The effect of dividends on consumption*

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Abstract

Classical models predict that the division of stock returns into dividends and capital appreciation does not affect investor consumption patterns, while mental accounting and other economic frictions predict that investors are more likely to consume from stock returns in the form of dividends. Using two micro data sets, we find evidence that investors are indeed far more likely to consume from dividends than capital gains. In the Consumer Expenditure Survey, household consumption increases with dividend income, controlling for total wealth, total portfolio returns, and other sources of income. In a sample of household investment accounts data from a brokerage, net withdrawals from the accounts increase one-for-one with ordinary dividends of moderate size, controlling for total portfolio returns, and also increase with mutual fund and special dividends. We discuss several potential explanations for the results.

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I. Introduction

Microsoft's $32 billion cash dividend of December 2004 was the largest corporate payout ever. Classical models of finance and consumption-savings decisions predict that this dividend will have little effect on the consumption of Microsoft investors. Under the assumptions of Miller and Modigliani (1961), for example, investors can always reinvest unwanted dividends, or sell shares to create homemade dividends, and thereby insulate their preferred consumption stream from corporate dividend policies. Thus, in traditional models, the division of stock returns into dividends and capital gains is a financial decision of the firm that has no "real" consequence for investor consumption patterns.

Yet there are a number of reasons to think that dividend policy, and dividends more generally, may indeed affect consumption. Most obviously, the ubiquitous popular advice to "consume income, not principal" suggests a potentially widespread mental accounting practice—discussed in detail in Thaler and Shefrin (1981), Shefrin and Statman (1984), and Shefrin and Thaler (1988)—in which investors do not view dividends and capital gains as fungible, as in the homemade dividends story and the permanent income hypothesis of consumption, but rather place them into different mental accounts from which they have different propensities to consume. More standard frictions, such as transactions costs (of making homemade dividends) and taxes, can also lead an investor to favor consuming dividends before capital appreciation.

Although the dividends-consumption link is a potentially fundamental link between corporate finance and the real economy, little empirical research has pursued the issue. This is because the most easily available data on consumption and dividends is aggregate time-series data, which have several limitations. Among other challenges, such data require one to identify the effect of a smooth aggregate dividend series using a small number of data points; such data

combine investors and non-investors; and such data face a major endogeneity problem: omitted third variables such as business conditions will jointly affect consumption, dividends, and capital appreciation, making it difficult to establish the causality behind any correlations.

In this paper, we study the effect of dividends on investor consumption using two micro data sets that provide powerful *cross-sectional* variation in dividend receipts and capital gains. The first is the Consumer Expenditure Survey (CEX), which is a repeated cross-section with expenditure measures and self-reported dividend income and capital gains (or losses). Our sample includes several hundred households per year between 1988 and 2001. The second data set was introduced by Barber and Odean (2000) and includes the trading records of tens of thousands of households with accounts at a large discount brokerage between 1991 and 1996. While these portfolio data do not contain an explicit expenditure measure, they complement the CEX by allowing us to accurately measure net withdrawals from the portfolio, a novel dependent variable in its own right and a necessary precursor to expenditure. The data set also allows us to track the withdrawal rate of different types of dividend income, including ordinary, special, and mutual fund dividends.

After a brief demonstration of the inability of aggregate time series to shed light on these questions, we start with the CEX data. Simple OLS regressions show that the coefficient on dividend income for total consumption expenditure, *controlling for total returns* (including dividends), is highly positive and significant. It is close to the coefficient on labor income and far higher than the coefficient on total returns. Thus, the form of returns appears to matter. This result is robust to a variety of control variables and estimation techniques, and contrasts with the predictions of classical models.

We then use the brokerage account data to confirm the mechanism behind this effect, i.e. we test whether dividend receipts are withdrawn from the household portfolio at a higher rate than capital gains. We strongly confirm this. On average, investors do not reinvest ordinary dividends: the propensity to withdraw modest levels of ordinary dividends is unity. A fraction of mutual fund and special dividends are also withdrawn, but very large dividends of any type are not fully withdrawn. Matching the pattern in the CEX data, the effect of capital appreciation on net withdrawals is uniformly smaller than the effect of dividends.

In sum, although the CEX and the portfolio data involve completely different households, they give very similar results. A variety of subsample splits and robustness tests suggest that the apparent effect of dividend policy on net withdrawals and consumption is at least partly causal, i.e. not arising simply because investors who plan to consume dividends in the future purchase dividend-paying stocks. For example, investors withdraw from special dividend income, which is unpredictable by definition. More generally, investors tend to withdraw from both predictable and unpredictable components of dividends.

It is worth noting that the low propensity to consume capital gains is not surprising. Under the permanent income hypothesis, individuals spread an increase in wealth over their lifetime. What is surprising is the high consumption of increases in wealth that are, somewhat arbitrarily, labeled "dividends." Our results strongly suggest that individuals consume dividends disproportionately in the period in which they are received.

Why are dividends apparently "relevant" for consumption? Perhaps the most obvious explanation is rooted in mental accounting: "consume income, not principal." But we first consider explanations based on frictions like transaction costs, taxes, and borrowing constraints. None of these explanations is satisfactory, upon closer inspection. Borrowing constraints have no

relevance here, because the substitution of dividends for capital gains has no overall wealth effects, and homemade dividends can be created by selling shares. The tax explanations are varied, but none seems consistent with key aspects of the data. The transaction costs explanation cannot account for, for example, the fact that high-turnover households favor withdrawals of dividends to the same extent as do low-turnover households.

While the results are undoubtedly driven by a combination of factors, mental accounting is among the most compelling. In addition to giving a natural explanation for why dividends are consumed at the same rate as labor income, mental accounting also explains some finer results. For example, ordinary dividends are more likely to be mentally accounted for as "current income" than are large special dividends. Hence, according to the Shefrin and Thaler (1988) mental accounting framework, one expects a higher propensity to consume ordinary than from large special dividends. This is consistent with the pattern we see in net withdrawals. Tax and transaction cost explanations, on the other hand, do not predict this pattern.

Our paper builds on an earlier literature that uses aggregate data. As we show, standard errors in such data are typically too large to draw any useful conclusions. Important early contributions include Feldstein (1973) and Feldstein and Fane (1973), which viewed the equality of the propensity to consume from dividends and corporate retained earnings, not capital appreciation, as the null hypothesis of interest. Subsequently, Peek (1983) and Summers and Carroll (1987) find that capital gains and losses have little effect on aggregate consumption. Poterba (2000) surveys studies on the stock market wealth effect.

To our knowledge, the only paper to use micro data in this context is a contemporaneous paper by Rantapuska (2005). He analyzes Finnish investor registry data and finds that there is little reinvestment within two weeks after receipts of dividends or tender offer proceeds. His

results are broadly consistent with and complementary to ours, but there are some important differences. In particular, the CEX data allow us to look at actual consumption, not just reinvestment. Moreover, reinvestment may occur over horizons much longer than two weeks, an issue that our brokerage account data allows us to investigate. Finally, automatic reinvestment plans are absent in Finland but common in the U.S., so the effect of dividends on consumption and reinvestment could be quite different in any case.

Our results also relate to the literature documenting that consumers have a relatively high propensity to consume moderately-sized cash windfalls. For instance, Souleles (1999) finds that federal income tax refunds generate clear consumption responses whether or not the household faced borrowing constraints, and Souleles (2002) shows that consumption responds to the pre-announced Reagan tax cuts. Related studies include Bodkin (1959), Kreinin (1961), Wilcox (1989), Parker (1999), Stephens (2003), and Johnson, Parker, and Souleles (2005). Intuitively, ordinary dividends are like moderate-size windfalls, but our analysis differs in that our focus is on the *relative* propensity to consume two forms of income, dividends and capital gains. More broadly, our results fit into a growing literature that Campbell (2006) terms "household finance."

The paper proceeds as follows. Section II briefly illustrates the trouble with aggregate time series estimates of the effect of dividends on consumption. Section III analyzes a sample from the Consumer Expenditure Survey. Section IV studies a sample of portfolio data. Section V reviews alternative explanations, and Section VI concludes.

II. Evidence (or lack thereof) from aggregate time series

To illustrate the need for cross-sectional data we start by illustrating the inability of aggregate time series to shed clear light on the link between dividends and consumption.

A. Data and definitions

We collect annual data from 1945-2004 on aggregate consumption, measures of income, and measures of wealth. Consumption and its components are from the Bureau of Economic Analysis (BEA) GDP table (Table 1.1.5). After-tax wage income is from the BEA Personal Income table (Table 2.1) and defined as wages (line 2) plus self-employment income (line 9) plus rental income (line 12) plus transfer income (line 16) minus income taxes (line 25) and other taxes (line 24). Other income and related flows include interest (line 14), total dividends (line 15), and total (dollar) returns including dividends on NYSE shares, which are from the CRSP Indices file. We focus on the dollar returns on the NYSE to allow for comparison in the pre- and post-Nasdaq period. Net worth is from the Federal Reserve *Flow of Funds* (Table B.100).

B. Summary statistics

Table 1 summarizes aggregate time-series measures of consumption, wealth, and income. Real per capita values are computed using population and inflation measures from the BEA. We present results for real per capita levels and real per capita changes.[1] Note that dividends are a small fraction of consumption, on average, and have a much smaller standard deviation in levels. This immediately suggests that, even leaving aside endogeneity issues, it will be difficult to document a strong relationship between aggregate dividends and consumption.

C. Aggregate time series estimates

Table 2 examines the relationships between stock returns, dividends, and consumption. Similar to Poterba (1990) and Case, Quigley, and Shiller (2005), we run regressions of the form:

$$C_t = a + b(Y_t - D_t - I_t) + cR_t + dD_t + eI_t + fN_t + gt + u_t, \quad (1)$$

[1] A third specification option, log real per capita changes, leads to similar (i.e., similarly inconclusive) results and is omitted to save space.

where C is alternately total consumption or nondurables and services consumption, Y is after-tax wage income plus dividend and interest income, R is total stock returns including dividends, D is dividends, I is interest, N is net worth, and t is a time trend, which is included to reduce the potential for spurious regression but whose coefficient we do not report. We run regressions in real per capita levels and real per capita changes. Inferences are based on Newey-West (1987) robust standard errors with four lags.

As a preliminary, note that models like Eq. (1) can tell us more about the relative *timing* of different types of wealth effects than the *existence* of these effects. This is a familiar point in the consumption literature: Any change in wealth must eventually change consumption (or bequests, or taxes). What interests us here is whether there is a link between consumption and certain wealth sources within horizons of a year or less. Following convention, we refer to such relationships as identifying the "propensities to consume" from these wealth sources, and we note caveats to this interpretation as they appear.

