock prices can only be determined with a model that allows for other determinants of consumer spending. A preliminary assessment of the effects of lower stock prices can be made by comparing actual consumer spending since the crash with projections of consumer spending based on economic conditions before the crash. The projections were produced with data on consumer spending, stock prices, and other variables through September 1987. All variables in the model were then projected over the period from October 1987 to January 1988 based on the movements of the variables through September.¹⁶ However, only the consumer spending projections are reported in this article. **If** the model accurately reflects the interrelationships among the major factors **affec-**

¹⁶ The model is a Bayesian vector **autoregression** estimated over the period **from** January 1960 to September 1987. The article focuses on unconditional projections that make no assumptions about the values of the variables after September. However, the article will also discuss alternative **projections** that set stock **prices** equal to their actual values from October to January.

For a general **introduction** to vector **autoregressions**, see Craig S. Hakkio and Charles S. Morris, "Vector **Autoregressions**: A User's Guide," Research Working Paper **84-10**, Federal Reserve **Bank of Kansas** City, November 1984. Bayesian vector **autoregressions** are discussed in Richard M. Todd, "Improving Economic Forecasting With Bayesian Vector **Autoregression**," *Quarterly Review*, Federal Reserve **Bank of Minneapolis**, Fall 1984, pp. 18-29.

CHART 3

Actual consumer spending and projections based on pre-crash conditions



Note: Shaded area is one standard deviation confidence band around projection.

ting consumer spending, then any large shortfall from the model's projections is likely due to some unpredictable event—such as the stock market crash—that depressed consumer spending.

The projections of consumer spending were derived from a small statistical model—a vector autoregression—estimated through September 1987.¹⁷ Three consumption variables were used: consumer spending on nondurable goods and ser-

VICES, consumer spending on automobiles, and consumer spending on durable goods other than automobiles. In addition, six determinants of consumer spending were used: the Standard and Poor's 500 common stock price index, disposable income, the Index of Consumer Sentiment, the ten-year constant maturity yield on Treasury securities, the dollar amount of consumer installment credit, and the Consumer Price Index. Each variable was explained primarily by its own historical values, but the model also allowed the variables to affect each other. Consumer spending, disposable income, and consumer installment credit were measured in current dollars. The Consumer Price Index helped capture the effect of a rising price level on these current dollar measures as well as the possibility that consumers might change their spending patterns in anticipa-

¹⁷ The vector autoregression included 12 lagged values of each explanatory variable. The variables enter the model in a logarithmic form, and each equation includes a deterministic time trend and a constant term. Bayesian estimation was chosen over ordinary least squares because the Bayesian approach produces more plausible monthly forecasts. Linear interpolation was used to obtain monthly values of the Index of Consumer Sentiment before January 1978.

TABLE 3
Comparison of actual consumer spending with projections
based on pre-crash conditions
(billions of current dollars)

	<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>
Personal consumption expenditures				
Projection	3,034.4	3,048.8	3,065.1	3,086.1
Lower confidence bound	3,019.1	3,030.2	3,044.2	3,063.6
Actual	3,002.2	3,016.7	3,038.6	3,048.6
Nondurable goods and services				
Projection	2,598.2	2,609.9	2,627.9	2,646.9
Lower confidence bound	2,589.4	2,599.4	2,615.2	2,632.8
Actual	2,599.2	2,604.7	2,614.2	2,624.1
Nonauto consumer durable goods				
Projection	224.6	225.8	228.6	229.5
Lower confidence bound	222.1	223.0	225.1	225.6
Actual	216.9	220.2	221.7	223.9
Automobiles and auto parts				
Projection	211.7	213.0	208.6	209.7
Lower confidence bound	201.5	201.0	196.1	196.5
Actual	186.1	191.8	202.6	200.6

Note: Lower confidence bounds are one standard deviation below projected values.

tion of future changes in the inflation rate.

Recent consumer spending has been weaker than projected by the statistical model. Chart 3 shows actual and projected levels of consumer spending for the last three months of 1987 and January 1988. The values projected using the model are shown by the dashed line. To allow for uncertainty about whether the model has captured the precise relationship, the chart also contains a shaded confidence band around the pro-

jected level. Actual consumer spending would be expected to fall within the confidence band unless the crash or some other unusual event had affected consumer spending. Although actual spending was consistently below the confidence band, the shortfall was due primarily to the sharp decline of consumer spending in October. Personal consumption expenditures in October were about \$30 billion lower than projected by the statistical model. Consumer spending grew almost as fast

as projected from October to January, increasing at an annual rate of 6.3 percent compared with the projected rate of 7.0 percent. The chart gives no evidence of a rebound in consumer spending to the levels that were projected to occur without the stock market crash. Thus, the crash is still depressing the level of consumer spending in 1988.

