Fully Closed: Individual Responses to Realized Capital Gains and Losses*

Steffen Meyer† and Michaela Pagel‡

April 24, 2018

Abstract

We use transaction-level data for portfolio holdings and trades as well as account balances, income, and spending of a large sample of retail investors to explore how individuals respond to realized capital gains and losses. To identify the effects of realized gains and losses, we exploit plausibly exogenous mutual fund liquidations. Specifically, we estimate the marginal propensity to reinvest out of one dollar received from a forced sale event when the investor either achieved a capital gain or a loss relative to his or her initial investment. Theoretically, if individuals held optimized portfolios, the marginal propensity to reinvest out of forced liquidations should be 100% independent of realizing a gain or a loss. Individuals should just reinvest all of their liquidity immediately into a fund with similar characteristics. Empirically, individuals keep a share of their newly found liquidity in cash, save it, consume it, or reinvest it into different funds, stocks, or bonds. Moreover, individuals reinvest 80% if the forced sale resulted in a capital gain, but only 40% in the event of a loss. Such differential treatment of gains and losses is inconsistent with active rebalancing or tax considerations, but consistent with mental accounting and the idea that individuals treat realized losses differently from paper losses (Barberis and Xiong, 2012; Imas, 2016).

Keywords: reinvestment of capital gains and losses, realization effect, risk-taking after losses

*We thank Paul Tetlock, Jonathan Parker, Justine Hastings, Stijn Van Nieuwerburgh, Florian Peters, Marina Gertsberg, Kent Daniel, and Gur Huberman for valuable comments as well as seminar participants at Tsinghua Business School, CKGSB, and Frankfurt School of Finance. This research would not have been possible without the collaboration of a German bank. We gratefully acknowledge provision of data from this bank. We thank this bank and all its employees who helped us.

†Leibniz University of Hanover; meyer@gif.uni-hannover.de

‡Columbia Business School, NBER, and CEPR; mpagel@columbia.edu

1 Introduction

Fluctuations in stock prices should affect households' savings and consumption decisions, after all, stock and mutual fund holdings represent a significant fraction of household financial wealth – comparable to the stock of housing wealth. At the same time, stocks and funds are very liquid, much more so than housing wealth, and can be easily monetized any time when individuals adjust consumption or other liquidity needs arise. However, fluctuations in stock prices may be a source of emotional stress for investors making them reluctant to invest in the first place, rebalance optimally, or liquidate to consume. While the theoretical literature makes clear predictions about how individuals should respond to changes in the value of their stockholdings (independent of whether or not those are liquidated, if transaction costs and tax considerations are negligible), empirical evidence about how individuals respond to paper versus realized capital gains and losses remains scarce.

Clearly, estimating the marginal propensity to consume or reinvest out of stock price changes or liquidations is difficult. Aggregate fluctuations in stock prices are endogenous with respect to other macroeconomic shocks, such as income growth and consumer confidence. Therefore, the relationship between aggregate consumption and stock price fluctuations will be overestimated due to common shocks. Common shocks are arguably less problematic when utilizing individual-level data and computing abnormal returns. This way, one could sensibly estimate the marginal propensity to consume out of unrealized capital gains or irregular dividends. However, if one were to look at realized capital gains, there are clear-cut endogeneity problems present. When individuals decide to liquidate stockholdings, they did so because they decided to either consume more or rebalance.

To investigate the effect of capital gains and losses on individual investor reinvestment, savings, and consumption, we use a unique panel dataset on the daily trading of 103,000 retail investors in Germany spanning the years 1999 to 2016. We precisely measure each individual's daily activity by his or her log in and trading behavior as well as their balances and transactions in all accounts. To estimate the causal effect of realized capital gains and losses, we utilize mutual fund liquidations. Mutual fund liquidations are arguably independent of individual retail investor characteristics and

thus constitute an exogenous source of forced liquidations. For the period from 2006 to 2016, we obtain and use the International Securities Identification Number (ISIN) and dates of 3,306 mutual fund closures.

We estimate the effects of forced liquidations on reinvestment, savings, and consumption using either a time-series or cross-sectional approach. The former compares the same individuals before and after the forced liquidations, effectively employing an Event study or a Regression Discontinuity in Time (RDiT) design. The deployment of RDiT faces an number of challenges primarily due to its reliance on time-series variation for identification, which is different from the canonical cross-sectional identification of standard regression discontinuity (RD) designs. We argue that our setting is addressing all these challenges because we use high-frequency, high-accuracy, transaction-level data for different short bandwidths of time around a number of events alleviating concerns due to time-series trends and time-varying confounds. To complement the identification approach with cross-sectional variation, we use a diff-in-diff methodology with the universe of other investors or a matched group of investors based on portfolios and consumption patterns as the control group.

We find that individuals on average reinvest approximately 80% of their funds within a few days after the forced sale event. Furthermore, the reinvestment share is approximately 80% for capital gains but only 40% for capital losses. These findings are not consistent with the idea that individuals hold optimized portfolios, actively rebalance, or optimize their taxes. If individuals held optimized portfolios in the first place, they would reinvest 100% of their newly found liquidity in a fund with similar characteristics. If individuals held suboptimal portfolios in the first place because of tax considerations, they may take the forced sale event as an opportunity to rebalance and not reinvest 100% of their funds. However, in that case, they should always reinvest a loss at a higher rate than a gain. After all, losses should not be affected by tax considerations and, moreover, losses should not cause a rebalancing away from the initial amount of stockholdings.

We provide empirical evidence for the theoretical framework developed in Barberis and Xiong (2012) who explain the disposition effect via a utility function in which individuals narrowly frame utility over individual stock's sales or realizations. Because individuals dislike realizing losses more so than they like realizing gains, the utility specification explains the disposition effect. What

we observe is a reverse disposition effect after forced realizations (Chang et al., 2016) and fully consistent with the modeling assumptions put forward in Barberis and Xiong (2012). That our investors are subject to the disposition effect (Odean, 1998), and thus treat unrealized capital gains and losses very differently, has been documented by Koestner et al. (2017).

Imas (2016) develops a theoretical framework of dynamic cumulative prospect theory with mental accounting. After a paper loss, the mental account of prior outcomes remains open and the loss is evaluated jointly with the outcome, causing the individual to take on more risk to recover from it. A realized loss closes the associated mental account and resets the reference point. Closing the mental account in the red causes the individual to be sensitized to the prospect of further losses, leading him or her to take on less risk. In contrast, after a realized gain, the investor is not sensitized, resulting in the prediction that realized gains should result in more reinvestment than realized losses. Imas (2016) presents evidence for this framework in a series of lab experiments. Our results are unique in providing clean evidence from consequential investment decisions in the field, and can thus be seen as strong empirical support for the realization effect.

By showing that individuals do not rebalance in due course after forced sales, we conclude that they do not appear to hold optimized portfolios providing evidence for investor inattention and inertia following Bilias et al. (2010), Alvarez et al. (2012), Bonaparte and Cooper (2011), Calvet et al. (2009a,c), Karlsson et al. (2009), Brunnermeier and Nagel (2008), Agnew et al. (2003), Dahlquist and Martinez (2013), and Mitchell et al. (2006). As shown by Chien et al. (2012), Reis (2006), and Gabaix and Laibson (2002), such inattention matters in the aggregate.

By showing that individual's propensity to reinvest appears to be affected by losses, we provide new empirical evidence from observational data relating to a large literature on how prior losses affect subsequent risk-taking. The literature has analyzed risk-taking in response to losses in a variety of settings, including choices over lotteries in laboratory experiments (Thaler and Johnson, 1990), trading decisions of experienced market-makers (Coval and Shumway, 2005), IPO investors (Kaustia and Knüpfer, 2008; Anagol et al., 2015), and individuals receiving inheritances (Andersen et al., 2014). This research has produced contradictory results: some studies find that individuals become more risk-seeking following losses (Andrade and Iyer, 2009; Langer and Weber, 2008), while

other studies find the opposite, that they become more risk-averse (Shiv et al., 2005; Liu et al., 2010). Imas (2016) reconciles this evidence by arguing that individuals become more risk averse only after realized losses but not after paper losses (the realization effect).