Turning to specific hypotheses, the simple life-cycle/permanent income theory holds that the propensity to consume from total permanent wealth is roughly the real interest rate and independent of the form of wealth. In particular, the null hypothesis of interest here is that the division of returns into dividends and capital gains should be irrelevant. Eq. (1) allows for a crude test of this null. If the effect of dividends is zero, controlling for total returns (which already include dividends), then investors have the same propensity to consume from dividends as capital gains. If the coefficient on dividends is positive, then we reject the null in favor of a *higher* propensity to consume from dividends.[2] Although differences in data require us to use

[2] An alternative and perfectly equivalent formulation of the same test would replace R with capital gains alone. Then, we would be interested in whether the coefficient on dividends *equals* that of capital gains.

slightly different specifications for each data source we analyze, a common theme will be that we control for total returns and test whether dividends have a unique effect.

Table 2 shows that it is difficult to obtain reliable estimates with aggregate time series data, as expected given prior work and the low power of these regressions. The estimates are unstable across sample periods and signs change with specification. In particular, the coefficients on dollar returns and changes in dollar returns are close to zero, but are not reliably estimated, while the coefficients on dividends and changes in dividends are positive, but again are not well estimated enough to be significant. The confidence intervals on dividends include 0.00, 1.00, and the coefficient on labor income, and so we cannot reject any interesting hypothesis. The high R^2 in levels comes from the common growth in the macroeconomic variables.

There is a vast literature on aggregate consumption functions and no agreement on the proper models. We have therefore considered numerous variants of Eq. (1) that include alternative scaling variables, lags, etc., but we obtain similarly unstable and inconclusive results. We conclude that aggregate data yield give us few robust answers about the propensities to consume from dividends and capital appreciation. Of course, even if significant effects had appeared in these data, we would still need to address omitted-third-variable endogeneity concerns and (in the levels regressions) spurious regression concerns.

III. Evidence from household consumption surveys

We now turn to two micro data sets which yield clearer results. Micro data offer the obvious advantage of cross-sectional variation in dividend receipts and capital appreciation. This is far more powerful and also avoids some endogeneity problems with the time series approach.

A. Data and definitions

Our first micro data source is from the Consumer Expenditure Survey (CEX) of the Bureau of Labor Statistics. The CEX has been carried out since 1980, and it is a short panel based on a stratified random sample of the U.S. population. Selected households are interviewed each quarter for five quarters, then leave the sample and are replaced by new households. Information on financial asset holdings and changes in these holdings over the preceding twelve months is collected in the fifth interview, while data on dividends, received interest, and other income variables, as well as demographic information, is collected in the second and fifth interviews and cover the twelve months prior to the interview date. We extract most of the variables from the CEX family files, while the data on housing and credit are from the detailed expenditure files.

We follow Parker (2001) and define non-durables consumption, C, as the sum of food, alcohol, apparel, transportation, entertainment, personal care, and reading expenditure, and we sum up consumption over the four quarters from the second to fifth interview. We also consider CEX total expenditure as a consumption measure. The dividends variable, D, is based on the question asking for "the amount of regular income from dividends, royalties, estates, or trusts" over the past twelve months. We also collect the information on interest, I, received by the household. We use reported income after taxes, Y, as a proxy for total income.

We define total wealth, W, as the sum of home equity (sum of property values minus sum of outstanding mortgage balances) and financial wealth. Financial wealth is defined as the sum of balances in checking accounts, savings accounts, savings bonds, money owed to the household, and stocks (holdings of stocks and mutual funds, but also corporate bonds and

government bonds that are not savings bonds), minus other debt.[3] Before 1988, there is no information on the level of mortgage balances, only on newly taken up mortgages and repayments. For this reason we use the 1988 to 2001 data only. Also, while we have changes in financial assets over twelve months, for certain of the other wealth components (home equity and "other debt"), we can only compute the change over the nine-month period between the second to the fifth interview.

CEX participants are asked about the amount of securities purchased and sold over the preceding 12 months in their fifth interview. This information allows us to decompose the change in the value of stock holdings into an active investment/disinvestment component and a capital gains component. In order to compute capital gains, G, we need to make an assumption regarding the timing of investment. The reported investment could either have occurred early or late in the measurement period. We assume that half was made at the beginning of the period, and half at the end.

We employ filters to screen out unusual observations. We require that there is only one consumer unit (family) in the household, and that the marital status of the respondent and the size of the family remain the same from the second to fifth interview. We require W_{t-1} to be greater than zero and that the household have a nonzero fraction of financial wealth invested in shares or mutual funds (as mentioned before, one of the shortcomings of the aggregate data is that it combines shareholders and non-shareholders). We delete observations where any wealth

[3] The surveys do not ask respondents to include retirement assets, but they also do not ask explicitly to exclude them. Hence, it is unclear whether some respondents include them or not. The bond component of the "stocks" position cannot be isolated in the CEX data, but it is likely to be very small for most households (see Brunnermeier and Nagel (2005) for more details).

component or income is topcoded.[4] Finally, we use the Consumer Price Index (CPI) to deflate all variables to December 2001 dollars.

B. Summary statistics

Table 3 presents summary statistics for the CEX data. After our filters, we are left with 3,272 household-year observations. In this sample, the mean non-durables consumption, reported in Panel A, is $15,157, and the median is slightly lower. Total expenditure, including durables, is about three to four times higher. Panels B and C show wealth and income measures. Financial wealth is typically around a third of total wealth. Total income, which includes dividends, but not capital gains, has a mean of $56,789 and again a slightly lower median. Comparing Panels A and C, it is apparent that total income is slightly higher than total expenditure. For the mean household, interest income is $1,207 and dividend income is $891. Panel D shows that on average, interest and dividends account for 4% and 2% of total income, respectively. The distribution is skewed, with the median household reporting zero dividend income.

C. Regression model

The baseline model that we take as the point of departure for our analysis of the CEX data, and later the household brokerage account data, is that consumption for household i in year t can be described as

$$C_{it} = a_{1i} + a_{2t} + b(Y_{it} - D_{it}) + cR_{it} + dD_{it} + fW_{it-1} + u_{it}, \quad (2)$$

where the residual u_{it} is uncorrelated with the explanatory variables. Under the null hypothesis of the irrelevance of the form of returns, consumption should not be correlated with the amount of dividends received, i.e. $d = 0$, once lagged total wealth, $W_{it\text{-}1}$, the total dollar return on stocks and mutual funds, $R_{it} = D_{it} + G_{it}$, current income excluding dividends, $Y_{it} - D_{it}$, household fixed

[4] To preserve the anonymity of respondents, the CEX administrators reset observations above certain thresholds on wealth, income, and some other variables to a cutoff threshold value.

effects captured by a_{1i}, and time effects a_{2t} are controlled for. In contrast, under our alternative hypothesis, households' propensity to consume from dividends is greater than the propensity to consume from capital gains, i.e. $d > 0$. That is, under the alternative, it matters whether returns come in the form of capital gains or dividends.

D. Effects of dividends on household consumption

Table 4 reports OLS regressions using the CEX data. Specifications in the left columns use non-durables consumption as the dependent variable, and those in the right columns use total expenditure. The first specification includes total income (excluding dividends) and total returns, plus control variables and various fixed effects. The estimates indicate that the propensity to consume from current-year returns is close to zero, both in economic and statistical terms. But the coefficient on dividends, shown in our second specification, suggests a much higher propensity to consume from dividends (0.10) than from total returns. It is statistically significant and of comparable magnitude to the propensity to consume from total income. The fourth specification looks at the sum of dividends and interest income, $D_t + I_t$. It seems plausible that mental accounting consumers, for example, would treat interest income and dividend income similarly, and the results provide some support for this view.

When total expenditure is the dependent variable, the estimated propensities to consume from D_t and $D_t + I_t$ are four to five times as high as in the regressions with non-durables consumption. In both cases, the contemporaneous coefficients are now robustly higher than the lag coefficients, consistent with a causal effect from dividends to consumption.

The OLS approach could be criticized on the grounds that the residuals are likely to be heteroskedastic, due to scale differences in wealth, consumption, and income across households, making OLS inefficient. To address this, we have run weighted-least squares (WLS) regressions,

weighting each observation by the inverse of lagged total wealth subject to a minimum of $10,000. These regressions produce results that are quantitatively the same as those in Table 4. Note that WLS is numerically the same as scaling dependent and explanatory variables, including an intercept scaled by wealth. By scaling the intercept, too, WLS avoids the potential spurious correlation that arises with scaled variables and an unscaled intercept.

E. Reverse causality

Our cross-sectional study addresses a major endogeneity problem with time-series studies, namely that a third business-cycle variable is driving both aggregate consumption and dividends. In our baseline model, such unobserved additional variables are represented by k_t and can easily be captured with time fixed effects.

Nonetheless, our approach is potentially affected by a different endogeneity problem, whereby households that expect to consume decide, ex ante, to hold securities that pay the preferred consumption stream in the form of dividends.[5] In our baseline model, this effect is represented by the household fixed effect a_{1i}. While this "ex ante effect" could also indicate that the irrelevance hypothesis fails, in the sense that consumers anticipate their unwillingness to consume from principal and adjust their investment plans accordingly, it could also be driven by some unobserved third variable that drives both consumption and dividends. Moreover, if the correlation between dividends and consumption were driven entirely by this ex ante effect, there would not be any causal effect from an unexpected change in dividends on consumption. Thus, we make an effort to disentangle the causal effect from the reverse causal effect.

Neither of our micro datasets perfectly solves this problem. In the CEX data, we try to capture as much of a_{1i} as possible by including household characteristics as control variables

[5] See Graham and Kumar (2005) and references therein for clear evidence of dividend clienteles. Graham and Kumar show that the allocation to and trades of dividend-paying stocks depends on investor characteristics.

(age fixed effects, family size fixed effects, lagged financial wealth, percentage of financial wealth invested in stocks and mutual funds). However, this still leaves open the possibility of some residual heterogeneity that explains both dividends and consumption.

Our second approach here (and with the portfolio data analyzed later) is to run specifications that include lagged dividends. If all of the correlation between consumption and dividends were driven entirely by the ex ante effect a_{1i}, then both D_{it} and $D_{it\text{-}1}$ should have about the same correlation with C_{it} and hence about the same coefficient in our regressions. To the extent that the coefficient on D_{it} turns out to be higher than the coefficient on $D_{it\text{-}1}$, the ex ante effect is unlikely to be the whole story. Of course, with these data, we cannot rule out that consumers are financing consumption needs that change significantly at an annual horizon with portfolio allocations chosen with *expected* dividends in mind. We view this as less plausible than a causal effect from *unexpected* dividends to consumption.

The first question is whether there is a significant predictable component to dividends. In the CEX data, which we examine in levels, dividends are somewhat predictable, with 17% of the variation in dividends explained by lagged values. The second question is whether this predictable component explains consumption, or whether the unpredictable component also plays a role. To do examine this, our third and eighth specifications in Table 4 includes lagged dividends as an additional control for the potential ex ante effect of expected consumption on holdings of dividend-paying assets. This implies that the contemporaneous coefficient is identified from variation orthogonal to lagged dividends. Consistent with an ex ante effect, as well as the delayed consumption of dividends, the coefficient estimate on $D_{t\text{-}1}$ is greater than zero. In any case, the inclusion of $D_{t\text{-}1}$ hardly changes the magnitude of the coefficient on D_t, and the coefficient on D_t is higher than the coefficient on $D_{t\text{-}1}$. For specifications 4 and 9, which use

$D_t + I_t$ and its lag as explanatory variable, the contemporaneous effect is stronger, but only for total expenditure. Overall, the evidence is consistent with a causal effect of dividends.

