Stock Market Returns and Consumption*

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Abstract

This paper employs Swedish data on households' stock holdings to investigate how consumption responds to changes in stock market returns. We instrument the actual capital gains and dividend payments with past portfolio weights. Unrealized capital gains lead to a marginal propensity to consume (MPC) of 23% for the bottom 50% of the wealth distribution and about 3% for the top 30% of the wealth distribution. Households' consumption is significantly more responsive to dividend payouts across all parts of the wealth distribution. Our findings are consistent with households treating capital gains and dividends as separate sources of income.

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I. Introduction

In the U.S., stockholdings represent the largest share of financial assets on households' balance sheets, reaching more than $32 trillion (with about $15 trillion in non-retirement accounts), which makes them comparable in importance to the stock of housing wealth. Given their prominence, movements in stock prices and dividend payments might significantly affect households' consumption and savings decisions. With soaring stock prices, households' savings rate is at a 12-year low, sparking the question of whether stock market trends indeed drive households' spending habits.[2] This shift away from saving, however, could leave some consumers exposed to changes in market conditions. Furthermore, concerns about the consumption-wealth effects of stock market returns have been the main driver of US monetary policy sensitivity to stock price movements (Cieslak and Vissing-Jørgensen, 2020). Thus, a natural question is: how much of a decline in aggregate consumption should we expect if stock prices take a sudden turn for the worse as they did during past recessions?

Despite the central importance of these issues, there is no comprehensive study on the *causal* impact of changes in stock market wealth on households' consumption. This is due to several challenges. First, aggregate movements in stock prices are endogenous with respect to other macroeconomic shocks, such as expectations of future income growth and consumer confidence (Beaudry and Portier, 2006). Second, due to the presence of home bias, exploiting regional cross sectional variation that would control for macroeconomic fluctuations is also not ideal. One could potentially address these challenges by exploiting household level data, such as the Consumer Expenditure Survey (CEX), however, the advantages of using such data are counterbalanced by the lack of accuracy in the reported measures of capital gains (Dynan and Maki, 2001).[3] Furthermore, households bias their investment towards their own companies and local industries, resulting in correlation between capital gains and other factors affecting their income directly, which may even introduce a new source of endogeneity that is absent in the aggregate data (Benartzi, 2001; Coval and Moskowitz, 2001; Mitchell and Utkus, 2003; Meulbroek, 2005). Finally, given the skewness of the stockholdings, it is important to estimate

[2] The Commerce Department has reported that the savings rate was 2.4% of disposable household income in December 2017, the lowest rate since September 2005. The savings rate had risen to 6.6% when the recession ended in June 2009.

[3] There is no direct measure of capital gain in the CEX, and capital gains are imputed based on changes in total security holdings and the amount of sales and purchases during that year. Any such imputation requires strong assumptions on the timing and portfolio rebalancing of households. Moreover, many households report zero capital gains in the years the stock market performs remarkably well.

the consumption behavior of the households at the top of the wealth distribution, which are usually underrepresented in surveys.[4]

In this paper, we overcome these challenges by using very granular household level data from Sweden. Due to the presence of a wealth tax, we are able to have a full picture of the households' balance sheets at the end of each year from 1999 to 2007 (when the tax was repealed). We have data on the universe of households' portfolio holdings at the security level, as well as information about their debt obligations and real estate transactions. To measure consumption, we follow the *residual* approach proposed by Koijen, Van Nieuwerburgh and Vestman (2015) that imputes consumption as a residual of households' disposable income net of other transactions and also validate this measure against survey information. Koijen, Van Nieuwerburgh and Vestman (2015), Eika, Mogstad and Vestad (2020), and Kolsrud, Landais, and Spinnewijn (2019) discuss the quality of this imputed measure of consumption based on administrative data and its comparison with survey data. These papers show that the quality of the consumption measure based on the residual method depends on the availability of data on detailed household level asset allocation as well as data on housing transactions.

Even with this data, households' portfolio choices are endogenous and might be driven by omitted factors that also drive households' consumption behavior. We address this issue in several ways. First, we exploit the panel nature of our data and estimate all of our regressions using first differences. This allows us to capture any time-invariant difference across households that might be correlated with the level of their capital gains or dividend income. Second, we limit the heterogeneity across households' portfolios by estimating the MPC separately for different parts of the wealth distribution. Third, we also exclude stockholdings in the households' own industry of activity from their portfolios before computing the capital gains and dividends. This ensures that our results are driven by households' holdings in industries other than their own, whose fluctuations are less likely to be correlated with changes in households' income.

One might still be concerned that changes in capital gains and dividend income could be driven by *dynamic* changes in households' portfolios. In fact, changes in households' portfolios can be driven by factors such as the liquidation of stock holdings due to an expenditure shock or a large durable purchase, the very same factors that are likely responsible

[4] See Table AI in the Appendix for the distribution of stock holdings in the US according to the Survey of Consumer Finances.

for household consumption. Therefore, we implement a simulated IV strategy where we instrument the variations in capital gains and dividend income with the capital gains and dividend income that would have accrued, had the household kept its portfolio the same as the one observed in previous years. Intuitively, the portfolio weights in previous years should not be determined by future shocks that drive both stock returns and consumption choices. In other words, our identification comes from the stickiness in the households' portfolios, for which we find strong evidence in our data.

The first main result is that the MPC out of (unrealized) capital gains for households in the top 30% of the financial wealth distribution is about 3% and does not exhibit significant variation between, for instance, households in the 70th to 90th percentile and households in the top 5% of the wealth distribution. In contrast, the MPC for households in the bottom half of the distribution is significantly higher at about 23%. However, it is worth noting that these households own less than 7% of overall stockholdings. Our estimates are robust to directly controlling for realized capital gains, which we observe for a subsample. Intuitively, households can freely respond to changes in unrealized capital gains by adjusting their savings decisions.[5] In further tests, we also condition on households sharing the same employer, which ensures that they share a similar income stream, and provide several tests to show that our estimates are not driven by measurement error. Overall, these results show that households' consumption is responsive to paper wins.

Moreover, consistent with buffer-stock models of consumption, such as Zeldes (1989), Carroll (1997), Gourinchas and Parker (2002), and their extension to life-cycle portfolio choice model like Cocco, Gomes, and Maenhout (2005), we show that what determines the heterogeneity in MPC out of capital gains is not financial wealth per se, but the ratio of financial wealth and average income. The MPC out of capital gains of buffer-stock households, defined as households with financial wealth less than six months of their disposable income, is almost 40%, but, conditional on not being a buffer-stock household, their MPC is almost invariant with respect to wealth, and is about 3%.

Second, consistent with the evidence in Baker, Nagel and Wurgler (2007), we find that households are significantly more responsive to changes in dividends. In fact, the MPC out of dividends, for all of our wealth groups, is around 40-60%, that is, more than ten times the MPC

[5] Note that this is also why transaction costs, related to the liquidation of the stock holdings, are unlikely to drive the difference between the MPC for capital gains and dividends.

out of capital gains for the top 50th percentile of wealth distribution. It is worth mentioning that this result is not driven by a potentially endogenous sorting of households with higher levels of consumption (relative to their income) into stocks that pay more dividends. This is because all of our estimates are based on within household variation of consumption that is caused by changes in the same firms' dividend payments. Though it is hard to reconcile this result with a fully rational model without transaction costs, our result on MPC out of dividends and capital gains is consistent with near rational behavior in which households separately optimize their consumption with respect to capital gains and dividend income as if they were independent from each other.[6] This interpretation is consistent with the *free dividend fallacy* identified by Hartzmark and Solomon (2019): investors view capital gains and dividend income as separate attributes of a stock.

Finally, in exploring the mechanisms driving the results, we find evidence consistent with life cycle models such as Gourinchas and Parker (2002), where older and unconstrained households have higher MPC to transitory income (or wealth) shocks, since they consume those capital gains over a shorter period of time and face significantly less uncertainty about their lifetime income and wealth.

Our findings are most closely related to Baker, Nagel and Wurgler (2007) and Hartzmark and Solomon (2019). Baker, Nagel and Wurgler (2007) exploit cross sectional variation in households' consumption, capital gains and dividend income in CEX, in addition to using data from a large discount brokerage. The authors document that households' consumption and their withdrawal behavior is significantly more responsive to dividend income than to capital gains.[7] Our results confirm the main finding of Baker, Nagel and Wurgler (2007) and suggest that the significant difference between MPC out of capital gains and dividend income is not driven by measurement error in capital gains, endogeneity of households' portfolio choice or lack of data on the household balance sheet outside a brokerage account. Moreover, our results are helpful in discerning between the different underlying theories. In fact, our estimate of a significantly positive MPC out of capital gains allows us to conclude that near rational behavior, in which households treat capital gains and dividends as separate sources of income, might be a better description of households' behavior than a mental

[6] See Baker, Nagel and Wurgler (2007) for a comprehensive discussion on the inconsistency of this result with a fully rational model.

[7] When using data from the brokerage accounts, Baker, Nagel and Wurgler (2007) proxy for consumption expenditures with net withdrawals from the accounts. In contrast to a zero MPC for capital gains when they use CEX, they estimate a 2% MPC when they analyze the brokerage account data.

accounting model, where households consume out of dividend but not capital gains, which is the leading explanation for the differential MPCs out of dividend and capital gains in Baker, Nagel and Wurgler (2007).

Hartzmark and Solomon (2013) and Harris, Hartzmark and Solomon (2015) investigate the impact on stock prices of investors' demand for dividend income. Hartzmark and Solomon (2019) show that, in contrast to Miller and Modigliani (1961), investors do not fully appreciate that dividends come at the expense of price decreases. Our results show that this fallacy translates in differential consumption responses, which suggests that it might have aggregate effects on the real economy.

Our results also contribute to the extensive literature that attempts to measure households' MPC. For example, Johnson, Parker and Souleles (2006), Johnson et al. (2013), Agarwal and Qian (2014) and Jappelli and Pistaferri (2014) discuss estimates of MPC out of one time transfers like tax rebates. Baker (2018) and Kueng (2018) on the other hand estimate MPC out of more regular income shocks. Most of this literature finds MPCs for non-durables of about 20% and for total consumption between 60-80%. Our estimates of MPC out of dividend income are in line with these estimates, especially once one takes into account that the majority of stockowners are not financially constrained.

Closely related is also the literature linking housing wealth and stock wealth with consumption expenditures, see Davis and Palumbo (2001), Case, Quigley and Shiller (2005, 2013), Carroll, Otsuka, and Slacalek (2011), Carroll and Zhou (2012), Dynan and Maki (2001), Guiso, Paiella, and Visco (2006) and Paiella and Pistaferri (2017). More recently, Chodorow-Reichet al. (2020) exploit regional heterogeneity in stock market wealth to identify the causal effect of stock price changes on labor market outcomes. The estimated MPCs out of capital gains in both categories of these papers range from as low as 0% to as high as 10%.[8] Poterba (2000) and Paiella (2009), as well as Table AII in the Appendix, provide a more detailed review of the literature on stock market wealth and consumption. Our paper contributes to this literature by ensuring that the measurement error on the stockholdings of individuals is minimal, and households in the top parts of the wealth distribution are not underrepresented.[9]

[8] See Mian and Sufi (2011), Aladangady (2017), Campbell and Cocco (2007), Cloyne et al. (2019) and Agarwal and Qian (2017) for estimates of MPC out of housing wealth that are based on micro data.

[9] Dynan and Maki (2001) argue that the imputation of household level capital gains based on the CEX responses might be problematic. For instance, they mention that in the 1995-1998 period – a period of very strong market growth – 30% of households with positive security holdings reported no change in their security holdings. Therefore, instead of using capital gains based on CEX, they impute the level of stock holding of each household in the beginning of each year and assume all households experience the aggregate market return on their portfolio.