Each category of consumption in the model has been weaker than projected. Table 3 shows the projections, the lower confidence bounds, and the actual values for total consumer spending and its three components. The confidence bounds are useful in judging whether the stock market crash has affected consumer spending **significantly**.¹⁸ It is unlikely that consumer spending would fall below the lower confidence bounds unless consumers are affected by some unusual event such as the crash. Consumer spending on nondurable goods and services was less than projected but did not fall below the confidence bound until December. However, consumer spending on durable goods other than automobiles fell below the confidence bound in October and has remained there through January. The projections for purchases of new automobiles and automotive parts must be taken with caution because of the distorting effects of sales incentive programs. Nevertheless, actual automobile purchases were substantially less than projected, although they exceeded the lower confidence bound in December and January.

As a further check on how much of the shortfall in consumer spending has been due to the stock market crash rather than other factors, con-

sumer spending was also projected by setting stock prices equal to their actual values from October to January. In the previous set of projections, predicted stock prices were higher than were actually observed after the crash. Setting stock prices equal to their actual values thus gave an alternative set of projections based on lower stock prices. Despite the lower values for stock prices, these alternative projections of consumer spending were only slightly smaller than the projections in Chart 3 and Table 3. The limited effect of setting stock prices equal to their actual values suggests that stock prices may have been responsible for only a small part of the total shortfall in consumer spending. However, these alternative projections could be misleading because the effects of stock prices, interest rates, and consumer sentiment cannot be easily separated. Also, even if these projections capture the average historical effect of stock prices on consumer spending, the 1987 crash was unusually severe and might have had a larger or more sudden effect. Nonetheless, the model projections that result from setting stock prices at their historical values strongly suggest that the effect of the stock market crash has not been larger than the shortfall shown in Chart 3.

The sudden response of consumer spending to the crash does not contradict the basic life-cycle theory of consumption. Although smaller than some estimates, the roughly \$30 billion shortfall of consumer spending in October was within the range of responses that life-cycle studies predict for a \$1 trillion loss in **wealth**.¹⁹ However, if the

¹⁸ The confidence bounds were calculated by simulating the vector autoregression 1,000 times with disturbances drawn from a random number generator. The means and standard deviations of the forecast distributions were computed from the 1,000 simulated values. The confidence bounds in Table 3 are levels of consumer spending that are one standard deviation below the mean projected value.

¹⁹ Various life-cycle studies imply a response ranging from \$30 billion to \$70 billion. Although the October shortfall in consumer spending is at the bottom of this range, it is too early to assess the total dollar response because further lagged effects are possible. Moreover, the perceived loss of household wealth was probably less than \$1 trillion because of the partial recovery of stock prices since the crash and the temporary nature of the 1987 stock market gains.

shortfall was indeed due to lower stock prices, the response was much quicker than some empirical studies suggest.

Taken as a whole, the empirical results are consistent with the view that the stock market crash has had a small effect on consumer spending. All three components of consumer spending have been weaker than were projected based on economic conditions before the crash. Unless consumer spending rebounds in coming months, the crash has also reduced the level of consumer spending in 1988. But consumer spending grew almost as fast as projected from October to January, showing that fears of a **collapse** in spending were **unwarranted**.

Conclusion

Economic research implies that a large decline in stock prices slows the growth of consumer spending. The life-cycle hypothesis and **supporting** empirical evidence imply that the decline in household wealth resulting from the October 1987 stock market **crash** would reduce consumer spending in recent months. Other research suggests **that** the associated decline in consumer confidence would transmit the effects of the crash even to households that do not own stocks. For these reasons, most economic forecasters have lowered their predictions for consumer spending in 1988.

But identifying the effects of the stock market crash is difficult because consumer spending had begun weakening before the crash in response to sluggish income growth, higher interest rates, and

reduced incentives for automobile purchases. Consumer spending since the crash has been weaker than projected by a simple vector **auto**-regression based on economic conditions before the crash. The major shortfall in consumer spending occurred in October, coincident with the crash. This weakness in consumer spending supports the view that the stock market crash is causing consumers to spend less. However, revisions of the economic data might show that consumer spending since the crash has been weaker or stronger than is currently estimated. Thus, more time will be needed before the full effects of the crash can be accurately gauged.

Slower growth of consumer spending does not necessarily imply an economic recession. Reduced growth of consumer spending has a major effect on the economic outlook because consumer spending makes up about two-thirds of **GNP**. But consumer spending has not collapsed in the wake of the crash, and the cut in tax rates effective in 1988 could help maintain consumer spending by raising disposable incomes. Other factors are also contributing to growth of the U.S. economy. Rapid growth of real exports is raising output and employment in goods-producing sectors of the economy, higher utilization of industrial capacity is stimulating business fixed investment, and the decline in long-term interest rates is encouraging both business and residential investment. Thus, although the stock market crash may have reduced economic growth, the crash does not make a recession inevitable in 1988.

Federal Deficits and the Stock Market

By V. Vance Roley and Lawrence D. Schall

Some analysts claim that concern about large federal budget deficits contributed to the October 1987 stock market crash. These analysts argue that concern over continued large budget deficits and the associated need to attract a continued large inflow of foreign capital led to the run-up in long-term interest rates last year that made bonds increasingly attractive relative to stocks. In this view, failure to make satisfactory progress in reducing the U.S. budget deficit was ultimately to blame for the stock market crash.

