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Stock Market Wealth and Consumption

James M. Poterba

Wealth creation was one of the dominant themes of the U.S. economy in the 1990s. Between the end of 1989 and the end of 1999, the real net worth of U.S. households increased by nearly \$15 trillion, or by more than 50 percent. Per capita net worth at the end of 1999 was slightly more than \$150,000. At the top of the wealth distribution, the rise of great fortunes has led many to compare the 1990s to the Gilded Age of the late 19th century, when Carnegie, Rockefeller, Vanderbilt and others amassed their financial empires. In October 1999, the Forbes 400 included 267 billionaires, 200 more than ten years earlier.

More than 60 percent of the wealth creation during the 1990s was due to the rising value of household stock holdings. Very favorable stock market returns turned many households with modest investments at the beginning of the 1990s into substantial wealthholders. There were roughly three million households with net worth of at least \$1 million in the 1995 Survey of Consumer Finances, and nearly 4.5 million such households in the 1998 survey. The increase in stock prices since the 1998 survey makes it likely that the number of millionaire households in 2000 exceeds five million.

The rapid expansion of wealth in recent years has raised a host of questions for economic analysis. The effect of stock market wealth on consumer spending has attracted particular attention, figuring in discussions of whether the Federal Reserve Board should consider asset prices in setting monetary policy (Greenspan, 1999). Rising stock prices have also been cited as an important source of higher tax revenues, hence reduced federal deficits.

■ *James M. Poterba is the Mitsui Professor of Economics at the Massachusetts Institute of Technology, and Director of the Public Economics Program, National Bureau of Economic Research, both in Cambridge, Massachusetts.*

This paper describes what economists know about how stock market wealth affects household behavior, especially consumption. The evidence suggests that the rising stock market has surely contributed to rising consumer spending in the 1990s. Even if the marginal propensity to consume out of wealth is smaller than the estimates in many macroeconomic models suggest, the sheer magnitude of the wealth accumulation during the last decade still translates into a substantial increase in aggregate consumer spending. The clearest evidence of a stock market wealth effect should be observed amongst the small set of households that own the majority of corporate stock, while the effect for most households should be modest. The rising stock market has also clearly raised federal income tax receipts, but its direct effects cannot account for all of the recent gains in federal revenues.

Household Net Worth, Wealth Concentration, and Stock Ownership

In studying how wealth affects household behavior, it is useful to begin with an overall perspective on the composition, level, and distribution of net worth. The stock market accounts for roughly one-quarter of household net worth. Tangible assets, primarily owner-occupied real estate and consumer durables such as automobiles, are roughly equal in value to corporate equity holdings. Other financial assets, such as bonds and interest-bearing deposits, as well as a range of other assets such as equity in unincorporated businesses, account for the remainder.

Table 1 shows the composition of household net worth at the end of 1989, 1995, and 1999. Real household net worth rose by nearly \$15 trillion between 1989 and 1999. This corresponds to an annual real compound growth rate of 4.4 percent. More than two-thirds of the wealth expansion occurred between 1995 and 1999.

Table 1 highlights the sharp differences in growth rates across the various components of net worth. While the real value of tangible assets increased only 14 percent during the ten years spanned by the data in the table, and the real value of financial assets other than equities rose 38 percent, the real value of corporate equities surged 262 percent. There is only one other period in the last 80 years, the early 1950s, when stockholders earned comparable returns over such a sustained period.

The overall growth of household net worth in the 1990s is also unusual, but not outside the realm of past experience. The 1920s saw something similar. Between 1922 and 1929, real household net worth rose by 43.2 percent, or at a compound annual growth rate of 5.2 percent. Wolff and Marley (1989) provide data on nominal wealth holdings for this period, and inflation for this period can be constructed from the U.S. Department of Commerce (1975, Series E-135). Between December 31, 1959, and December 31, 1968, real household net worth increased by 52 percent, or at a compound annual growth rate of 4.8 percent. Real wealth

Table 1

Composition of Household Net Worth, December 1989 and December 1999
 (\$1999 billion)

<i>Asset Category</i>	<i>December 1989</i>	<i>December 1995</i>	<i>December 1999</i>
Tangible Assets	12,183.5	11,796.2	13,940.9
Financial Assets Excluding Equities	15,634.5	17,168.8	21,616.8
Market Value of Equities	3,682.8	6,730.4	13,331.5
Liabilities	4,542.2	5,453.5	6,840.9
Net Worth	26,958.5	30,241.8	42,048.2

Source: Board of Governors of the Federal Reserve (2000), Table B.100.e, and author's calculations. Nominal magnitudes from December 1989 and December 1995 are converted to December 1999 using the Consumer Price Index for Urban Workers.

grew even more rapidly in the years immediately following World War II. The most striking contrast to the recent experience is the pattern during the 1970s, when real household wealth in the United States grew very slowly.

Wealth is dispersed quite unevenly across households. The 1 percent of U.S. households with the greatest net worth hold roughly one-third of the assets in the U.S. economy. The least wealthy four-fifths of the households, by comparison, hold roughly 20 percent of the assets. Wolff (1998) provides a detailed discussion of both the current concentration of net worth and of changes in this concentration over time.