Moreover, the data on households' holdings of each individual security helps us distinguish between exogenous changes in the capital gains of households due to market movements and the endogenous variation due to changes in household portfolio.

The rest of the paper is organized as follows. Section II describes the data and provides summary statistics. Section III lays out our empirical strategy. Section IV presents the main results, while Section V presents several tests showing that measurement error is not the main driver of our results. Section VI explores the potential mechanisms for our findings by investigating heterogeneous responses to capital gains, and Section VII presents more robustness checks. Section VIII discusses the implications of these findings and concludes.

II. Data

To construct our sample of analysis, we begin with administrative data containing information on all Swedish residents, including information on income, municipality of residence, basic demographic information, and detailed wealth data.

For information on households' wealth, we mainly use the Swedish Wealth Register (Förmögenhetsregistret), collected by Statistics Sweden for tax purposes between 1999 and 2007, when the wealth tax was abolished. The data include all financial assets held outside of retirement accounts at the end of a tax year, December 31st, reported by different sources. Financial institutions provided information to the Swedish Tax Agency on their customers' security investments and dividends, interest paid, and deposits. Importantly, this information was reported even for individuals below the wealth tax threshold.[10]

Since this data was collected for tax purposes, we observe an end-of-the-year snapshot of each listed bond, stock, or mutual fund held by individuals, reported by their International Securities Identification Number (ISIN).[11] Using each security's ISIN, we collect data on the prices, dividends, and returns for each stock, coupons for each bond, and net asset values per

[10] During this time period, the wealth tax was paid on all the assets of the household, including real estate and financial securities, with the exception of private businesses and shares in small public businesses (Calvet, Campbell, and Sodini, 2007). In 2000, the wealth tax was levied at a rate of 1.5% on net household wealth exceeding SEK 900,000. This threshold corresponds to $95,400 at the end of 2000. In 2001, the tax threshold was raised to SEK 1,500,000 for married couples and non-married cohabitating couples with common children and 1,000,000 for single taxpayers. In 2002, the threshold rose again to SEK 2,000,000 for married couples and non-married cohabitating couples and 1,500,000 for single taxpayers. In 2005, the threshold for married couples and cohabitating couples rose to SEK 3,000,000 (Black et al. 2017).

[11] Two exceptions to this are the holdings of financial assets within private pension accounts, for which we only observe total yearly contributions, and "capital insurance accounts", for which we observe the account balance but not the asset composition. The reason is that tax rates on those two types of accounts depend merely on the account balances and not on actual capital gains.

share for each mutual fund in the database from a number of sources, including Datastream, Bloomberg, SIX Financial Information, Swedish House of Finance, and the Swedish Investment Fund Association (FondBolagens Förening).[12] This additional information allows us to compute the total returns on each asset, as well as capital gains and dividends paid to each individual.

From this data, we also observe the aggregate value of bank accounts, mutual funds, stocks, options, bonds, debt, debt payment, and capital endowment insurance as well as total financial assets and total assets. We use data from the Income Register to measure disposable income for our sample. As a result, we are able to obtain a close-to-complete picture of each household's wealth portfolio.

It should be noted that during the 1999 to 2005 period, banks were not required to report small bank accounts to the Swedish Tax Agency unless the account earned more than 100 SEK in interest during the year. From 2006 onwards, all bank accounts above 10,000 SEK were reported. In surveys, 99% of Swedes aged 15 and above have a bank account, indicating that in reality the people who are measured as having zero financial wealth probably in fact have some bank account balance. We follow Calvet, Campbell, and Sodini (2007), Calvet and Sodini (2014), and Black et al. (2017) and impute bank account balances for households without a bank account using the subsample of individuals for whom we observe their bank account balance even though the earned interest is less than 100 SEK. As a robustness check, we redo our analysis for the subsample of households for whom the imputed balance accounts for less than 10% of the total reported bank accounts and confirm that our results are not sensitive to this.

Since we are interested in the effect of capital gains on consumption, we limit our sample of analysis to households with a portfolio in the previous period. Furthermore, we restrict attention to households in which the head is younger than 65 years of age.

Additionally, in order to mitigate potential measurement errors in households' asset changes and consumption, we follow the restrictions Koijen, Van Nieuwerburgh and Vestman (2015) impose on the data.[13] In particular, we limit the sample to households with a fixed number of household members between two consecutive periods, those who remain in the same

[12] For more in-depth description of this component of the data, see Calvet, Campbell, and Sodini (2007, 2009) who use the Swedish Wealth Register for the period 1999 to 2002.
[13] See Table 13 of Koijen, Van Nieuwerburgh and Vestman (2015) for the impact of each of these steps on their sample size. These restrictions' effects on our sample size are detailed in Table AIII in the Appendix.

municipality, and those where none of the household members are self-employed or own non-listed stocks, due to valuation problems. Using the real estate transaction register, we drop households who have cash flow from real estate transactions.[14] We also drop observations where a household member owns any derivative product (e.g. options), since it is difficult to value those assets correctly, and households for which the calculated financial asset return on the portfolio of stocks and mutual funds is in the bottom 1% or the top 1% of the return distribution in each year.

Finally, to mitigate measurement error, we remove households with extreme changes in financial cash flow between two consecutive periods. This could happen for reasons such as bequests or inter-vivos transfers from family members, which we do not observe. We drop households for which the changes in financial cash flow are in the top or bottom 2.5% in the corresponding year-specific distribution.[15]

As mentioned before, when measuring capital gains and dividends, we distinguish between assets that belong to firms that are active in the same industries in which household members work versus firms in other industries and exclude those assets that belong to households' industry of activity from their portfolio. To do this, we categorize each security held by an individual in our sample into a 4-digit NACE industry code and do the same for the firm in which a person works. This ensures that our results are driven by households' holdings in industries other than their own, whose fluctuations are less likely to be correlated with changes in household income, and reduces the concern that the relation between capital gains and household consumption is driven by the household's expectation about its future income.

Table I presents detailed summary statistics of the main variables of interest for our base sample. The main takeaway is that there is significant heterogeneity across households in all dimensions. For instance, average consumption ranges from 235,000 SEK in the bottom 50% of the financial wealth distribution to 592,000 SEK for the top 5%.[16] While the average value of stock wealth is around 27,000 SEK among the stockholders in the bottom 50% of the wealth distribution, it is worth around 715,000 SEK in the top 5%. Also, for the sample of

[14] As explained in Koijen, Van Nieuwerburgh and Vestman (2015), this is because any error in the recorded transaction price of houses can introduce a new source of measurement error. Using the same specification as in Table 3, but including households involved in a real estate transaction, we find that there is no statistical relationship between capital gains and being involved in a real estate transaction. In particular, the coefficient estimate of the impact of capital gains on having a real estate transaction is -0.001 and for dividend payments is 0.002 with standard errors (0.004) and (0.007), respectively.

[15] As we will show later in the paper, our results are not sensitive to this threshold.

[16] Ranking in the distribution of financial wealth is based on financial wealth in year t-2 and is conducted before all other aforementioned restrictions are imposed.

people participating in the stock market, about 45% of the total financial wealth is stock wealth (including both direct holding of stocks and indirect holding of stocks through mutual funds) for the bottom 50% versus 55% for the top decile. Furthermore, there is also some heterogeneity within each financial wealth bin as the standard deviations of our main variables are still noticeable. Our research design aims to explain part of this heterogeneity as a function of the returns on the households' portfolios.

III. Research Design

This section describes our empirical strategy. First, we follow the approach proposed by Koijen, Van Nieuwerburgh and Vestman (2015) to impute consumption expenses. Specifically, we impute consumption expenditure from the household budget constraint by combining information from the Swedish registry data on income, detailed asset holdings, and asset returns that we collect from third party sources. For each household *i,* we employ the following identity to compute consumption:

$$c_t = y_t - Debt\ Interest\ Payment_t + \Delta Debt_t - \Delta Bank\ Account_t - Active\ Financial\ Saving_t\ - Active\ Housing\ Saving_t - Pension\ Contribution_t \quad (1)$$

Intuitively, consumption is the difference between the households' after tax labor and financial asset income (plus transfers plus rental income from renting out owned houses), y_t, and the payment on existing debt, financial and housing savings (which do not include capital gains) as well as pension contributions. We also take into account changes in the indebtedness level. The granularity of the Swedish tax records allows us to measure the right hand side of equation (1).

This approach has the advantage of allowing us to build a panel of the consumption measure for each household. However, there are some limitations. For instance, stock holdings are observed at an annual frequency; this means that we have to ignore stock price changes and active portfolio rebalancing within a year, as well as gifts and transfers. Eika, Mogstad and Vestad (2017) shows that conditional on having information on real estate transactions, taking

into account stock transactions within each year does not add much to reducing measurement error.[17]

Having imputed consumption expenditures, we are interested in estimating the following specification relating consumption to capital gains and dividends:

$$c_{it} = \alpha_i + \gamma_t + \beta_1 Capital\ Gain_{it} + \beta_2 Dividend\ Income_{it} + \epsilon_{it} \quad (2)$$

where β_1 and β_2 are the main coefficients of interest, α_i is the household fixed effect and γ_t is the time fixed effect. More formally we want to estimate:

$$c_{it} = \alpha_i + \gamma_t + \beta_1 (X_{it} \cdot r_t) + \beta_2 Dividend\ Income_{it} + \epsilon_{it} \quad (3)$$

where X_{it} is a vector of stockholding shares of household *i* in the beginning of year *t* (that we approximate with holdings that we observe on the last day of year *t-1*); r_t measures the return during period *t* on portfolios held in the beginning of the period, and $Dividend\ Income_{it}$ measures the observed dividend income of household *i* in period *t.*

By exploiting the panel nature of our dataset and estimating a first difference, we control for time invariant household characteristics that might affect both the consumption choices and capital gains. More specifically, we estimate:

$$\Delta c_{it} = \beta_1 (X_{it} \cdot r_t - X_{it-1} \cdot r_{t-1}) + \beta_2 (Dividend\ Income_{it} - Dividend\ Income_{it-1})$$
$$+\beta_3 \Delta Income_{it} + \beta_4 \Delta Wealth_{it-1} + \beta_5 ND_{it,t-1} + \delta_t + \epsilon_{it} \quad (4)$$

where we also control for change in disposable income (net of dividend payment) between time *t-1* and *t*, change in lagged financial wealth, time fixed effect, and a dummy for whether the household has received any dividend payments in either of the two periods.

However, even after excluding stockholding of households in their own industry (as explained before), both the change in capital gain and the change in dividend income in equation (4) contain not only an exogenous component that arises from the movements in market returns to each stock (r_t) or changes in the dividend payments per share, but also an endogenous component that comes from changes in household portfolio allocation X_{it}. In particular, the change in capital gains (or equivalently for dividends) can be rewritten as $X_{it-1}.(r_t - r_{t-1}) + (X_{it} - X_{it-1}).r_t$. While the variation in the first term is driven by the

[17] Following Koijen, Van Nieuwerburgh and Vestman (2015), in our main analysis we exclude a few households with negative imputed consumption, our results are qualitatively and quantitatively the same without excluding those data points.

variations in the stock market returns, the variations in the second term are completely driven by the changes in the portfolio endogenously made by the household.

For instance, consider a household who receives a positive income shock and increases its consumption as a result. However, at the same time, the positive income shock can result in the expansion of the portfolio and therefore a positive change in capital gains - since $(X_{it} - X_{it-1})$ will be positive. Alternatively, we can think of a household who received an expenditure shock in period *t-1* and liquidated part of its portfolio to finance that expenditure shock. Since this was a one-time expenditure shock, everything else being fixed, Δc_{it} will be negative. However, because this household liquidated part of its portfolio in *t-1,* $(X_{it} - X_{it-1})$ will be negative, and therefore, the change in capital gains will be negative. These are just two examples of reasons why one could observe a positive correlation (assuming market return in that year was positive) between changes in consumption and capital gains without that correlation being driven by the causal impact of capital gains on household consumption.