In summary, we thus document that individuals hold suboptimal portfolios, potentially because they are inattentive and inert (Brunnermeier and Nagel, 2008). Furthermore, individuals' portfolio choices are significantly affected by the realizations of capital gains and losses. In that sense, our findings are evidence for mental accounting (Shefrin and Thaler, 1988) and we provide empirical evidence for realization utility and effects (Barberis and Xiong, 2012; Imas, 2016).

2 Data and Summary Statistics

Our data set stems from one of the largest online banks in Germany. An advantage of our data set is that we can exclude quasi-automatic trades, such as savings plan transactions. Additionally, trading decisions in our sample are not moderated by any influence from third parties, such as financial advisers. To further ensure that our sample includes only self-directed online consumers, we exclude all customers who are not self-directed. Further, we exclude transfers among personal accounts, saving plans and trades from limit orders, because this type of transactions do not reflect current trading decisions of investors. Moreover, we obtain data on customer demographics such as gender, age, and occupation as well as detailed information on traded securities such as asset class, risk class, issuer or issue date of a security.

We thus get information on a daily basis regarding logins (from 2012 onwards), trades, and portfolio holdings of approximately 103,000 customers as well as all balances and transactions of each investor's other accounts at the online bank from 1999 to 2016. We keep only private investors that reside in Germany. Moreover, in online banks, silent attribution is a common phenomenon, as usually there is no charge for having an account. Therefore, in order to not analyze accounts of investors who stopped trading, we require that individuals execute at least 1 trade per year.

Our sample is not representative for the German population as a whole; less than half of Germans are invested into equities, either directly or indirectly. However, it is a relatively representative

sample of self-directed retail investors in Germany. We think that this portion of the population is of particular interest and importance when thinking about measurement error in imputed consumption precisely because these individuals are the most likely to be performing substantial amounts of equity trades and seeing the greatest amount of heterogeneity in asset price growth.

Our sample does not comprise the entirety of the bank's customer base, but a roughly 10 percent sample of all customers. The bank did not pick the sample of retail investors by trading frequency but rather chose a random subsample of all bank users who held a brokerage account. In that sense, our sample is representative for individuals in Germany holding an investment portfolio at a major bank. The average age of investors is 53 and the median age is 52. 16.9 percent of our sample is female and 83.1 percent is male. Brokerage clients are generally expected (Cole et al., 2012) and found to be more sophisticated than the overall population (Dorn and Huberman, 2005). The same is true for our sample: 6 percent of our investors hold a doctoral degree, which is higher than average in the German population (of Statistics, 2011, 1.1%,).

Investors own portfolios that are worth 55,854€, on average. These descriptive statistics are comparable to those reported by household finance studies using US-data (Barber and Odean, 2000). In addition, we compare average portfolio values to official statistics in Germany. The Deutsche Bundesbank (2013) reports the average portfolio value of a German stock market investors to be around 48,000 Euros. This value seems comparable to the average values we observe in our sample. Additionally, we compare portfolio holdings to self-reported gross annual household incomes for those investors who reported these data. Since income is reported in several ranges, we use the midpoint of each range as a proxy for investor income. The mean ratio of the average portfolio value (over the entire sample period) to annual income is 1.3. For comparison, the ratio of total financial assets to gross household income in the German population is about 1.1 (of Statistics, 2008; Bundesbank, 2013).

We observe 3,606 fund closures roughly evenly distributed between 2006 and 2016 as can be seen in Figure 1. The information on fund closures was obtained from the Bundesverband Investment und Asset Management e. V. (BVI). The BVI is the point of contact for politicians and supervisory authorities on all issues related to the German Capital Investment Code (Kapitalanlagegesetzbuch,

KAGB), and represents the interests of the German fund industry at national and international level. Moreover, in Figure 2, we display the day of month and the day of week of all fund closures.

[Insert Figure 1 and 2 about here]

The SPIVA US Scorecard 2017 documents that over a 15-year period, 58% (48%) of equity (fixed income) funds were merged or liquidated and states that the main reason is continued poor performance. Brown and Goetzmann (1995), the forerunners of mutual fund termination studies, found that US mutual fund disappearance is a function of lagged relative returns, relative fund size, fund expenses, and fund age. Bu and Lacey (2009) argue that the importance of returns depends on the age and style of the fund and show that beyond returns also expenses, turnover, the S&P 500, and the short-term interest rate matter for mutual fund closures. Evans (2006) shows that total returns are more important than risk-adjusted returns in explaining mutual fund termination. When we look at our sample, we do not find underperformance relative to the fund's style class. Moreover, the total returns are for diversified mutual funds mostly determined by market conditions. In any case, we feel that is is unlikely investors can choose to invest into to-be-closed funds endogenously and thus consider liquidations as plausibly exogenous.

Of those 3,606 fund closures, we observe 2,228 forced sales, i.e., individuals affected by the mutual fund closures. Most forced sales happen in 2007 but we also observe many in 2008, 2013, and 2015, as can be seen in Figure 3. While our results may be specific to the year 2007, it is important to note that the financial crisis did not hit before the end of 2008. In that sense, our results are unlikely to be affected by the financial crisis.

[Insert Figure 3 about here]

Table 1 shows detailed summary statistics for our forced sales events including the holding periods before closure, the purchase and selling share prices, and the average value and return of the forced sales.

[Insert Table 1 about here]

Table 2 shows detailed summary statistics for the closed funds including the share of equity, bond, and balanced funds, as well as the average age (in months).

[Insert Table 2 about here]

Table 3 shows detailed summary statistics of assets under management for all funds that did not close or merge, funds that were closed, and funds that were merged. The row last total assets refer to the last value of total net assets right before closure or merger of the closed and merged funds or the total assets at the last observation for the non-closed or merged funds. Furthermore, Table 4 shows the raw return performance of all, closed, or merged funds from 2 years up to 1 day prior to the closing date. It can be seen that the closed funds did not necessarily perform much worse than the merged or the remaining universe of funds. In fact, in the raw return numbers there does not appear to be a clear pattern in terms of the decision to keep a fund alive or not. The size of the fund appears a more important factor than the performance.

[Insert Tables 3 and 4 about here]

Table 5 shows detailed summary statistics for our universe of investors relative to those affected by the fund closures, i.e., holding funds that were closed, and relative to those affected by the fund closures and ultimately forced to sell. It can be seen that the three samples of investors look very similar in terms of demographics and income.

[Insert Table 5 about here]

Figure 4 shows the average amounts (in Euros) of all fund liquidations per year. We can see that the average amounts are quite substantial ranging from 6,000€ to 10,000€. Clearly, the fund liquidation does not represent a wealth shock, but they are quite substantial liquidation shocks.

[Insert Table 4 about here]

3 Methodology

To identify the individuals affected by the forced sales and estimate the effect of capital gains and losses on individual investor reinvestment, savings, and consumption, we use the International Securities Identification Number (ISIN) and dates of 3,306 mutual fund closures as provided to us

by the Bundesverband Investment und Asset Management e. V. (BVI). We estimate the effects of forced liquidations on reinvestment, savings, and consumption in an Event study or a Regression Discontinuity in Time (RDiT) design. The RDiT design is prone to potential difficulties mainly because of the time series identification which is different from the canonical cross-sectional designs of standard regression discontinuity (RD) designs. In fact, as documented by Hausman and Rapson (2017), estimates may be biased if the time-series properties of the data are ignored, for instance in the presence of autoregressive processes. In contrast, tests for sorting or bunching near the discontinuity, as typically done for standard RD designs, are often irrelevant, making the methodology closer to an event study than a RD design.

The typical RDiT application in energy and environmental economics has the following features: (1) there is no cross-sectional variation in the experimental implementation, so a diff-in-diff framework is not possible; (2) the relevant variables are available at a high frequency over a long time horizon before and after the experiment; and (3) there exist potential time-varying confounders, but they must be assumed to change smoothly across the date of the experiment. We address the latter two concerns, by using transaction-level data that is measurement error free with homogeneous time bands around each event. Moreover, we are interested in relatively short-run effects, from the day of the announcement to approximately one month after, which makes potential time-series confounds less worrisome. Finally, because we use many events rather than just one, we are not concerned about other time-varying confounds.