There are important differences across net worth components in the concentration of ownership. Table 2 presents data from the 1998 Survey of Consumer Finances. It shows the percentage of corporate stock that is held by the one-half of 1 percent of households with the largest holdings of corporate stock. It also shows the analogous percentage of other assets, and of net worth, held by the households with the largest holdings of these other assets. For the purposes of this calculation, corporate stock holdings are defined inclusive of "indirect" holdings through mutual funds, defined-contribution retirement plans such as 401(k) plans, and trust accounts.

The top 1 percent of equity holders account for roughly half of household holdings of corporate stock, while the top 1 percent of holders of other assets account for a significantly smaller share of holdings of those assets. The contrast between corporate stock and residential real estate is particularly striking. The 1 percent of households with the greatest real estate holdings hold 15 percent of all real estate, while the 80 percent of households with the lowest holdings account for 29 percent. By comparison, for corporate stock, the bottom 80 percent of holders accounts for only 4.1 percent of total holdings.

The absolute magnitude of household net worth at different points in the wealth distribution can be an important consideration in evaluating wealth effects. For the bottom four-fifths of the wealth distribution, average net worth in 1998 was \$65,000. Even for the second highest quintile of the wealth distribution, average net

Table 2

Percentage of Different Assets Owned by Households with Substantial and More Limited Holdings, 1998 *Survey of Consumer Finances*

<i>Percentage of Owners</i>	<i>Common Stock Excluding Pensions</i>	<i>All Common Stock</i>	<i>Non-Equity Financial Assets</i>	<i>Housing Equity</i>	<i>Net Worth</i>
Top .5 Percent	41.4	37.0	24.2	10.2	25.6
Next .5 Percent	11.8	10.7	7.8	4.6	8.4
Next 4 Percent	27.7	27.2	26.2	20.5	23.4
Next 5 Percent	10.3	11.3	14.0	15.4	11.4
Next 10 Percent	7.2	9.8	13.9	20.1	12.8
Bottom 80 Percent	1.7	4.1	14.0	29.3	18.5

Source: Author's tabulations using 1998 *Survey of Consumer Finances*.

worth was only \$173,400. These statistics suggest that an across-the-board increase in asset values might have only a modest effect on the behavior of most households, since most households hold relatively few assets to begin with.

For most households, changes in stock prices have modest wealth effects, since they have no or very limited holdings of corporate stock. Less than half of all households own corporate stock. Even for those who do, stock is typically not the largest asset in their portfolio. In 1998, for example, only 15.9 percent of households had total holdings of corporate stock in excess of the gross value of their home, and nearly half of the households for which this was true did not own a home. Only 7.8 percent of households both owned a home and held stocks worth more than the value of their home. These statistics dramatize the importance of studying consumption patterns amongst a small subset of households when trying to identify how stock market wealth affects consumer spending.

Balance sheet calculations such as those in Tables 1 and 2 omit another important household asset, human wealth. The Office of Management and Budget (1995) estimated that the replacement cost of the "formal education capital" of U.S. workers over the age of 16 was \$27.5 trillion—roughly the same order of magnitude as the value of physical and financial assets. Since this estimate ignores the value of human capital that has been acquired outside of the formal education system, it is almost surely an underestimate. Krueger (1999) estimates that in 1996, labor earnings of \$4.46 trillion were attributable to the returns to education and potential labor market experience. Capitalizing on this flow would likely yield a human capital stock significantly larger than the OMB estimate.

Including human capital in household net worth reduces the relative importance of the stock market as a share of household net worth. Becker (1987, 1997) notes this fact, and concludes that the change in consumption associated with a change in stock market wealth is correspondingly smaller than many suggest.

Consumption Responses to Stock Market Wealth Shocks: Conceptual Framework

Empirical discussions of “the wealth effect,” particularly in the popular press, often suggest that there is some question about whether such an effect exists. Such discussions are misguided. The logic of budget constraints dictates that when an individual’s wealth rises, the individual must either spend that wealth while living, or leave the money to other individuals, charities, or the government after death. Except in the extreme case of an individual who does not increase consumption at any date as a result of a favorable wealth shock, and who bequeaths to heirs who behave in the same way, an increase in wealth will raise consumption at some point.

The central issue in analyzing wealth effects is timing. If the lag between a favorable shock to household balance sheets and an increase in consumption spending takes many years to develop, then stock market fluctuations may have a limited impact on aggregate spending. However, if the link from net worth to consumption is powerful and immediate, then sharp changes in asset values may translate into sharp changes in consumer spending.

To anchor the empirical analysis of how wealth fluctuations affect consumer spending, it is helpful to have a benchmark estimate of the amount by which a household might increase its consumption if it received a favorable wealth shock. Consider a household that does not care about leaving a bequest. The amount by which this household could increase its consumption in all remaining years of life, when it receives a favorable wealth shock, depends on its life expectancy and the after-tax real interest rate. Table 3 reports values of the feasible annual increase in consumption, expressed as a percentage of the one-time increase in wealth, for a range of time periods and interest rates. For example, a household with a 30-year planning horizon that faces a 3 percent real after-tax return can raise consumption outlays by 5 cents for each \$1 increase in wealth.