Our main proposed solution to deal with the aforementioned endogeneity issue is to employ passive changes in returns $(X_{it-1}.(r_t - r_{t-1}))$ and passive changes in dividends $(X_{it-1}.(D_t - D_{t-1}))$, where D_t and D_{t-1} measure the dividend payments per share at time *t* and *t-1,* to instrument for actual changes in total portfolio returns $([(X_{it} \cdot r_t) - (X_{it-1} \cdot r_{t-1})])$ and total dividends $(Dividend\ Income_{it} - Dividend\ Income_{it-1})$ in the first difference regression.[18] By doing so, we capture the effect of changes in actual returns from what would have been household i's capital gains and dividend income, assuming no changes in its portfolio.[19] Intuitively, in this setting, any variation in portfolio allocations cannot drive our results, limiting the endogeneity concerns. In theory, the weights can significantly change from year to year, but we show that households' portfolio choice is relatively stable, and our instruments strongly predict the actual capital gains and dividends.

Our baseline specification is an IV estimation of equation (4) for different wealth groups. Specifically, we separately identify a coefficient for households between the 5th and the 50th percentile, 50th and 70th, 70th and 90th, 90th and 95th, and 95th to 100th percentiles of the financial wealth distribution. Coefficients β_1 and β_2 capture the marginal propensity to consume for every dollar of capital gains and dividends.

[18] In order to compute passive changes in dividends, we use Datastream to get data on dividend payments per share.

[19] Calvet, Campbell and Sodini (2009) use a similar strategy to calculate the share of risky assets in household portfolio in the absence of any rebalancing.

We devote Section V to discuss and investigate whether measurement error in capital gains and consumption could bias our estimates.

IV. Main Results

This section presents the main results. We start our analysis by reporting the OLS results for specification (4), where the returns are driven by employing the actual portfolio weights. The results here are due to the changes in capital gains and dividend income that are generated from both the passive return due to market movements and also endogenous rebalancing of the portfolios by households between the two periods. Comparing these results with the IV estimates (presented in Table III) sheds light on the importance of the endogeneity concern.

Table II presents the results. We find that households in the bottom 50% of the wealth distribution consume about 53 cents for every dollar of capital gains. This MPC monotonically declines with households' wealth to about 4 cents for the top 5% of the distribution. We find a larger reaction of consumption to dividend payments. Except for the households in the top 5th percentile of the wealth distribution, households consume about 30-40 cents for every dollar of change in dividend income. For households in the top 5% of the wealth distribution this reduces to 17 cents per dollar. Although these estimates correct for the endogeneity concern arising from households' portfolio exposure to their own industry, they do not address the concern about the endogeneity in capital gain or dividend income changes due to the changes in households' portfolio. Therefore, we now turn to our main empirical strategy.

We next focus on the IV estimates of specification (4), where households' capital gain and their dividend income are instrumented by their passive capital gain and passive dividend income. First stage results for this exercise have been presented in Panel A of appendix Table AIV.1 and AIV.2. Table AIV.1 shows that passive capital gain strongly predicts the actual capital gain, which is consistent with the evidence on the persistence of households' portfolio allocations. Interestingly, the explanatory power of passive capital gains for total capital gains increases with household wealth; this can be seen from an increase in the R-squared values of the regressions in the first stage. While for the bottom 50th percentile of the wealth distribution changes in passive capital gains explain 36% of variation in total capital gains, the same number is around 80% for the top 5% of the wealth distribution. This also suggests that the endogeneity concern is a more important problem for households in the lower part of the wealth

distribution. Table AIV.2 shows similar observations for dividend payments and confirms that passive dividend income is a strong predictor of total dividend income. It is worth noting that the data we use to estimate passive dividend income (from Datastream) has lower coverage than our data on stock returns (coming from 6 different sources, including Datastream), and therefore, our estimated coefficients for the impact of passive dividend income on actual dividend income are smaller than the analogous coefficient for the capital gain regression. This is also reflected in the lower R-squared values of the regressions reported in Table AIV.2.

Moreover, disposable income and lagged financial wealth are only very weakly related to capital gains and dividend income, and the first stage regression coefficients remain the same in the absence of these control variables. We also report the first stage estimates for capital gains and dividend income without including the controls in Panel B of appendix Table AIV.1 and AIV.2. These results confirm that our instruments are not correlated with observable controls and also that adding controls does not change the explanatory power of our instruments for the actual capital gains and dividend income.

As with Table II, each column in Table III presents the average MPC out of capital gains and dividends for a specific wealth group. All specifications include disposable income (net of dividend payments) and a lagged measure of financial wealth as controls, as well as year fixed effects and a dummy for whether the household has received any dividend payments in the two periods. Moreover, our specification in first differences captures time-invariant household characteristics that might be correlated with the consumption decision.

We find that the highest MPC belongs to the bottom 50^{th} percentile of the wealth distribution and is about 23 cents for every dollar increase in capital gains. From there, it decreases significantly to about 3 cents for households in the top 30^{th} percentile of the wealth distribution. The second row of Table III shows that the MPC out of changes in dividends is significantly larger than the estimated MPC for capital gains in all wealth groups and is about 40-60 cents for all wealth groups.

These results are consistent with models of buffer-stock households, such as those proposed by Zeldes (1989), Carroll (1997), Gourinchas and Parker (2002) and, more recently, Kaplan and Violante (2014) that predict households with low liquid wealth exhibit higher MPC from temporary income or wealth shocks.

Table IAI in the internet appendix reports the results of the same regressions without any controls. This is to ensure that our results are not contaminated by the fact that we do not

use exogenous variations in households' income. Tables IAII.1, IAII.2 and IAII.3, instead, show that our results are robust to alternative restrictions in the sample construction. To be specific, Table IAII.1 reports the results when we do not exclude observations with negative imputed consumption. In Table IAII.2 we restrict our sample to households for whom the total balance of bank accounts (either imputed or not) is less than or equal to 10% of the reported bank accounts.[20] Table IAII.3 drops households for which the change in financial cash flow is in the top or bottom 1% of the distribution in each year (as opposed to 2.5% in the base sample).

Finally, in Table IAIII we allow for a lagged impact of capital gains and dividend income on households' consumption and find similar results to the baseline specifications.

What can explain the difference in the MPC out of capital gains and MPC out of dividends? Baker, Nagel and Wurgler (2007) discuss in detail why this is inconsistent with fully rational behavior, but is in line with mental accounting by households (Shefrin and Thaler, 1988). At the root of the inconsistency with a fully rational model is the fact that, to the extent that stock prices reflect the value of all future dividends, any change in dividend payouts should not have any additional impact on household consumption. While it is difficult to reconcile our findings with a fully rational model, our result on MPC out of dividends and capital gains can be consistent with a near rational behavior in which households optimize their consumption with respect to capital gains and dividend income as if they were independent from each other. In particular, in our data, dividend income changes are significantly more persistent than changes in capital gains (as shown in Figure 1) and, as long as households consider capital gains and dividend income as separate sources of income, this can rationalize an MPC out of dividend income that is significantly larger than MPC out of capital gains.[21]

A. Capital Gains, Dividend Income, and Components of Household Saving

The depth of our data and the fact that we observe all components of the household balance sheet allow us to take a step further and not only study the response of household consumption to stock market returns, but also analyze the relation between capital gains and

[20] As reported in Table AVI.2, imputed bank accounts, on average, account for less than 1% of the total bank accounts for this sample.

[21] In the extreme case that any change in dividend payments is permanent, the "optimal" response of households in this near-rational framework is to increase their consumption by one dollar for each dollar of increase in their dividend income. Alternatively, if the price of a security follows a random walk, a one-dollar increase in a stock price today does not have any predictive power about future movements in the stock price. In that case, the optimal response of household consumption to this one time wealth shock is the same as the consumption response of the household to a one-time temporary income shock –since households can always transfer a dollar of transitory income shock to a dollar of wealth and vice versa- and is equal to the annuity income of one dollar –which is significantly less than one.

dividend income and each component of household financial saving. This analysis also sheds light on how shocks to capital gains or dividend income can propagate to other markets through households' balance sheets.

The results are shown in Table IV. Panel A reports the impact of capital gains on household active financial saving and its components.[22] Each cell is related to a separate regression. For example, the first row reports the impact of capital gains on total cash flow of households when estimated separately for each wealth group. These coefficients, by construction, are equal to the MPC estimates of capital gains times minus one. The first row in Panel B reports the impact of dividend income on households' active financial saving. Again, these coefficients by construction are equal to one minus the estimated MPC out of dividend income (reported in Table III). The estimated coefficients for dividend income show that on average, households save 40-60% of their dividend income.

Next, we investigate the response of different components of households' balance sheets to capital gains and dividend income. Row (a) in Panel A of Table IV shows that households in the top 50th percentile of the wealth distribution reduce their savings in stocks by about 10 cents with respect to a dollar increase in their portfolio value (i.e. 90 cents net increase in the value of their portfolio in response to a dollar of capital gain). This comes both from selling some of their existing stocks and, more importantly, by adjusting their savings and purchase of new stocks which will not incur any transaction cost. Rows (b) and (c) of Panel A show that households use part of this additional cash flow (either from liquidating stocks or reducing their savings in stocks) to pay down their debt and increase their holdings in their bank accounts. Row (a) of Panel B shows that indeed households in the top 50th percentile of wealth distribution reinvest about 30-50 cents from each dollar of income from dividends in stocks. Rows (b) and (c) show that they also some of the dividend income in their bank account and use another 10 cents to pay down their debt.

B. Realized vs. Unrealized Capital Gains

So far, we have focused on the effects of capital gains on households' consumption, regardless of whether the gain is realized or not. This is partly driven by data limitations; since we are unable to observe stock transactions, for most of the sample period, we cannot cleanly

[22] Note that our imputed consumption is equal to household disposable income minus household active financial saving.

identify the price at which households bought the stocks, which makes it impossible to compute realized capital gains.

However, between 2005 and 2007, households' realized capital gains for different asset categories were reported in the Capital Income Registry. Table IAIV reports detailed summary statistics for realized and total capital gains during this period. We exploit this additional piece of information to try to shed light on whether the realized capital gains are the only driver of the changes in households' consumption. The hypothesis is that, if all the estimated coefficients are driven by the realized capital gains, we should observe the coefficient on our measure of capital gain decrease when we add the realized gains as an additional control. Since we have this additional information only for three years, we first estimate our baseline IV regression of equation (4) for that subsample and report the result in Internet Appendix Table IAV. The table shows that the coefficients on both capital gains and dividends are very similar to the ones found for the entire sample (Table III).

Table V shows the results. We find that, although, expectedly, an increase in the realized capital gains is positively correlated with an increase in consumption, the coefficient on our measure of total capital gain (including both the realized and unrealized capital gain) is almost unaffected.

It should be noted that, while our estimated coefficient for total capital gain relies on the passive variations in capital gain that are not affected by household choices, realized capital gain is affected by the endogenous decision of households to rebalance their portfolio (e.g. a household receives an expenditure shock and liquidates part of its stock holding in order to smooth that shock), and therefore, the estimated coefficient can be biased upward. [23]

The fact that households' consumption is responsive to unrealized capital gains suggests that in response to a positive capital gain, households do not necessarily need to liquidate their stocks in order to increase their consumption. Rather, they can reduce (or increase) their savings rate, which in turn affects their expenditures. Adjustment through the change in the saving rate is also tax advantageous, because it allows households to avoid paying capital gain tax. In sum, it seems that adjustment in saving rate is an important channel through which households' consumption responds to capital gain.

[23] Meyer and Pagel (2019) use liquidation of mutual funds as an exogenous source of variation of realized capital gains and show an asymmetric response of households to realized capital gains.