Theoretically, the RDiT framework can be interpreted as good as a local randomized experiment solving selection concerns by randomly assigning subjects into control and treatment status in the same way as a canonical RD framework. The running variable is time itself, which, however, cannot be randomly assigned. However, we can safely argue that the forced sale date is randomly assigned to our investors as it is not chosen with individual-level investor characteristics in mind. Whether a given investor at a given date is affected by a forced sale event can be thought of as good as random. Nevertheless, covariates that are discontinuous in time, such as week-of-month effects need to be included as controls in an RDiT design, whereas in many cross-sectional RD frameworks these covariates are used only to improve precision (Lee and Lemieuxa, 2010). We thus have to flexibly

control for time. Similarly, to a cross-sectional RD framework, there is potential for bias when one chooses a time frame for the RDiT framework further away from the threshold. However, unlike many environmental applications, we only look at a short time window around the experiment date. Furthermore, given the size of our sample, we do not have to increase the time window to increase statistical power. Moreover, as discussed in Hausman and Rapson (2017), RDiT estimates may be biased if the time-series properties of the data are ignored, for instance in the presence of autoregressive processes. Whenever a potential liquidation of funds itself would cause further liquidations, our estimates may be biased upwards. While such autoregression is a potential concern in many environmental applications of RDiTs, it is not a concern here. After all, there are no wealth effects associated with the liquidation itself or the act of reinvesting the liquid funds (the wealth effects from potential fee payments can safely be seen as very small). Clearly, there may occur serial dependence in the residuals, which we address by clustering standard errors at the individual level. Finally, as in a standard RD design, one may worry about strategic behavior around the threshold. Clearly, using time as an assignment variable makes such test logically irrelevant. However, one may worry about a type of sorting when individuals change their behavior to avoid the treatment, in our setting, by selling before the forced sell, which is announced six months in advance. However, those individuals are easily observed and automatically excluded from the analysis as they are not affected by the forced sale.

Specifications

We consider two approaches, one "conditional cross-sectional" regression and one "unconditional panel" regression. The conditional cross-sectional regression is specified as follows:

$$\Delta Y^i_{j,j+\tau} = \alpha + \beta F^i_j + \gamma m_j + \theta y_j + \epsilon^i_j$$

where $\Delta Y^i_{j,j+\tau}$ is the sum of the outcome variable of interest for investor i at the time of the forced sale event j to $j+\tau$, F^i_j is the forced sale affecting investor i at time j, m_j is a month fixed effect, and y_j is a year fixed effect. We consider two bandwidths τ: five or thirty days since the day

that the money arrives in individual's accounts. Because the forced sale is exogenous to individual investors, other control variables are not necessary but may increase precision.

The unconditional panel regression is specified as follows:

$$\Delta Y^i_{t,t+\tau} = \eta_i + \gamma myw_t + \theta S^i_t + \beta F^i_t + \epsilon^i_t$$

where $\Delta Y^i_{t,t+\tau}$ is the the sum of the outcome variable of interest for investor i in the time frame t to $t+\tau$, η_i is an individual fixed effect, myw_t are time controls, week-of-month (if τ is less than 30 days), month, and year fixed effects as well as a forced sale indicator, S^i_t is any sale of investor i at time t, and F^i_t is the forced sale affecting investor i at time t.

Alternatively to looking at the forced sale events, we can look at individuals who decide to sell voluntarily either before the announcement of the fund closure or after the announcement of the fund closure, which is six months before the actual closure, but before the forced sale.

We adjust standard errors for heteroskedasticity. Alternatively, we can cluster standard errors at the ISIN level, which represents the treatment level though we do not think that standard errors are uncorrelated across ISINs and thus consider robust standard errors more appropriate.

Outcome variables

When investors make a trade or a position gets liquidated, then there occurs a transfer to the settlement account (Verrechnungskonto). The settlement account is an account dedicated for making trades and automatically opened when individuals open a portfolio. It pays some interest and is federally insured. We thus consider the following outcome variables: 1) transfers to the portfolio via purchases of securities (investment), 2) transfers to the checking account within in the bank (consumption), 3) transfers to the savings account within the bank (savings), and 4) transfers outside of the bank (residual transfers, likely consumption). All the variables are transfers and thus flow variables. Furthermore, we log all variables to take care of outliers and linearize potential non-linear relationships in line with our regression approach.

Tax implications of forced sale events

In Germany, capital gains are taxed at the same rate as dividends and interest payments and the tax is subtracted at the source, i.e., in the event of a capital gains realization, the funds that arrive in the settlement account are already after tax funds. Since 2009, the capital gains tax (Abgeltungssteuer) is 25% plus solidary addition (Solidaritätszuschlag) (5.5% of the capital gains tax) and church tax (Kirchensteuer) (8 or 9% of the capital gains tax) which amounts to approximately 28% in total. Furthermore, there is an initial allowance (Freibeträge) of 801€ for singles and 1.602€ for married couples. Individuals can specify their main brokerage such that the capital gains tax will not be subtracted unless the initial sum is exceeded (Freistellungsauftrag). Furthermore, if capital losses are realized before capital gains, then the capital gains tax will be automatically lowered by the realized losses. For stocks and funds that were bought before the 1st of January 2009, the sale does not initiate the automatic capital gains tax subtracted at the source. Before 1st of January 2009, capital gains and dividends were taxed at the personal income tax rate, which can amount up to 42%. For stocks and funds bought but not sold before 1st of January 2009, any capital gains will remain tax free until the end of 2017 and tax free up until 100,000€ from January 2018 on. Overall, the capital gains tax is thus taken at the source and all funds individuals receive are after-tax.

4 Results

Table 6 shows the estimation results for the share of liquidity reinvested, transferred to savings accounts, and transferred to checking accounts in the five days after individuals receive their liquidity from the forced sales.

[Insert Table 6 about here]

We find that, on average, individuals reinvest 80% of their newly found liquidity within a few days, which is in the same ballpark as Calvet et al. (2009b), who find that individuals offset about 50% of asset price fluctuations by rebalancing actively. Individuals do not appear to transfer any money out of the settlement account within the first days of the forced sale as we cannot find

significant effects on all outflows, outflows to savings, or outflows to checking accounts.

Furthermore, Table 7 shows the same estimation results for the share of liquidity reinvested, transferred to savings accounts, and transferred to checking accounts in the five days after individuals receive their liquidity from the forced sales, but interacts with a dummy of whether or not individuals realized a loss relative to their initial investment.

[Insert Table 7 about here]

It can be seen that individuals are much more likely to reinvest a capital gain, then to reinvest a capital loss. Strikingly, the reinvestment share is approximately 80% for capital gains but only 45% for capital losses. Furthermore, a capital loss is significantly less likely to be transferred out and will thus stay in the settlement account for a while. It could be argued that realizing a capital gain or loss is endogenous as the market entry decision is endogenous. However, it is important to keep in mind that individuals do not know that their fund will get liquidated at the time of investing. Furthermore, individuals do not successfully market time as a general rule. Finally, our results on gains and losses rule out tax considerations as a reason for why individuals do not hold optimally rebalanced portfolios before the forced sale event, which would imply that they would not optimally reinvest a 100% of their liquidation. If this were the case, then capital losses should be reinvested at a higher rate than capital gains. Moreover, individuals do not appear to actively rebalance in the right direction. If they would take the forced liquidation as an opportunity to actively rebalance, potentially because they held an suboptimal portfolio initially because of tax considerations, then they should again reinvest a loss at a higher rate than a capital gain.

Tables 8 and 9 show the same estimation results for the share of liquidity reinvested, transferred to savings accounts, and transferred to checking accounts in the thirty days after individuals receive their liquidity from the forced sales. The results for five versus thirty days look qualitatively and quantitatively similar. After thirty days, individuals also transfer a significant fraction of approximately 16% of their liquidity into savings accounts.

[Insert Table 8 and 9 about here]

We want to compare the estimated coefficients in response to forced sales to the estimated

coefficients when sales were deliberate or voluntary. We estimate the same specification for two other groups of sales. First, we estimate the coefficients using all the sales of investors who sold the same funds after the announcements of the funds' liquidations but before the forced liquidations. Second, we estimate the coefficients using all the sales of investors who sold the same funds before the announcements of the funds' liquidations. The estimation results for the deliberate sales after the announcements of the funds' liquidations for either five or thirty days and with and without the loss interactions can be found in Tables 10 to 13.