The annuity market offers households one way to calibrate their feasible consumption spending, even if they do not perform calculations exactly like those in Table 3. In May 1998, the *Annuity Shopper*, a trade magazine, reported that the average annuity payout for a 45 year-old female annuity buyer, per \$1,000 of annuity premium, was \$60.84. This implies that such a buyer could be assured of consuming about 6 percent of a windfall, in nominal terms, in each year for the balance of her life. The analogous payouts were 6.8 percent for 55 year-old women, and 7.9 percent for 65 year-old women. Payouts are greater for men than for women because men have shorter life expectancies, and smaller for married couples than for individuals. Nominal annuity payouts are not strictly comparable to the real calculations in Table 3, but they offer some guidance on feasible lifetime consumption changes.

Recent research on consumer behavior suggests many reasons why consumers might increase their spending by less than these simple calculations suggest. These include bequest motives and the potential desire to accumulate a precautionary stock of wealth to finance future consumption emergencies. While much research

Table 3
**Change in Current Consumption Per Dollar of
 Increase in Wealth, Assuming Consumers Are
 Life-cycle Planners with No Bequest Motive**

<i>After-Tax Rate of Return</i>	<i>Household Planning Horizon</i>		
	<i>15 Years</i>	<i>30 Years</i>	<i>45 Years</i>
.01	.074	.038	.027
.03	.081	.050	.040
.05	.092	.062	.053
.07	.103	.075	.069

Source: The table reports the change in consumption, ΔC , that satisfies $\Delta W = \sum_{t=0}^T \frac{\Delta C}{(1+r)^t}$.

has examined these influences on consumer behavior, virtually none of it has used data sets that include substantial numbers of households with large holdings of corporate stock. These are the households most affected by wealth changes in the 1990s.

Distinguishing corporate stock and other components of wealth can be important for analyzing wealth effects. There are conceptual reasons to expect differences in the marginal propensity to consume out of changes in the value of different wealth stocks, beyond the differences in asset concentration that were noted above.

Consider the example of housing wealth. Tracy, Schneider and Chan (1999) note that the change in household net worth associated with a change in house prices is larger than the change from a comparable change in stock values for the vast majority of households. Yet it is possible that house price fluctuations trigger smaller consumption changes than stock market fluctuations. The extent to which an unanticipated increase in house prices raises a household's real wealth depends on the time horizon over which the household plans to live in its current home. When house prices rise, the implicit "user cost" of living in a house also rises, so the relevant price index for the consumer's consumption basket rises. For someone who does not expect to live in his current home for very long, the present discounted value of the increase in the cost of living in the house will be small relative to the positive wealth effect of the increase in the home's value. In this situation, one might predict an increase in current nonhousing consumption. For those who expect to live in their homes for many years, however, the positive wealth effect associated with a house price increase can be largely offset by the increase in the effective cost of buying housing services. Empirical work, such as Engelhardt (1996) and Skinner (1996), suggests at best a weak link between house price changes and nonhousing consumption.

How house price changes affect consumption is largely an incidental issue for analyzing recent consumption growth, since the Census Bureau's index of the

purchase price of a constant quality home increased by almost precisely the same amount as the Consumer Price Index between December 1989 and June 1999. In the late 1970s and early 1980s, however, the pattern of stock market and housing market appreciation was reversed, and much of the wealth accumulation during that period was the result of rising house prices.

Time Series Evidence on the Comovement in Consumption and Household Net Worth

Most estimates of how wealth affects consumer spending are based on aggregate time series data. The framework that underlies most of this research is a refined version of the aggregate consumption function developed by Ando and Modigliani (1963). A typical specification relates per capita consumer expenditures to per capita labor income, measured on an after-tax basis, per capita net wealth, and rate of return variables that capture the price of current versus future consumption. Consumption is usually measured as expenditures on nondurables and services, since consumption of durable good services does not equal the flow of expenditures on such durables. It is difficult to interpret the coefficients in equations like this as structural parameters, but one can hope that the reduced form coefficients are relatively stable over time. While earlier studies such as Bhatia (1972) and Peek (1983) included capital gains directly in the consumption function, more recent work has focused on wealth-based models.

Existing empirical estimates of how wealth is correlated with consumption span a substantial range. Laurence Meyer and Associates (1994) provide a representative set of estimates. Four different components of consumption—nondurables, services, nonauto durables, and durables—are modeled as a function of labor income, transfer income, other net transfers, the market value of corporate stock, and other net worth. Various income flows are included with distributed lags, but only contemporary values of the stock market and the nonequity components of net worth are included. The resulting estimates suggest that a \$1 increase in equity values raise consumption in the next quarter by 2 cents, while an analogous increase in nonstock market wealth raises next-quarter consumption by 1.4 cents. The long-run impact of a \$1 increase in stock market wealth is a consumption increase of 4.2 cents, while an increase in nonequity wealth raises consumer spending by 6.1 cents. Brayton and Tinsley (1996) also suggest that the marginal propensity to consume out of changes in equity values (.030) is smaller than that out of changes in other components of net worth (.075).

The estimate of the parameter that is interpreted as the marginal propensity to consume out of wealth varies substantially across models. It depends on the particular measure of wealth that is included in the set of explanatory variables, on the measure of household consumption, on the data sample, and on the particular specification being estimated. Ludvigson and Steindel (1999) find that the effect of

total wealth on consumption is .040 for their full sample, 1953–1997, but it is quite different for different subperiods. In particular, they estimate a much larger effect (.106) for the 1976 to 1985 sample, and a smaller effect (.021) for the post-1986 period. Given the short periods of these subsamples, however, it is hard to know if these differences reflect fundamental changes in consumer behavior.