V. Measurement Error

One potential concern about our analysis is the possibility that the lack of transaction level data introduces measurement error in both capital gains and imputed consumption, which might result in a biased MPC estimate (Baker et al. 2018). In this section, we investigate both theoretically and empirically the extent to which this is a concern in our setting.

A. Measurement error in dividends

It should be emphasized that our data does include a measure of total dividends earned by the household during each year. As a result, we use *actual* dividend income, and not imputed dividends, in both the construction of our measure of imputed consumption and as our right hand side variable in the estimation of the MPC out of dividend income. Specifically, households' portfolios in previous years are only used to construct the measure of passive changes in dividend income, which is used only as an *instrument* for the *actual* changes in dividend income. Therefore, a change in the household portfolio during the year does not cause any error in the measure of total dividend income. Consequently, measurement error in dividend income does not seem to be a source of bias in our estimates of MPC out of dividend income.

B. Measurement error in capital gains

Unlike dividend income, unrealized capital gains are not taxed and therefore our measure of capital gains is a noisy measure of actual capital gains. We now discuss whether the measurement error in our imputed capital gains could bias the MPC estimates. We first discuss the requirements for the estimate of MPC in levels to be unbiased and then extend the framework to the first difference estimates used in the paper. It should be noted here that in all of our main analysis based on Swedish data we control for time fixed effects. This means that we are only exploiting the cross sectional variation in stock returns. Therefore, throughout this section we assume that the expected return of the assets is equal to zero.

B.1. Measurement error in capital gains and level regressions

Let's assume the true relation between consumption c_{it} and capital gain R_{it} is:

$$c_{it} = \beta R_{it} + \varepsilon_{it}. \quad (5)$$

However, not having transaction level data results in measuring R_{it} with error. Let us define δ_{it} as the measurement error in estimating the capital gain of household *i* in period *t*:

$$\tilde{R}_{it} = R_{it} + \delta_{it} \quad (6)$$

where $\tilde{R}_{it}$ is the imputed capital gain.

This error in the measurement of the capital gains affects our measure of imputed consumption as well and implies that the relation between actual consumption and the imputed consumption ($\tilde{c}_{it}$) is:

$$\tilde{c}_{it} = c_{it} + \delta_{it} + \mu_{it}. \quad (7)$$

Consequently, the relation between imputed consumption and imputed capital gains is:

$$\tilde{c}_{it} = \beta\tilde{R}_{it} + (1 - \beta)\delta_{it} + \mu_{it} + \varepsilon_{it}. \quad (8)$$

Therefore, the necessary condition to estimate an unbiased MPC out of capital gains in our setting is for the measured capital gains ($\tilde{R}_{it}$) to be uncorrelated with the measurement error in the capital gains (δ_{it}).

In order to shed more light on the assumptions required for our MPC estimates to be unbiased, let's assume that each year is divided into two sub-periods, but we only observe the household portfolio in the first sub-period of the year. In this case, we can write:

$$R_{it} = X_{it}^1 \cdot r_t^1 + X_{it}^2 \cdot r_t^2 \quad (9)$$

where X_{it}^j is the vector that contains the holdings of household *i* in the sub-period *j* in year *t* and r_t^j is the vector of market returns in sub-period *j* of year *t*.[24] Assuming that all trades between year *t* and year *t+1* happen at the end of year *t,* the measured capital gain is:

$$\tilde{R}_{it} = X_{it}^1 \cdot (r_t^1 + r_t^2) = X_{it}^1 \cdot r_t \quad (10)$$

where r_t is the vector of total market return for each stock in year *t*. Therefore, measurement error in capital gain is:

$$\delta_{it} = (X_{it}^1 - X_{it}^2) \cdot r_t^2 = u_{it} \cdot r_t^2 \quad (11)$$

where u_{it} is defined as within the year changes in household portfolio. The requirement for the MPC estimates in levels to be unbiased is that the measured capital gains $X_{it}^1 \cdot r_t$ needs to be uncorrelated with δ_{it}. This requires changes in the household's portfolio (u_{it}) to be uncorrelated with the portfolio of the household at the beginning of the year (X_{it}^1), with the market returns in that sub-period (r_t^2) and the market return in the previous sub-period (r_t^1). The independence of household initial portfolio from the subsequent changes in household portfolio does not seem unreasonable. The independence of the changes in households'

[24] Note that X_{it}^1 is the same as X_{it} used in Section III, that is, the vector of stockholding of household *i* on the first day of year *t* (or the last day of the year *t-1*).

portfolio and the return of the portfolio in that sub-period also results directly from the lack of households' ability to time the market.

However, changes in the number of shares held by the household (and not the value of the stock holdings of the household per se) and market return in the first sub-period (r_t^1) can be correlated, for example, due to a positive feedback trading behaviors. If households tend to invest a higher fraction of their income in stock market whenever the market return is higher, there will be a negative correlation between our measurement error in capital gains (δ_{it}) and the imputed capital gains and therefore our estimates of the MPC out of capital gain will be biased downward. Alternatively, to the extent that in response to positive capital gains households rebalance their portfolio and liquidate part of their portfolio (either to consume or to keep the fraction of their investment between stocks and nominal assets constant), there will be a positive correlation between δ_{it} and market return in the first sub-period. However, here, the size of the bias is also a function of the correlation between the household portfolio returns in the first sub-period and the household portfolio return in the second sub-period (i.e. $E[(X_{it}^1 \cdot r_t^1)(u_{it} \cdot r_t^2)]$.

This discussion suggests that, whether the measurement error in capital gains and the imputed capital gains are correlated is an empirical question. However, using the annual snapshots of household portfolios in Sweden, we cannot test directly whether the lack of transaction level data results in any error in our estimates. Therefore, we use external data to provide evidence that this is generally not a concern. Specifically, we use the transaction level data from a large brokerage in the US supplemented with monthly dividend distributions from the Center for Research in Securities Prices (CRSP).[25] Following the data preparation steps in Baker, Nagel and Wurgler (2007) gives us a dataset that contains monthly household information on total portfolio value, net withdrawals, capital gains, and dividend income as shares of the previous month's assets. Similar to Baker, Nagel and Wurgler (2007), we use withdrawals as a proxy for consumption expenditures. Lastly, we account for outliers using the same methods as in Baker, Nagel and Wurgler (2007) by, first, excluding household-month observations where CRSP stocks and mutual funds do not account for at least 75% of the portfolio value in month *t-1*, excluding households whose portfolio value falls below $10,000 or whose dividend information is missing in months *t* to *t-11*, and, second, excluding

[25] See Barber and Odean (2000) for more details on the data. We are grateful to Terrence Odean for providing the data.

household-month observations where the absolute value of net withdrawals surpasses 50%. This leaves us with 98,951 household-month observations.

We then construct a measure of annual net withdrawals and annual capital gains and dividend income for households that we observe in our data for at least three years. We also use the annual snapshots of the data (households' portfolio holdings as of the end of December each year) to construct our measures of net withdrawals as well as capital gains and dividend income that we would have estimated if we only had annual data. The net withdrawals measure based on annual data incorporates a proxy for stocks and funds bought and sold between year *t* and year *t+1* using midyear (June) prices.

Column (1) of Table VI investigates the correlation between measurement errors in capital gains due to lack of monthly data and passive annual capital gains in levels. Column (2) replicates the same analysis, but when the independent and dependent variables are normalized by the value of the households' previous year's assets, following the footsteps of Baker, Nagel and Wurgler (2007). Indeed, in both columns we find that errors in the passive capital gains and measurement error in the imputed capital gains are uncorrelated which makes the estimation of MPCs based on the annual data unbiased. In order to show this point more directly, Column (3) replicates the results in Table 6 Regression 3 in Baker, Nagel and Wurgler (2007) and estimates net brokerage withdrawals on total dividends and total returns using monthly data.[26] Since the main object of interest in our analysis is the relation between consumption and capital gains and dividend income at the annual frequency, as opposed to monthly frequency, we next use the same data, but construct measures of household annual withdrawal and annual capital gains and dividend income. Column (4) shows the results for the same regression specification in Column (3) using annual household data constructed by aggregating the monthly withdrawals, capital gains, and dividends and reporting their annual values as shares of the households' previous year's assets. One can think of this as the relation between annual consumption (net withdrawals) and annual capital gains and dividend income in the absence of measurement error due to lack of transaction level data.[27] Column (5) uses only annual snapshots of the data to construct the measures of annual consumption and annual

[26] The small difference between our result and the one in Baker, Nagel and Wurgler (2007) most likely is due to having slightly different data on dividend payments of mutual funds. This is because of the missing CUSIPs for mutual funds in CRSP data (see Pastor, Stambaugh and Taylor (2015) for the issue of missing CUSIPs on mutual funds and various ways of addressing that).

[27] Our further investigation shows that some households reinvest part of their dividend income with some delay and therefore the annual "MPC" out of dividend income is slightly smaller than the monthly "MPC" out of dividends.

capital gains and dividend income and therefore is the closest in spirit to our setting. Given the fact that in this data the measurement error in capital gains is not correlated with the passive capital gains, it is not surprising that our estimated MPCs based on annual data and monthly data are almost the same. The estimated "MPCs" out of capital gains and dividend income using the brokerage data in the US resemble the result that we find for the Swedish households, further validating our main estimates.

This exercise provides evidence that the measurement error originated from not observing intra-year transactions is, most probably, orthogonal to the measured "passive" return. This could be because of the unpredictable nature of changes in holdings within the year and the fact that changes in holdings do not predict returns. In other words, actual "active" returns are measured returns plus noise uncorrelated with the passive return.[28]

B.2. Measurement error in capital gains and first difference regressions

We now turn to the discussion of bias due to capital gain measurement error while estimating the MPC out of capital gains in first differences. Extending equations (9), (10), and (11) to this new setting, for the OLS regression in the first differences to be unbiased, the correlation below needs to be equal to zero.

$$
\begin{aligned}
& cov[\tilde{R}_{it} - \tilde{R}_{it-1}, \delta_{it} - \delta_{it-1}] \\
& = cov[X^1_{it} \cdot r_t - X^1_{it-1} \cdot r_{t-1}, u_{it} \cdot r_t^2 - u_{it-1} \cdot r_{t-1}^2] \\
& = cov[X^1_{it-1} \cdot (r_t - r_{t-1}), u_{it} \cdot r_t^2 - u_{it-1} \cdot r_{t-1}^2] \\
& \qquad + cov[(X^1_{it} - X^1_{it-1}) \cdot r_t, u_{it} \cdot r_t^2 - u_{it-1} \cdot r_{t-1}^2] \qquad (12)
\end{aligned}
$$

While the requirements for the first term of the covariance to be equal to zero or negligible is similar to the requirements that we discussed for the level regressions, the covariance in the second term can be different from zero. This is because any trend in the portfolio of the household, for example, due to life cycle patterns in portfolio choice such as accumulation or liquidation of assets depending on the income growth path, will result in a negative correlation between the change in the portfolio of households from one year to the next $(X^1_{it} - X^1_{it-1})$ and the change within a year (i.e. u_{it} and u_{it-1}). Assuming the

[28] We have also tested whether the fact that the capital gains have been imputed using price data from the end of the year could be a concern. Specifically, we performed a similar analysis, but imputed households' consumption by changing our assumption about the price at which they traded their shares to June prices. These estimates are very similar to the baseline ones.

independence of stock returns across different years, $cov[(X_{it}^1 - X_{it-1}^1) \cdot r_t, u_{it-1} \cdot r_{t-1}^2]$ will be equal to zero. This assumption can be justified by the fact that we do control for time fixed effect in all of our regressions. However, given the positive correlation of r_t and r_t^2, the term $cov[(X_{it}^1 - X_{it-1}^1) \cdot r_t, u_{it} \cdot r_t^2]$ can still be negative which biases the OLS estimates of MPC in the first difference setting.