In contrast, other analysts claim that budget deficits had little if any effect on stock prices. Noting that the federal budget deficit declined **substantially** in fiscal year 1987, Milton Fried-

man, for example, characterized much of the discussion of the links between budget deficits and the stock market crash as reflecting “**reliance** on economic fallacies.”¹ Moreover, stock prices surged throughout most of the 1980s despite mounting budget deficits. Perhaps investors did not consider budget deficits a problem. Or perhaps the stimulative fiscal policy led to such a strong economic expansion that stocks became increasingly attractive investments despite concerns that high budget deficits would raise interest rates and inflation.

The unprecedented size of recent budget deficits and of the stock market decline brought attention to the relation between budget deficits and stock prices. But it is dangerous to draw strong conclusions based on such limited information. Instead, economists rely on economic theory and data over longer periods to sort out the effects of budget deficits.

V. Vance Roley is Rainier National Bank Professor of Banking and Finance at the University of Washington and a visiting scholar at the Federal Reserve Bank of Kansas City. Lawrence D. Schall is Ford Motor Company Professor of Finance and Business Economics at the University of Washington. Part of this research was supported by a grant from the Center for the Study of Banking and Financial Markets, University of Washington. The views expressed in this article are those of the authors and do not necessarily represent those of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

¹ See Milton Friedman, "An Economist's Growing Garden of Fallacies," *The Wall Street Journal*, December 2, 1987.

Such an approach is taken in this article. The finding is that budget deficits resulting from expansionary fiscal policy actions have historically been associated with small improvements in stock prices. The implications for the current situation are not entirely clear, however, because budget deficits since 1982 have been unique in several respects. The first section of the article reviews a theoretical model of how stock prices are determined. The prospective effects of budget deficits on the economy and stock prices are analyzed in the second section. The third section presents empirical evidence showing that budget deficits have typically led to slightly higher stock prices. The final section draws out the implications for evaluating the recent and prospective link between fiscal policy and the stock market.

Determinants of stock prices

In this section, a simple model of stock prices is considered to identify their determinants. The factors affecting stock prices are then related to such broad economic measures as economic activity, inflation, and interest rates. These relationships are used in the next section to describe possible links between federal deficits and stock prices.

In a market dominated by rational investors, the price of a firm's stock reflects its intrinsic value. In turn, the intrinsic value of a stock depends on future as well as current earnings and risks. Changes in assessments about the firm's performance in either the current or future periods, then, should be translated into movements in current stock prices. More formally, the value of a firm's stock depends on the firm's current and prospective earnings as measured by equity cash flows.² Among the factors determin-

ing these cash flows are the firm's revenues, expenses, taxes, and interest payments.

Investors must thus predict future cash flows to determine how much to pay for stocks. A stock's current intrinsic value is the sum of the present values of these expected future cash flows.³ That is, to convert expected future cash flows into current values, investors must discount these future values. The cash flow in the next period, for example, is discounted by using a single-period, risk-adjusted discount rate, which is often represented as the sum of a constant risk-free rate and a risk premium. The yield on Treasury bills is frequently taken as the risk-free rate. The risk premium is added to the risk-free rate to take into account the risk associated with future cash flows. An increase in either the risk-free rate or the risk premium raises the discount rate on stocks and thus reduces the present value of future cash flows.

Although the prices of individual stocks are viewed as reflecting the discounted value of an individual firm's expected cash flows, such aggregate economic factors as economic growth, inflation, and interest rates influence the average level of stock prices by affecting the expected cash flows of all firms, as well as the rate used to discount those cash flows. For example, the unpre-

$$C = X - T - P - I$$

where C is the cash flow, X is the pretax operating cash flow (revenues minus expenses and capital outlays), T equals taxes, P represents net principal payments on the firm's debt, and I equals the interest payments on the firm's debt. Equity cash flows are simply referred to as cash flows in the remainder of this article.

³ In analytic terms, a firm's equity value can be expressed as

$$S_0 = \sum_{t=1} \frac{E(C_t)}{(1+k)^t}$$

where S_0 is equity value in period 0, $E(C_t)$ is the expected cash flow in period t, and k is the firm's discount rate. All expected values are formed at time 0. All cash flows are nominal quantities, and k is the nominal discount rate.

² A firm's equity cash flow can be approximated as

dictability of aggregate economic variables may affect the risk premium incorporated in the rate used for discounting expected future cash flows. The effects of these aggregate economic factors on stock prices are considered next.

First, increases in current and expected levels of economic activity should cause stock prices to rise. This rise reflects increases in the assessments about the expected future cash flows of corporations, since cash flows and economic activity are positively related. This link accounts for the stock market being used as a leading economic indicator.

Second, an increase in the overall level of interest rates should cause stock prices to decline. If the risk premium is constant, a rise in interest rates increases the rate used to discount a firm's cash flows.⁴ The higher discount rate reduces current stock prices.