Since most aggregate consumption function studies stop short of modeling the source of shocks to aggregate net worth, it should not be too surprising that the resulting parameter estimates vary across specification and sample. Some shocks to wealth may originate with shifts in consumer preferences, while others may derive from changes in the economy's production technology. There is no reason to expect such shifts to have the same effect on consumer spending. To identify convincingly the spending effect of an exogenous shock to household net worth, one needs to disentangle changes in net worth that are, and are not, attributable to shocks to consumer preferences. While it might be possible to model profits and discount rates as functions of their own past values, and then to decompose stock price movements into shocks from various sources, such calculations would be quite controversial. The problem of isolating the source of value fluctuations is even greater for other components of net worth where there is less information on expected future cash flows.

There are three reasons to suspect that the marginal propensity to consume out of wealth may vary over time. First, there have been changes in the mix of wealth shocks. Since recent shocks have been associated primarily with equities, which are held by fewer households than many other assets, the marginal propensity to consume out of wealth may seem smaller in the 1990s than in previous periods.

A second factor that may also have reduced the marginal propensity to consume out of stock market wealth is the growing importance of equity investments that are held in tax-favored retirement accounts such as Individual Retirement Accounts (IRAs) and 401(k) plans. At the beginning of the 1980s, a negligible fraction of outstanding corporate stock was held through plans of this type. By 1998, the total value of assets in 401(k) plans and IRAs exceeded \$4 trillion, and Poterba and Wise (1998) report that roughly half of these assets were invested in corporate stock. Roughly one-fifth of all stockholders have invested only through self-directed retirement plans. Thaler (1990) argues that households develop "mental accounts" that make them more likely to consume assets held in some ways than in others. It seems particularly likely that the marginal propensity to consume out of wealth gains in retirement accounts is smaller than the propensity to consume from directly held assets, since the former are often thought of as "long term assets."

Finally, an institutional change that could contribute to a lower marginal propensity to consume out of wealth is a falling cost of leaving bequests. Poterba (2000) notes that in the mid-1990s, the top marginal estate tax rate was 60 percent. However, estate tax reform has been a very active topic of congressional debate in recent years, with numerous proposals calling for the elimination of the "death

tax.” Married couples who die after 2005, and who have received competent tax advice, will be able to leave \$2 million to their heirs without any estate tax payments. This contrasts with a limit of \$1.2 million in the years between 1986 and 1997, and lower levels of feasible transfers in the years before 1986. If prospective reductions in the estate tax raise the attractiveness of bequests, then high net worth households may reduce their current marginal propensity to consume out of wealth.

Quantifying Wealth Effects: What Impact on Aggregate Consumption?

The foregoing discussion suggests that the marginal propensity to consume out of shocks to household net worth in the 1990s equity market may be smaller than consumption functions estimated over long time periods and over many types of wealth suggest. But just how large a consumption effect could be associated with recent wealth movements? Can rising household net worth during the 1990s explain a substantial part of the growth in aggregate economic activity through a “wealth effect” channel, and can it explain the decline of the measured personal saving rate over this period?

A number of studies, including Zandi (1999), Gale and Sabelhaus (1999), and Parker (1999), have recently addressed this question or a closely related one. While there is no consensus on the size of the wealth effect, some illustrative calculations can demonstrate the importance of narrowing the range of uncertainty regarding the marginal propensity to consume out of wealth.

Table 4 presents illustrative calculations of how wealth changes, like those in the 1990s, could affect consumer spending. The table considers three possible values of the marginal propensity to consume out of wealth: 0.01, 0.03, and 0.05. The empirical work discussed above suggests that values around 0.03 probably represent something close to the consensus on how stock market gains affect consumer spending, but there would be some support for lower values (0.01) as well. Values as high as 0.05 probably represent the upper range of current estimates.

Table 4 considers the stock market wealth accumulation that took place over three intervals: 1989–1999, 1995–1999, and 1997–1999. In each case, the calculation focuses on how the stock market wealth change over this period might affect the real value of consumer spending. Even if consumers spent only 1 cent of each dollar of stock market wealth that was accumulated between 1989 and 1999, consumer spending in early 2000 would be nearly \$96 billion (or about 1.5 percent) higher than it would have been in the absence of the prior stock market changes. Over the period 1979–1998, aggregate real consumer spending rose at an average annual rate of 3.0 percent, so the wealth effect would be equivalent to six months of typical consumption growth.

Assuming this same 1 percent marginal propensity to consume, the post-1995

Table 4

The “Stock Market Wealth Effect” on Consumer Spending in 2000 (\$ billion)

<i>If the Marginal Propensity to Consume Out of Stock Market Wealth Is:</i>	<i>Then 2000 Consumer Spending Would be This Much Higher as a Result of the Stock Market Change From:</i>		
	<i>December 1989– December 1999</i>	<i>December 1995– December 1999</i>	<i>December 1997– December 1999</i>
.01	96.5 (1.5%)	66.0 (1.0%)	37.4 (0.6%)
.03	289.5 (4.5%)	196.0 (3.0%)	112.3 (1.7%)
.05	482.4 (7.4%)	330.1 (5.1%)	187.1 (2.9%)

Source: Author’s calculations using data from the Federal Reserve Board (2000). Entries are measured in billions of December 1999 dollars. Aggregate consumer spending in early 2000 was approximately \$6,500. Values in parentheses are percentages.

wealth accumulation could account for a \$66 billion, or 1 percent, increase in consumer spending in 2000. Perhaps more significantly, this estimate of the wealth-induced increase in consumer spending equals roughly 1 percent of disposable income. With personal saving only a few percent of disposable income even before the wealth increase of the 1990s, this wealth effect could significantly depress personal saving. If \$1 of additional wealth generates 3 cents of additional spending, the 1995 to 1999 increase in household net worth could account for a consumption increase equal to roughly 2.8 percent of disposable income in early 2000. This would represent a 3.0 percent increase in consumer spending, or an increment to aggregate demand of roughly 2 percent of GDP.