However, our IV methodology ignores any variation in the capital gains that is originated from the changes in households' portfolios across two years and only relies on the changes in the capital gain that would have happened in the absence of any such changes (i.e. $X_{it-1}^1 \cdot (r_t - r_{t-1})$). Therefore, the requirements for the impact of capital gain measurement error on our first difference IV estimate to be negligible is similar to the requirements for running the level regressions.

B.3. Household portfolio turnover and capital gain measurement error

While we cannot test directly the size of the bias in our first difference IV estimates, we now compare the estimated MPCs for households with high vs. low average annual turnover to provide suggestive evidence on the size of the measurement error bias induced by lack of data on capital gains. This comparison is not perfect, because the selection into high versus low turnover is endogenous and can be correlated with behavioral characteristics of households that may directly affect their consumption behavior. Moreover, our measure of household portfolio turnover is based on the annual turnover of household portfolios and not portfolio turnovers within the year. However, it is difficult to imagine that annual turnover and turnover within the year are not highly correlated with each other.

To be specific, we define a measure of similarity of household portfolios across years based on the share of each stock or mutual fund for each household portfolio in a given year and divide our sample in each wealth group into a high versus low turnover group. Table VII shows similar estimates for the estimated MPC out of capital gains for low and high turnover households across different wealth groups. Again, this result is suggestive of the limited importance of the measurement error in capital gains in our first difference IV estimates of MPC. However, as mentioned before, low turnover households are different from high turnover households and are more likely to have more passive investment strategies and for example they can be more likely to opt in automatic reinvestment of their dividends, which will result in lower MPC out of dividends for this group.

VI. Heterogeneity

To provide further evidence on the mechanisms behind the results, we examine whether households with different access to liquid wealth and those in different parts of their life cycle exhibit heterogeneous consumption responses to changes in their portfolio returns.

To investigate the effect of access to liquid wealth, we define "buffer-stock" households as those whose level of liquid wealth (cash, stocks, funds, bonds, and endowment insurance) is less than 6 months of disposable income and ask whether the response to capital gain differs with being liquidity constrained.[29] For each wealth group, we interact capital gain and dividend income with a dummy indicating whether a household is a "buffer-stock" household and employ the corresponding instrumental variables. Note that hardly any households in the top 10% of the distribution qualify as "buffer-stock", and as a result, we do not have any reliable interaction estimates for households in those two groups.

Table VIII reports the results. We find that the interaction coefficients for capital gain are statistically and economically significant. The results indicate that when households have access to "high enough" liquidity, response to capital gain shocks varies much less across different wealth groups. The result on the interaction term with capital gain also shows that the buffer-stock households have significantly higher MPC out of capital gain. While this result is consistent with the prediction of life cycle consumption models with financial frictions, such as Carroll (1997) and Gourinchas and Parker (2002), it can also be consistent with a model in which both lower financial wealth and higher MPCs are caused by the households being less patient.

The interaction terms with dividends are positive, but not statistically significant. This can be partly rationalized by the fact that, even in models with financial frictions and precautionary saving motivation, households' consumption response to permanent changes is not a function of how financially constrained the household is and is close to one. To the extent that changes in dividend payments are perceived by households as relatively stable, we should expect less heterogeneity in MPC out of dividend income between buffer-stock households and other households. The second reason for the insignificant coefficient is that shocks to dividend income (especially for households in the bottom 90th percentile of wealth distribution) account

[29] The 6-months of income threshold used here is somewhat arbitrary, but the results are also robust to using 3 or 9 months of income as the threshold.

for less than 1% of households' annual income. This can make the standard errors in our estimates of the MPC out of dividend income larger, which makes it even more difficult to find a significant difference between MPC out of dividends for buffer-stock households compared to other households.

We also examine whether households in different parts of their life cycle exhibit heterogeneous consumption responses to changes in their portfolio returns. To do so, we report the estimates separately for three age groups: less than 40, between 40 and 55, and between 55 and 65 in Table IX. What seems to be clear here, especially in the case of heterogeneous response to portfolio return, is that households consume more out of capital gains as they get older. This is consistent with the predictions of life cycle models with less than complete bequest motive, in which older unconstrained households have higher MPC out of transitory income or wealth shocks, since they consume those gains over a shorter period of time and face significantly less uncertainty about their lifetime income and wealth.

VII. Robustness Analysis

So far, we have abstracted from the potential role of other types of wealth in our regressions. One could imagine that passive capital gains could be correlated with changes in housing wealth or financial wealth net of portfolio. To investigate this, we add these controls and instrument changes in housing wealth with the average changes at the municipality level. The results are presented in Table X. The coefficient estimates for capital gains and dividend income are not significantly affected. This suggests that our coefficients of interest are not driven by changes in the value of other types of wealth.

Additionally, although in our analysis all the variation in capital gains comes from passive movements in individual stock prices, one may be concerned about the potential determinants of the static portfolio choice of households, such as the riskiness of household income or the co-movement of household income with the aggregate economy, and how those affect household consumption. In order to alleviate these concerns, we go further by directly matching households based on several characteristics, such as their financial wealth, age, income, portfolio's dividend yield, portfolio's value, and share of directly held holdings (i.e. not held through mutual funds).

Specifically, we define bins based on: 10 wealth deciles, 9 age groups between 18 and 65, 10 income deciles within each wealth group, and 5 groups based on the share of directly

held stocks within each wealth group. This results in 4,500 finely defined groups. We then re-estimate our baseline regression in Table III, but let observations in each of these 4,500 bins to have a different time trend. In other words, we only exploit the variation in capital gains and consumption within these very narrowly defined groups in order to estimate the MPC out of capital gain and dividend income. The results are presented in Table XI and overall confirm our previous findings.

In order to ensure that we are not capturing an spurious correlation between the stockholding of individuals and their consumption, in Table IAVI we run placebo regressions in which we match non-stockholders with a stockholder that looks closest to them based on observable factors like wealth, age and income and investigate whether the imputed consumption of the non-stockholders is correlated with the capital gains and dividend income of their matched stock holders. Indeed we find that the estimated placebo MPCs are not significantly different from zero.

Finally, in our most restrictive specification, we use the variation for households who share the same employer (for the head of the household) and also have similar wealth, income, age and share of stocks in their portfolios. The same employer requirement ensures that our results are not driven by any differential exposure of households' income to the business cycle. In particular, we define new bins based on each employer (firm) in our data, five wealth groups, four income quartiles within each wealth group, three age groups (less than 35, 35-50, and older than 50) and two groups based on the share of stocks within each wealth group. Then we allow for workers within each bin to have a different time trend. The results are reported in Table XII and confirm our baseline estimates.[30]

Another potential concern might be about the role of differential exposures to aggregate risk factors in creating bias. Households with different portfolio weights might also have different consumption growth paths. To shed light on whether the observed return differences in the cross section are capturing ex-ante differences in loading on different risk factors or ex-post idiosyncratic differences, we decompose our measure of total capital gains into a part that can be explained by the loading on the four factor model and a residual (idiosyncratic returns), and then replicate our MPC regressions. The idea is that even if households endogenously

[30] Note that the number of observations within each wealth category that we use to present results is reduced to less than half of the number of observations in Table III. This is because for this specification we require at least two workers with the same employer and the same bin based on wealth, income, age and stocks share. Also, the reason that we have fewer wealth/income/age/share of directly held stock groups than the previous exercise is to have enough number of final bins containing at least two households.

choose the loading of their portfolio on different factors, it will be difficult for them to predict the idiosyncratic component of their returns. To be clear, we do not argue that the factor related returns are expected, although they may be correlated with consumption growth. We only need to assume that households do not have any predictive ability about the idiosyncratic component of their returns and therefore, do not endogenously sort their portfolio based on that.

In order to perform this exercise, we use a two-year rolling window to estimate the loading of each individual stock or mutual fund on the Swedish stock market index and the four factor model for Sweden and decompose each individual stock's return into factor related and idiosyncratic returns.

The results presented in Table XIII show that, once we control for individual characteristics, such as financial wealth, income and demographics as well as time fixed effects, which are all likely to drive the loading on the different factors, our estimated MPCs are driven by the idiosyncratic component of the returns. Since most people are exposed to the stock market through index funds, our controls are likely to capture most of the variation generated by the factor related returns as this will be common across individuals. This is likely to explain why the factor related returns do not seem to be driving households' consumption decision in a significant way.

VIII. Conclusion

This paper takes advantage of a unique administrative dataset containing household level information on stock holdings and imputed consumption for the entire Swedish population to analyze whether stock market trends drive households' spending habits and whether this link depends on households' overall wealth.

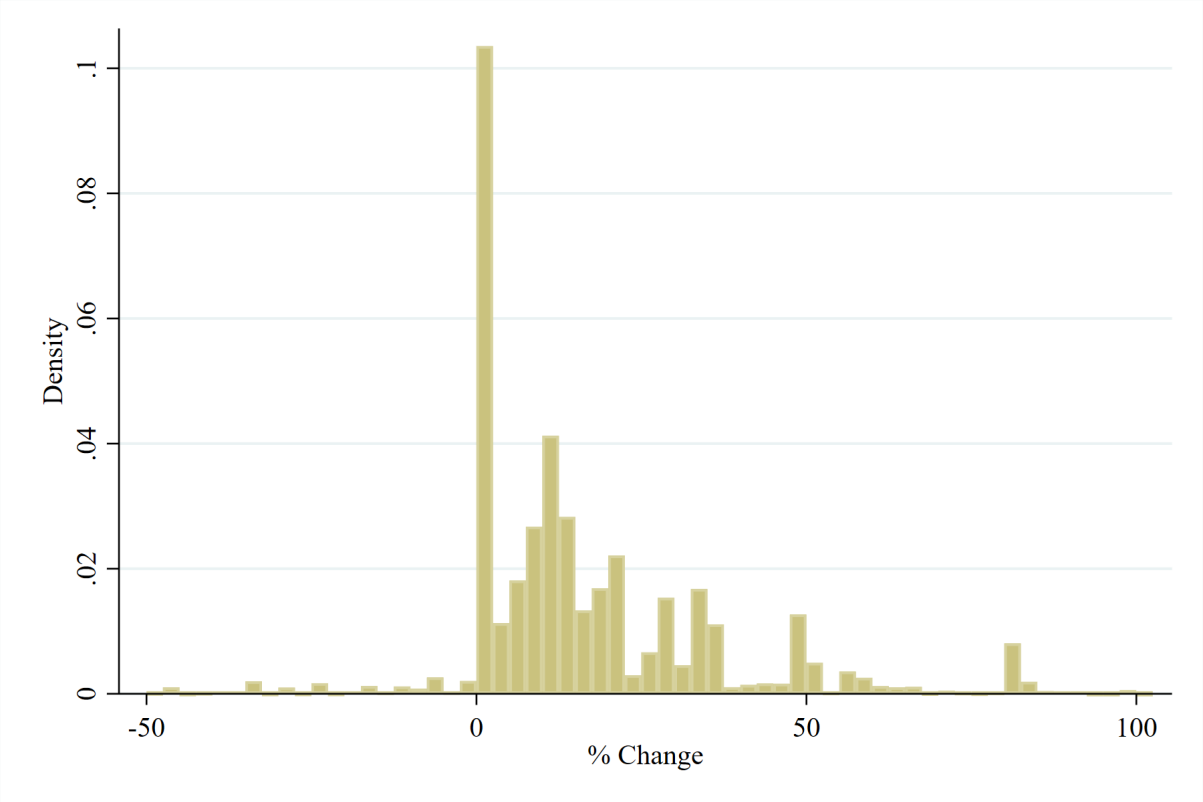
Two main advantages of our approach set this paper apart from the existing literature. First, we are able to address the endogeneity issues arising from the fact that a change in portfolio value could be the result of passive changes in asset prices as well as active (endogenous) rebalancing of portfolio and that factors, such as income shocks or bonus payments, might increase both household consumption and household stockholdings by fixing the portfolio weights of the households when computing the capital gains and the dividends to the ones observed in previous years. Second, the scope of our data allows us to investigate the heterogeneity in households' response depending on the level of household wealth.

