Gambling with Dividends[a]

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Abstract

In this paper, we document that retail investors have a tendency to gamble with dividends and we show that this behavior has asset pricing implications. First, using two independent brokerage datasets, we find that investors use disproportionate fractions of dividends to buy lottery stocks and warrants. Second, using stock market data, we show that marketwide dividends are associated with excess price pressure in lottery stocks. Third, using two experiments, we replicate the tendency to gamble with dividends in the lab and investigate whether this tendency can be reduced through an educational intervention about dividends.

Keywords: dividend reinvestment, gambling preferences, lottery stocks, warrants, mental accounting

JEL classification: D14, G11, G12, G40, G41, G50, G51, G53

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In this paper, we analyze a) brokerage data, b) stock market data, and c) experimental data to a) document that investors have a tendency to gamble with dividends, b) test the asset pricing implications of this tendency, and c) replicate the tendency in the lab as well as investigate the mechanism behind it. The motivation for our hypothesis that investors gamble with dividends stems from the mental accounting of dividends, according to which dividends and principal are placed in two separate mental accounts (Shefrin and Statman 1984; Hartzmark and Solomon 2019). Previous studies use such mental accounting to explain excess spending out of dividends (Baker, Nagel, and Wurgler 2007; Di Maggio, Kermani, and Majlesi 2020; Bräuer, Hackethal, and Hanspal 2022). We argue that, even if dividends are not spent but instead reinvested, mental accounting drives hedonic decision making. In particular, it tempts investors to gamble their dividends in the financial markets and buy lottery stocks (defined by their idiosyncratic volatility, skewness, price, and maximum one-day return, see Kumar 2009; Bali, Cakici, and Whitelaw 2011) and warrants (e.g., Dorn, Dorn, and Sengmueller 2015).

In the first part, we document that investors reinvest dividends in lottery stocks and warrants using two independent brokerage samples: a sample from one of Germany's largest banks from 2007 through 2011 and the widely used sample from Barber and Odean (2000) of a large US discount broker from 1991 through 1996.

In both datasets, we identify dividend-induced purchases as purchases shortly after a dividend payment (e.g., within 30 days) that covers a substantial part of the purchase amount (at least 50% in our baseline specification). Each dataset has its advantages for the identification of dividend-induced purchases. In Germany, dividends are generally paid once a year, often in May, leading to a concentration of large dividend payments that makes purchases in May prime candidates for dividend-induced purchases. The US

sample contains daily trading data (whereas the German sample contains monthly data), which allow a precise mapping of dividend payments to subsequent purchases.

Under our baseline specification, we document that 17% (22%) of dividend-induced stock purchases are in lottery stocks at the German (US) broker. Across all asset classes, 23% (28%) of dividend-induced purchases are in warrants. These fractions are 6 to 8 percentage points higher than the corresponding fractions among dividend-unrelated purchases, controlling for investor fixed effects, time fixed effects, and order size.

Why do retail investors reinvest disproportionate fractions of their dividends in lottery stock and warrants? Our results point to a distinct mental accounting of dividends, consistent with Shefrin and Statman (1984). First, we use cash balance data from our German brokerage sample to show that dividends increase the propensity to purchase lottery stocks and warrants even when the cash balance before the dividend payment would have sufficed to cover the purchase amount. Second, we find that recently received dividends are gambled more often than recently received funds from any other source (e.g., interest or sales proceeds). Thus, gambling with dividends can neither be subsumed under a general tendency to gamble with excess cash nor a more specific tendency to gamble with "hot cash" (He and Zhu 2026). Third, we analyze special dividends as plausibly exogenous shocks to investors' dividend income (Baker, Nagel, and Wurgler 2007; Kaustia and Rantapuska 2012). We find that special dividends are also disproportionately invested in lottery stocks and warrants, even more so than ordinary dividends (for example, with a 17pp higher fraction of lottery stocks among purchases induced by special rather than ordinary dividends). This finding is consistent with a mental-accounting framework in which special dividends are even more readily allocated to a "fun money" account. Also, given the plausible exogeneity of special dividends, the finding provides evidence that

dividend payments causally induce a shift from holdings of cash to holdings of lottery-like securities (in addition to the causal evidence from our experiments presented below).