Third, an increase in expected inflation should cause stock prices to fall. One reason is that increases in inflation have been related historically to declines in future economic **activity**.⁵ So, increases in inflation are taken as signals of declines in the real value of future cash flows. Another reason inflation causes lower stock prices stems from the interaction between inflation and the tax system. By raising a firm's real, or inflation-adjusted, tax liability, inflation can reduce real after-tax cash flows. Taxes increase because of the treatment of inventory costs, depreciation,

and the **tax** basis of assets a company **sells**.⁶ Some of these negative tax effects might be offset by reductions in the real value of a corporate debt. On balance, though, empirical evidence confirms that higher expected inflation lowers stock prices.

Finally, more uncertainty about economic activity, interest rates, and inflation could cause the equity risk premium to rise. If more volatile interest rates lead to greater uncertainty, for example, the risk premium for stocks may rise. Similarly, increased inflation volatility could also raise the risk premium and thus the rate used for discounting future cash flows. Because higher discount rates reduce the present value of expected future cash flows, stock prices fall in response to increases in risk.

Federal deficits and stock prices: Theoretical considerations

Budget deficits affect stock prices by influencing both the **overall** economic climate and the valuation of alternative assets. This section discusses the possible theoretical relationship between federal deficits and stock prices. The link is examined by considering how changes in the deficit affect aggregate economic output, interest rates and inflation. As discussed in the previous section, these aggregate variables are thought to affect stock prices either through changes in the cash flows of firms or through the rate used in discounting future cash flows.

Two main cases are considered in examining the effects of federal deficits. One case assumes that enough labor and capital are available so that

⁴ To keep the effects of inflation separate, assume that real interest rates increase and that the real risk premium is constant. Also, this analysis ignores the capital gain to firms due to unanticipated increases in interest rates. The value of the firm's outstanding debt falls in this case.

⁵ For empirical evidence on the negative inflation-stock price relationship, as well as the inflation-future economic output link, see Eugene F. Fama, "Stock Returns, Real Activity, Inflation, and Money," *American Economic Review*, September 1981, pp. 545-565, and Charles R. Nelson, "Recursive Structure in U.S. Income, Prices, and Output," *Journal of Political Economy*, December 1979, pp. 1307-1327.

⁶ Inflation creates taxable nominal gains on inventories and asset dispositions when though these gains are not real. Also, historical cost depreciation, rather than the current replacement cost of depreciable assets, is used to compute taxable income. See Martin Feldstein, "Inflation and the Stock Market," *American Economic Review*, December 1980, pp. 839-847, and Lawrence D. Schall, "Taxes, Inflation and Corporate Financial Policy," *Journal of Finance*, March 1984, pp. 105-126.

increases in output can occur with little or no pressure on the prices of goods. The other case assumes the economy is operating so near its **maximum** capacity that further economic stimulus leads to a rise in the prices of goods.

In the case of unemployed resources, any increase in the deficit from a discretionary tax cut or an increase in government spending most likely stimulates economic activity. A personal tax cut, for example, raises the after-tax income of households. This rise in disposable income leads in turn to increases in consumption spending and thus in aggregate demand. Similarly, higher government spending on goods and services raises aggregate demand directly. Because the increase in aggregate demand can be satisfied by employing idle resources, the likely effect on prices will be minimal. In this case, budget deficits do not cause higher inflation. Interest rates, however, are likely to rise somewhat because of the expansion in overall economic activity. In particular, the rise in income causes an increase in the demand for **money**.⁷ If the Federal Reserve does not monetize the deficit by increasing the supply of money, the rise in money **demand** exerts upward pressure on interest rates. Individuals sell bonds to satisfy their increased demand for money, causing bond prices to fall and interest rates to rise.

The net effect of the increase in the deficit on stock prices is unclear. The rise in income and output increases corporate cash flows. But the rate used in discounting future cash flows also rises because of higher interest rates. So, while future cash flows are higher, the net effect on their present value is uncertain.

⁷ The demand for money also may depend on wealth. Issues related to wealth effects are not considered to keep the analysis simple. For a discussion of wealth effects, see Benjamin M. Friedman, "Crowding Out Or Crowding In? Economic Consequences of Financing Government Deficits," *Brookings Papers on Economic Activity*, 1978:3, pp. 593-641.

The net effect of deficits on stock prices would likely be positive, however, if the Federal Reserve were to monetize the increase in the deficit. The Federal Reserve could purchase Treasury securities to increase reserves in the banking system, eliminating the need to finance the deficit through borrowing from the public. The resulting increase in reserves would increase the supply of money and thus alleviate the interest rate pressure from higher money demand. As a consequence, the positive effects of higher output on stock prices probably dominate any adverse interest rate effects. By assumption, ample resources are available to meet increased demand, so the higher money supply would not heighten investors' concerns about inflation. Therefore, monetization of deficits during a period when the economy is operating well below capacity would likely lead to a positive relationship between deficits and stock prices.

In contrast, fiscal stimulus would likely lead to a decline in stock prices during periods when **all** of the factors of production are fully employed. An increase in the federal deficit caused by either an increase in government spending or a reduction in taxes would still raise aggregate demand. If the economy is already fully employing all available resources in producing output, the increased aggregate demand could not lead to higher output and thus higher cash flows. Instead, firms would merely raise prices on their products. The resulting rise in the general price level would reduce real, or inflation-adjusted, money holdings. To restore real money balances to their previous level, individuals would try to sell their bonds, causing interest rates to **rise**.⁸ Deficit monetization in this case would further exacerbate inflationary concerns. So increased deficits during periods of high resource use can generally be expected to lead to lower stock prices.