We uncover three main findings. First, we show that the MPC out of capital gains for the households in the top 50% of the financial wealth distribution varies between 3-7% and it generally goes down with wealth. On the other hand, it is significantly higher for the bottom 50% of the distribution. Importantly, we show that in the absence of limited access to liquid wealth, there is not much heterogeneity in MPC out of stock wealth among households in different parts of the wealth distribution. This is consistent with models of buffer-stock consumption in which households with high enough liquid wealth behave according to the predictions of permanent income hypothesis.

We also find that the MPC out of dividends, for all of our wealth groups, is much larger than the MPC out of capital gains. Higher MPC out of dividend payments is consistent with a near rational behavior in which households optimize their consumption with respect to capital gains and dividends income as if they were separate sources of income.

To provide further evidence on the mechanisms driving the results, and in addition to investigating the role of having access to *enough* liquid wealth compared to monthly disposable income, we also examine whether within each wealth group, households in different parts of their life cycle exhibit heterogeneous responses to changes in capital gains and dividend income. We find that among households with enough financial wealth, MPC out of capital gain is significantly larger for older households. This finding is consistent with life cycle models such as Gourinchas and Parker (2002) and Cocco, Gomes and Maenhout (2005) where older unconstrained households have higher MPC to transitory income (or wealth) shocks, since they consume those gains over a shorter period of time and they face significantly less uncertainty about their lifetime income and wealth.

Figure 1: Distribution of Percentage of Annual Changes in Dividend Payments



Note: This figure displays the distribution of the percentage of annual changes in dividend payments weighted by dividend amount at the firm level. The sample includes both domestic and foreign firms from Datastream and includes observations for years 1999-2007.

Table I: Summary Statistics

	p10	p25	p50	p75	p90	p99	mean	sd
Panel A: Entire Sample (6.35 m observations)								
Financial Wealth	18.12	48.93	128.82	319.7	690	2115	278	442.5
Stock Wealth	2.62	13.30	50.96	155.7	378.9	1376	147.4	285.9
Income	119.9	168.9	256.9	379.8	482.5	741.3	285.9	321.3
Consumption	115.4	165.6	261.9	400.2	549.8	984.3	307.2	255.3
Capital Gain	-17.64	-1.05	1.03	9.57	36.23	204.5	6.15	57.73
Dividend	0.001	0.081	0.465	1.670	4.634	20.83	1.851	4.568
Panel B: 0 - 50th percentile of financial wealth (2.49 m observations)								
Financial Wealth	8.41	19.79	44.66	83.55	131.6	274.2	60.80	59.44
Stock Wealth	0.65	3.98	14.90	37.64	69.67	157.91	27.30	35.73
Income	93.95	138.9	188.7	288.5	382.7	525.7	217.2	112.5
Consumption	103.7	140.3	194.8	301.4	418	708.3	235.1	140.6
Capital Gain	-3.76	-0.25	0.28	2.34	7.21	26.88	1.11	8.18
Dividend	0.00	0.012	0.115	0.376	0.782	2.008	0.287	0.546
Panel C: 50th - 70th percentile of financial wealth (1.65 m observations)								
Financial Wealth	50.67	103.35	184.36	305.2	465.3	829	228.7	178.7
Stock Wealth	9.24	32.48	86.95	173	292.9	610.1	125.77	131.6
Income	124	170.6	252.4	370.8	466.2	684.5	279.7	159.4
Consumption	114.4	164.7	257.2	386.2	521.2	899.5	295.7	282.8
Capital Gain	-23.12	-3.08	2.263	13.08	34.02	111.6	4.61	32.62
Dividend	0.014	0.213	0.799	1.907	3.599	9.134	1.450	2.102
Panel D: 70th - 90th percentile of financial wealth (1.62 m observations)								
Financial Wealth	72.83	142.7	290	562.3	927.7	1765	413	382.4
Stock Wealth	12.14	40.96	117.49	281.4	541.5	1265	213.8	268.4
Income	167.5	229.9	332.6	421.8	511.7	727.5	337.7	139.6
Consumption	149.5	222.6	331.2	452.6	588.1	975.1	356.9	189.9
Capital Gain	-31.24	-3.57	2.87	16.66	47.25	179.8	6.348	50.62
Dividend	0.058	0.348	1.202	3.242	6.921	19.63	2.673	4.249
Panel E: 90th - 95th percentile of financial wealth (361 k observations)								
Financial Wealth	140.4	280.8	579.4	1061	1630	2848	757.7	633.8
Stock Wealth	25.65	86.27	245.3	558	985.5	2065	400	448.4
Income	212.5	298.9	404.8	511.4	621	892.5	417.7	1181
Consumption	200.7	296.8	423.4	568.9	737.6	1203	455.7	523.8
Capital Gain	-77.13	-6.49	8.83	48.83	125.3	372.9	18.52	109.7
Dividend	0.193	0.847	2.755	7.089	13.78	34.44	5.398	7.408
Panel F: 95th - 100th percentile of financial wealth (226 k observations)								
Financial Wealth	218	456.4	965.6	1791	2787	5380	1299	1206
Stock Wealth	44.26	151.1	437.8	990.2	1748	3742	714.6	821.7
Income	253.4	354.1	478.1	616.3	771.4	1296	507.8	243.3
Consumption	253.6	376.5	536.5	733.4	977.7	1681	591.6	332.7
Capital Gain	-126.6	-11.93	15.25	90.69	230.4	651.5	37.37	191.0
Dividend	0.418	1.659	5.445	13.81	26.50	67.03	10.48	14.34

Notes: This table reports summary statistics of financial characteristics as well as imputed consumption of households in different wealth groups. Each observation refers to a household-year. Monetary values have been reported in 1,000 SEK. The sample includes observations for years 2001-2007 and is restricted to households (1) who participate in the stock market in two consecutive periods, (2) in which the head is younger than 65 years of age, (3) with a fixed number of members in two consecutive periods, (4) who remain in the same municipality, (5) where none of the members are self-employed, owns non-listed stocks, or any derivative products, and (6) who have neither moved nor received any cash flow from the sale of real estate. We also drop households for which we observe non-identified dividend payments. Finally, we drop households for which the calculated financial asset return on their portfolio of stocks and mutual funds is in the bottom 1% or the top 1% of the return distribution in each year, the change in financial cash flow is in the bottom or top 2.5% respective of corresponding year-specific distribution, dividend income over 3-year average income is in the top 0.5% of the distribution, capital gain over 3-year average income is in the bottom or top 0.5% of the distribution, or consumption over 3-year average income is in the bottom or to 0.5% of the distribution. Ranking in the distribution of financial wealth is based on financial wealth in year t-2 and is conducted before all other restrictions are imposed. Financial wealth includes bank accounts, bond holdings, as well as stock holdings. Stock wealth includes both direct holding of stocks as well as holding of mutual funds. Income includes both labor income and financial income minus dividend income plus transfers. Portfolio gain is the passive return on the portfolio of the household as of the year before. Dividend income is based on the dividends of identified assets. Consumption is imputed according to equation (1).

Table II: Stock Returns and Consumption – OLS Regressions

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.531	0.217	0.113	0.053	0.038
	(0.017)***	(0.007)***	(0.004)***	(0.005)***	(0.006)***
Dividend	0.385	0.311	0.362	0.308	0.170
	(0.122)***	(0.049)***	(0.039)***	(0.057)*	(0.030)**
Disposable income	0.767	0.786	0.691	0.696	0.761
	(0.004)***	(0.012)***	(0.020)***	(0.004)***	(0.014)***
Lag wealth	6.089	8.504	9.060	8.017	1.704
	(0.081)***	(0.121)***	(0.201)***	(0.198)***	(0.776)**
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.087	0.091	0.066	0.097	0.123

Notes: The table reports the OLS regression of change in households' consumption as a function of change in their capital gain and dividend income:

$$\Delta c_{it} = \beta_1\, \Delta Capital\ Gain_{it} + \beta_2\, \Delta Dividend\ Income_{it} + \beta_3 \Delta Income_{it} + \beta_4 \Delta Wealth_{it-1} + \beta_5 ND_{it,t-1} + \delta_t + \epsilon_{it}$$

The table reports five separate regressions for each wealth group and controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Wealth is represented in 1,000 SEK. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table III: Stock Returns and Consumption – IV Regressions

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.233	0.068	0.037	0.027	0.028
	(0.026)***	(0.008)***	(0.005)***	(0.007)***	(0.007)***
Dividend	0.560	0.601	0.512	0.587	0.386
	(0.109)***	(0.050)***	(0.038)***	(0.057)***	(0.030)***
Disposable income	0.766	0.786	0.690	0.696	0.661
	(0.004)***	(0.012)***	(0.020)***	(0.004)***	(0.014)***
Lag Wealth	6.991	8.251	8.820	7.867	1.683
	(0.081)***	(0.120)***	(0.196)***	(0.194)***	(0.766)**
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.081	0.089	0.062	0.097	0.123

Notes: The table reports the IV regression of change in households' consumption as a function of change in capital gain and dividend income when change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income: $X_{it-1}.(r_t - r_{t-1})$ and $X_{it-1}.(D_t - D_{t-1})$ where X_{it} is a vector of stockholding shares of household *i* in the beginning of year *t*; while r_t and D_t are vectors of stock returns and dividends, as defined in Section III of the paper. Wealth is represented in 1,000 SEK. Controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1, **=5%, *=10%).

Table IV: Stock Returns and Active Financial Saving – IV Regressions

Dependent Variable: Active Financial Saving					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Panel A: Capital Gain and Components of Household Financial Saving					
1.Portfolio Return	-0.223	-0.068	-0.037	-0.027	-0.028
	(0.026)***	(0.008)***	(0.005)***	(0.007)***	(0.007)***
(a) Portfolio	-0.313	-0.118	-0.100	-0.088	-0.074
	(0.024)***	(0.006)***	(0.008)***	(0.008)***	(0.012)***
(b) Bank Accounts	0.004	0.022	0.022	0.043	0.047
	(0.008)	(0.004)***	(0.004)***	(0.007)***	(0.009)***
(c) Debt	0.098	0.043	0.043	0.017	0.021
	(0.015)***	(0.006)***	(0.004)***	(0.005)***	(0.007)***
(d) Private Pension	0.000	0.000	0.006	0.005	0.001
	(0.001)	(0.001)	(0.001)***	(0.001)***	(0.004)
(e) Bonds	-0.005	-0.003	0.002	0.005	0.008
	(0.005)	(0.002)	(0.002)	(0.003)*	(0.005)
(f) Capital Insurance	-0.004	-0.009	-0.008	-0.010	-0.031
	(0.003)	(0.001)***	(0.001)***	(0.002)***	(0.003)***
(g) Debt Service	-0.003	-0.003	-0.002	0.000	0.000
	(0.001)***	(0.000)***	(0.000)***	(0.001)	(0.001)
Panel B: Dividend Income and Components of Household Financial Saving					
1.Dividend	0.440	0.399	0.488	0.413	0.614
	(0.110)***	(0.053)***	(0.039)***	(0.057)***	(0.028)***
(a) Portfolio	0.179	0.291	0.351	0.283	0.462
	(0.027)***	(0.031)***	(0.030)***	(0.122)***	(0.033)***
(b) Bank Accounts	0.140	0.056	0.041	0.034	0.064
	(0.049)***	(0.052)	(0.047)	(0.068)	(0.045)
(c) Debt	0.109	0.049	0.088	0.089	0.077
	(0.104)	(0.051)	(0.027)***	(0.036)**	(0.035)**
(d) Private Pension	0.000	0.000	0.001	0.001	0.004
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)***
(e) Bonds	0.000	0.001	0.004	0.003	0.002
	(0.014)	(0.021)	(0.015)	(0.016)	(0.017)
(f) Capital Insurance	0.000	0.001	0.003	0.003	0.005
	(0.009)	(0.004)	(0.011)	(0.090)	(0.010)
(g) Debt Service	0.012	0.001	0.000	0.000	0.000
	(0.004)***	(0.002)	(0.001)	(0.001)	(0.001)