These calculations illustrate that even with relatively low estimates of the marginal propensity to consume out of wealth, the consumption effects of the 1990s stock market boom are substantial. However, it also seems likely that the marginal propensity to consume out of this wealth has been lower than many statistical analyses of aggregate consumption spending suggest.

The Stock Market and Consumption Among the Wealthy

The concentrated ownership of corporate stock suggests that in searching for the consumption effect of the 1990s bull market, it makes sense to analyze the types of consumption that are associated with those in the top percentiles of the net worth distribution. However, there is virtually no survey data on the consumption patterns of high net worth households. Sabelhaus (1998) reports that data from the Consumer Expenditure Survey, the usual source of information on household consumption, shows that households in the top 5 percent of the income distribution, those with incomes of more than \$100,000, account for roughly 12 percent of aggregate consumer spending. (Income and net worth are imperfectly correlated, but the problems with high net worth households are likely to be similar to those

for high income households.) Because high income households are underrepresented in the Consumer Expenditure Survey, however, this estimate is likely to understate the concentration of consumption. In the absence of direct evidence on consumption outlays by high net worth households, we must rely on anecdotal or indirect evidence. There is a substantial body of such evidence that points to rising consumption by such groups, but it is difficult to develop an overall quantitative profile of this spending increase.

The concentration of stock ownership is cited by some analysts, for example Swonk (1999), as a reason for assuming a modest link between stock market gains and aggregate consumption, relative to the link between other wealth and consumer spending. A rough calculation suggests the importance of focusing on consumption by the small group of households with substantial stock ownership. Assume that the top 5 percent of stockholders own 80 percent of corporate stock, and that such households account for roughly one-fifth of consumption (roughly double the share of the top 5 percent of the income distribution in the Consumer Expenditure Survey data). Assume that aggregate consumption rose 1.9 percent as a result of the 1990s bull market; this is a modest effect using a 0.01 marginal propensity to consume out of stock market gains. Eighty percent of this increase, or an increase of 1.5 percent of aggregate consumption, would need to be associated with the top 5 percent of households. This would translate to a 7.5 percent increase in the consumption of this group. Given the high concentration of stock market wealth even within the top 5 percent, the required change in the consumption of large stockholders would need to be very large indeed.

There is definitely anecdotal support for the notion that certain consumption flows typically associated with high net worth households have increased in the late 1990s. In the National Income and Product Accounts, “jewelry and watches” is one category that may be associated with luxury consumption. “Personal boats and planes” is another. In the second quarter of 1999, the consumption share of expenditures on personal boats and planes was 76 percent greater than its value four years earlier. For jewelry and watches, the consumption share was 21 percent greater than four years earlier. Zandi (1999) notes that jewelry and watch expenditures now account for 1 percent of personal consumption expenditures, an all-time high. Linking luxury outlays to stock market movements is more difficult than these anecdotes suggest, however. Poterba and Samwick (1995) note that econometric estimates of the link between luxury spending in the NIPA and stock market fluctuations often produce weak effects.

Data on automobile sales also suggest brisk demand in the highest price range. The number of Porsches sold in the United States tripled between 1995 and 1998. The number of new Mercedes sold increased nearly as rapidly, according to data compiled by Ward’s Automotive. Sales of luxury vehicles, a broader category that includes vehicles with sales prices over (roughly) \$24,000 in 1999, have also risen much faster than other auto sales in the late 1990s. In some markets, such as Silicon Valley, Zesinger (1999) reports that dealers in even more expensive vehicles, such as Ferraris, have trouble maintaining any inventory. Whether these visible pur-

chases are representative of consumption patterns among high net worth consumers remains unclear. In 1998, only slightly more than 17,000 new Porsches were sold, while there are one million households in the top 1 percent of the net worth distribution.

Sales of many luxury products appear to have been stimulated by the recent stock market boom and yet for many nondurable luxuries, this does not seem to have driven up prices. An increase in demand for luxuries should only translate into higher prices if the goods are inelastically supplied. While there is no official index of the cost of goods purchased by those in the top tier of the wealth distribution, *Forbes* magazine compiles a "Cost of Living Extremely Well Index" (CLEWI) that may provide some insight. The index includes 42 idiosyncratic items, ranging from a round-trip New York to London ticket on the Concorde, to Lenox silverware, to a Bill Blass dress and a year's tuition at Groton. The *Forbes* index is computed by calculating the arithmetic average of the price increases for these items. The cumulative increase in the CLEWI over the four years from September 1995 to September 1999 was 16.5 percent, compared with 9.7 percent for the Consumer Price Index. Thus the recent relative growth in the prices of this basket of luxury goods was modest, even though over the post-1975 period that *Forbes* has computed the CLEWI index, the price of luxury goods has increased significantly faster than the price of other goods.