[Insert Table 10 to 13 about here]

Furthermore, the estimation results for the deliberate sales after the announcements of the funds' liquidations for either five or thirty days and with and without the loss interactions can be found in Tables 14 to 17.

[Insert Table 14 to 17 about here]

The estimation results line up sensibly. When individuals sell deliberately before the funds' closure announcements, they tend to not reinvest their liquidity immediately. Presumably, because they decided to rebalance or consume part of their funds. We thus see some transfers into savings accounts and some residual out transfers as well as some liquidity simply remaining in the settlement account. Furthermore, we see more outflows into savings accounts when individuals realized a loss. After thirty days, individuals reinvest approximately 38% of their funds as well as saving and consuming another 15%.

When individuals sell deliberately but where induced to sell by the funds' closure announcements, they also save more out of the funds. Furthermore, immediately after the fund sell, there is less of a savings response to a loss. After thirty days, individuals reinvest approximately 54% of their funds as well as saving another 18%.

We now turn to the unconditional panel regression. The panel estimation results paint a similar picture as the cross-sectional results. Individuals reinvest approximately 73% on average after 5 and 30 days, and approximately 50% after 5 days and 25% after 30 days less if they sell voluntarily

after the announcement but before the forced sale event. The results without loss interactions can be found in Tables 18 and 19.

[Insert Table 18 and 19 about here]

Moreover, individuals reinvest less if they realize a loss. Here, individuals appear to reinvest even less when they are forced to liquidate at a loss in which case they reinvest approximately 50% of their newly found liquidity less. In contrast, if they liquidate deliberately, they reinvest less in response to a loss but only approximately 30%. The results with loss interactions can be found in Tables 20 and 21.

[Insert Table 20 and 21 about here]

5 Mechanisms

5.1 Tax considerations and rebalancing

In Germany, capital gains are taxed at the same rate as dividends and interest payments and the tax is subtracted at the source, i.e., in the event of a capital gains realization, the funds that arrive in the settlement account are already after tax funds. Since 2009, the capital gains tax (Abgeltungssteuer) is 25% plus solidary addition (Solidaritätszuschlag) (5.5% of the capital gains tax) and church tax (Kirchensteuer) (8 or 9% of the capital gains tax) which amounts to approximately 28% in total. Furthermore, there is an initial allowance (Freibeträge) of 801€ for singles and 1.602€ for married couples. Individuals can specify their main brokerage such that the capital gains tax will not be subtracted unless the initial sum is exceeded (Freistellungsauftrag). Furthermore, if capital losses are realized before capital gains, then the capital gains tax will be automatically lowered by the realized losses. For stocks and funds that were bought before the 1st of January 2009, the sale does not initiate the automatic capital gains tax subtracted at the source. Before 1st of January 2009, capital gains and dividends were taxed at the personal income tax rate, which can amount up to 42%. For stocks and funds bought but not sold before 1st of January 2009, any capital gains will remain tax free until the end of 2017 and tax free up until 100,000€ from January 2018 on.

Overall, the capital gains tax is thus taken at the source and all funds individuals receive are after-tax. However, our results do not appear to be consistent with tax considerations as individuals should always reinvest a loss at a higher rate than a gain.

As an alternative mechanism, individuals could hold a suboptimal portfolio in the first place because there are transaction costs associated with rebalancing. Transaction costs are not very high for the online bank under consideration but they are non-zero. In particular, one trade costs a basis of 4.90€ plus 0.25 percent of the order price times volume, a minimum of 9.90€ and a maximum of 59.90€. Additionally, the exchanges charge a small fee ranging from 0.0015 percent with a minimum of 1.50€ and to 0.0025 percent with a minimum of 2.50€. While in a standard model, such fees would not majorly discourage an agent to rebalance optimally, it may cause some insufficient rebalancing. Nevertheless, again, the treatment of losses we observe is not consistent with insufficient rebalancing as individuals should reinvest a loss at a higher rate than a gain.

5.2 Inattention

We know from the existing literature that investors are inattentive and we observe quite substantial inertia, i.e., money staying in the settlement account especially in the first five days after the forced sale. A natural question is whether individuals notice the forced sale or not. Because the deliberate sales we observe pre and post the closure announcement look very similar, we believe that most individuals miss the closure announcement.

After deciding to close the fund the investment company has to report to the supervisory authority and responsible reserve bank. In turn, the closure is announced in the electronic federal gazette, the "Bundesanzeiger," as well as in the half-year report to inform investors. Furthermore, the company has to adhere to a notice period of six months after they have informed the investors in writing via the half-year report. We believe that many investors ignore all fund reports and thus miss the closure announcement. However, upon the liquidation of the fund, the investor receives a sales receipt by email or mail. This sales receipt is much less likely to remain unnoticed as it also states the tax implications as well as whether or not the investor experienced a capital gain or loss. Even if investors are inattentive though, such inattention cannot explain our results as they have

to choose to be more inattentive in the event of a loss than a gain.

5.3 Mental accounting, realization utility, and effects

As an alternative theoretical explanation, we consider mental accounting. Clearly, the transfer of money from the fund to the settlement account caused individuals to treat it differently especially so when it represents a loss as opposed to a gain. We thus provide evidence for mental accounting, as the transfer between accounts matters, even though the money is theoretically fungible (abstracting from the transaction costs). Thaler (1985) and Shefrin and Thaler (1988) were pioneering the mental accounting literature and other empirical evidence exists Milkman and Beshears (2009); Feldman (2010); Choi et al. (2009); Abeler and Marklein (2008); Huffman and Barenstein (2005); Karle et al. (2011).

We also think that investors may take the liquidation as an exogenous reason to close their mental investment account, which leads them to not engage in the disposition effect (Odean, 1998). That our investors are subject to the disposition effect, and thus treat unrealized capital gains and losses very differently, has been documented by Koestner et al. (2017). We thus provide empirical evidence for the theoretical framework developed in Barberis and Xiong (2012) who explain the disposition effect via a utility function in which individuals narrowly frame utility over individual stock's sales or realizations. Because individuals dislike realizing losses more so than they like realizing gains, the utility specification explains the disposition effect. What we observe is a reverse disposition effect after forced realizations (Chang et al., 2016) and fully consistent with the modeling assumptions put forward in Barberis and Xiong (2012).

Imas (2016) develops a theoretical framework of dynamic cumulative prospect theory with mental accounting. After a paper loss, the mental account of prior outcomes remains open and the loss is evaluated jointly with the outcome, causing the individual to take on more risk to recover from it. A realized loss closes the associated mental account and resets the reference point. Closing the mental account in the red causes the individual to be sensitized to the prospect of further losses, leading him or her to take on less risk. In contrast, after a realized gain, the investor is not sensitized, resulting in the prediction that realized gains should result in more reinvestment than

realized losses. Imas (2016) presents evidence for this framework in a series of lab experiments. Our results are unique in providing clean evidence from consequential investment decisions in the field, and can thus be seen as strong empirical support for the realization effect.

6 Conclusion

Using a large sample of transaction-level data on all asset holdings, spending, and income from a German retail bank, this paper explores how individual consumption responds to realized capital gains and losses. Our identification strategy exploits mutual fund closures, which are arguably exogenous to individual characteristics. We find that individuals reinvest a large part of their newly found liquidity immediately. However, even after a month, individuals have not reinvested a share of their liquidity and also transferred some of it into savings accounts. These findings suggest that individuals were not holding perfectly optimized portfolios in the first place and are partially inert. Nevertheless, most individuals are quite attentive and rebalance actively. Furthermore, individuals behave very differently if a loss is realized instead of a gain relative to their initial investment. If a gain is realized, individuals reinvest almost 90% of their funds. If, however, a loss is realized, then individuals only reinvest 50% of their funds and tend to transfer more into savings accounts. This differential treatment of gains and losses is inconsistent with active rebalancing or tax considerations.