Notes: The table reports the IV regression of change in one year active financial saving and its components, as a function of change in capital gain and dividend income for each wealth group. Portfolio gain and dividend income are instrumented by the passive capital gain and passive dividend income. Both active. Year fixed effects are included and standard errors are clustered at the household level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table V: Realized vs. Unrealized Capital Gain – IV Regression

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.172	0.051	0.042	0.046	0.043
	(0.041)***	(0.017)***	(0.012)***	(0.015)***	(0.013)***
Dividend	0.648	0.494	0.516	0.483	0.495
	(0.200)**	(0.058)***	(0.084)***	(0.087)***	(0.035)***
Realized Cap. Gain	0.430	0.485	0.116	0.212	0.101
	(0.049)***	(0.027)***	(0.055)**	(0.031)***	(0.056)*
Disposable income	0.736	0.793	0.686	0.703	0.735
	(0.007)***	(0.006)***	(0.041)***	(0.058)***	(0.018)***
Lag Wealth	6.903	7.139	10.488	9.316	6.603
	(0.104)***	(0.145)***	(0.225)***	(0.344)***	(0.451)***
Observations	771,036	501,804	420,437	121,349	91,315
R-squared	0.101	0.082	0.086	0.089	0.119

Notes: The table reports the IV regression of change in households' consumption as a function of change in capital gain and dividend income, controlling for the realized capital gains. Change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income: $X_{it-1}.(r_t - r_{t-1})$ and $X_{it-1}.(D_t - D_{t-1})$ where X_{it} is a vector of stockholding shares of household i in the beginning of year t; while r_t and D_t are vectors of stock returns and dividends, as defined in Section III of the paper. The sample is restricted to years 2005-2007 (i.e. 2006 and 2007 in the difference regressions). Other controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table VI: Measurement Error Robustness – Measurement error in Capital Gains

Dependent Variable	Capital Gain Measurement Error		Net Withdrawal (as share of last year assets)		
	(1) Level	(2) Share of last year assets	(3) Monthly	(4) Annual based on monthly data	(5) Annual based on Snapshot
Returns in month *t*			0.025 (0.003)***		
Dividends in month *t*			0.666 (0.046)***		
Annual capital gains based on monthly data				0.037 (0.012)***	
Annual dividend based on monthly data				0.439 (0.165)***	
Annual passive capital gains based on annual snapshot data	-0.022 (0.020)	-0.005 (0.003)			0.036 (0.013)***
Annual dividend based on annual snapshot data	-0.036 (0.106)	-0.014 (0.029)			0.339 (0.167)**
Observations	2,146	2,146	98,757	2,146	2,146
R-squared	0.022	0.001	0.003	0.011	0.008

Notes: The table reports regression results of the consumption measure (net withdrawals) as a function of capital gains and dividend income. The data used for the regressions comes from transaction level data from a large brokerage in the US (see Barber and Odean 2000 for more details) supplemented with monthly dividend distributions from CRSP. The data preparation follows the same steps in Baker, Nagel and Wurgler. (2007) which results in a dataset containing monthly household information on total portfolio value, net withdrawals (the consumption measure), capital gains, and dividend income. Column (1) shows the relationship between the measurement error in imputed capital gains due to lack of transaction level data and passive annual capital gains based on annual snapshot of the data. In Columns (2)-(5), similar to Baker, Nagel and Wurgler (2007), the dependent variables and all RHS variables are scaled by the previous-year's assets, such as in Column (2) is scaled by assets in year *t-1* and Column (3) is scaled by assets in month *t-12.* Column (2) repeats the analysis in Column (1) except for the normalized variables. Column (3) replicates the Table VI Regression 3 result in Baker, Nagel and Wurgler (2007). Column (4) investigates the relationship between net annual withdrawals and capital gains and dividend income based on monthly data. Column (5) only uses annual snapshots of the data to estimate the relationship between annual consumption and annual capital gains and annual dividend income. The net withdrawals and capital gains measures incorporate a proxy for stocks and funds bought and sold during the year using midyear (June) prices. Constant not reported in the table. Robust standard errors are reported. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table VII: Measurement Error Robustness – Stock Returns and Consumption for Low vs. High Turnover Households

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Low turnover					
Portfolio Return	0.292	0.085	0.026	0.023	0.024
	(0.038)***	(0.010)***	(0.006)***	(0.009)***	(0.010)**
Dividend	0.310	0.537	0.244	0.236	0.232
	(0.095)***	(0.079)***	(0.074)***	(0.096)***	(0.035)***
Observations	1,203,247	810,691	800,781	178,763	112,241
High turnover					
Portfolio Return	0.191	0.044	0.039	0.022	0.032
	(0.037)***	(0.011)***	(0.007)***	(0.010)**	(0.010)***
Dividend	0.844	0.576	0.601	0.684	0.416
	(0.267)***	(0.067)***	(0.050)***	(0.068)***	(0.066)***
Observations	1,203,246	810,688	800,777	178,763	112,241

Notes: Low vs. High Turnover has been defined based on the average turnover of a household in all periods within each wealth category. The table reports the IV regression of change in households' consumption as a function of change in capital gain and dividend income when change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income: $X_{it-1}.\left(r_t - r_{t-1}\right)$ and $X_{it-1}.\left(D_t - D_{t-1}\right)$ where X_{it} is a vector of stockholding shares of household *i* in the beginning of year *t*; while r_t and D_t are vectors of stock returns and dividends, as defined in Section III of the paper. Controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table VIII: Heterogeneity in Liquid Wealth over Income and Stock Market MPC

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.070	0.042	0.036	0.023	0.024
	(0.037)*	(0.008)***	(0.005)***	(0.007)***	(0.007)***
Return*Buffer-Stock	0.393	0.195	0.179		
	(0.043)***	(0.020)***	(0.024)***		
Dividend	0.563	0.607	0.509	0.579	0.382
	(0.405)	(0.065)***	(0.040)***	(0.053)***	(0.044)***
Div.* Buffer-Stock	0.034	0.048	0.062		
	(0.423)	(0.100)	(0.100)		
Controls	Y	Y	Y	Y	Y
Controls * Buffer-Stock	Y	Y	Y	Y	Y
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.084	0.092	0.066	0.098	0.124

Notes: The table reports the IV regression of change in households' consumption as a function of change in capital gain, change in dividend income, as well as those changes interacted with whether the household is a buffer-stock household (i.e. has financial saving less than 6 months of its disposable income). Changes in capital gain and dividend income are instrumented by their passive capital gain and passive dividend income. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table IX: Life Cycle and MPC out of Stock Market Capital Gain

Dependent Variable: Consumption				
	Financial Wealth Percentile	(1) Age<=40	(2) 40<Age<=55	(3) 55<Age<=65
Portfolio Return	5-50	0.244	0.322	0.346
		(0.035)***	(0.041)***	(0.051)***
	50-90	0.001	0.057	0.078
		(0.008)	(0.006)***	(0.006)***
	90-100	0.015	0.018	0.055
		(0.016)	(0.008)***	(0.007)***
Dividend	5-50	0.480	0.499	0.667
		(0.250)*	(0.129)***	(0.142)***
	50-90	0.450	0.551	0.647
		(0.073)***	(0.046)***	(0.062)***
	90-100	0.586	0.418	0.493
		(0.101)***	(0.040)***	(0.045)***

Notes: The table reports the IV regression of change in households' consumption as a function of change in capital gain and dividend income for different age and wealth groups. Each cell is related to a separate regression. Change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income: $X_{it-1}.(r_t - r_{t-1})$ and $X_{it-1}.(D_t - D_{t-1})$ where X_{it} is a vector of stockholding shares of household *i* in the beginning of year *t*; while r_t and D_t are vectors of stock returns and dividends, as defined in Section III of the paper. Wealth is represented in 1,000 SEK. Controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table X: Robustness Check I - Controlling for Other Types of Wealth

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.221	0.074	0.050	0.036	0.030
	(0.027)***	(0.008)***	(0.005)***	(0.007)***	(0.007)***
Dividend	0.533	0.558	0.536	0.573	0.418
	(0.112)***	(0.046)***	(0.035)***	(0.065)***	(0.029)***
Home value	107.3	28.90	42.86	46.78	35.64
	(7.537)***	(4.390)***	(2.915)***	(4.905)***	(4.888)***
Fin. Wealth net	0.390	0.305	0.248	0.223	0.147
of portfolio	(0.007)***	(0.005)***	(0.007)***	(0.012)***	(0.010)***
Disposable income	0.806	0.688	0.719	0.697	0.779
	(0.005)***	(0.010)***	(0.018)***	(0.004)***	(0.014)***
Lag Fin. Wealth	5.511	7.524	8.545	7.885	1.683
	(0.113)***	(0.128)***	(0.195)***	(0.214)***	(0.776)*
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.071	0.077	0.079	0.094	0.147

Notes: The table reports the IV regression of change in households' consumption as a function of change in capital gain and dividend income when change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income. The change in home value has been instrumented by the change in the average home value at the municipality. Wealth is represented in 1,000 SEK. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table XI: Robustness Check II – Non-Parametric Controls for Income, Age, and Financial Characteristics

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.249	0.093	0.039	0.026	0.022
	(0.040)***	(0.019)***	(0.006)***	(0.007)***	(0.009)**
Dividend	0.502	0.537	0.566	0.591	0.413
	(0.118)***	(0.049)***	(0.041)***	(0.058)***	(0.033)***
Disposable income	0.794	0.752	0.709	0.730	0.688
	(0.005)***	(0.007)***	(0.012)***	(0.009)***	(0.015)***
Lag Wealth	7.172	8.013	7.725	6.948	2.391
	(0.093)***	(0.120)***	(0.202)***	(0.189)***	(0.552)***
Observations	2,340,428	1,647,177	1,620,781	313,740	189,920
R-squared	0.141	0.182	0.164	0.208	0.241

Notes: To get these estimates, we first define 4,500 bins based on: 10 wealth deciles, 9 age groups between 18 and 65, 10 income deciles within each wealth group, and 5 groups based on the share of directly held stocks within each wealth group. Then we repeat the exercise in Table III replacing year fixed effects with 4,500*6 (27,000) bin-year fixed effects. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table XII: Robustness Check III – Exploiting Variations between Similar Workers Sharing the Same Employer

Dependent Variable: Consumption					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio Return	0.239	0.086	0.041	0.032	0.027
	(0.056)***	(0.033)***	(0.012)***	(0.018)*	(0.020)
Dividend	0.713	0.556	0.615	0.416	0.424
	(0.294)**	(0.096)***	(0.053)***	(0.102)***	(0.154)***
Disposable income	0.763	0.779	0.661	0.714	0.692
	(0.011)***	(0.019)***	(0.026)***	(0.029)***	(0.037)***
Lag Wealth	6.825	7.792	7.638	6.477	1.992
	(0.147)***	(0.203)***	(0.255)***	(0.216)***	(0.638)***
Observations	933,673	705,632	612,663	67,932	37,161
R-squared	0.355	0.394	0.406	0.462	0.499

Notes: To get these estimates, we first define bins based on: each employer (firm) in our sample of households, five wealth quintiles, three age groups between 18 and 65, four income quartiles within each wealth group, and two groups based on the share of directly held stocks within each wealth group. Then we repeat the exercise in Table III, replacing year fixed effects with bin-year fixed effects. Standard errors are clustered at the household level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table XIII: Stock Returns and Consumption: Factor Related vs. Idiosyncratic Returns 2003-7