Price patterns for some luxury goods that are in inelastic supply suggest that one way in which consumption outlays by those who own stock can increase, and can increase quickly, is through appreciation of the price of luxury durables. This is one of the inflationary forces associated with rising stock prices that has concerned monetary policy authorities. The art market is booming, prices of vintage Bordeaux have risen sharply, the markets for vacation real estate in a number of exclusive locations have experienced rapid price appreciation, and other collectibles appear to have appreciated in recent years. In some housing markets, more expensive homes have appreciated much more rapidly than more modest homes. Bidding up the prices of real estate and related assets is hardly a novel effect of rapid wealth generation. Crook (1999) describes the buying patterns of the *nouveaux riches* of the Industrial Revolution in Britain, and he notes that the vast majority of the new wealthy invested very substantially in landed estates and similar properties.

Evidence on the link between stock prices and real estate is unfortunately somewhat sketchy. McGeehan (1997) presents anecdotal evidence on rising real estate prices in New York and in the resort communities that are frequented by those who have participated actively in the financial market run-up of the 1990s. Kahn (1999) summarizes some of the current patterns in and around Silicon Valley. The median house price recorded on transactions in Santa Clara County, California—the center of Silicon Valley—rose 48.5 percent in the three-year period from 1995–1998. Green (1999) finds that this run-up in housing prices is closely correlated with movements in the stock prices of technology-based companies, while price movements in Los Angeles are much less correlated with stock prices.

Of course, the correlation of stock prices and home prices in Silicon Valley may not reflect a wealth effect, but rather, it could indicate that house prices and stock prices are reacting to the same news about fundamentals for the technology-based firms in the Silicon Valley region.

These data suggest two consequences of the concentrated nature of corporate stock ownership and the associated concentration of wealth gains in the late 1990s. First, there has been an expansion in total outlays on some luxury items, although the increase in such outlays is probably small by comparison to the increase in household stock market wealth. Second, there has been a sharp increase in the demand for some durable luxury goods that are in fixed supply, resulting in significant price appreciation for such goods. Because higher asset prices translate into higher user costs for these durables, and because the appropriate measure of consumption outlays for durables is their rental equivalent cost, durable good inflation translates into higher consumption for the households who own these goods. This is a wealth effect on consumption, although the limited size of the market for luxury durables makes it possible that these effects are not observed in the Commerce Department's estimates of durables consumption. It is nonetheless important to recognize that when a household sells stock to buy a new home, the increase in consumption is *not* equal to the amount of housing expenditure, but is rather equal to the rental equivalent expenditures on this home. Equity assets are replaced by housing assets in the household's portfolio.

Stock Market Wealth and Consumption: 1929 and 1987 Experiences

The importance of refining our estimate of how changes in stock market wealth affect consumer spending suggests the value of looking beyond regression evidence to consider the lessons of particular episodes associated with sharp stock price movements. The 1929 and 1987 stock market declines, while reflecting wealth declines rather than increases, are natural episodes to consider. In neither case does the evidence suggest a large impact of stock market fluctuations on consumer spending.

Temin (1976) investigates the consumption impact of the 1929 stock market crash. He estimates the link between aggregate consumption spending and household income and wealth during the interwar years. While the data that underlie the estimates are less accurate than the comparable data for the postwar period, the estimates are remarkably similar; they suggest roughly a 2 percent marginal propensity to consume out of wealth. Temin concludes that the decline in consumer spending in the 1930–1932 period was substantially greater than the stock market decline could explain.

At least two factors may have contributed to the muted stock market effect. First, even in 1929, the total market value of corporate stocks represented only

about one-third of household net worth. Wolff and Marley (1989) present data that supports this claim. Stocks had been one-sixth of household wealth in 1922, so their value had clearly risen, but they still represented a limited share of net worth. Second, ownership of substantial amounts of corporate stock in 1929, as today, was limited to a small subset of high net worth households. This makes it difficult to attribute the consumption decline of the broad population in the early 1930s to stock market fluctuations.

The 1987 stock market decline, in which the real value of the stock market fell nearly 30 percent in a span of a month, provides another opportunity to assess the wealth effect on consumption. In this case, several studies have suggested relatively small consumption effects. Blinder (1987) noted at the time of the crash that its direct effect was likely to be small. His rough calculations nevertheless assumed, perhaps following Blinder and Deaton (1985), a marginal propensity to consume out of wealth of roughly 0.05. The small estimated effect on consumption was partly due to the limited magnitude of the 1987 wealth shock; by comparison, the stock market gains of the 1990s are far larger.

Pennar (1988) discusses the post-1987 crash evidence, and Poterba and Samwick (1995) present more detailed statistical analysis. One reason why the stock market's impact on consumer spending in 1987 and 1988 may have been muted is that the market had risen quickly, and then declined more quickly. Overall, the level of the stock market at the end of 1987 was very similar to its level at the beginning of the year. Given the costs of adjusting consumption to news about wealth, a short-term change in stock prices may not have as large an effect on consumption as a protracted price change.