In summary, the best available micro data on consumption suggests that dividends, controlling for total returns, do in fact have a significant effect on consumption.

IV. Evidence from household portfolios

A concern with the CEX data is that dividends and, in particular, capital gains are likely to be measured with substantial error, as they are both self-reported. It is not clear to what extent measurement error influences our results. Furthermore, it would be even more convincing if we could verify the intermediate, mechanical step between dividend receipts and consumption expenditure—that dividend receipts are in fact withdrawn from a brokerage account, and done so at a higher rate than capital gains. Our second micro data set, based on household portfolios, achieves both of these objectives and thus nicely complements the CEX data. It also allows us to study net withdrawals from investment portfolios, an interesting and novel dependent variable in its own right.[6] Finally, its larger sample size and detail allows for various robustness tests and sample splits that are difficult in the CEX data.

A. Data and definitions

Our household portfolio data set was introduced by Barber and Odean (2000). It contains monthly position statements and trading activity for a sample of 78,000 households that had accounts at a large discount brokerage firm. To enter the sample, households were required to have an open account during 1991. For sampled households, position statements and accounts data were gathered for January 1991 through December 1996. The data set includes all accounts,

[6] Similar in spirit, Choi et al. (2004) use shifts in savings into 401-K plans to identify changes in consumption.

including margin and retirement accounts, opened by each sampled household at this brokerage. For our sample, we exclude margin accounts, IRAs, Keogh accounts, and accounts that are not joint tenancy or individual accounts. Securities whose positions and trades are recorded include common stocks, mutual and closed-end funds, ADRs, and warrants and options held in these accounts. We focus here on common stock and mutual funds, which represent all, or nearly all, of most households' portfolios. See Barber and Odean (2000) for additional details.

We use household-month level observations on net withdrawals, portfolio value, capital gains, and total dividends. Net withdrawals C (we use C in analogy with our earlier definitions, although, to be precise, we are only measuring net withdrawals here) are inferred as the starting value of assets in the portfolio A, plus capital gains G, plus dividends D, minus the ending value of the portfolio. That is, for household i,

$$C_{it} = A_{it-1} + G_{it} + D_{it} - A_{it}, \tag{3}$$

where the components that can be directly estimated include total portfolio value, the product of price P and quantity Q held in investment j and summed across investments,

$$A_{it} = \sum_{j} Q_{jt} P_{jt}, \tag{4}$$

capital gains,

$$G_{it} = \sum_{j} Q_{jt-1} \left(P_{jt} - P_{jt-1} \right), \tag{5}$$

where prices are adjusted for stock splits, and total dividend income,

$$D_{it} = \sum_{j} Q_{jt-1} D_{jt}. \tag{6}$$

For simplicity, we suppress the household i subscript on the quantity of each security Q.

To estimate these quantities from the brokerage data, we start by pooling accounts by household to obtain positions and trades by household-month. The brokerage data do not directly

identify dividend income; we use the CRSP stock file to infer dividends on common stock holdings and the CRSP mutual fund file to obtain dividends for mutual funds. Dividends are estimated as the security's dividend yield from CRSP in month t applied to holdings as of the end of month t-1. For common stock dividends, we follow DeAngelo, DeAngelo, and Skinner (2000) in using CRSP distribution codes 1232, 1212, 1218, 1222, and 1245 to identify ordinary dividends and 1262 and 1272 to identify special dividends.

The accounts data contain outliers due to account openings and closings that do not reflect real consumption and savings decisions. We exclude household-month observations where we cannot identify a CRSP mutual fund or common stock match for more than 75 percent of the account value at month t-1, and we exclude households where account value falls below $10,000. This leaves 93,312 household-months of data on lagged account value, dividends, capital gains, and net withdrawals. However, these data still contain some outliers; for instance, the minimum value for net withdrawals as a percentage of lagged account value is -2,807.7, indicating a proportionately large net inflow of funds. To prevent a few such data points from driving results, we exclude household-months in which net withdrawals exceed 50% in absolute value. This screen excludes about 0.96% of the sample.[7] The final sample includes 92,412 household-months.

The advantages of household portfolio data vis-à-vis aggregate data and the CEX data are fairly obvious, but these data nonetheless have certain limitations of their own. One is that we usually do not know how important the accounts we observe are in terms of the household's total wealth, although in a fraction of the sample we do have self-reported data on household net

[7] The results below are robust to choosing different cutoffs. For example, they are quantitatively similar when 5% or 0.5% of the most extreme observations are eliminated. However, without eliminating the extreme outliers, the most extreme *single* observation would account for about *one third* of the total sum of squared net withdrawals (even though we have close to 100,000 observations in total), which would make the results practically meaningless.

worth, and moreover we see no reason why this should lead to bias as opposed to simply adding noise. Another limitation is that we observe net withdrawals, not consumption. While this means that the portfolio data is a useful complement to the CEX, it raises a concern that dividends and realized capital gains may be deposited into a cash account that we do not observe. If so, and if a portion of these funds are eventually reinvested and ultimately reappear in the portfolio, we should not be counting that portion as potential consumption. Hence, an important aspect of our analysis of the brokerage accounts data will be to examine the extent to which contemporaneous withdrawals are offset by delayed reinvestment.

B. Summary statistics

The size and composition of portfolios are described in Panel A of Table 5. The mean account value is $54,400 and the median is $28,400. For the mean household, 82.7% of this value is due to common stock holdings and 13.5% reflects mutual funds.

Changes in portfolio value are in Panel B. To make cross-household comparisons, we scale net withdrawals, capital gains, and dividend estimates by portfolio value at the end of month t-1. The average household-month in our sample has slight net withdrawals at the rate of 0.06% per month, while net savings in the median household-month is zero. The average total monthly return is positive, at 1.11%. The average dividend income per month, 0.20% of beginning-of-month portfolio value, is a significant fraction of the average month's total return, although it is much less volatile.

Dividend income is broken down in Panels C and D. Dividend income is positive in just under half of the household-months in the sample. On average for these observations, 77.92% of the dividend income is due to ordinary dividends, with mutual funds accounting for virtually all of the remainder. Special dividends are rare, but can be very large when they do occur.

C. Effects of dividends and capital gains on net withdrawals

We begin with some scatterplots. Figure 1 shows household-month observations of net withdrawals and contemporaneous total dividends. The figure shows two modal behaviors with respect to dividend income. The line of points indicating a one-for-one increasing relationship between net withdrawals and dividends evidences a "zero (contemporaneous) reinvestment" policy; the line of points indicating a flat relationship indicates an "automatic reinvestment" policy. And the many thousands of observations that lie on neither line suggest a positive relationship more generally. We omit an analogous scatterplot of net withdrawals as a function of capital gains because it shows no visible patterns.

Mean and median behaviors are plotted in Figure 2. In Panel A, we break dividend income into eleven groups, one for household-months with no dividend income and ten deciles for positive-dividend observations. Within each group, we plot median total dividends and net withdrawals. The results suggest that median behavior is to not immediately reinvest moderate-size dividends. Net withdrawals increase one-for-one with dividend income over the bottom several deciles, i.e. in this range, a modal behavior from Figure 1 is also the median behavior.

Mean behavior with respect to dividends is presented in Panel B. We show mean net withdrawals for the zero-dividend group and for the mean level of dividends within each of the ten positive-dividend deciles. The figure again shows a positive relationship between dividends and net withdrawals. Note that the mean behavior is to contemporaneously withdraw most, but not all, of larger dividends. It is perhaps intuitive in a theory of mental accounting that the large dividends that result from cash acquisitions, for example, are not treated like ordinary dividends, but rather as principal to be reinvested.

The bottom two panels provide an initial look at the effect of capital gains. The contrast with the dividends pictures confirms the CEX results: the effect of capital gains appears to be much smaller than that of dividends. Panel C shows that median contemporaneous net withdrawals are zero regardless of the level of capital gains. Panel D shows mean behavior, which suggests that very high capital gains engender net withdrawals on average and very low capital gains engender net inflows, on average, with no clear effect in the intermediate range.

In Table 6, we report regressions to estimate the effects of contemporaneous dividends and total returns. Our first specifications include just linear effects, but we confirm the additional structure suggested in the figures using a piecewise linear specification. Specifically, we allow for a differential effect when dividends are in the top decile and a differential effect when total returns (mainly capital gains) are smaller than 2.50% in absolute value:

$$\frac{C_t}{A_{t-1}} = a + d_1 \frac{D_t}{A_{t-1}} + d_2 \frac{D_t}{A_{t-1}} \left\{ \frac{D_t}{A_{t-1}} > 90^{th}\, Pctle \right\} + r_1 \frac{R_t}{A_{t-1}} + r_2 \frac{R_t}{A_{t-1}} \left\{ \left| \frac{R_t}{A_{t-1}} \right| < 0.025 \right\} + v_t \,. \qquad (7)$$

We suppress the household *i* subscripts.

It is useful to explicitly interpret these coefficients. The first regression in the left panel indicates that, on average, investors have a propensity to withdraw contemporaneous dividends of 0.35. The second regression shows that, on average, investors have a propensity to withdraw contemporaneous returns of 0.02. The third regression shows that for a given contemporaneous total return, investors have a 0.35 *higher* propensity to withdraw from the dividends component than from the capital gains component. Because the propensity to withdraw from contemporaneous capital gains is almost zero, this also means that the total propensity to withdraw from dividends is around 0.35, as in the first regression. Although direct comparisons are not appropriate, we note that these coefficients are remarkably similar to the effects of

dividends and capital gains on total consumption that we estimated in the CEX data (e.g., column 7 of Table 4).

Note also that the results do not imply that the effect of capital gains on consumption is negligible. Prior work by Poterba (2000) and others suggests that it is not. In fact, because the range between the 10^{th} and 90^{th} percentile is about 30 times bigger for returns than for dividends (see Table 5), the point estimates in Table 6 suggest that the variation in withdrawals caused by dividends and capital gains could be of roughly similar economic magnitude. However, for our purposes, the appropriate focus is on the relative magnitude of the dividend and capital gains effects for a given change in wealth, not on the proportion of withdrawal variance explained by each effect.

Moving to the second panel of Table 6, with piecewise linear effects, the first regression indicates a propensity to withdraw contemporaneous dividends of 0.77 for typical levels of dividend income and 0.33 (0.77 – 0.44) for unusually high levels of dividend income. The last regression shows that for small levels of total returns, investors have a propensity to withdraw from contemporaneous capital gains of -0.03 (0.02 – 0.05), i.e. not withdraw at all, while the differential propensity to withdraw contemporaneous dividends stays the same. All of these results are consistent with Figure 2.