Finally, we examine the characteristics of "dividend gamblers", who invest their dividends in lottery stocks or warrants, and compare them with a) "dividend non-gamblers", who invest their dividends elsewhere, and b) "non-dividend gamblers", who buy lottery stocks or warrants with dividend-unrelated funds. We find that the average dividend gambler falls between the two groups, often more closely resembling dividend non-gamblers, e.g., in terms of lottery stock and warrant holdings before the dividend reinvestment. Thus, our results indicate that investors who use dividends as fun money are generally not full-time gamblers, which makes sense given that lottery-like investments generally produce little dividend income.

In the second part, we use stock market data to test asset pricing implications. Hartzmark and Solomon (2025) find that stock market returns increase based on the amount of dividends paid by the market, consistent with price pressure from dividend reinvestments. Our findings from the brokerage sample indicate that reinvestments are made disproportionately in lottery stocks, implying a particularly pronounced price pressure in lottery stocks. To test this implication, we study the German stock market from 2000 through 2025 (and replicate our results in the US). Germany provides an ideal setting for our tests because German companies usually pay dividends once a year, during spring (especially in May), leading to a concentration of marketwide dividend payments in time.

Our stock market analysis yields five major results. First, we exploit the German dividend season for a straightforward test of price pressure in lottery stocks. We separate the stock market into a value-weighted portfolio of lottery stocks and a portfolio of all remaining stocks (the non-lottery portfolio). Then we compare the performance of the portfolios in May (when the market pays out 1% of its capitalization in dividends, on

average), with the performance in all other months. Consistent with price pressure from dividend reinvestments, we find that the return of the lottery portfolio is 7pp higher in May than in all other months (while the average return of the non-lottery portfolio is the same in May as in all other months).

Second, we show that the outperformance of the lottery portfolio in May can be translated into simple, cheap, and ex-ante implementable investment strategies. For example, a strategy of holding the lottery portfolio during May and holding the non-lottery portfolio during all other months more than doubles the performance of a buy-and-hold investment in the market at virtually no transaction costs. We find that the returns of the lottery portfolio in May are a) not explained by factor models, b) have a higher skewness, c) lower loss frequency, and d) higher outperformance frequency compared with the non-lottery portfolio, a rare combination of characteristics that investors generally find attractive (Holzmeister et al. 2020; Ungeheuer and Weber 2023).

Third, we follow Hartzmark and Solomon (2025) and estimate price pressure by regressing portfolio returns on the marketwide dividend yield of the past n days. This methodology has the benefits of being more precise regarding the timing of price pressure and being applicable in markets without a dividend season. Thus, we apply the methodology in Germany as well as the US. In both markets, we find that the excess price pressure in the lottery portfolio builds up gradually and reaches its peak around 20 days after the dividend payment at a value of 6pp (5pp) per 1% of its capitalization that the German (US) market pays out in dividends, consistent with our prior results.

Fourth, we test if there is a reversal of the price pressure in the lottery portfolio. By analyzing price developments up to 3 months after the dividend payment, we find no evidence of a reversal. Importantly, the absence of a reversal does not mean that the lottery portfolio continues to outperform the non-lottery portfolio indefinitely. Over time,

the price pressure is offset by the substantial average underperformance of the lottery portfolio of -1.7pp per month. Using a back-of-the-envelope calculation, this means that the value of the lottery portfolio is driven up by 7pp in May and then gradually declines until it reaches its pre-price-pressure value again in September, after 4 months (7/1.7).

Fifth, we address the fact that price pressure is the product of excess demand and the price multiplier (i.e., the dollar increase in portfolio value per dollar invested). As lottery stocks are, on average, more illiquid than non-lottery stocks, we make sure that the price pressure differences are not explained by price multiplier differences, alone. To do so, we compare price pressure in the lottery portfolio with price pressure in illiquidity-matched non-lottery portfolios (for which we expect a similar multiplier). We find that the price pressure in the lottery portfolio is still 5pp higher per 1% of marketwide dividends, which indicates that the excess price pressure in the lottery portfolio is indeed driven by excess demand from dividend gambling and not just the by-product of a higher price multiplier.

Is it plausible that the dividend-gambling behavior of retail investors drives the prices of lottery stocks to such a large extent? To address this question, we perform a back-of-the-envelope calculation of the price multiplier that would be necessary to generate our results. We estimate a multiplier of 6, consistent with prior evidence on multipliers of factor portfolios (Ben-David et al. 2022; Li 2022; Peng and Wang 2026; Gabaix and Koijen 2023). The intuition is that marketwide dividends are extremely large relative to the lottery portfolio, such that relatively few reinvestments suffice to drive up the prices substantially.