The report of the Presidential Task Force on Market Mechanisms (1988), formed in the aftermath of the 1987 market crash, voiced skepticism of traditional analyses that suggested a substantial link between the stock market and consumer spending. After noting the concentration of stock market holdings among a small group of households, the report concluded that (p. VII-2): "[I]t is not clear . . . how to interpret the observed relationship between stock price movements and aggregate-level consumer spending. . . . A more likely explanation [than the usual direct wealth effect] is that stock price declines affect consumer spending . . . by shaking people's confidence in the security of their jobs and the stability of their incomes." This possibility is discussed in more detail below.

Household-Level Evidence of Wealth Effects

It is difficult to carry out household-level studies on how wealth affects consumer behavior because very few household surveys contain information on household net worth as well as consumption and labor supply. Fewer still include information on the change in net worth over time. The Panel Survey of Income Dynamics (PSID) is a notable exception, but it includes relatively few households with substantial stock market wealth. Parker (1999) analyzes the PSID data, and

concludes that the marginal propensity to spend out of household net worth is approximately 8 percent. This is much higher than most aggregate studies suggest, although it seems to be lower among households with higher net worth. Mankiw and Zeldes (1991) analyze similar data and find that the comovement between stock prices and food consumption is stronger for those who own stock than for those who do not. This is consistent with the notion that the most pronounced impact of stock market wealth changes should be found amongst the high net worth households that own corporate stock.

Juster, Lupton, Smith and Stafford (1999) present a careful analysis of saving and wealth using the three-wave panel of wealth surveys in the PSID. They find an overall marginal propensity to consume out of wealth of about 0.03, but they estimate a much larger effect for stock market wealth. This finding bears further analysis, particularly to control for other factors, such as changes in the value of human capital, that may be correlated with the ownership of corporate stock.

Other household studies suggest that Parker's (1999) result may overstate the stock market wealth effect. Starr-McCluer (1999) uses data from the Survey of Consumers carried out by the Survey Research Center at the University of Michigan to explore stock market wealth effects. She finds that a remarkable 85 percent of the respondents indicated that the "trend in stock prices over the past few years" had not affected their spending or saving patterns. Only 3.4 percent of respondents indicated that they were spending more and saving less as a result of the market run-up. A larger group, 11.6 percent, indicated that they were spending less and saving more, presumably as a result of the perception of higher expected returns available to investors.

While the Survey of Consumers is a random sample, and thus may include relatively few households that own substantial amounts of stock, similar results emerge from a survey by U.S. Trust (1999). That survey does oversample high-income and high net worth households. Forty-two percent of respondents indicated that they had left all of their "earnings"—presumably meaning their accrued capital gains—in the stock market. Another 45 percent indicated that they left most of their earnings in the market. Unfortunately, surveys such as these do not address the question of what households would have done in the absence of the stock market run-up. Perhaps the households would have saved more in the absence of the market's rise.

One problem with household-level studies of wealth effects is that wealth changes are due to household saving decisions or investment decisions in prior periods. Households that buy one type of asset (say stocks) may differ from households that do not buy stocks in more ways than just their portfolio holdings. They may, for example, be more informed about financial markets, so that when a run-up in stock prices increases the demand for financial services professionals, the value of their human capital may vary along with the stock market. This leads to a fundamental endogeneity problem in studying wealth changes and consumption changes.

One clever recent attempt to solve this endogeneity problem involves studying

the effect of winning a lottery on household behavior. (Of course, lottery participants may not be representative of the population at large.) This line of research builds on earlier work, for example by Bodkin (1959) and Landsberger (1963), on the impact of war reparations on household consumption. The lottery evidence analyzed by Imbens, Rubin and Sacerdote (1999) suggests that relatively modest winnings, winnings that could provide an annual income on the order of \$15,000, have no discernable effect on household behavior. Larger winnings, of say five times this magnitude, generally induce greater consumption of leisure and higher spending, although there is some evidence that those who are not in the labor force when they win are more likely to work after their award. These results are broadly consistent with the findings from Kaplan's (1985) survey which found that 23 percent of those who won at least \$1 million in a lottery payout left the labor force, while virtually none of those who won small payouts changed their labor market status.

The lottery studies consider labor supply as well as consumption responses to wealth shocks. It can be important to consider how favorable wealth shocks can affect labor supply, since if households reduce their labor supply in response to a stock market rise, this will blunt the effect of rising share prices on consumer spending.

Retirement is one dimension of labor supply that might be affected by stock market wealth fluctuations, although the evidence for such effects is weak. For households within five or ten years of traditional retirement age, a rising stock market may facilitate earlier-than-expected retirement. Recent media accounts have called attention to "401(k) millionaires" who have become wealthy through the appreciation of assets that are held in their retirement accounts.

The empirical evidence on the link between wealth and retirement behavior is remarkably weak. Diamond and Hausman (1984) explored the effect of income, Social Security, and household net worth on retirement behavior, using data on men who reached retirement age in the 1970s. They did not find a strong effect of wealth on retirement decisions. Samwick (1998) found a statistically insignificant but positive effect of financial assets on the probability of retirement, and a negative effect of net housing equity on this probability, using data from the 1983 and 1986 Surveys of Consumer Finances. Thus the existing evidence suggests only a weak effect if any of stock market appreciation on retirement.