D. Delayed reinvestment

While Figure 2 and Table 4 clearly suggest large differences in the withdrawal behavior of dividends versus capital gains, and hence suggest that dividend policy may indeed affect consumption, a number of questions remain. One is to consider the possibility that a portion of dividends (and perhaps capital gains), rather than being withdrawn for consumption, may just have been temporarily moved to a cash account and reinvested in subsequent months. To the

extent that this is the case, estimates based on contemporaneous effects are overstating the true potential impact on consumption.

To investigate this effect, we augment our previous model to allow for up to one year of delayed reinvestment. The resulting model is unsightly but easy to interpret:

$$\frac{C_t}{A_{t-1}} = a + d_1 \frac{D_t}{A_{t-1}} + d_2 \frac{D_t}{A_{t-1}} \left\{ \frac{D_t}{A_{t-1}} > 90^{th}\, Pctle \right\} + d_3 \frac{1}{11} \sum_{s=1}^{11} \frac{D_{t-s}}{A_{t-1}} + d_4 \frac{1}{11} \sum_{s=1}^{11} \frac{D_{t-s}}{A_{t-1}} \left\{ \frac{D_{t-s}}{A_{t-1}} > 90^{th}\, Pctle \right\}$$

$$+ r_1 \frac{R_t}{A_{t-1}} + r_2 \frac{R_t}{A_{t-1}} \left\{ \left| \frac{R_t}{A_{t-1}} \right| < 0.025 \right\} + r_3 \frac{1}{11} \sum_{s=1}^{11} \frac{R_{t-s}}{A_{t-1}} + r_4 \frac{1}{11} \sum_{s=1}^{11} \frac{R_{t-s}}{A_{t-1}} \left\{ \left| \frac{R_{t-s}}{A_{t-1}} \right| < 0.025 \right\} + v_t . \qquad (8)$$

Using this specification, one can compute that when the monthly total return is greater than 2.5% in absolute value, the long-run propensity to withdraw is (r_1 + r_3). For a monthly total return smaller than 2.5% in absolute value, the long-run propensity to withdraw capital gains is (r_1 + r_2 + r_3 + r_4). The differential long-run propensity to withdraw from small or medium dividend income realizations is (d_1 + d_3) while the differential long-run propensity to withdraw a top-decile dividend realization is (d_1 + d_2 + d_3 + d_4). Note that in this setup, any effect of delayed reinvestment will show up as a *negative* estimate for d_3 and d_4 (or r_3 and r_4), as dividends (capital gains) that are reinvested will be detected as reduced net withdrawals as a function of lagged dividends (capital gains).[8]

The short answer from Table 7 is that allowing for the possibility of delayed reinvestment does not alter earlier inferences about the effects of dividend income. In the simple linear regressions, the contemporaneous coefficients are as before, and the effects of lagged dividends are nil. The full piecewise linear model in the rightmost column shows that the long-run

[8] In principle, one could also include individual lags of D_t and R_t instead of the summation terms and then sum up the estimated coefficients on the individual lags to calculate the total effect of delayed reinvestment. The approaches are equivalent when D_t and R_t and their lags, respectively, are uncorrelated. In our data, these correlations are low, so both approaches lead to similar results. For simplicity, we report results from the summed lags approach.

propensity to withdraw small or medium dividends is 0.73 (0.80 – 0.07) greater than that of capital gains, almost the same as the 0.77 gap in the short-run propensities to withdraw that we found before, and thus indicating little reinvestment of such dividends. On the other hand, the differential long-run propensity to withdraw very large dividends is still positive, but considerably smaller, at 0.33 (0.80 – 0.47 – 0.07 + 0.07). There is little evidence that capital gains engender reinvestment.

In sum, accounting for delays in reinvestment does not alter the conclusion that there is a large difference in the propensities to withdraw dividends and capital gains. Unless households in this sample are out of steady state, systematically accumulating cash balances (and doing so out of dividends, not capital gains), the results are consistent with the notion that a substantial portion of dividend income is permanently withdrawn to finance consumption.

E. Household characteristics

To establish robustness, Table 8 splits the sample across several household and portfolio characteristics. First, we split by portfolio size. These accounts typically represent a rather small fraction of net worth. For about a fifth of the sample, we have self-reported data on net worth and tax rates supplied to the brokerage firm at the opening of the account, so we can test whether the results extend to households for which the portfolio represents at least half of reported net worth. Second, we split by net worth itself. Third, we split by tax rate, which is obviously also a proxy for income. Fourth, we split the sample by portfolio turnover.

The results suggest that the higher propensity to withdraw dividend income is broadly robust across household characteristics. An apparent exception is that the difference is insignificant for the below-median tax rate subsample, although standard errors are quite large in

this small sample. Also, wealthier households appear more likely to reinvest very large dividends, but again standard errors are too large to make any confident conclusions.

F. Composition of dividends

Intuition and mental accounting considerations suggest that it may be inappropriate to treat all types of dividends as equivalent. The nonlinear effects documented in Figure 2 and Table 6 may be due to differences in the treatment of special dividends and ordinary dividends, for example, and the reinvestment of dividends could also vary by type.

Figure 3 shows scatterplots of contemporaneous net withdrawals as a function of dividends of each type. An immediate conclusion is that the "automatic reinvestment" mode is apparent only in mutual fund dividends, likely reflecting formal elections to automatically reinvest. In addition, both mutual fund dividend recipients and many ordinary dividend recipients engage in the "zero reinvestment" mode. Perhaps because large special dividends are so rare, there is little visually apparent pattern in how they are withdrawn or reinvested.

Median and mean net withdrawals by dividend type are in Figure 4. Median behavior is to withdraw ordinary dividends one-for-one, while for mutual fund dividends the median behavior is to withdraw nothing, as also suggested in the scatterplots. Median behavior is not to immediately reinvest any portion of special dividends unless they represent a large fraction of portfolio value. In means, the patterns are naturally rougher, and affected by the fact that the average household is a net saver into its portfolio over this period. But even in means, there are generally monotonic relationships for dividends of each type. Notably, very high values of mutual fund dividends do not increase mean net withdrawals one-for-one.

These impressions are confirmed in Table 9. Ordinary dividends have a differentially higher propensity to be contemporaneously withdrawn of 0.90 versus capital gains, i.e. a

propensity to be contemporaneously withdrawn of near unity versus one near zero. Reflecting the "automatic reinvestment" policy pursued by many mutual fund investors, mutual fund dividends are withdrawn at a lower rate. Standard errors are too large to make finer observations about reinvestment and how behavior changes for unusually large dividends. Small special dividends are withdrawn at roughly the same rate as ordinary dividends, while the point estimates suggest that large special dividends are mostly reinvested.

G. Reverse causality

As in the CEX data, the above results are potentially affected by an endogeneity problem. Some households may have chosen their ordinary-dividend paying stocks and, to a lesser extent, their mutual funds, in anticipation of consumption. If so, the evidence presented so far does not suffice to demonstrate that dividends, particularly ordinary dividends, have a causal effect. Our approach again is to run specifications that include lagged dividends.

As before, the first question is whether there is a significant predictable component to dividends. Unlike before, dividends are scaled by portfolio value, reducing a potential source of cross-sectional predictability. As it turns out, dividends in total (ordinary, mutual fund, and special) are relatively unpredictable based on lagged dividends (i.e. most all variation is "unexpected"), with twelve months of lagged values explaining only 4% of the variation. Hence reverse causality is empirically not an issue in our earlier results, unless we are to believe that investors are rapidly rebalancing their portfolios in anticipation of changing consumption needs.

However, ordinary dividends on their own (scaled by beginning-of-period portfolio value) are indeed very predictable, with the one-year lagged value explaining 57% of the variation in ordinary dividends, and the one-year and three-month-lagged values together explaining 81%. Mutual fund dividends are less so, with the one-year lagged value explaining

43% and the three-month-lagged value (as expected) adding little. Special dividends are, of course, unpredictable by definition. Therefore, like our results for total dividends, the results for special dividends are not subject to reverse causality concerns.

The second question is whether the predictable component explains consumption, or whether the unpredictable component also plays a role. To examine this, our second specification in Table 9 includes the twelve-month lag of dividends as an additional control for the potential ex ante effect of expected consumption on holdings of dividend-paying assets. This implies that the remaining coefficients are identified from variation orthogonal to the twelve-month lag. Consistent with the conjectured ex ante effect, the coefficient estimate on $D_{t\text{-}12}$ is greater than zero for both ordinary and mutual fund dividends. But, we find that including the twelve-month lag does not meaningfully change any magnitudes or significance levels. For example, the ordinary dividends coefficient remains highly significant and much higher than the coefficient on $D_{t\text{-}12}$. We find similar results for mutual fund dividends.

We conclude that reverse causality most likely plays only a modest role in the case of ordinary dividends and even less of a role for our other results, including special dividends and total dividends. At least an important element of causality seems to run from dividends to withdrawals—and, based on our analysis of the CEX data, to consumption.

V. Explanations

The evidence from two very different micro data sets strongly suggests that the division of stock returns between dividends and capital appreciation affects consumption. So far we have focused on documenting this pattern and establishing its robustness. Now we move forward and consider potential explanations.

A. Borrowing constraints

A standard explanation for the high the sensitivity of consumption to current income is borrowing constraints.[9] However, borrowing constraints by themselves do not predict a different propensity to consume from dividends and capital appreciation. The substitution of dividends for capital gains has no overall wealth effects, and homemade dividends can always be created by buying and selling shares. Hence, borrowing constraints cannot be a major factor.

B. Transaction costs

The transaction costs of making homemade dividends are an a priori more relevant factor. Perhaps reinvesting dividends, especially the modest levels that accrue in smaller accounts in our sample, would require the purchase of an odd lot, which carries relatively high transaction costs. To the extent such costs are substantial, rational households should prefer to consume from recent dividends rather than from selling shares.

The CEX data allow us to examine a transaction cost explanation in which the trading costs (and perhaps taxes) of creating extra homemade dividends constrain consumption. For households where income exceeds total expenditure, this constraint does not bind: These households could create homemade dividends at no cost by simply saving less. In unreported results, we find coefficients of a similar magnitude and generally lower standard errors among households that save income, casting doubt on the transaction cost explanation.

The brokerage data results in Table 8 also contain results that cast doubt on transaction costs as a complete explanation. First, if households view odd lot transaction costs as an important consideration, one might expect a higher propensity to withdraw dividends in smaller accounts which face the odd lot costs more often. In contrast, the propensity to withdraw

[9] A closely related, but behavioral, explanation for the high propensity to consume current income is hyperbolic discounting as in Angeletos et al. (2001).

dividends appears not to depend on the size of the portfolio. Second, the propensity to withdraw dividends is similar, if not even higher, for high-turnover households. These households would be able to reinvest unwanted dividends at little, if any, marginal cost; again, the transaction costs are not binding.[10]

C. Taxes

Perhaps investors fail to fully reinvest dividends (and hence have a higher propensity to withdraw them) because they have a policy of withholding a portion for federal and state taxes. Of course, because taxes can be paid from any source, this story is founded on mental accounting. Table 8 shows that high-tax households are more likely to withdraw dividend income. In fact, the difference between lower-tax and higher-tax is much too large (although standard errors are large) to attribute to differential taxation: higher-tax households withdraw 100% of small and medium dividends, far more than they would need to cover taxes.