References

Abeler, J. and F. Marklein (2008, May). Fungibility, labels, and consumption. IZA Discussion Papers 3500, Institute for the Study of Labor (IZA).

Agnew, J., P. Balduzzi, and A. Sunden (2003). Portfolio Choice and Trading in a Large 401(k) Plan. *American Economic Review 93*(1), 193–215.

Alvarez, F., L. Guiso, and F. Lippi (2012). Durable Consumption and Asset Management with Transaction and Observation Costs. *American Economic Review 5*(102), 2272–2300.

Anagol, S., V. Balasubramaniam, and T. Ramadorai (2015). The effects of experience on investor behavior: Evidence from india's ipo lotteries.

Andersen, S., T. Hanspal, and K. M. Nielsen (2014). Once bitten, twice shy: Do personal experiences or wealth changes affect risk taking?

Andrade, E. B. and G. Iyer (2009). Planned versus actual betting in sequential gambles. *Journal of Marketing Research 46*(3), 372–383.

Barber, B. M. and T. Odean (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The journal of Finance 55*(2), 773–806.

Barberis, N. and W. Xiong (2012). Realization Utility. *Journal of Financial Economics 104*, 251–271.

Bilias, Y., D. Georgarakos, and M. Haliassos (2010). Portfolio Inertia and Stock Market Fluctuations. *Journal of Money, Credit and Banking 42*(9), 715–742.

Bonaparte, Y. and R. Cooper (2011). Costly Portfolio Adjustment. *NBER Working Paper 15227*.

Brown, S. and W. Goetzmann (1995). Performance persistence. *Journal of Finance 50*, 679–698.

Brunnermeier, M. and S. Nagel (2008). Do Wealth Fluctuations Generate Time-Varying Risk Aversion? Micro-Evidence on Individuals' Asset Allocation. *American Economic Review 98*(3), 713–736.

Bu, Q. and N. Lacey (2009). On understanding mutual fund terminations. *Journal of Economics Finance 33*, 80–99.

Bundesbank, D. (2013). Statistik ueber wertpapierinvestments, mimeo.

Calvet, L., J. Campbell, and P. Sodini (2009a). Fight or Flight? Portfolio Rebalancing by Individual Investors. *Quarterly Journal of Economics 2*, 301–348.

Calvet, L. E., J. Y. Campbell, and P. Sodini (2009b). Fight or flight? portfolio rebalancing by individual investors. *The Quarterly journal of economics 124*(1), 301–348.

Calvet, L. E., J. Y. Campbell, and P. Sodini (2009c). Measuring the Financial Sophistication of Households. *American Economic Review 99*(2), 393–98.

Chang, T., D. Solomon, and M. Westerfield (2016). Looking for someone to blame: Delegation, cognitive dissonance, and the disposition effect. *Review of Financial Studies 50*, 679–698.

Chien, Y.-L., H. Cole, and H. Lustig (2012). Is the Volatility of the Market Price of Risk due to Intermittent Portfolio Rebalancing? *American Economic Review 102*(6), 2859–96.

Choi, J., D. Laibson, and B. Madrian (2009). Mental Accounting in Portfolio Choice: Evidence from a Flypaper Effect. *American Economic Review 99*(5), 2085–95.

Cole, S., A. Paulson, and G. Shastry (2012). Smart money: The effect of education on financial behavior.

Coval, J. D. and T. Shumway (2005). Do behavioral biases affect prices? *The Journal of Finance 60*(1), 1–34.

Dahlquist, M. and J. Martinez (2013). Investor Inattention: A Hidden Cost of Choice in Pension Plans? *European Financial Management 9999*, 1–19.

Dorn, D. and G. Huberman (2005). Talk and action: What individual investors say and what they do. *Review of Finance 9*(4), 437–481.

Evans, R. B. (2006). Does alpha really matter? evidence from mutual fund incubation, termination and manager change. *manuscript, Boston College*.

Feldman, N. (2010). Mental Accounting Effects of Income Tax Shifting. *Review of Economics and Statistics 92*(1), 70–86.

Gabaix, X. and D. Laibson (2002). The 6D Bias and the Equity-Premium Puzzle. *NBER Macroeconomics Annual 16*, 257–312.

Hausman, C. and D. S. Rapson (2017). Regression discontinuity in time: Considerations for empirical applications. Technical report, National Bureau of Economic Research.

Huffman, D. and M. Barenstein (2005). A Monthly Struggle for Self-Control? Hyperbolic Discounting, Mental Accounting, and the Fall in Consumption Between Paydays. *Working Paper IZA Bonn*.

Imas, A. (2016). The realization effect: Risk-taking after realized versus paper losses. *The American Economic Review 106*(8), 2086–2109.

Karle, H., G. Kirchsteiger, and M. Peitz (2011). The Impact of Contextual Reference Dependence on Purchase Decisions: An Experimental Study. *Working Paper*.

Karlsson, N., G. Loewenstein, and D. Seppi (2009). The Ostrich effect: Selective Attention to Information. *Journal of Risk and Uncertainty 38*(2), 95–115.

Kaustia, M. and S. Knüpfer (2008). Do investors overweight personal experience? evidence from ipo subscriptions. *The Journal of Finance 63*(6), 2679–2702.

Koestner, M., B. Loos, S. Meyer, and A. Hackethal (2017). Do individual investors learn from their mistakes? *Journal of Business Economics 87*(5), 669–703.

Langer, T. and M. Weber (2008). Does commitment or feedback influence myopic loss aversion?: An experimental analysis. *Journal of Economic Behavior & Organization 67*(3), 810–819.

Lee, D. S. and T. Lemieuxa (2010). Regression discontinuity designs in economics. *Journal of economic literature 48*(2), 281–355.

Liu, Y.-J., C.-L. Tsai, M.-C. Wang, and N. Zhu (2010). Prior consequences and subsequent risk taking: New field evidence from the taiwan futures exchange. *Management Science 56*(4), 606–620.

Milkman, K. L. and J. Beshears (2009). Mental accounting and small windfalls: Evidence from an online grocer. *Journal of Economic Behavior & Organization 71*(2), 384 – 394.

Mitchell, O., G. Mottola, S. Utkus, and T. Yamaguchi (2006). The Inattentive Participant: Portfolio Trading Behavior in 401(k) Plans. *University of Michigan Working Paper* (115).

Odean, T. (1998). Are Investors Reluctant to Realize their Losses? *Journal of Finance 53*, 1775–1798.

of Statistics, G. F. B. (2008). Einkommens- und verbrauchsstichprobe (einkommen, einnahmen & ausgaben). url https://www.destatis.de/de/zahlenfakten/gesellschaftstaat/einkommenkonsumlebensbedingungen/einkommeneinnahr einkommens- und verbrauchsstichprobe 2008 (vermoegen, schulden). url https://www.destatis.de/de/zahlenfakten/gesellschaftstaat/einkommenkonsumlebensbedingungen/vermoegenschulder evs.html.

of Statistics, G. F. B. (2011). Bildungsstand. url https://www.destatis.de/de/zahlenfakten/gesellschaftstaat/bildungforsc

Reis, R. (2006). Inattentive Consumers. *Journal of Monetary Economics 53*, 1761–1800.

Shefrin, H. M. and R. H. Thaler (1988). The behavioral life-cycle hypothesis. *Economic Inquiry 26*(4), 609–43.

Shiv, B., G. Loewenstein, A. Bechara, H. Damasio, and A. R. Damasio (2005). Investment behavior and the negative side of emotion. *Psychological science 16*(6), 435–439.

Thaler, R. (1985). Mental accounting and consumer choice. *Marketing Science 4*(3), 199–214.

Thaler, R. H. and E. J. Johnson (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management science 36* (6), 643–660.