⁸ The increase in interest rates also serves to reduce interest-sensitive private spending so that aggregate demand equals

To summarize the results in this section, standard economic analysis implies that stimulative fiscal actions increase economic output when the economy is operating at less than full employment. Interest rates could rise, however, **implying** an uncertain net effect on stock prices. Nevertheless, if the increase in the deficit is at least partially monetized, the effects on economic output and interest rates are more favorable for stock prices in this version of the model. In particular, output is higher and interest rates are lower in comparison with the debt-financed case. When full employment is assumed, the effect of deficits on stock prices is unambiguously negative. In this case, output remains at its full employment level, but inflation and interest rates rise.

Finally, it should be noted that these results are not exhaustive, as a number of subtle factors have not been considered. One caveat is that households may infer that higher federal debt **will** eventually result in higher taxes. Consider, for example, the effects of a reduction in federal taxes. To finance the increase in the deficit resulting from the tax cut, the government must sell Treasury securities. This added federal debt could be interpreted as requiring higher future taxes for debt service and retirement. So, consumers might increase their current saving or reduce their current consumption expenditures by an amount equal to the tax cut in recognition of higher future **taxes**.⁹ If this occurs, the **tax** cut

would have no effect on aggregate spending. As a consequence, economic output and interest rates would not change, implying no change in stock prices.

Empirical evidence

Since economic theory does not provide a clear-cut result in assessing the effects of budget deficits on stock prices, empirical evidence must be examined to determine the relationship. This section examines the historical relationship between federal deficits and stock prices. Three measures related to the federal deficit are first discussed. These measures—the structural component of the deficit, the cyclical component of the deficit, and the amount of deficit monetization—are then considered in terms of their historical performance. Next, stock prices are related to the three measures.

Historical performance of federal deficits

To measure the potential economic stimulus from the discretionary fiscal actions analyzed in the previous section, the structural deficit concept is sometimes used. The structural component of the deficit is the part that would prevail under normal economic **conditions**.¹⁰ Changes in

aggregate supply. Some types of stimulative fiscal policies also could increase aggregate supply. Lower marginal **tax** rates, for example, could increase the work effort of labor, causing a rise in aggregate supply. For an analysis of this and other cases, see Robert J. Barro, *Macroeconomics*, John Wiley & Sons, New York, 1984.

⁹ This result is often labeled as the Ricardian equivalence theorem. This theory also depends on intergenerational **transfers** in which the size of bequests **varies** with the presumed **tax** liability of future generations. For more discussions of the Ricardian equivalence theorem, see Martin J. Bailey, *National Income and the Price Level*, McGraw-Hill, New York, 1971; Robert J. Barro, "Are Government Bonds Net Wealth?" *Journal of Political Economy*,

November/December 1974, pp. 1095-1117; Levis A. Kochin, "Are Future Taxes Anticipated by Consumers?" *Journal of Money, Credit, and Banking*, August 1974, pp. 385-394, and Martin Feldstein, "Government Deficits and Aggregate Demand," *Journal of Monetary Economics*, January 1982, pp. 1-20.

¹⁰ This measure corresponds to the cyclically adjusted federal deficit constructed by the U.S. Department of Commerce. For further details, see Frank de Leeuw and Thomas Holloway, "Cyclical Adjustment of the Federal Budget and Federal Debt," *Survey of Current Business*, December 1983, pp. 2540. This measure **has** also been used in other recent studies. See, for example, Guido Tabellini and Vincenzo La Via, "Money, Deficit and Public Debt: An Empirical Investigation," *mimeo*, University of California at Los Angeles, September 1986. Some economists advocate other measures of the deficit that correct

this component result from changes in tax or expenditure policy or from the failure to offset bracket creep and other distortions caused by inflation. On the revenue side, for example, reductions in personal or corporate tax rates would increase the structural deficit. A reduction in social security taxes would have the same result. On the expenditure side, any policy that increases budget outlays for a given level of economic activity would also increase the structural deficit. Increases in defense spending have been a good example in recent years. In addition to explicit changes in **tax** and expenditure policies, inflation can cause changes in both the nominal and real structural deficit. If personal **tax** rates are not lowered in times of inflation, for example, the real tax burden on individuals rises. The higher real tax receipts tend to reduce the inflation-adjusted value of the structural deficit. In sum, the structural deficit is constructed to represent the deficit that would occur for a normal level of economic activity under a given set of tax and expenditure policies.

The cyclical component of the deficit is the difference between the actual and structural deficits. This component changes as a result of fluctuations in overall economic activity. For an average level of economic activity, the cyclical deficit is zero. During recessions, the cyclical deficit increases as tax receipts decline and transfer payments increase. Tax receipts fall because of the declines in personal income and corporate profits, and transfer payments rise due to an increase in unemployment. So, for given federal tax and expenditure policies, cyclical deficits rise during recessions. Similarly, higher than usual levels of economic activity result in cyclical budget surpluses. In sum, this measure simply reflects the effects of business cycles on the federal deficit

for various items not included in the conventional measure. See, for example, Robert Eisner, *How Real is the Federal Deficit?* Free Press, New York, 1986.

for a given set of tax and expenditure policies. As such, its effect on stock prices should be minimal because changes in the cyclical deficit are transitory. Moreover, stock prices should already reflect current business conditions and so should not be affected much by any associated changes in the budget deficit.

