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.

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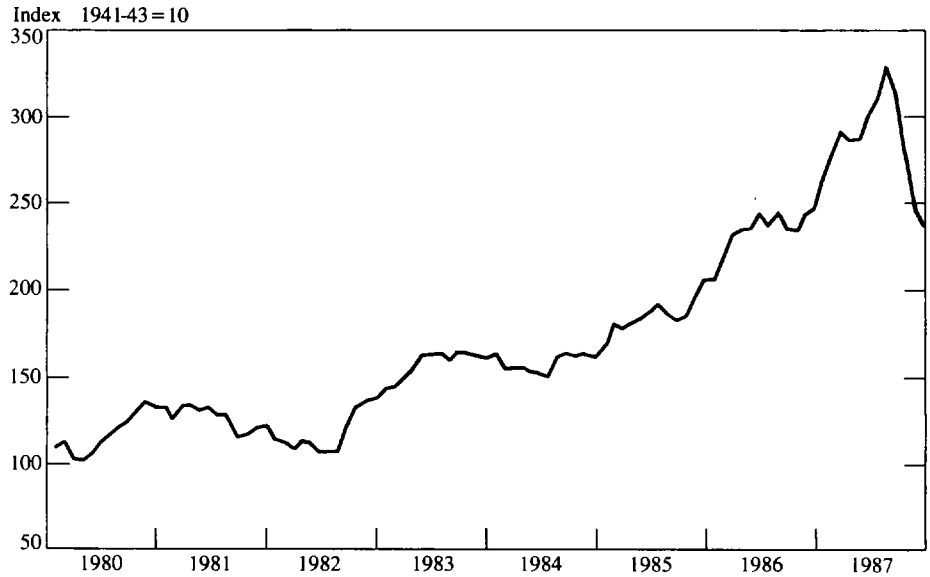
CHART 1

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-

[2] The stock market crash on October 19, 1987, reduced the Dow 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. II.

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:

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

Alternatively, equation 1 can be rearranged to give:

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

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.

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,

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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.

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

Household Net Worth	Percent of House-Holds	Percent of Group With Stock	Mean Dollar Value of Stock	Percent of Total Value
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.

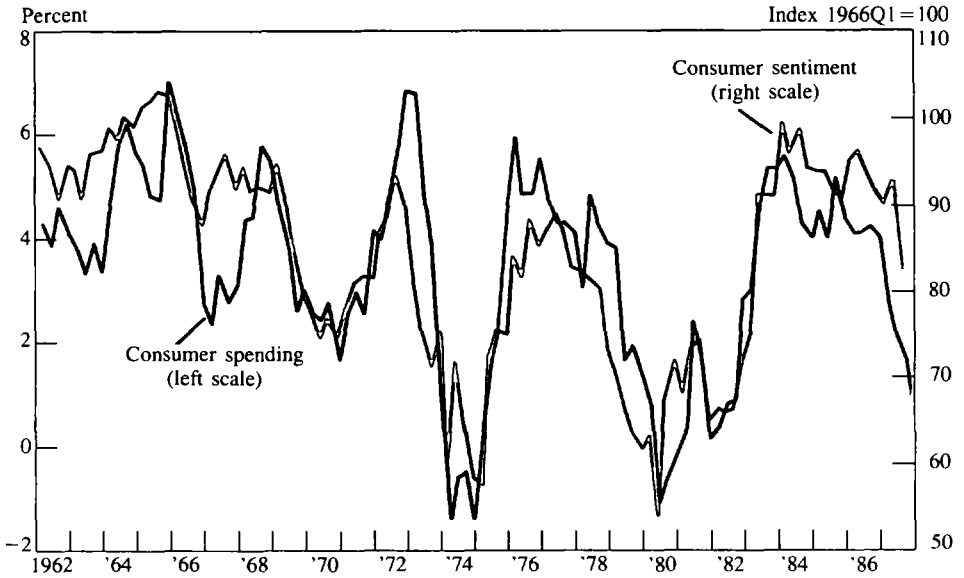
Some analysts believe that consumer confidence about future business and financial conditions is an important determinant of consumer spending. These analysts argue that consumption decisions depend not only on ability to buy but also on willingness to buy, with consumer optimism or pessimism being a key determinant of willingness.[11] 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 90.8 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 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,

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 Brown, 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 Garner, "The Predictive Usefulness of Consumer Sentiment Data," Research Working Paper 86-09, Federal Reserve Bank of Kansas City, December 1986.

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] 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-

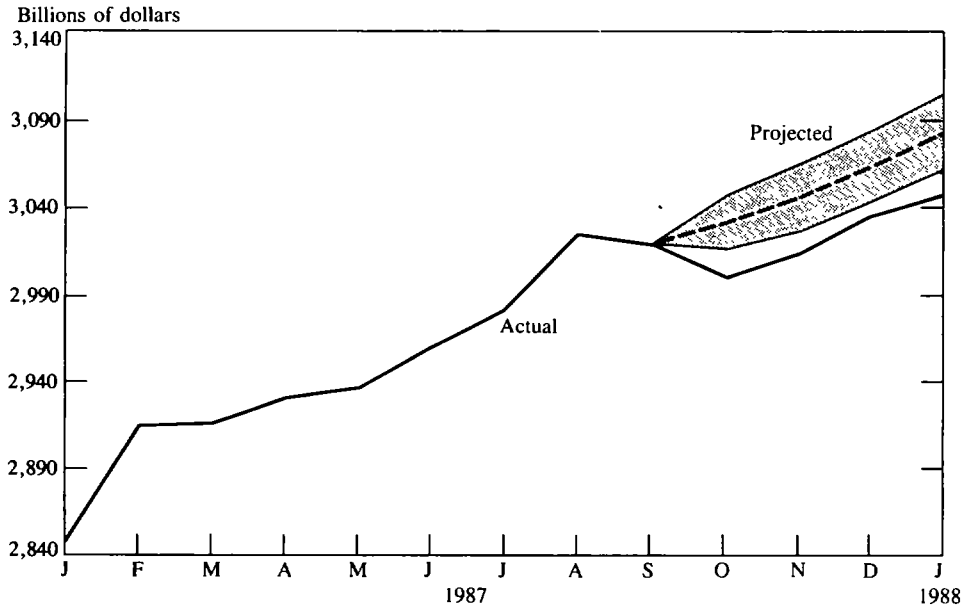
[15] Weak consumer spending in October and stronger disposable income growth have raised the personal saving rate since the crash. Conversely, the saving rate was very low in the summer of 1987 when stock prices and consumer wealth were at high levels. Thus, movements of the personal saving rate over 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.

[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 services, 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)

	October	November	December	January
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 projected 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, consumer 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 autoregression 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.