Another tax consideration is the higher tax rate of dividend income than capital gains that prevails in our sample period. The idea is that households have made mistakes ex ante in buying the highly-taxed dividend-paying assets, but ex post, given their holdings, it makes sense to finance consumption through dividends not capital gains. But, developing this idea further, many households in our sample have individual stocks with accumulated capital losses at any given time, so from an ex post tax perspective these households should consume from realized losses even before dividends. This conflicts with Odean's (1998) evidence that investors are more likely to sell winners than losers in every month except December.

[10] See Odean (1999) and Barber and Odean (2000) for more general arguments that investors trade too much and fail to properly consider transaction costs.

D. Different "permanence" of dividends and capital gains

One way to reconcile our results with the permanent income hypothesis is to say that shocks to wealth that coincide with increases in dividends are largely permanent while shocks to wealth in the form of capital gains are much less so.

In aggregate data, Poterba and Summers (1988) and Fama and French (1988) identify low frequency mean reversion in aggregate stock returns. Campbell and Shiller (1989) quantify this effect using a variance decomposition and argue that over half of the variation in aggregate stock returns reflects temporary changes in discount rates, not future dividends. Lettau and Ludvison (2004) connect Campbell and Shiller's insight to consumption patterns, finding empirical support for the idea that consumption responds more to permanent than to temporary changes in wealth. Because permanent shifts are identified with the dividend yield, this finding is also broadly consistent with mental accounting. Note also that in a rational general equilibrium, temporary aggregate wealth movements must reflect shifts in preferences or risk. In other words, a rational explanation for Lettau and Ludvigson's result requires one to take a stand on the preferences of the representative agent. A reduction in aggregate risk aversion, for example, must be associated with a weaker consumption response than a wealth-equivalent increase in expected cash flows.

Moreover, the empirical evidence in the cross-section of stock returns is quite different. While DeBondt and Thaler (1985) find that individual stock returns are also mean reverting, Vuolteenaho (2002) and Cohen, Polk, and Vuolteenaho (2005) argue that a much smaller fraction of the variation individual stock returns is temporary. Given that the year fixed effects in our regressions eliminate aggregate movements in asset values, the remaining variation in returns is largely stock-specific and thus mostly permanent. Hence, by focusing on cross-sectional variation in dividends and returns, we are examining a situation where consumption from

dividends and capital gains – both of which reflect permanent shifts in the cross section of wealth – should be quite similar under the permanent income hypothesis, even for those investors who care separately about permanent and temporary wealth.

E. Mental accounting

A higher propensity to consume from dividends than capital gains is predicted by mental accounting theories. For instance, in the Shefrin and Thaler (1988) model, households place wealth into one of three mental accounts: "current income," "current assets," and "future wealth." Shefrin and Thaler as well as Shefrin and Statman (1984) suggest that the propensity to consume wealth categorized as current income, such as dividends, is greater than the propensity to consume wealth categorized as assets, such as capital and its appreciation. Mental accounting is thus consistent with the standard advice to "spend from income, not from principal."

Indeed, Shefrin and Thaler describe the higher propensity to consume from dividends than capital appreciation as an important untested prediction of the mental accounting framework. All of our evidence suggests that this prediction receives strong support. The propensity to withdraw and consume dividends is indeed much higher for dividends than capital gains. Moreover, in the CEX data, the propensity to consume dividends is similar to the propensity to consume labor income, consistent with the notion that they are viewed similarly.

Mental accounting also suggests natural explanations for finer aspects of our results that are less easily explained by other theories. For example, it is natural that ordinary dividends and small special dividends are categorized as "current income" to a greater extent than are special dividends, while special dividends, in turn, are still more "income-like" than capital appreciation. One expects a higher propensity to consume ordinary than large special dividends and a higher propensity to consume large specials than capital gains. Table 9 shows just this pattern.

The underlying psychology behind this sort of mental accounting is still an open question. Shefrin and Statman (1984) outline several explanations based in self control and prospect theory. Another possibility consistent with anecdote is that, although firm-level stock returns are largely permanent, individuals do not view them this way. A quasi-rational rule of thumb for a passive investor facing perceived stock market mispricing may be to consume dividends but not capital gains. This is admittedly a more flexible theory and harder to falsify than the related "rational" theory based on differences in permanence between dividends and capital gains.

Finally, mental accounting of any type suggests bounded rationality. Thus a natural issue to consider is the welfare consequence of deviating from the predictions of the permanent income hypothesis, consuming dividends immediately rather than over a lifetime. We suspect that these consequences are small for two reasons. First, dividends make up a smaller fraction of total portfolio returns. Second, and more importantly, dividends have a much lower standard deviation. In the spirit of work by Shefrin, Statman, and Thaler, corporations smooth dividends, attempting to adjust payout partially and only to the permanent component of income, thereby catering to boundedly-rational investors and limiting the welfare consequences of a "rule of thumb" to consume from dividends.

VI. Conclusion

How investors consume from dividends versus capital gains is important to a range of questions in corporate finance, macroeconomics, and tax policy. Classical theories suggest that investor consumption patterns are independent of dividend policy, while mental accounting and

various economic frictions lead to the alternative hypothesis that investors are more likely to consume dividends than capital appreciation.

While aggregate time series data are not powerful enough to address this issue, we exploit the cross-sectional variation in two household-level data sets. Our main finding is that consumption responds much more strongly to returns in the form of dividends than returns in the form of capital gains. Data from the Consumer Expenditure Survey (CEX) show a strong relationship between household consumption and dividends, controlling for total returns (which includes dividends). A sample of household portfolio data also show that dividends are much more likely than capital gains to generate withdrawals from the investment account, thus illustrating the mechanical process of translating dividend income into consumption. After reviewing a variety of explanations, we conclude that an important factor in the results is likely to be mental accounting of the sort summed up in the adage, "consume income, not principal."

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Figure 1. Net withdrawals versus dividends: Scatter plot. We plot monthly net withdrawals against contemporaneous dividends. Net withdrawals are equal to household monthly net withdrawals. All data are scaled by household account value in period *t*-1 and expressed in percentage terms.

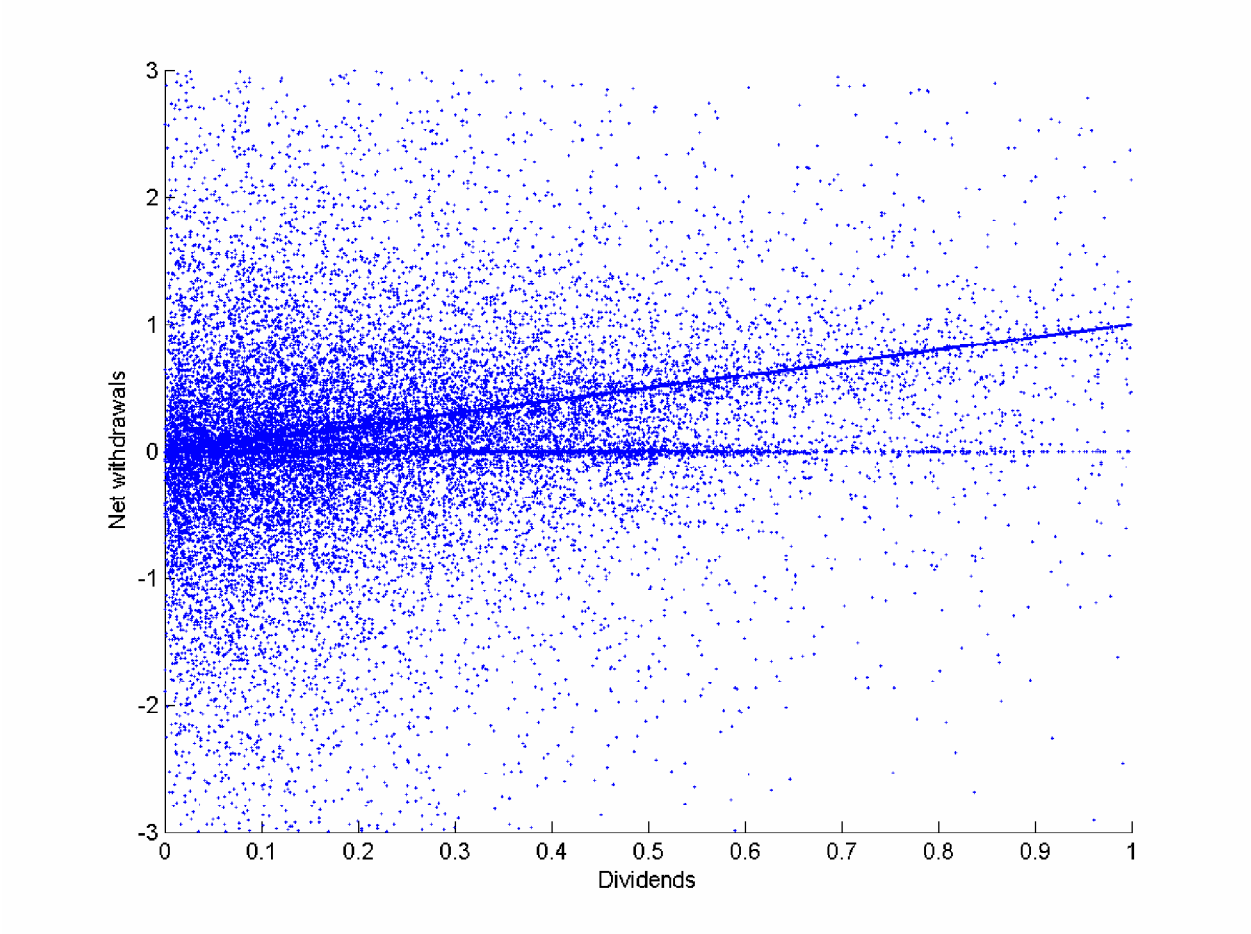
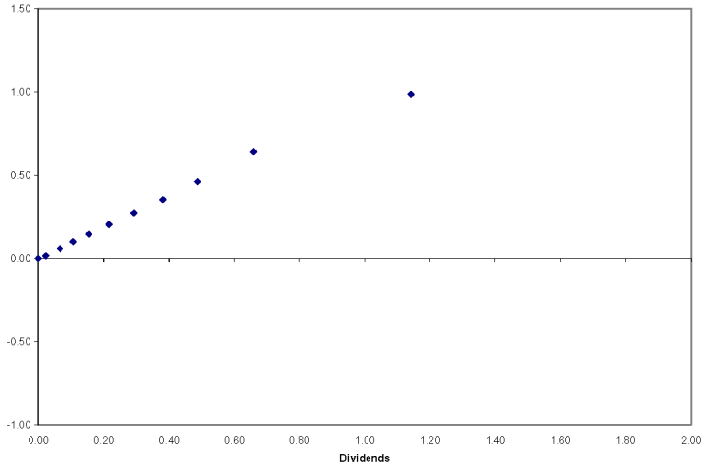
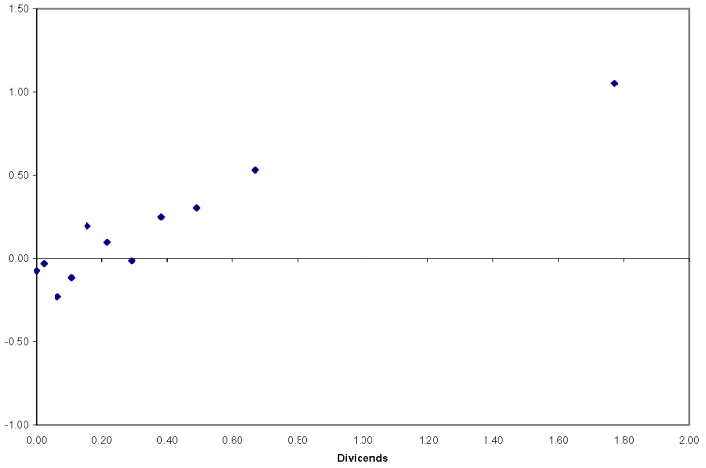