Moreover, our results are consistent with Hartzmark and Solomon (2025), who find that price pressure a) is stronger in smaller stocks and non-dividend paying stocks (leaving room for the price pressure in lottery stocks we find), b) has been increasing since the 2000s (matching our sample period), and c) reaches its maximum 20 days after the

dividend payment (which we also find for price pressure in lottery stocks). Additionally, our results are consistent with Greenwood, Laarits, and Wurgler (2023), who document price pressure in stocks with low prices and high volatility up to 15 days after the payment of stimulus checks in the US and who find no reversal up to 60 days after the payment.

In the third part, we design two experiments: the first to establish that dividend receipts causally increase subsequent gambling and the second to test how an educational intervention affects dividend-gambling behavior. In the first experiment, participants allocate their endowment between cash and Stock A that has a return of 8% with 60% probability or -6% with 40% probability. After several periods, participants are randomly assigned to one of four treatments (two-by-two between-subjects design). Participants are either paid a dividend by Stock A (which decreases their holdings of A) or not paid a dividend. Moreover, participants are offered a new Stock B which has payoffs that are either lottery-like (+90% with 10% probability or -10% with 90% probability) or non-lottery-like (+5% or -5% with equal probability). Because the dividend corresponds to a partial sale of Stock A and participants can still trade A, participants can home-make or undo the dividend and, rationally, the dividend should not make a difference for participants' allocation between Stocks A, B, and cash.

Yet, consistent with our prior results, we find that the dividend does make a difference. 62% of participants who are paid a dividend and are offered the lottery Stock B invest in B which is 15pp more than the 47% of participants who invest in lottery Stock B without a dividend. For participants who are offered the non-lottery Stock B, the dividend payment only makes a difference of 2pp (29% - 27%). Thus, the dividend-induced propensity to gamble (which is indicated by the difference in differences) is 13pp (15pp - 2pp).

In the second experiment, we investigate whether dividend gambling persists after an educational intervention aimed at correcting the free dividends fallacy (i.e., the failure

to understand that dividend payments lead to corresponding reductions in stock prices Hartzmark and Solomon 2019). To test this, we adapt the design of the first experiment in two ways. First, every participant receives a dividend and is offered the lottery-like Stock B. Second, participants are randomly assigned to one of two between-subjects conditions: half receive an educational intervention explaining how dividend payments reduce stock prices (as in Hackethal et al. 2026), while the other half do not. Although the intervention substantially reduces the free dividends fallacy, we find no corresponding reduction in the propensity to gamble with dividends. Combined with our findings from the brokerage data, this result suggests that dividend gambling is rooted in a mental-accounting framework that persists even when investors understand that dividends are not free income, consistent with Shefrin and Statman (1984).

Our paper contributes to multiple strands of literature. First, we contribute to research on how investors use their dividends and why they do so. Previous studies often document that investors spend a large fraction of their dividends (Baker, Nagel, and Wurgler 2007; Di Maggio, Kermani, and Majlesi 2020; Bräuer, Hackethal, and Hanspal 2022). Recently, a) Müller-Dethard, Reinhardt, and Weber (2025) and b) Hackethal et al. (2026) find that investors spend less and reinvest more of their dividends if a) their brokerage account has a cash balance that is separate from their checking account and b) if the investors are educated about dividends. As these studies concentrate on showing that dividends are reinvested in securities portfolios but leave open into which securities, we fill a research gap by analyzing the reinvestment targets. Our findings that (i) dividend reinvestments are more lottery-like than investments funded from other sources, that (ii) this pattern also holds for special dividends, and that (iii) education about dividends does not reduce dividend gambling are consistent with a persistent mental accounting of dividends (Shefrin and Statman 1984; Shefrin and Thaler 1988; Hartzmark and Solomon

2019). Our findings thus extend the literature on the non-fungibility of cash (e.g., Thaler and Johnson 1990; Arkes et al. 1994; Thaler 1999; He and Zhu 2026) by documenting a dividend-specific tendency to gamble that goes beyond established mechanisms such as house money effects, windfall gains, and cash temperature.