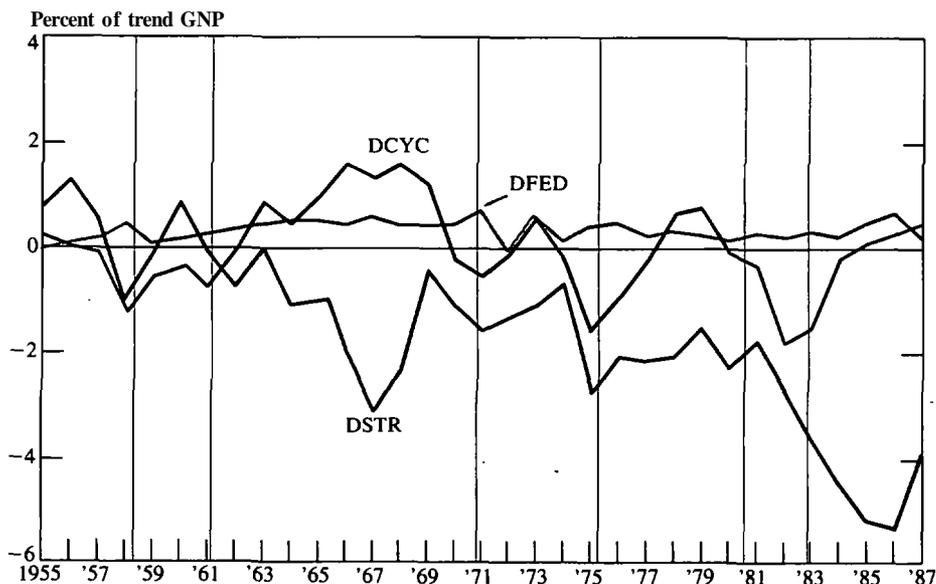
The remaining measure to be discussed is the part of the deficit monetized by the Federal Reserve. This measure corresponds to Federal Reserve purchases of federal debt securities. In purchasing these securities, the Federal Reserve increases the amount of reserves in the banking system, thus providing the basis for increases in the money supply. As discussed in the previous section, deficit monetization can result in either higher inflation or higher output than with a **debt**-financed deficit.

Chart 1 shows the size of the structural deficits and the cyclical deficits relative to trend **GNP** from 1955 through 1987.¹¹ Reported values are negative for deficits and positive for surpluses. The sum of the two measures equals the total federal deficit as a fraction of trend **GNP**. The chart also shows the Federal Reserve's net open market purchases of Treasury securities as a percent of trend **GNP**, a measure of the extent of monetization. Finally, the beginnings of **economic** expansions are marked by vertical lines to highlight the behavior of the components of budget deficits during the early stages of economic expansions.

Several patterns can be seen in Chart 1. First, except for 1955-57 and 1960, there was a structural deficit rather than a surplus. Second, the structural deficit first peaked in 1967 in association with the Vietnam War buildup, and then

¹¹ Data for 1987 represent the first three quarters of the year. Trend **GNP** is formed from a regression with the logarithm of **GNP** and linear and quadratic time variables. This measure appears to correspond more closely to the cyclical adjusted deficit measure than a simple log-linear trend.

CHART 1
Components of the federal deficit



DSTR = Structural deficit (-) or surplus (+)
 DCYC = Cyclical deficit (-) or surplus (+)
 DFED = Net Federal Reserve purchases of Treasury securities

Vertical lines represent the beginning of economic expansions.

recovered somewhat before soaring to record highs in the 1980s. In 1985, for example, the structural deficit was about 5 percent of trend **GNP**, well above the previous peak of about 3 percent in 1967. Third, in contrast to the usual behavior in the early stages of economic expansions, the structural deficits continued to expand in 1984, 1985, and 1986. The typical behavior of the structural deficit in the chart suggests that discretionary fiscal policy began tightening soon after economic expansion began. In contrast, the structural deficit in the most recent expansion continued to grow through 1986. Although somewhat smaller, the structural deficit in 1987 was still large by historical standards. Fourth, the cyclical deficit has alternated between periods of positive and negative values, which is to be expected since this part of the deficit is caused

by the **recurring** oscillations of the general economy. Again, negative values reflect the effects of periods when economic activity is below its historical trend. Finally, the Federal Reserve's net open market purchases of Treasury securities have usually accounted for only a small portion of the total federal deficit, with no clear trend toward increased deficit monetization over time.

Estimation results

The historical effects of federal deficits on stock prices are estimated below. The main issue is whether discretionary fiscal actions leading to higher deficits have been associated historically with increases or decreases in stock prices. The structural component of the deficit is used to represent any such discretionary fiscal actions.