Figure 2. Net withdrawals of dividends and total returns: Decile plots. We sort the data into groups according to monthly dividends and total returns and compute the corresponding level of net withdrawals. The first two panels show dividend sorts. The eleven groups include ten deciles for months with positive dividends and a single group for months with zero dividends. The second two panels show total returns sorts. The ten groups break the sample into deciles according to monthly total returns. We plot within group median (average) net withdrawals versus median (average) dividends in Panels A and C (Panels B and D). Net withdrawals are equal to the monthly net withdrawals by household. All data are scaled by household account value in period *t*-1 and expressed in percentage terms.

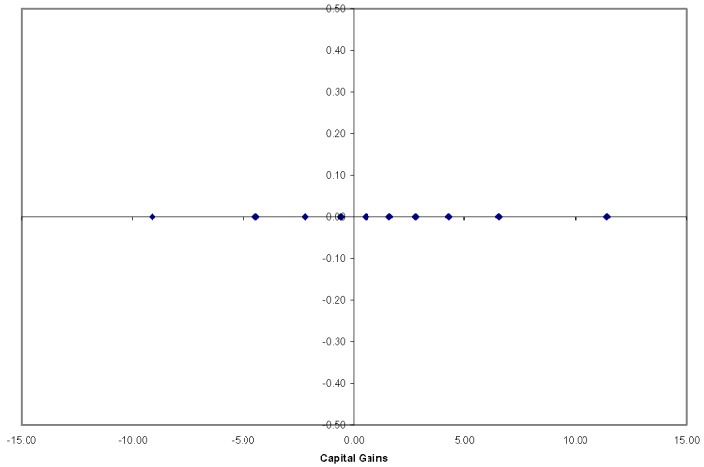
Panel A. Median net withdrawals versus dividends



Panel B. Average net withdrawals versus dividends



Panel C. Median net withdrawals versus total returns



Panel D. Average net withdrawals versus total returns

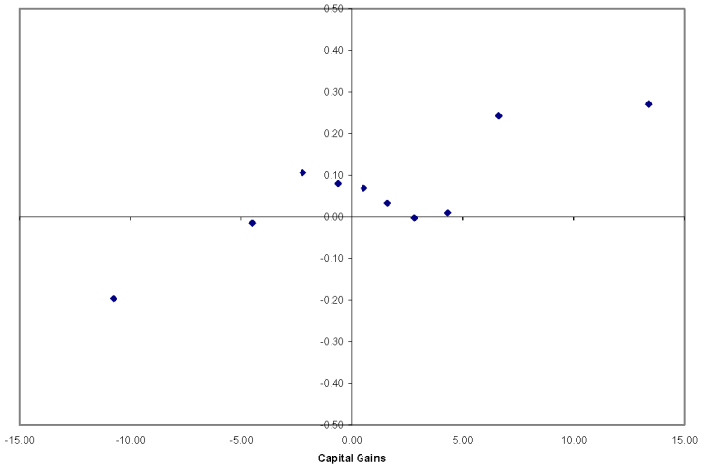
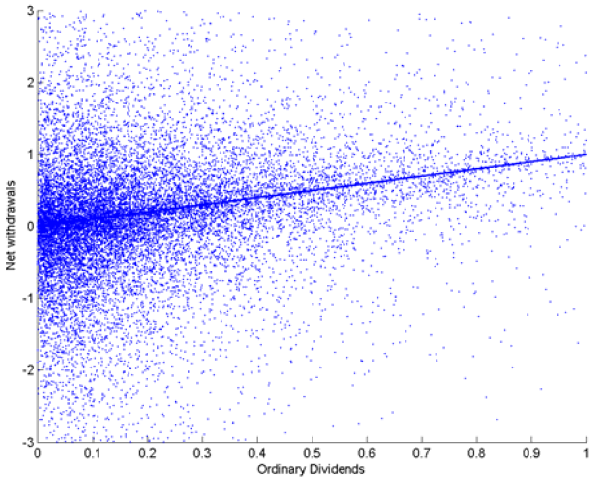
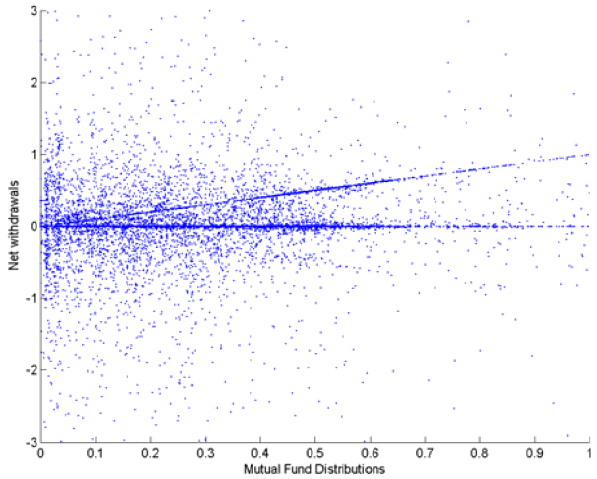


Figure 3. Net withdrawals of dividends by type: Scatter plots. We plot monthly net withdrawals against contemporaneous ordinary, mutual fund, and special dividends. Net withdrawals are equal to household monthly net withdrawals. All data are scaled by household account value in period *t*-1 and expressed in percentage terms.

Panel A. Net withdrawals versus ordinary dividends



Panel B. Net withdrawals versus mutual fund dividends



Panel C. Net withdrawals versus special dividends

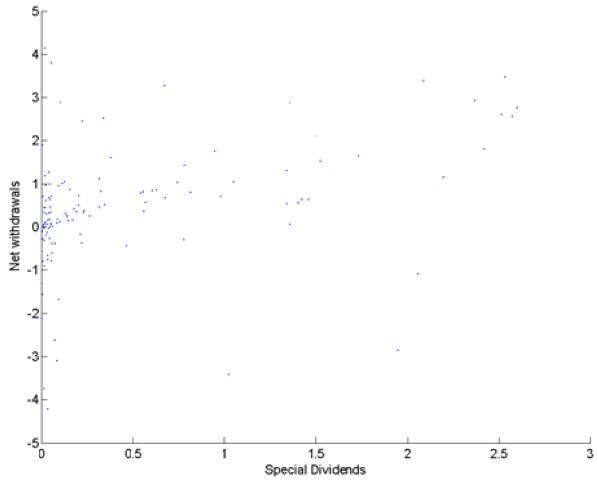
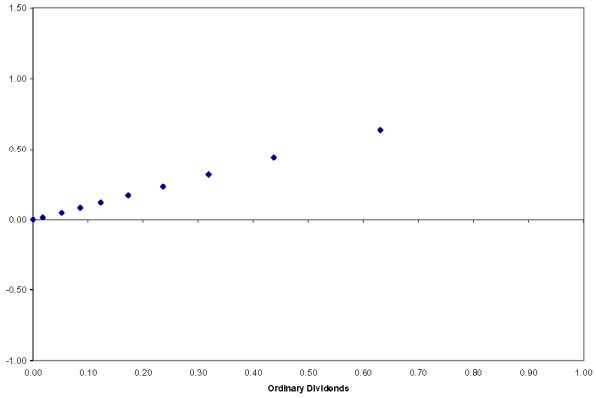
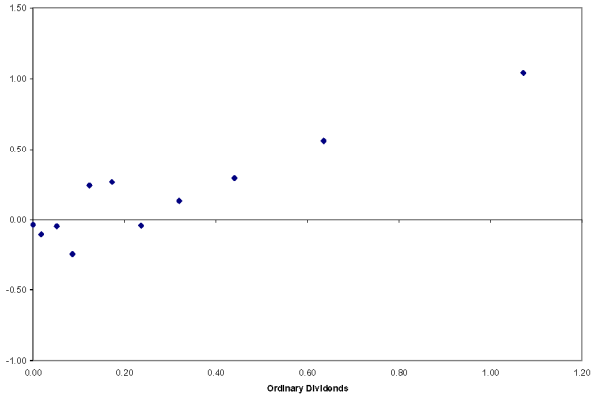


Figure 4. Net withdrawals of dividends: Ordinary, mutual fund, and special dividends. We sort the data into groups according to monthly ordinary, mutual fund, and special dividends and compute the corresponding level of net withdrawals. The first two panels show ordinary, common stock dividend sorts; the second two panels show mutual fund dividend sorts; and the last two panels show sorts on the remaining dividends, including special dividends, liquidating dividends, and cash acquisitions. In each case, the eleven groups include ten deciles for months with positive dividends and a single group for months with zero dividends. We plot within group median (average) net withdrawals versus median (average) dividends in Panels A, C, and E (Panels B, D, and F). Net withdrawals are equal to the monthly net withdrawals by household. All data are scaled by household account value in period *t*-1 and expressed in percentage terms.