Second, this paper adds to research on gambling preferences in financial markets (e.g., Dorn and Sengmueller 2009; Grinblatt and Keloharju 2009; Kumar 2009; Bali, Cakici, and Whitelaw 2011; Kumar, Page, and Spalt 2011; Dorn, Dorn, and Sengmueller 2015; Gao and Lin 2015; Agarwal, Jiang, and Wen 2022; Kormanyos, Hanspal, and Hackethal 2025; Baker et al. 2026). We find that dividends can induce investors who do not typically gamble to buy lottery-like securities.

Third, our research integrates two separate strains of asset pricing literature. The first documents an average underperformance of lottery stocks that varies based on exogenous drivers of lottery demand (e.g., Barberis and Huang 2008; Doran, Jiang, and Peterson 2012; Conrad, Kapadia, and Xing 2014; Eraker and Ready 2015; Kumar, Page, and Spalt 2016; Bali et al. 2017; An et al. 2020; Byun, Goh, and Kim 2020; Liu et al. 2020; Chen, Kumar, and Zhang 2021; Bali and Wen 2023; Greenwood, Laarits, and Wurgler 2023; Jiang, Zhou, and Zhu 2024; Hung and Lin 2026). The second strain documents dividend-reinvestment-induced price pressure in the dividend-paying stock (Ogden 1994; Berkman and Koch 2017; Li, Yang, and Zhang 2026), co-held stocks in institutional portfolios (Kvamvold and Lindset 2018; Schmickler and Tremacoldi-Rossi 2023; Chen 2024), and the stock market as a whole (Hartzmark and Solomon 2025), which are all mechanically linked to the dividend payment. In this paper, we use gambling preferences to link dividend payments with reinvestment targets and identify dividend payments as an exogenous driver of lottery demand that leads to a temporary, predictable outperformance of lottery stocks.

1 Brokerage data

In this section, we analyze two brokerage samples to document that investors have a tendency to use their dividends for purchasing lottery-like securities. First, we present the brokerage data and our methodology to analyze the characteristics of the securities that investors purchase with their dividends. Second, we report the results.

1.1 Brokerage data: Data and methodology

The German brokerage dataset was initially introduced by Dorn and Weber (2017) and analyzed by Müller-Dethard, Reinhardt, and Weber (2025), who find that 80% of dividends are reinvested in securities over the course of one year. The dataset covers a randomly selected sample of self-directed brokerage clients from one of Germany's three largest online banks from January 2007 through October 2011. We use monthly portfolio holdings data to infer the purchases of individual securities by an investor in a given month. To calculate dividends paid out to an investor in a given month, we match holdings with dividend information from Datastream and CRSP and adjust for withholding taxes as in Müller-Dethard, Reinhardt, and Weber (2025). Return data are also from Datastream and CRSP. Data for European factor returns are from Ken French's website.

The US brokerage dataset is the widely used dataset from Barber and Odean (2000) covering clients of a large US discount broker from 1991 through 1996. The dataset contains daily trading records of each client's security purchases and sales. We calculate dividend payments by combining holdings and trading data with dividend information from CRSP.

Our goal is to test whether purchases are more gambling-like when they are dividend-induced. Analyzing purchases of stocks, we identify gambling-like purchases based on the

stock's idiosyncratic volatility, skewness, price, and maximum one-day return (Kumar 2009; Bali, Cakici, and Whitelaw 2011).[1] Analyzing purchases across asset classes, we define gambling-like purchases as purchases of warrants (Bauer, Cosemans, and Eichholtz 2009; Boyer and Vorkink 2014; Dorn, Dorn, and Sengmueller 2015; Bryzgalova, Pavlova, and Sikorskaya 2023).

We identify a purchase as being dividend-induced, if the purchase has a close connection with the dividends in terms of timing and amount. To ensure the robustness of our results, we vary the definition of a close connection, allowing a maximum distance between dividends and purchases of 1, 2, or 3 months and requiring dividends to cover more than 10%, 50%, or 100% of the purchase amount. The strictness of the definition balances sample size against the risk of misidentification. Our baseline definition, which requires same-month dividends to cover more than 50% of the purchase amount, identifies 4,840 dividend-induced purchases (2,731 in the German sample and 2,109 in the US sample). The loosest definition, which requires dividends from the purchase month and the preceding 2 months to cover more than 10% of the purchase amount, identifies 75,064 dividend-induced purchases (40,451 in the German sample and 34,613 in the US sample).