As indicated in the previous section, stock prices would increase, for example, if the output gain from stimulative fiscal policy outweighed any increases in interest rates and risk.

The empirical model relates unanticipated portions of the structural deficit, the cyclical deficit, and deficit monetization to the rate of return on a broad portfolio of stocks. Only unanticipated changes are considered because the expected values of each of these measures of the deficit should already be reflected in current stock prices. Moreover, most of the variation in stock prices over any given period is due to the effect of new **information**. To represent stock price movements, the rate of return on stocks is used. The rate of return equals the percentage change in stock prices plus the dividend yield. Because dividends move rather sluggishly over time, fluctuations in the rate of return are dominated by movements in stock prices. Thus, an increase in the rate of return can generally be associated with higher stock prices.

The specific model estimated can be represented as:¹²

$$RS_t = E(RS_t) + b_1 \cdot (DSTR^u)_t + b_2 \cdot (DCYC^u)_t + b_3 \cdot (DFED^u)_t + e_t$$

The observed rate of return on the stock market is represented by RS_t , which includes dividends and capital gains on a value-weighted portfolio of stocks. To better isolate the effects of new information about the deficit on stock returns, the

¹² This same general specification has been used in other recent studies on the effects of deficits on asset rates of return. However, the deficit has not been decomposed into cyclical and structural components. See Charles I. Plosser, "Government Financing Decisions and Asset Returns," *Journal of Monetary Economics*, May 1982, pp. 325-352, and Roger D. Huang, "Does Monetization of Federal Debt Matter? Evidence from the Financial Markets," *Journal of Money, Credit, and Banking*, August 1986, pp. 275-289.

expected rate of return is included as a determinant of actual stock returns. This variable is denoted as $E(RS_t)$, and it represents the predicted rate of return formed at the end of the previous period. Since predicted returns cannot be observed directly, several different measures were used for this variable to ensure the robustness of the empirical results. The remaining variables measure unanticipated changes in both the structural and cyclical components of budget deficits, in the degree of deficit monetization, and in other unspecified factors that could cause the actual rate of return on stocks to differ from the expected rate of return.

The first of these variables, $(DSTR^u)_t$, represents unanticipated changes in the structural deficit resulting from unanticipated fiscal policy actions. This measure most closely corresponds to the changes in the deficit due to discretionary fiscal policy actions and should thus measure the effects described in the previous section. The unanticipated changes in this and other variables were estimated with empirical models used to predict future values of each series. Deviations of actual values from those predicted were used to measure unanticipated changes. The deficit measures were also scaled by trend GNP. As a result, they represent unanticipated changes as a fraction of trend GNP.¹³

¹³ In forming unanticipated changes in the three variables, each of the variables divided by trend GNP is regressed on a set of **information** that includes data known by the end of time t . The information set includes four lagged values of the 3-month Treasury bill yield, linear and quadratic time trends, and seasonal dummy variables. The residuals from these regressions are taken as the unanticipated changes.

While this approach is fairly standard, it has some shortcomings in this application. In particular, changes in the structural deficit are taken to represent discretionary fiscal policy actions. Such actions are widely debated in the Congress, and legislation is enacted in advance of its potential effect on the economy. As a consequence, better proxies for the expected structural deficit may be available. Nevertheless, the intended results of federal tax and expenditure policies may differ from the actual outcomes, so proxies such as those used here may be appropriate.

The additional variables included in the model are intended to capture the effects of all factors other than discretionary fiscal policy actions. The unanticipated change in the cyclical component of budget deficits is denoted as $(DCYCU)_t$. As discussed in the previous section, this component of the deficit would be expected to have little or no effect on stock prices because it reflects changes in government revenues and spending caused by fluctuations in the economy rather than by discretionary policy actions. Unanticipated monetization of debt is denoted by $(DFEDU)_t$, which is an estimate of the degree to which the Federal Reserve buys more or fewer Treasury securities than expected by investors when they form expectations of returns on stocks. Unanticipated movements in the rate of return on stocks not captured by any of these factors are represented by the random error term, e_t . Finally, the estimated effects of the various variables are reflected by the coefficients, b_1 , b_2 , b_3 .

The estimation results of the effects of deficits on the stock market are reported in Table 1. Several versions of the model are estimated, mainly reflecting different methods of representing the expected rate of return on stocks. In the first row, the expected rate of return is assumed to be a constant over time. In the second row, the expected rate of return is represented by a constant plus the 3-month Treasury bill yield at the end of the previous period. A set of past information is used to construct the expected rate of return in the third row.¹⁴ Again, these different versions were estimated to help ensure the robustness of the results. Finally, in the fourth row, the real rate of return on stock is considered. In this case, the expected real rate of return again is assumed to be a constant.

¹⁴ With one exception, the information set corresponds to that used to form unanticipated changes in the deficit variables. The exception is that four-lagged values of the rate of return on stock also were included.