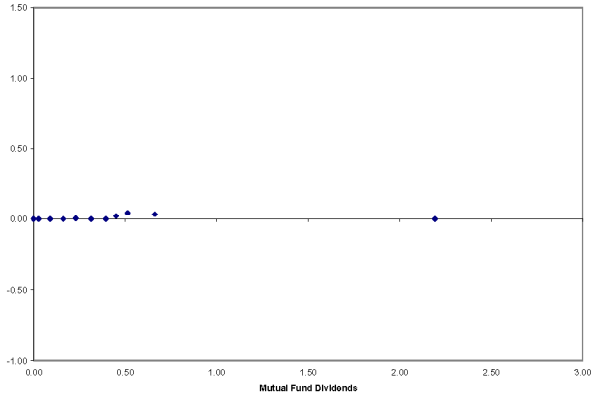
Panel A. Median net withdrawals vs. ordinary dividends



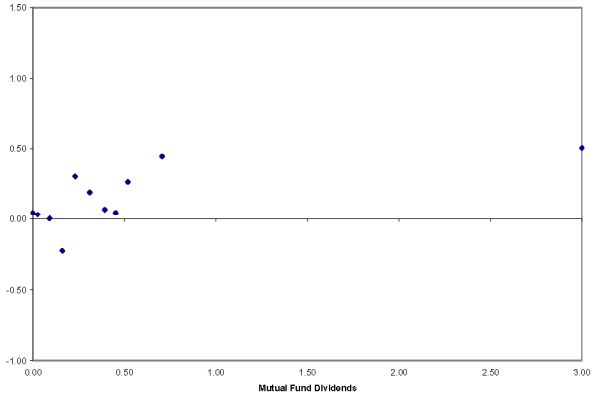
Panel B. Average net withdrawals vs. ordinary dividends



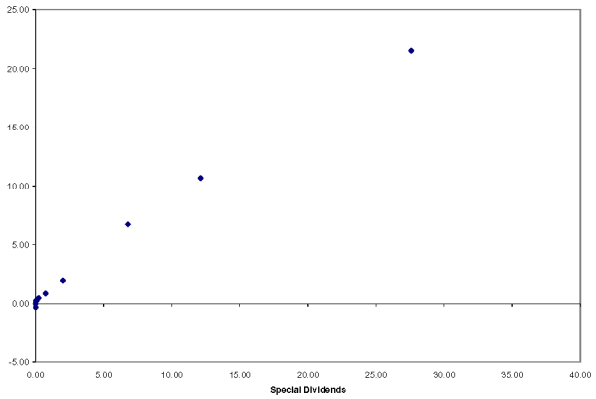
Panel C. Median net withdrawals vs. MF dividends



Panel D. Average net withdrawals vs. MF dividends



Panel E. Median net withdrawals vs. special dividends



Panel F. Average net withdrawals vs. special dividends

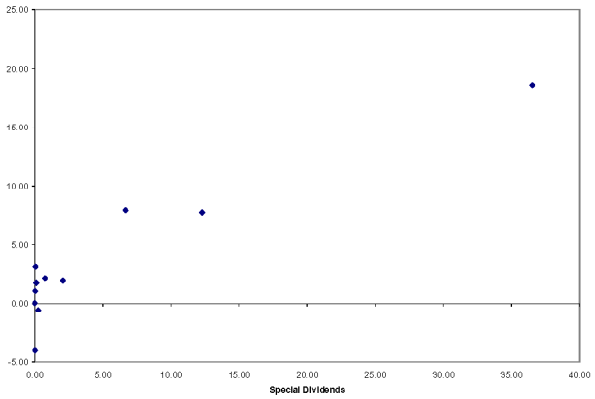


Table 1. Summary statistics: Aggregate data. Means, medians, and standard deviations for annual consumption, income, and wealth. Panel A shows consumption data listed in Table 1.1.5 (Gross Domestic Product) from the Bureau of Economic Analysis. We divide consumption into total (line 2), durable (line 3), non-durable (line 4), and services (line 5) consumption. Panel B presents income data listed in Table 2.1 (Personal Income). After-tax income is equal to wages (line 2) plus self-employment income (line 9) plus rental income (line 12) plus interest income (line 14) plus dividend income (line 14) plus transfer income (line 16) minus income (line 25) and other (line 24) taxes. Dollar returns are from CRSP, computed as the beginning of year market capitalization times the value-weighted return with distributions for the NYSE. Panel C shows the level of household and nonprofit wealth listed in Table B.100 from the Federal Reserve *Flow of Funds*. The first set of four columns shows real per capita levels, computed using population and inflation measures from the BEA; the second set takes first differences.

	Real Per Capita Levels ($)				Real Per Capita Changes ($)			
	N	**Mean**	**50%**	**SD**	**N**	**Mean**	**50%**	**SD**
Panel A. Consumption								
Total	60	14,496.8	13,933.1	5,760.9	59	330.7	322.8	302.6
Durable	60	1,851.0	1,859.6	679.1	59	45.9	80.3	146.7
Non-Durable	60	5,359.7	5,654.4	1,091.7	59	61.6	59.2	130.4
Services	60	7,286.1	6,398.8	4,043.8	59	223.3	203.2	136.1
Panel B. Income								
After-Tax Income (Y_t)	60	15,682.4	15,320.5	5,990.4	59	323.7	340.8	299.8
Interest (I_t)	60	1,886.3	1,629.8	1,260.4	59	45.1	36.1	125.0
Dividends (D_t)	60	616.7	471.9	336.7	59	19.4	14.3	41.3
Returns (R_t)	60	1,337.3	1,411.9	2,473.4	59	67.9	-208.7	3,046.3
Panel C: Wealth								
Net Worth	60	77,807.2	69,922.6	34,154.8	59	1,946.5	1,933.9	4,348.6

Table 2. Consumption of dividends: Aggregate data. OLS regressions of aggregate consumption on wealth and sources of income and a time trend. The first panel uses the full post-war sample. The second two panels split the sample period in half. The first set of four columns shows real per capita levels, computed using population and inflation measures from the BEA; the second set of four columns take first differences. Newey-West robust standard errors, with four lags, are shown in parentheses.

	Real Per Capita Levels ($000)				Real Per Capita Changes ($)			
	Total Consumption		Nondurable and Services		Total Consumption		Nondurable and Services	
	Coef	**(se)**	**Coef**	**(se)**	**Coef**	**(se)**	**Coef**	**(se)**
Panel A. Full Sample, 1945-2004								
$Y_t - D_t - I_t$	0.84	(0.07)	0.75	(0.04)	0.53	(0.15)	0.37	(0.08)
R_t	-0.01	(0.01)	-0.01	(0.01)	-0.02	(0.01)	-0.02	(0.01)
D_t	0.93	(0.49)	1.84	(0.42)	0.51	(0.50)	0.56	(0.46)
I_t	0.55	(0.09)	0.58	(0.07)	-0.19	(0.21)	-0.03	(0.19)
Net Worth	0.02	(0.01)	0.01	(0.01)	0.03	(0.01)	0.02	(0.00)
R^2		0.9987		0.9991		0.5771		0.6394
Panel B. First Half, 1945-1974								
$Y_t - D_t - I_t$	0.16	(0.31)	0.09	(0.14)	-0.07	(0.19)	0.04	(0.09)
R_t	-0.03	(0.03)	-0.03	(0.02)	-0.05	(0.02)	-0.04	(0.01)
D_t	2.83	(1.50)	0.95	(0.80)	3.19	(1.70)	0.28	(1.21)
I_t	2.96	(1.04)	3.25	(0.51)	1.22	(1.94)	2.60	(1.51)
Net Worth	0.06	(0.03)	0.05	(0.01)	0.08	(0.02)	0.05	(0.01)
R^2		0.9951		0.9986		0.6843		0.7525
Panel C. Second Half, 1975-2004								
$Y_t - D_t - I_t$	0.85	(0.10)	0.58	(0.06)	0.86	(0.17)	0.57	(0.12)
R_t	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)
D_t	0.46	(0.54)	0.68	(0.45)	0.55	(0.44)	0.96	(0.45)
I_t	0.41	(0.12)	0.23	(0.13)	-0.29	(0.27)	-0.18	(0.26)
Net Worth	0.03	(0.00)	0.02	(0.00)	0.03	(0.01)	0.02	(0.00)
R^2		0.9974		0.9987		0.6597		0.6453

Table 3. Summary statistics: Consumer expenditure survey data, 1988-2001. We report means, medians, and standard deviations for annual consumption, wealth, and income in the short-panel CEX. Non-durable consumption is equal to the sum of food, alcohol, apparel, transportation, entertainment, personal care, and reading expenditure over the four quarters from a household's second to fifth interview. Total expenditure, which includes durables, over the same period is taken directly from the CEX files. Income is the after-tax income over the prior four quarters, as reported by households in their fifth interview. It includes income from dividends (income from dividends, royalties, estates, or trusts) and interest income, but not capital gains. Total wealth is measured as the sum of home equity and financial wealth. We define financial wealth as the sum of checking and savings accounts balances, holdings of savings bonds, money owed to the household, and stock holdings (stocks plus mutual funds plus small positions in corporate and government bonds other than savings bonds) minus other debts. We compute dollar capital gains as the difference between the change in reported stock holdings over four quarters and the reported net investment in stocks during the same period. We limit the sample to households with nonzero financial wealth invested in stocks and nonmissing data on income and consumption. We also require that there is only one consumer unit (family) in the household and that the marital status of the respondent and the family size remain unchanged from the second to fifth interview, and that none of the wealth component is topcoded. We use the CPI to deflate all variables into December 2001 dollars.

	N	Mean	50%	5%	95%	Min	Max
Panel A. Consumption							
Non-Durable Consumption	3,272	15,157	13,866	4,524	30,023	1,347	182,367
Total Consumption	3,272	48,387	45,042	15,778	92,107	4,955	213,382
Panel B. Wealth							
Financial Wealth (t-1)	3,272	63,824	35,601	-118	217,430	-89,383	984,165
Total Wealth (t-1)	3,272	157,334	123,964	9,509	419,323	190	1,199,269
Panel C: Income							
Income (Y_t)	3,272	56,789	52,777	12,522	115,332	32	303,793
Interest income (I_t)	3,021	1,207	125	0	6,106	0	86,391
Dividends (D_t)	3,272	891	0	0	4,465	0	144,658
Other income	3,021	54,483	51,012	10,385	112,311	-13,823	302,238
Capital gains (G_t)	3,272	435	0	-15,222	18,766	-301,407	181,503
Panel D. Composition of Income and Capital Gains (%)							
Interest income	3,021	4.0	0.2	0.0	18.1	-137.1	2,086.4
Dividends	3,272	2.0	0.0	0.0	11.3	-36.4	236.7
Other income	3,021	89.7	97.8	45.8	120.7	-13,249.2	3,996.0
Capital gains	3,272	4.3	0.0	-25.5	37.0	-5,216.1	13,397.0
Panel E. Control Variables							
Financial Wealth Invested in Stock (%, t-1)	3,272	55.6	59.2	3.7	97.9	0.0	100.0
Age	3,272	51	48	30	79	21	93
Family Size	3,272	3	2	1	5	1	11

Table 4. Consumption of dividends and other sources of income: Consumer expenditure survey data. OLS regressions of consumption on dividends and other sources of income. Non-durable consumption is equal to the sum of food, alcohol, apparel, transportation, entertainment, personal care, and reading expenditure over the four quarters from a household's second to fifth interview. Total expenditure, which includes durables, over the same period is taken directly from the CEX files. Heteroskedasticity robust standard errors are in parentheses. All variables are deflated by the CPI into 2001 dollars.