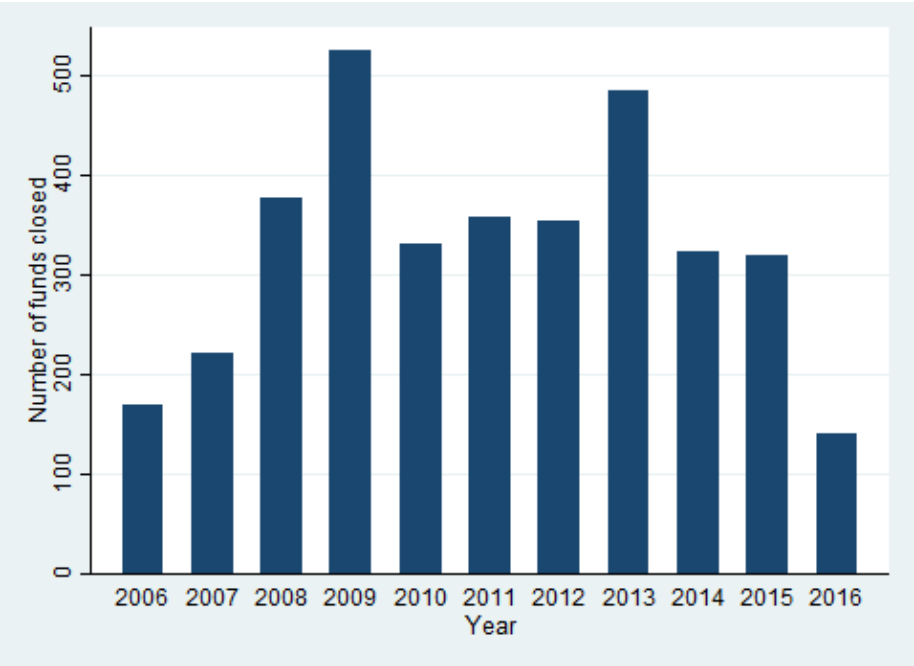

Figure 1: Number of mutual funds closures, as identified by the International Securities Identification Number (ISIN), per year over the period 2006 to 2016.

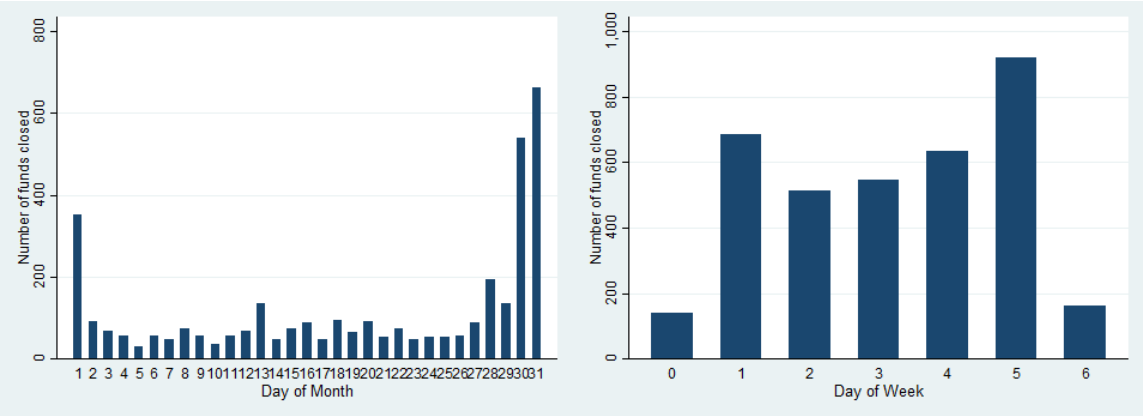

Figure 2: Number of mutual funds closures, as identified by the International Securities Identification Number (ISIN), per day of month and per day of week (0=Sunday to 6=Saturday).

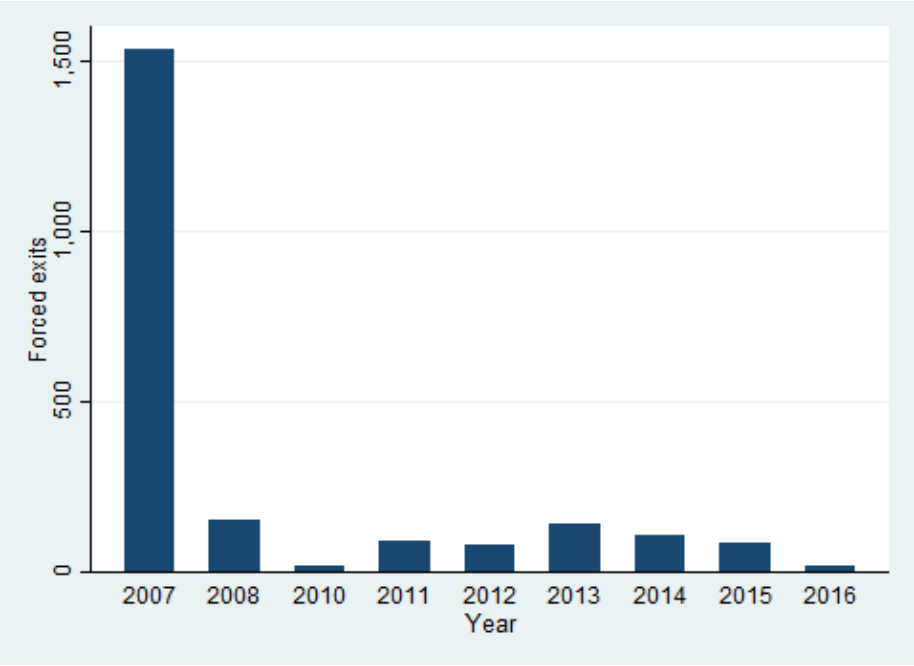

Figure 3: Number of forced sales, i.e., number of individuals affected by each fund closure, per year over the period 2006 to 2016.

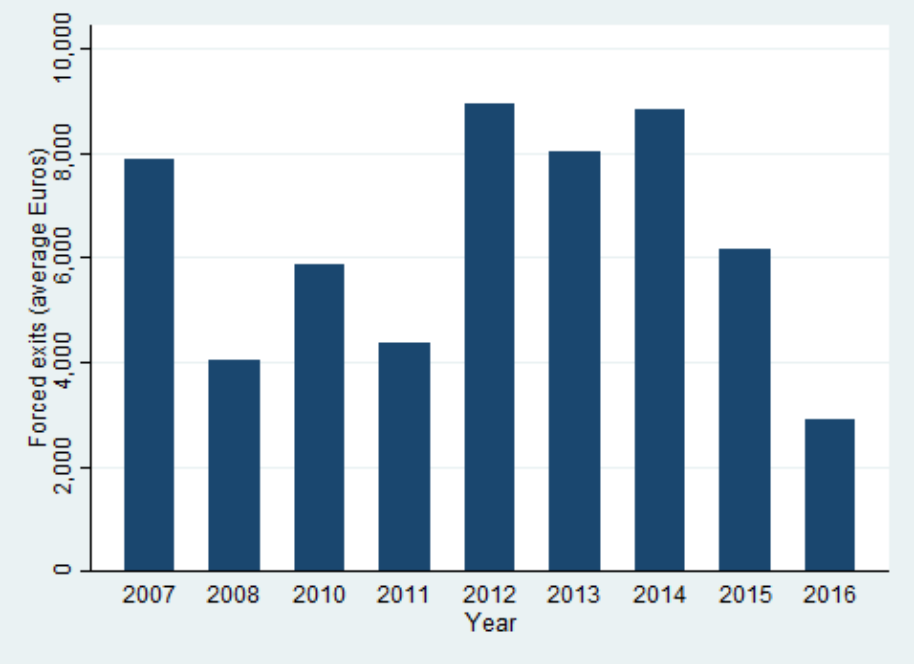

Figure 4: Average amounts of forced sales per year over the period 2006 to 2016.