Lottery winnings provide one potentially exogenous source of variation in household net worth. Receipt of bequests provides another. The results from studies of bequest recipients are mixed. Holtz-Eakin, Joulfaian and Rosen (1993) find that single persons who received an inheritance of at least \$150,000 in 1982 had an 18 percent greater chance of leaving the labor force between 1982 and 1985 than did comparable individuals who did not receive bequests. Similar results emerge for married couples. The study concludes that receiving a substantial inheritance raises the chance of retirement by a factor of between two and three. In contrast, Joulfaian and Wilhelm (1994), using data from the Panel Survey of

Income Dynamics, find only small effects of inheritance on labor supply. They also find a very small effect, if any, of bequest receipt on food consumption.

The explanation for the disparity between the two sets of results is probably that the average inheritance in the PSID data is smaller than the average inheritance in the data set based on estate tax returns. If only large inheritances are likely to change labor supply, then in a random cross section one might find virtually no effect of inheritances, even though the small subset of large inheritors are affected by these windfalls. This is a point that must be remembered more generally in considering wealth effects. There are likely to be important differences in the behavioral responses of high net worth households and those of more modest means, and it may be difficult to extrapolate evidence from the latter to assess how a highly concentrated increase in stock market wealth affects household behavior.

Anecdotal evidence on the behavior of entrepreneurs in Silicon Valley suggests that many of those who have profited the most from the stock price run-up have not left the labor market, but continue to work at least as hard as before the stock market rise. For such entrepreneurs, it may be too soon to observe the effect of substantial wealth build-up on household behavior, particularly for the many young households that have benefited from the run-up in stock market values at high technology companies. Levy (1999) writes, "[F]ew of the new multimillionaires and billionaires have cashed in their lucrative shares . . . all keep hours as long now as when their companies were mere blips on the technology scene."

The Stock Market and Government Saving

The discussion so far has considered the link between changes in stock market wealth and personal consumption outlays. While changes in consumption affect national saving through their impact on personal saving, a rising stock market can also affect national saving through its effect on government saving. In recent years the stock market has often been cited as a contributory factor in rapidly rising federal revenues.

Rising stock prices can boost federal tax receipts through a number of channels. The most immediate is through higher capital gains realizations, which increase federal income tax revenues. The rising stock market and a reduction in capital gains tax rates in the Taxpayer Relief Act of 1997, which is likely to have increased realization rates, have worked together to raise federal tax receipts from capital gains. Federal income taxes on capital gains rose by \$50 billion, from roughly \$30 billion to approximately \$80 billion, between 1992 and 1997. The resulting increase in government saving has probably offset, to some degree, the decline in personal saving triggered by the rising stock market.

It is more difficult to quantify the other channels through which rising share values affect tax receipts. The tax collected on withdrawals from tax-deferred retirement saving plans is greater when the value of the assets in these plans is greater. Federal estate tax receipts are also likely to increase when share prices rise,

since that increases the value of taxable estates. Rising share prices also contribute to higher corporate profits, since firms may not need to make contributions to their defined benefit pension plans when the assets in these plans appreciate in value. The value of corporate stock option grants to employees also rises with the stock market, although since such grants represent taxable income to employees and a tax deduction for firms, the net impact on government revenues is probably modest. Taken together, these effects are likely to contribute to a further substantial increase in federal tax receipts.

While there is little doubt that the rising stock market has helped to reduce the federal budget deficit, the stock market is not the sole or even the most important force working in this direction. Kasten, Weiner and Woodward (1999) discuss the source of rising revenue in some detail. During the mid- and late-1990s, a shift in the composition of taxable income toward higher income households was at least as important as the rise in capital gains. Sharp overall growth in labor income has also been an important factor in revenue growth.

Closing Thoughts: Consumer Confidence and Asymmetric Response to Rising and Falling Wealth

The foregoing analysis has focused almost exclusively on the direct effects of rising stock market wealth on consumer spending. The highly skewed distribution of stock ownership necessarily implies that such direct wealth effects are likely to be small for most households. However, it is possible that changes in stock prices affect spending even by households that do not own stock because they affect consumer confidence or the uncertainty that consumers perceive about future economic conditions. This “confidence channel” need not be constrained by the logic of budget constraints that may delimit more traditional wealth effects, which means it is even more difficult to quantify.

Romer (1990) develops such a consumer confidence argument in her study of how the stock market affected consumer spending between 1929 and 1932. Zandi (1999) makes a similar argument with respect to the current increase in consumer spending, suggesting that a rising stock market has buoyed consumer confidence, thereby raising spending even among households with little or no direct exposure to the equity market. At the end of 1999, consumer confidence reached its highest level since October 1968, and this high level of confidence has probably contributed to the growth of consumer spending. If changes in stock market values can trigger changes in consumer confidence even among those who do not own stock, then it is possible for a stock price appreciation like that of the last few years to have a broader impact than the foregoing analysis suggests. There is little empirical evidence at this stage to quantify such an effect.

Another intriguing issue associated with the rise in stock market wealth is the potential asymmetry in how wealth changes affect consumer spending. Zandi

(1999) raises the possibility that consumers react more rapidly when wealth contracts than when it expands. This would imply that it is not possible to define "the wealth effect," but rather that it is necessary to consider the evolution of wealth and other factors in determining how consumer spending reacts to asset values. This is part of the research agenda on how asset values affect the real economy that is implicit in Greenspan's (1999) comments. Once again, existing empirical evidence provides very limited guidance on asymmetric responses to wealth shocks. Unfortunately, the only way to learn more about these effects may be by experiencing a downturn in stock market values.

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