	Non-durable consumer expenditure					Total consumer expenditure				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
$Y_t - D_t$	0.11	0.11	0.11			0.40	0.40	0.41		
	(0.01)	(0.01)	(0.01)			(0.02)	(0.02)	(0.02)		
$Y_t - D_t - I_t$				0.11	0.11				0.41	0.42
				(0.01)	(0.01)				(0.02)	(0.02)
$R_t = G_t + D_t$	0.01	0.00	0.00			0.03	0.00	0.00		
	(0.01)	(0.01)	(0.01)			(0.02)	(0.02)	(0.02)		
D_t		0.10	0.09				0.49	0.49		
		(0.04)	(0.04)				(0.10)	(0.09)		
D_{t-1}			0.05					0.14		
			(0.04)					(0.08)		
$R_t = G_t + D_t + I_t$				0.00	0.00				0.00	-0.01
				(0.01)	(0.01)				(0.02)	(0.02)
$D_t + I_t$				0.09	0.05				0.42	0.37
				(0.03)	(0.03)				(0.07)	(0.07)
$D_{t-1} + I_{t-1}$					0.07					0.11
					(0.03)					(0.07)
Financial Wealth_{t-1} (M)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Total Wealth_{t-1} (M)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
% Financial Wealth Invested in Stock_{t-1}	396	354	238	434	76	2239	2036	1853	2050	1319
	(356)	(355)	(380)	(375)	(403)	(915)	(912)	(957)	(947)	(1009)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family Size Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,272	3,272	3,012	3,021	2,597	3,272	3,272	3,012	3,021	2,597
R^2	0.43	0.43	0.43	0.42	0.41	0.56	0.57	0.57	0.57	0.57

Table 5. Summary statistics: Household portfolio data. Monthly net withdrawals are estimated as a household's account value at *t*-1 (aggregating across all eligible accounts held by the household) less the account value at *t* plus dividends and capital gains earned on the account holdings at *t*-1. Dividends are equal to the dividend yield from CRSP and the CRSP mutual fund database in month *t* on common stock and mutual fund account holdings at *t*-1. Capital gains are the capital appreciation from CRSP and the CRSP mutual fund database in month *t* on common stock and mutual fund account holdings at *t*-1. Ordinary dividends are equal to the dividend yield from CRSP (distribution codes 1000 through 1999 excluding codes 1262 and 1272) on common stock account holdings at *t*-1. Mutual fund dividends are equal to the dividend yield from the CRSP mutual fund database on mutual fund account holdings at *t*-1. Special dividends are all other dividends. All data are scaled by household account value in period *t*-1 and expressed in percentage terms. We exclude observations where we cannot identify a CRSP mutual fund or common stock match for more than 75 percent of the household account value at *t*-1; households where account value falls below $10,000; margin accounts; and accounts that are not joint tenancy or individual accounts. We further exclude observations where the absolute value of consumption exceeds 50%. This screen eliminates 900 observations, or 0.96% of the sample.

	N	Mean	50%	10%	90%	Min	Max
Panel A. Portfolio Composition							
A_{t-1} ($000)	92,412	54.4	28.4	13.8	99.8	10.0	5,018.9
Common Stocks (%)	92,412	82.69	0.0	0.0	100.0	0.0	100.0
Mutual Funds (%)	92,412	13.49	0.0	0.0	0.0	0.0	100.0
Other Assets (%)	92,412	3.82	100.0	0.0	100.0	0.0	25.0
Panel B. Dividends, Capital Gains, and Withdrawals (%)							
Withdrawals C_t/A_{t-1}	92,412	0.06	0.0	-0.7	1.0	-50.0	50.0
Dividends D_t/A_{t-1}	92,412	0.20	0.0	0.0	0.5	0.0	102.4
Returns R_t/A_{t-1}	92,412	1.11	1.1	-6.1	8.3	-74.0	153.5
Panel C: Dividends by Type (%)							
Ordinary D_t/A_{t-1}	92,412	0.12	0.0	0.0	0.4	0.0	3.0
Mutual Fund D_t/A_{t-1}	92,412	0.07	0.0	0.0	0.1	0.0	29.9
Special D_t/A_{t-1}	92,412	0.01	0.0	0.0	0.0	0.0	102.4
Panel D. Composition of Dividends by Type where $D_t>0$ (%)							
Ordinary D_t/A_{t-1}	44,509	77.92	100.0	0.0	100.0	0.0	100.0
Mutual Fund D_t/A_{t-1}	44,509	21.79	0.0	0.0	100.0	0.0	100.0
Special D_t/A_{t-1}	44,509	0.30	0.0	0.0	0.0	0.0	100.0

Table 6. Net withdrawals of dividends and total returns: Univariate regressions. OLS regressions of net withdrawals on dividends and total returns. Net withdrawals is equal to household monthly net withdrawals. All data are scaled by household account value in period *t*-1 and expressed in percentage terms. Heteroskedasticity-robust standard errors are in parentheses.

	Linear Regressions			Piecewise Linear Regressions		
	1	**2**	**3**	**1**	**2**	**3**
D_t/A_{t-1}	0.35		0.35	0.77		0.77
	(0.09)		(0.09)	(0.09)		(0.09)
D_t/A_{t-1}* $\{D_t/A_{t-1} > 90^{th}$ Pctle$\}$				-0.44		-0.44
				(0.11)		(0.11)
R_t/A_{t-1}		0.02	0.02		0.02	0.02
		(0.00)	(0.00)		(0.00)	(0.00)
R_t/A_{t-1}* $\{\lvert R_t/A_{t-1}\rvert < 0.025\}$					-0.03	-0.05
					(0.02)	(0.02)
N	92,412	92,412	92,412	92,412	92,412	92,412
R^2	0.0025	0.0005	0.0029	0.0027	0.0005	0.0032

Table 7. Net withdrawals of dividends and total returns: The effect of delayed reinvestment. OLS regressions of net withdrawals on dividends and total returns and 11-month lags of dividends and total returns. Net withdrawals are equal to household monthly net withdrawals. All data are scaled by household account value in period *t*-1 and expressed in percentage terms. Heteroskedasticity-robust standard errors are in parentheses.

	Linear Regressions			Piecewise Linear Regressions		
	1	**2**	**3**	**1**	**2**	**3**
D_t/A_{t-1}	0.35		0.35	0.81		0.80
	(0.09)		(0.09)	(0.10)		(0.10)
D_t/A_{t-1}* {$D_t/A_{t-1} > 90^{th}$ Pctle}				-0.48		-0.47
				(0.12)		(0.12)
$\frac{1}{11} \Sigma_{s=1 \text{ to } 11}$ {D_{t-s}/A_{t-1}}	0.01		0.01	-0.16		-0.07
	(0.10)		(0.10)	(0.17)		(0.18)
$\frac{1}{11} \Sigma_{s=1 \text{ to } 11}$ D_{t-s}/A_{t-1}* {$D_{t-s}/A_{t-1} > 90^{th}$ Pctle}				0.14		0.07
				(0.18)		(0.18)
R_t/A_{t-1}		0.02	0.02		0.02	0.02
		(0.00)	(0.00)		(0.00)	(0.00)
$R_t/A_{t\ 1}$* {$\lvert R_t/A_{t\ 1}\rvert < 0.025$}					-0.03	-0.04
					(0.02)	(0.02)
$\frac{1}{11} \Sigma_{s=1 \text{ to } 11}$ {R_{t-s}/A_{t-1}}		0.00	0.00		0.00	0.00
		(0.01)	(0.01)		(0.01)	(0.01)
$\frac{1}{11} \Sigma_{s=1 \text{ to } 11}$ R_{t-s}/A_{t-1}* {$\lvert R_{t-s}/A_{t-1}\rvert < 0.025$}					0.03	-0.06
					(0.06)	(0.06)
N	92,412	92,412	92,412	92,412	92,412	92,412
R^2	0.0025	0.0005	0.0029	0.0027	0.0005	0.0032

Table 8. Net withdrawals of dividends and total returns: By household type. OLS regressions of net withdrawals on dividends and total returns and 11-month lags of dividends and total returns. Net withdrawals are equal to household monthly net withdrawals. All data are scaled by household account value in period *t*-1 and expressed in percentage terms. Heteroskedasticity-robust standard errors are in parentheses. Household portfolio value is the average monthly portfolio value. Household net worth and tax rate are self-reported data supplied to the brokerage firm at the time of the opening of the account.

	Household Portfolio Value			Household Net Worth		Household Tax Rate		Household Portfolio Turnover	
	<Median	**>Median**	**>0.5*NW**	**<Median**	**>Median**	**<Median**	**>Median**	**<Median**	**>Median**
D_t/A_{t-1}	0.77	0.80	0.84	0.67	0.81	0.44	1.00	0.75	0.89
	(0.12)	(0.13)	(0.43)	(0.32)	(0.36)	(0.29)	(0.40)	(0.07)	(0.19)
D_t/A_{t-1}* {$D_t/A_{t-1} > 90^{th}$ Pctle}	-0.43	-0.48	-0.54	-0.16	-0.72	-0.32	-0.57	-0.45	-0.52
	(0.15)	(0.16)	(0.44)	(0.32)	(0.36)	(0.30)	(0.41)	(0.11)	(0.21)
R_t/A_{t-1}	0.02	0.02	0.01	0.02	0.02	0.04	0.00	0.01	0.03
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
R_t/A_{t-1}* {$\|R_t/A_{t-1}\| < 0.025$}	0.00	-0.08	-0.02	-0.07	-0.01	-0.07	-0.01	-0.02	-0.07
	(0.03)	(0.03)	(0.08)	(0.06)	(0.07)	(0.06)	(0.08)	(0.02)	(0.04)
N	45,092	47,320	6,240	11,947	7,973	11,768	8,152	48,353	44,059
R^2	0.0042	0.0026	0.0012	0.0035	0.0010	0.0021	0.0026	0.0062	0.0029

Table 9. Net withdrawals and the composition of dividends. OLS regressions of net withdrawals on dividends and total returns and 11-month lags of dividends and total returns. Net withdrawals are equal to household monthly net withdrawals. Ordinary dividends are equal to the dividend yield from CRSP (distribution codes distribution codes 1000 through 1999 excluding codes 1262 and 1272) on common stock account holdings at *t*-1. Mutual fund dividends are equal to the dividend yield from the CRSP mutual fund database on mutual fund account holdings at *t*-1. Special dividends are all other dividends. All data are scaled by household account value in period *t*-1 and expressed in percentage terms. Heteroskedasticity-robust standard errors are in parentheses.

	Ordinary Dividends		Mutual Fund Dividends		Special and Other Dividends	
	1	**2**	**1**	**2**	**1**	**2**
D_t/A_{t-1}	0.82	0.71	0.40	0.35	0.75	0.75
	(0.11)	(0.13)	(0.12)	(0.14)	(0.13)	(0.13)
D_t/A_{t-1}* {$D_t/A_{t-1} > 90^{th}$ Pctle}	0.16	0.16	-0.26	-0.23	-0.46	-0.46
	(0.12)	(0.12)	(0.13)	(0.13)	(0.19)	(0.19)
R_t/A_{t-1}	0.02	0.02	0.02	0.02	0.02	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R_t/A_{t-1}* {$\|R_t/A_{t-1}\| < 0.025$}	-0.02	-0.02	-0.04	-0.04	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
D_{t-12}/A_t		0.13		0.05		-0.08
		(0.09)		(0.06)		(0.04)
N (000)	92.4	92.4	92.4	92.4	92.4	92.4
R^2	0.0023	0.0023	0.0007	0.0007	0.0021	0.0022