Table 1: Summary statistics for the forced sales events of all fund closures

	mean	standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
holding period before closure	966	602	127	415	992	1,329	1,764
purchase share price	71	521	8.4	26	43	51	59
forced selling share price	76	510	13	27	50	61	61
value of forced sell	16,157	60,360	330	1,005	3,158	9,678	30,812
return of fund investment	.24	.37	-.16	.015	.15	.54	.66
observations	2,228						

Table 2: Summary statistics for the closed funds

	mean	standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
equity fund	.34	.47	0	0	0	1	1
bond fund	.21	.41	0	0	0	0	1
balanced fund	.21	.4	0	0	0	0	1
other fund	.24	.43	0	0	0	0	1
fund age (in days)	2,194	1,883	545	981	1,713	2,755	4,435
observations	3,606						

Table 3: Summary statistics for all funds, all closed funds, and all merged funds

	mean	standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
all funds							
mean total assets	1.4e+09	1.9e+10	724,455	5549601	2.7e+07	1.2e+08	6.1e+08
min total assets	3.1e+08	4.1e+09	100	76,000	2200000	1.6e+07	8.4e+07
max total assets	3.2e+09	5.2e+10	1723200	1.2e+07	6.0e+07	2.8e+08	1.5e+09
last total assets	1.9e+09	4.3e+10	72,600	1832943	1.5e+07	9.1e+07	5.4e+08
observations	49,605						
closed funds							
mean total assets	1.0e+08	8.3e+08	771,834	3235899	1.3e+07	4.9e+07	1.4e+08
min total assets	1.7e+07	9.8e+07	3,400	150,000	1610375	9225400	3.2e+07
max total assets	2.7e+08	2.6e+09	1307000	6472100	2.6e+07	9.5e+07	3.0e+08
last total assets	4.7e+07	5.1e+08	30,800	418,200	2787000	1.4e+07	5.8e+07
observations	2,809						
merged funds							
mean total assets	6.9e+07	2.0e+08	1197071	6813614	2.3e+07	6.5e+07	1.6e+08
min total assets	2.1e+07	9.7e+07	10,000	885,800	5027200	1.8e+07	4.1e+07
max total assets	1.5e+08	4.1e+08	2517000	1.3e+07	4.5e+07	1.3e+08	3.5e+08
last total assets	3.4e+07	1.1e+08	364,800	2475700	9915700	2.8e+07	7.5e+07
observations	1,077						

Table 4: Performance statistics for all funds, all closed funds, and all merged funds

Fund type		N	125 trading days before		250 trading days before		500 trading days before		1 trading day before	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median
Alternatives	All	2,117	-2.20%	-1.20%	-2.62%	-1.73%	-3.10%	-2.23%	-0.60%	0.00%
	Deleted	15	3.80%	4.40%	2.20%	1.41%	2.91%	1.98%	15.52%	2.78%
	Merged	3	-1.20%	0.33%	0.13%	4.25%	-4.85%	-7.84%	-49.25%	-62.86%
Bond	All	141,918	-4.20%	-3.77%	-4.42%	-3.64%	-4.20%	-4.09%	-7.68%	-1.84%
	Deleted	107	0.48%	0.04%	-0.89%	-0.92%	-1.60%	-1.79%	-465.82%	0.00%
	Merged	70	0.74%	0.09%	-2.36%	-1.86%	-3.77%	-3.62%	25.78%	0.00%
Commodity	All	929	5.81%	2.39%	11.94%	7.91%	8.35%	7.10%	10.45%	28.26%
	Deleted	16	1.45%	1.61%	6.27%	7.92%	5.24%	4.02%	-4.20%	-3.26%
	Merged	4	-10.27%	-10.31%	-0.21%	-0.27%	1.25%	4.65%	-104.36%	-104.32%
Equity	All	423,948	-4.18%	-8.73%	-4.39%	-9.79%	-3.26%	-5.70%	-7.64%	0.00%
	Deleted	292	0.42%	-5.86%	0.95%	-3.84%	1.46%	-1.83%	-171.37%	0.00%
	Merged	184	-4.33%	-8.02%	-4.85%	-8.13%	-6.41%	-9.66%	6.28%	0.00%
Mixed Assets	All	156,963	-3.05%	-4.12%	-3.55%	-4.63%	-3.14%	-3.72%	-7.34%	0.00%
	Deleted	142	6.80%	0.12%	6.62%	0.92%	4.62%	2.65%	257.72%	0.00%
	Merged	83	-3.75%	-2.64%	-2.46%	-3.04%	-1.77%	-1.95%	26.83%	0.00%
Money Market	All	4,892	-1.62%	-0.65%	-1.91%	-0.76%	-2.01%	-1.36%	-12.57%	0.00%
	Deleted	23	6.63%	0.14%	3.13%	0.30%	0.32%	-0.28%	11.79%	0.00%
	Merged	13	0.40%	-0.73%	-0.93%	-1.25%	-1.62%	-2.16%	20.96%	-2.20%
Other	All	6,117	3.90%	0.00%	2.97%	-0.37%	2.73%	-0.01%	2.28%	0.00%
	Deleted	92	-3.05%	-1.57%	-0.98%	-0.65%	-0.18%	-0.91%	-176.79%	0.00%
	Merged	22	-5.25%	-4.39%	-3.54%	-2.87%	-1.85%	-0.85%	8.39%	0.00%
Real Estate	All	12	8.78%	-1.31%	5.65%	-1.77%	2.63%	-1.21%	24.92%	0.00%
	Deleted	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Merged	1	-0.14%	-0.14%	-1.78%	-1.78%	-1.95%	-1.95%	0.00%	0.00%

Table 5: Summary statistics for all individuals, all affected individuals, and affected individuals who were ultimately forced to sell (income and risk aversion are self-reported in brackets)

	mean	standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
all individuals							
male	.84	.37	0	1	1	1	1
age	51	13	35	43	51	60	69
PhD educated	.066	.25	0	0	0	0	0
account tenure	11	3.7	6	11	11	12	18
risk aversion	3.4	1.6	1	1	4	5	5
income	50,259	24,688	10,000	30,000	50,000	80,000	80,000
observations	103,744						
affected individuals							
male	.85	.36	0	1	1	1	1
age	52	12	38	44	51	60	69
PhD educated	.089	.29	0	0	0	0	0
account tenure	13	3.4	11	11	11	14	18
risk aversion	3.7	1.4	1	3	4	5	5
income	52,713	24,316	10,000	30,000	50,000	80,000	80,000
observations	48,737						
affected individuals forced to sell							
male	.84	.37	0	1	1	1	1
age	52	11	39	45	51	58	67
PhD educated	.085	.28	0	0	0	0	0
account tenure	13	3.1	11	11	11	12	18
risk class	3.4	1.4	1	3	4	5	5
income	53,997	23,912	30,000	30,000	50,000	80,000	80,000
observations	2,228						

Table 6: Estimation results from forced liquidations of fund closures after 5 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.2375***	0.7021***	0.0493*	0.0110	-0.0140
	(0.0749)	(0.0821)	(0.0283)	(0.0209)	(0.0188)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	2,228	2,228	2,228	2,228	2,228
R-squared	0.1431	0.4223	0.0278	0.0109	0.0129

Table 7: Estimation results from forced liquidations of fund closures after 5 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.1235**	0.8195***	0.0400	0.0169	-0.0273
	(0.0508)	(0.0627)	(0.0323)	(0.0222)	(0.0272)
liquidation*loss	0.4064**	-0.4186**	0.0331	-0.0209	0.0473
	(0.1882)	(0.1993)	(0.0573)	(0.0444)	(0.0348)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	2,228	2,228	2,228	2,228	2,228
R-squared	0.1913	0.4531	0.0283	0.0113	0.0143

Table 8: Estimation results from forced liquidations of fund closures after 30 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.1437***	0.6824***	0.1565***	0.0174	-0.0156
	(0.0540)	(0.0837)	(0.0583)	(0.0297)	(0.0318)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	2,228	2,228	2,228	2,228	2,228
R-squared	0.0471	0.2535	0.0390	0.0107	0.0260

Table 9: Estimation results from forced liquidations of fund closures after 30 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.0766*	0.7869***	0.1272***	0.0093	-0.0421
	(0.0463)	(0.0628)	(0.0456)	(0.0265)	(0.0338)
liquidation*loss	0.2393	-0.3725*	0.1044	0.0288	0.0946
	(0.1483)	(0.2150)	(0.1462)	(0.0717)	(0.0724)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	2,228	2,228	2,228	2,228	2,228
R-squared	0.0616	0.2691	0.0409	0.0111	0.0281

Table 10: Estimation results from deliberate liquidations post announcements of fund closures after 5 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.7613***	0.3480	0.2475**	-0.3568	-0.3980
	(0.2921)	(0.2164)	(0.0992)	(0.4448)	(0.4458)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	3,102	3,102	3,102	3,102	3,102
R-squared	0.0477	0.0245	0.0263	0.0080	0.0103