The results were obtained by using quarterly data from 1956 through 1985. The first three rows indicate that unanticipated changes in the structural deficit have small effects on nominal stock returns. The first row, for example, indicates that an increase in the structural deficit equal to 1 percent of GNP , which corresponds to a value of -0.01 for $DSTRU$, is associated with a 0.17 (-0.01×-17.02) percentage point gain in the rate of return on equity. This then is the estimated effect on stock returns of policy-induced changes in fiscal policy that are likely to be long lasting.¹⁵ The fourth row indicates that these policy-induced changes in the deficit are associated with an increase in the real rate of return on stocks. Both the transitory business cycle component of the deficit and Federal Reserve monetization were not found to have effects significantly different from zero in any of the specifications.¹⁶

As a whole, the results indicate that stimulative fiscal policy actions have led historically to small increases in stock prices. Discretionary fiscal policy actions leading to higher deficits have typically occurred when resources in the economy

¹⁵ The empirical properties of the cyclically adjusted deficit measure support this proposition. The correlation of $DSTR_t$ with $DSTR_{t-1}$ is 0.87 . The correlation of $DSTR_t$ with $DSTR_{t-g}$ remains fairly substantial taking a value of 0.35 . Moreover, in forming empirical measures of the anticipated and unanticipated components of $DSTR$, the first lagged value of $DSTR$ has a coefficient of 0.75 . All of these results indicate persistent effects.

¹⁶ To determine the effect of the recent experience on the empirical results reported in the table, the equations were re-estimated with the years of the Reagan administration deleted from the sample. The remaining subsample examined began in 1956 and ended in 1980. The results from this subsample supported the evidence from the complete sample. In particular, policy-induced changes in the deficit had small significant effects on both the nominal and real rates of return on stock. As before, increases in this component of the deficit led to higher rates of return and, therefore, higher future stock prices. The transitory business cycle component of the deficit and Federal Reserve monetization again were estimated not to have effects significantly different from zero.

TABLE 1
Response of stock prices to budget deficits (1956:Q1 to 1985:Q4)

Dependent Variable	Constant †	DSTR ^u	DCYC ^u	DFED ^u	Summary Statistics		
					\bar{R}^2	SE	DW
RS	0.15* (0.03)	-17.02* (6.08)	-19.64 (13.44)	12.29 (8.74)	0.08	0.33	1.67
RS - RTB	0.09* (0.03)	-17.32* (6.11)	-20.07 (13.51)	12.17 (8.78)	0.08	0.33	1.66
RS - E(RS)	0.00 (0.03)	-12.03* (5.21)	-9.70 (11.52)	12.31 (7.48)	0.06	0.28	1.99
RRS	0.10* (0.03)	-18.45* (6.20)	-19.89 (13.71)	12.50 (8.91)	0.09	0.34	1.64

*Significant at the 5-percent level
†Numbers in parentheses are standard errors of estimated coefficients.
With the exceptions noted below, data are from the Citibank database.
Variables are defined as:

RS = nominal annualized quarterly rate of return on the value-weighted CRSP index (Source: University of Chicago, Center for Research in Security Prices)

RTB = 3-month Treasury bill yield on the last day of the previous quarter, calculated on an annualized coupon-equivalent basis (Sources: Board of Governors of the Federal Reserve System, H.15, and Department of the Treasury, Treasury Bulletin)

RRS = real annualized quarterly rate of return on the value-weighted CRSP index, calculated as $[(1+RS)/(1+\pi)]^{-1}$, where π is annualized quarterly inflation as represented by the Consumer Price Index

E(RS) = expected value of RS, formed from fitted values of a vector autoregression

DSTR^u = unanticipated cyclically adjusted federal budget surplus (+) or deficit (-) divided by trend gross national product, formed from a vector autoregression

DCYC^u = unanticipated federal budget surplus (+) or deficit (-) net of cyclical adjustment divided by trend gross national product, formed from a vector autoregression

DFED^u = unanticipated annualized net purchases (+) or sales (-) of Treasury securities by the Federal Reserve divided by trend gross national product, formed from a vector autoregression (Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts)

\bar{R}^2 = multiple correlation coefficient corrected for degrees of freedom
SE = standard error
DW = Durbin-Watson statistic

were underemployed. The implication is that the output gains from stimulative fiscal policy slightly outweighed any increases in interest rates or risk, leading to higher stock prices.

Conclusions

The potential effects of federal deficits arising from discretionary fiscal policy on the stock market depend on numerous factors. Perhaps the most important factor is the condition of the economy. In particular, stimulative fiscal actions are most likely to raise output and corporate cash flows when the economy is in a recession. During such periods, higher budget deficits are likely to boost stock prices. When the economy is near full employment, however, the positive output effects are likely negated by higher interest rates and

inflation that cause a decline in stock prices.

The empirical evidence suggests that increases in the structural deficit have historically led to slight increases in stock prices. The structural deficit has typically risen during recessions, and then decreased early in the subsequent expansions. Thus, the positive effect on stock prices has coincided with increases in output from recession levels. The deficit experience since 1982 has departed from this historical performance in that the structural component of budget deficits continued to grow even as the economy moved toward full employment. The theoretical analysis and empirical evidence in this article do not, therefore, rule out the possibility that increasing concerns about the implications of high budget deficits for interest rates and inflation contributed to the stock market crash.

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