	Dependent Variable: Consumption				
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Portfolio return-	0.014	0.002	0.003	0.004	0.021
predicted by four factor model	(0.017)	(0.011)	(0.006)	(0.008)	(0.008)***
Portfolio idiosyncratic returns	0.274	0.071	0.036	0.033	0.023
	(0.012)***	(0.008)***	(0.006)***	(0.007)***	(0.013)*
Dividend	0.685	0.642	0.480	0.481	0.352
	(0.116)***	(0.050)***	(0.041)***	(0.055)***	(0.031)***
Disposable income	0.752	0.788	0.695	0.696	0.745
	(0.005)***	(0.010)***	(0.024)***	(0.004)***	(0.016)***
Lag wealth	6.948	7.590	8.461	8.264	1.709
	(0.091)***	(0.138)***	(0.228)***	(0.226)***	(0.840)**
Observations	1,891,747	1,221,282	1,205,877	286,164	186,805
R-squared	0.061	0.063	0.022	0.091	0.113

Notes: The table reports the IV regression of change in households' consumption as a function of *factor related* and *idiosyncratic* change in capital gain as well as dividend income. In order to perform this exercise, we use a two-year rolling window to estimate the loading of each individual stock or mutual fund on the Swedish stock market index and the four factor model for Sweden and decompose each individual stock's return to the part predicted by the four factor model and the residual part (idiosyncratic returns). Change in capital gain and dividend income is instrumented by their passive capital gain and passive dividend income. The sample is restricted to the 2002-2007 period (2003-2007 difference). Wealth is represented in 1,000 SEK. Controls include income (net of dividend payment), one year lagged financial wealth of the household as well as, $ND_{it,t-1}$, a dummy equal to one if the household did not receive any dividend in both periods t and $t-1$. Year fixed effects are included and standard errors are clustered at the household level. See notes of Table I for description of variables and the restrictions on the sample. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table AI: Summary Statistics of Stock Wealth (Survey of Consumer Finances)

	p25	p50	p75	p90	p99	mean	sd	Total ($ Tr)
Panel A: Entire Sample (31,240 observations, 126.0m weighted)								
Financial Wealth	1.8	22	155	598	5,484	334	2,470	42.1
Stock Wealth	0	3.5	91	420	3,485	218	1,559	27.4
Directly Held Stocks	0	0	0	7	800	46	1,068	5.74
Quasi-liquid Retirement	0	1.1	67	310	1,712	119	414	15.0
Stock Mutual Funds	0	0	0	0	1,000	47	647	5.94
Combination and Other	0	0	0	0	25	6	282	0.76
Panel B: 0 – 50th percentile of financial wealth (12,723 observations, 63.0m weighted)								
Financial Wealth	0.4	1.9	7	14	21	4.6	5.7	0.29
Stock Wealth	0	0	0	5	17	1.4	3.6	0.09
Directly Held Stocks	0	0	0	0	1.7	0.07	0.8	0.00
Quasi-liquid Retirement	0	0	0	5	16	1.3	3.4	0.08
Stock Mutual Funds	0	0	0	0	0	0.03	0.5	0.00
Combination and Other	0	0	0	0	0	0	0	0.00
Panel C: 50th – 70th percentile of financial wealth (5,086 observations, 25.2m weighted)								
Financial Wealth	33	51	73	90	103	54	23	1.37
Stock Wealth	7	25	48	70	100	30	26	0.76
Directly Held Stocks	0	0	0	2	30	1.5	6.1	0.04
Quasi-liquid Retirement	1.3	23	45	66	100	28	26	0.69
Stock Mutual Funds	0	0	0	0	32	1.2	6.5	0.03
Combination and Other	0	0	0	0	0	0.2	0.5	0.00
Panel D: 70th – 90th percentile of financial wealth (6,153 observations, 25.2m weighted)								
Financial Wealth	155	221	348	473	583	261	131	6.58
Stock Wealth	90	152	251	3,800	530	178	132	4.49
Directly Held Stocks	0	0	0	30	200	12	42	0.30
Quasi-liquid Retirement	50	1,240	220	348	502	151	128	3.81
Stock Mutual Funds	0	0	0	45	240	14	47	0.35
Combination and Other	0	0	0	0	50	1.4	14	0.04
Panel E: 90th – 95th percentile of financial wealth (2,032 observations, 6.3m weighted)								
Financial Wealth	688	819	1,00	1,174	1,280	861	199	5.42
Stock Wealth	466	632	810	990	1,180	628	275	3.96
Directly Held Stocks	0	0	60	250	700	71	149	0.45
Quasi-liquid Retirement	200	483	687	888	1,140	465	311	2.93
Stock Mutual Funds	0	0	75	366	700	82	166	0.52
Combination and Other	0	0	0	0	800	11	83	0.07
Panel F: 95th – 100th percentile of financial wealth (5,246 observations, 6.3m weighted)								
Financial Wealth	1,68	2,321	4,47	8,784	3,175	4,515	10,135	28.5
Stock Wealth	1,22	1,654	3,00	5,780	1,886	2,879	6,371	18.1
Directly Held Stocks	0	70	554	1,600	7,620	787	4,712	4.96
Quasi-liquid Retirement	450	935	1,55	2,357	5,300	1,189	1,344	7.49
Stock Mutual Funds	0	100	800	2,000	9,120	800	2,781	5.04
Combination and Other	0	0	0	50	1,810	103	1,256	0.65

Note: This table reports summary statistics of household stock wealth and its components in thousands of USD, as reported by the Survey of Consumer Finances (SCF). Note that this sample includes both stockholders and non-stockholders. Each observation refers to a household-year. The sample includes observations for the year 2016. Because the SCF is not an equal-probability design (some types of households are overrepresented, particularly those with higher financial wealth), the Federal Reserve assigns analysis weights to each household in the sample. These weights were used in calculating the summary statistics reported above, and each panel reports the number of actual observations used as well as the equivalent number of observations in the weighted sample. Stock wealth is the sum of directly held stocks, quasi-liquid retirement accounts, stock mutual funds, and combination (/other) mutual funds. Share is the share of stock wealth for each group that is outside the retirement accounts.

Table AII: Summary of Literature Review

Panel A: Wealth Effects in Aggregate Data				
	Country/Data	Sample Period	MPC	Elasticity
Davis and Palumbo (2001)				
Financial Wealth	US/FFA and NIPA	1960-2000	0.057	0.07
Nonfinancial Wealth			0.08	0.36
Case, Quigley and Shiller (2013)				
Financial Wealth	USA States/FFA, SCF, CPH	USA : 1978-2009	0-0.06	-
Housing Wealth			0.04-0.15	-
Carroll, Misuzu and Slacalek (2011)				
Financial Wealth	USA/FFA and NIPA	1960-2007	0.06	-
Housing Wealth			0.09	-
Carroll and Zhou (2012)				
Financial Wealth	USA/Various	2001-2005	0.00*	-0.02*
Housing Wealth			0.05	0.24

Panel B: Wealth Effects in Survey Data				
	Country/Data	Sample Period	MPC	Elasticity
Dynan and Maki (2001)				
Equity	USA/CEX	1983-1999	0.05-0.15	-
Guiso, Paiella, and Visco (2006)				
Financial Wealth	Italy/SHIW	1991-2002	0.04	-
Housing Wealth			0.02	0
Baker, Nagel and Wurgler (2007)				
Total Stock Returns	USA/CEX	1988-2001	-0.01*	0.004*
Dividends			0.75	0.23
Grant and Peltonen (2008)				
Equity	Italy/SHIW	1989-2002	0.004	-
Housing Wealth			0.08	-
Bostic, Gabriel and Painter (2009)				
Financial Wealth	USA/FFA and CEX	1989-2001	-	0.02
Housing Wealth			-	0.06
Paiella and Pistaferri (2017)				
Financial Wealth	Italy/SHIW	2008-2010	-	-0.07*
Housing Wealth			-	0.03

Notes: * Not statistically significant

Table AIII: Sample Selection

Criteria Applied	Number of Observations Remaining
Households whose head is between the ages of 18 and 65	20,406,435
Participated in the stock market in two consecutive periods	12,813,758
Fixed number of family members across the two periods	10,895,293
No entrepreneurs in household in two consecutive periods	9,911,965
Did not move across municipalities and did not have real estate cash flow in two consecutive periods	8,643,639
Did not own derivatives	8,460,112
No unidentified dividend	7,156,787
Drop households for which financial asset return is in the top or bottom 1% of the distribution in each year	7,029,328
Drop households for which change in financial cash flow is in the top or bottom 2.5% of the distribution in each year	6,789,877
Drop households for which dividend over 3-year average income is in the top 0.5% of the distribution	6,751,108
Drop households for which capital gain or consumption over 3-year average income is in the top or bottom 0.5% of the distribution	6,624,248
Drop households with negative consumption	6,350,712

Table AIV.1: First Stage for the Capital Gain

Panel A: First Stage with Controls					
Dependent Variable: Capital Gain					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Passive Capital Gain	0.714	0.761	0.844	0.852	0.894
	(0.013)***	(0.003)***	(0.002)***	(0.003)***	(0.004)***
Passive Dividend	0.171	-0.095	0.001	-0.067	0.137
	(0.045)***	(0.038)**	(0.024)	(0.046)	(0.065)**
Income	-0.001	-0.000	-0.003	0.000	-0.010
	(0.000)***	(0.000)	(0.001)***	(0.000)***	(0.005)*
Lag Financial Wealth	-0.049	-0.153	-0.198	0.013	0.055
	(0.005)***	(0.010)***	(0.015)***	(0.027)	(0.028)*
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.362	0.625	0.690	0.748	0.794

Panel B: First Stage without Controls					
Dependent Variable: Capital Gain					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Passive Capital Gain	0.714	0.762	0.844	0.852	0.894
	(0.013)***	(0.003)***	(0.002)***	(0.003)***	(0.004)***
Passive Dividend	0.166	-0.105	-0.012	-0.066	0.136
	(0.045)***	(0.038)***	(0.024)	(0.046)	(0.063)**
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.362	0.623	0.689	0.745	0.793

Notes: The table reports the first stage of IV regressions in Table III where actual capital gain is instrumented by passive capital gain. The RHS specification in this Panel A is exactly the same as in Table III, while Panel B removes the controls. Year fixed effects are included and standard errors are clustered at the household level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Table AIV.2: First Stage for the Dividend Income

Panel A: First Stage with Controls					
Dependent Variable: Dividend Income					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Passive Capital Gain	-0.002	-0.003	-0.004	-0.005	-0.005
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Passive Dividend	0.219	0.188	0.211	0.180	0.259
	(0.016)***	(0.013)***	(0.005)***	(0.018)***	(0.007)***
Income	0.000	0.000	0.000	-0.000	-0.001
	(0.000)***	(0.000)	(0.000)	(0.000)***	(0.001)
Lag Financial Wealth	0.006	0.017	0.022	0.029	0.005
	(0.000)***	(0.001)***	(0.001)***	(0.002)***	(0.002)**
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.084	0.107	0.141	0.139	0.167

Panel B: First Stage without Controls					
Dependent Variable: Dividend Income					
	(1)	(2)	(3)	(4)	(5)
Wealth Group	5_50	50_70	70_90	90_95	95-100
Passive Capital Gain	-0.002	-0.003	-0.004	-0.005	-0.005
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Passive Dividend	0.220	0.189	0.212	0.181	0.259
	(0.016)***	(0.013)***	(0.005)***	(0.018)***	(0.007)***
Observations	2,495,037	1,647,177	1,620,781	361,389	226,328
R-squared	0.084	0.106	0.140	0.139	0.166

Notes: The table reports the first stage of IV regressions in Table III where actual dividend income is instrumented by passive dividend income. The RHS specification in this Panel A is exactly the same as in Table III, while Panel B removes the controls. Year fixed effects are included and standard errors are clustered at the household level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

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