Table 11: Estimation results from deliberate liquidations post announcements of fund closures after 5 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.9203**	0.3650	0.2426*	-0.5279	-0.5986
	(0.3964)	(0.2874)	(0.1308)	(0.6250)	(0.6283)
liquidation*loss	-0.5853	-0.0623	0.0179	0.6297	0.7379
	(0.4537)	(0.3594)	(0.1713)	(0.6528)	(0.6537)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	3,102	3,102	3,102	3,102	3,102
R-squared	0.0525	0.0246	0.0263	0.0128	0.0168

Table 12: Estimation results from deliberate liquidations post announcements of fund closures after 30 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.1118	0.5343**	0.1861**	0.1678**	0.0765
	(0.2125)	(0.2234)	(0.0933)	(0.0697)	(0.0712)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	3,102	3,102	3,102	3,102	3,102
R-squared	0.0179	0.0412	0.0313	0.0307	0.0138

Table 13: Estimation results from deliberate liquidations post announcements of fund closures after 30 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.0503	0.6257**	0.1906	0.1335*	0.0042
	(0.2811)	(0.2850)	(0.1288)	(0.0721)	(0.0804)
liquidation*loss	0.2266	-0.3361	-0.0167	0.1263	0.2658*
	(0.3652)	(0.3597)	(0.1499)	(0.1453)	(0.1441)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	3,102	3,102	3,102	3,102	3,102
R-squared	0.0187	0.0444	0.0313	0.0323	0.0197

Table 14: Estimation results from deliberate liquidations pre announcements of fund closures after 5 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.7124***	0.0100	0.1321*	0.1455*	0.1182
	(0.1501)	(0.0339)	(0.0716)	(0.0827)	(0.0721)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	32,811	32,811	32,811	32,811	32,811
R-squared	0.0433	0.0022	0.0086	0.0230	0.0135

Table 15: Estimation results from deliberate liquidations pre announcements of fund closures after 5 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.7494***	0.0403	0.0855	0.1248	0.1038
	(0.1619)	(0.0342)	(0.0618)	(0.0883)	(0.0779)
liquidation*loss	-0.1750	-0.1434	0.2204***	0.0980	0.0682
	(0.1785)	(0.1253)	(0.0812)	(0.1161)	(0.1166)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	32,811	32,811	32,811	32,811	32,811
R-squared	0.0438	0.0026	0.0114	0.0247	0.0142

Table 16: Estimation results from deliberate liquidations pre announcements of fund closures after 30 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.2815***	0.3804***	0.1376*	0.2005*	0.1459*
	(0.0967)	(0.0873)	(0.0759)	(0.1081)	(0.0850)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	32,811	32,811	32,811	32,811	32,811
R-squared	0.0081	0.0132	0.0077	0.0184	0.0098

Table 17: Estimation results from deliberate liquidations pre announcements of fund closures after 30 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.3209***	0.4379***	0.0998	0.1414	0.0807
	(0.0948)	(0.0697)	(0.0702)	(0.0976)	(0.0687)
liquidation*loss	-0.1869	-0.2720*	0.1790*	0.2799**	0.3091**
	(0.1213)	(0.1487)	(0.1046)	(0.1371)	(0.1289)
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
ISIN chars fund age	✓	✓	✓	✓	✓
observations	32,811	32,811	32,811	32,811	32,811
R-squared	0.0087	0.0143	0.0092	0.0238	0.0151

Table 18: Estimation results from forced liquidations as well as deliberate liquidations pre and post announcements of fund closures after 5 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.2156**	0.7438***	0.0281	0.0125	-0.0141
	(0.0938)	(0.0909)	(0.0520)	(0.0355)	(0.0372)
liquidation*post	0.4855***	-0.5150***	0.2209***	-0.1915***	-0.1976***
	(0.1170)	(0.1135)	(0.0649)	(0.0442)	(0.0464)
liquidation*pre	0.4978***	-0.7294***	0.1030*	0.1286***	0.1292***
	(0.0956)	(0.0927)	(0.0530)	(0.0361)	(0.0379)
ISIN fes	✓	✓	✓	✓	✓
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
observations	38,141	38,141	38,141	38,141	38,141
R-squared	0.0869	0.0407	0.0579	0.3076	0.2951

Table 19: Estimation results from forced liquidations as well as deliberate liquidations pre and post announcements of fund closures after 30 days

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation	0.1132	0.7314***	0.1299**	0.0254	-0.0231
	(0.0930)	(0.0953)	(0.0577)	(0.0445)	(0.0486)
liquidation*post	0.0971	-0.2496**	0.0384	0.1141**	0.1044*
	(0.1160)	(0.1189)	(0.0720)	(0.0555)	(0.0606)
liquidation*pre	0.1764*	-0.3532***	0.0093	0.1675***	0.1676***
	(0.0947)	(0.0971)	(0.0588)	(0.0453)	(0.0495)
ISIN fes	✓	✓	✓	✓	✓
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
observations	38,141	38,141	38,141	38,141	38,141
R-squared	0.0506	0.0650	0.0578	0.0637	0.0888

Table 20: Estimation results from forced liquidations as well as deliberate liquidations pre and post announcements of fund closures after 5 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation*forced	0.0985	0.8743***	0.0053	0.0218	-0.0228
	(0.1056)	(0.1024)	(0.0585)	(0.0399)	(0.0419)
liquidation*post	0.6705***	-0.6505***	0.2587***	-0.2787***	-0.2831***
	(0.1313)	(0.1273)	(0.0728)	(0.0496)	(0.0521)
liquidation*pre	0.6505***	-0.8293***	0.0806	0.0983**	0.1246***
	(0.1076)	(0.1043)	(0.0596)	(0.0407)	(0.0427)
liquidation*forced*loss	0.4569**	-0.5136***	0.0932	-0.0364	0.0329
	(0.1904)	(0.1846)	(0.1055)	(0.0719)	(0.0755)
liquidation*post*loss	-0.2876**	0.0113	-0.0503	0.3265***	0.3917***
	(0.1442)	(0.1399)	(0.0799)	(0.0545)	(0.0572)
liquidation*pre*loss	-0.1723***	-0.1482***	0.2175***	0.1030***	0.0662***
	(0.0432)	(0.0419)	(0.0239)	(0.0163)	(0.0171)
ISIN fes	✓	✓	✓	✓	✓
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
observations	38,141	38,141	38,141	38,141	38,141
R-squared	0.0875	0.0412	0.0600	0.3089	0.2962

Table 21: Estimation results from forced liquidations as well as deliberate liquidations pre and post announcements of fund closures after 30 days interacted with losses

	staying in settlement	outflows into portfolio	outflows into savings	all other outflows	outflows out of bank
liquidation*forced	0.0608	0.8543***	0.0779	0.0070	-0.0610
	(0.1047)	(0.1072)	(0.0649)	(0.0500)	(0.0546)
liquidation*post	0.0997	-0.2947**	0.0938	0.1012	0.1012
	(0.1301)	(0.1333)	(0.0807)	(0.0621)	(0.0679)
liquidation*pre	0.2621**	-0.4144***	0.0227	0.1297**	0.1458***
	(0.1067)	(0.1092)	(0.0662)	(0.0509)	(0.0556)
liquidation*forced*loss	0.2015	-0.4845**	0.2070*	0.0761	0.1523
	(0.1887)	(0.1933)	(0.1171)	(0.0901)	(0.0984)
liquidation*post*loss	0.1976	-0.3375**	-0.0038	0.1437**	0.1846**
	(0.1430)	(0.1465)	(0.0887)	(0.0683)	(0.0746)
liquidation*pre*loss	-0.1591***	-0.2994***	0.1867***	0.2718***	0.2884***
	(0.0428)	(0.0438)	(0.0266)	(0.0204)	(0.0223)
ISIN fes	✓	✓	✓	✓	✓
year fes	✓	✓	✓	✓	✓
month fes	✓	✓	✓	✓	✓
week-of-month fes	✓	✓	✓	✓	✓
observations	38,141	38,141	38,141	38,141	38,141
R-squared	0.0511	0.0664	0.0591	0.0682	0.0930