The German and US samples complement each other with distinct advantages for identifying dividend-induced purchases. In Germany, dividends are generally paid once a year, often in May, leading to a concentration of large and salient dividend payments that makes purchases in May prime candidates for dividend-induced purchases. The

[1]The idiosyncratic volatility of a stock is calculated as the standard deviation of the residuals from regressing the stock's daily returns over the previous six months on the daily returns of the Carhart (1997) four factors. The idiosyncratic skewness of a stock is calculated as the skewness of the residuals from regressing the stock's daily returns over the previous six months on the daily returns of the equity risk premium and the equity risk premium squared. The price is the beginning-of-month price. The maximum one-day return is the stock's maximum one-day return in the previous month. Breakpoints of a characteristic in a given month for the lottery stock definitions (e.g., the median) are based on the equally-weighted distribution of the characteristic in that month among all stocks that are ever held in the brokerage dataset. For data from Datastream, we require that a stock's returns are non-missing and non-zero on at least 75% of trading days in the previous six months and the previous month.

daily frequency of the US data, in turn, allows us to precisely map dividend payments to subsequent purchases and ensure that the dividends were not used for other purchases beforehand. Yet, it is important to note that misidentifications generally bias our results toward 0 because mixing dividend-induced purchases with dividend-unrelated purchases makes the resulting group less distinct from the remaining dividend-unrelated purchases.

To ensure that we compare dividend-induced purchases with other purchases that occur as part of investors' self-directed, regular trading activity, we (i) focus on purchases of securities that are not already part of the investor's portfolio, (ii) exclude mutual funds for which the German bank offers a savings plan that also automatically reinvests the funds' dividends, (iii) exclude purchases made during investors' initial portfolio formation (i.e., when the portfolio value before the purchase was 0). After application of these filters, the German sample contains 255,927 purchases from 21,136 accounts over a 57 month period and the US sample contains 1,165,219 purchases from 62,625 households over a 71 month period. Depending on the strictness of the identification, we identify 0.5% to 16.8% of these purchases as dividend-induced in the German sample and 0.1% to 3.1% in the US sample. The higher frequency of dividend-induced purchases in the German sample is in line with an increase in the dividend reinvestment rate from the 1990s to the 2010s (Müller-Dethard, Reinhardt, and Weber 2025) and consistent with the larger size and greater salience of the annual dividend payments in Germany.

Table 1 presents summary statistics for the purchases and the investors making the purchases in the German brokerage sample. Panel A shows that the median purchase amount is 2,200 euros, with 25% of purchases being smaller than 1,000 euros and 25% being larger than 4,800 euros. By contrast, the dividend amount is 0 euros in 70% of purchase months, highlighting the need for the matching between purchase and dividend amounts that is part of our identification of dividend-induced purchases. Panel B shows

Table 1: Brokerage data: Summary statistics

	Min	P25	Median	Mean	P75	Max	N
A: Purchase and dividend amounts							
Purchase amount (€)	0.01	1,029	2,218	5,033	4,812	3,448,068	255,927
Dividend amount (€)	0	0	0	75	8	114,611	255,927
B: Asset classes of purchased securities							
Stock	0	0	100	65	100	100	255,927
...of which lottery-like	0	0	0	9	0	100	133,122
Fund	0	0	0	10	0	100	255,927
Bond	0	0	0	5	0	100	255,927
Certificate	0	0	0	7	0	100	255,927
Warrant	0	0	0	14	0	100	255,927
C: Demographics							
Age (years)	0	41	50	51	62	98	255,927
Sex: Male	0	0	100	65	100	100	255,927
Sex: Female	0	0	0	13	0	100	255,927
Sex: Shared account	0	0	0	22	0	100	255,927
Married	0	0	100	59	100	100	255,927
Retired	0	0	0	13	0	100	255,927
D: Portfolio characteristics							
Portfolio size (€1k)	0.0	9.0	26.8	69.8	71.0	1,117.2	255,927
Dividend yield p.a.	0.0	0.4	1.1	1.4	1.9	22.1	255,927
Number of buys p.a.	0.2	3.8	8.8	15.7	19.1	252.0	255,927
Financially inexperienced	0.0	0.0	0.0	0.6	0.0	100.0	255,927

This table presents summary statistics for the purchases and the investors making the purchases in the German brokerage sample. Panel A presents data on purchase amounts and the amount of dividends received by investors in the purchase month. Panel B shows the distribution of asset classes of the purchased securities. Panels C and D contain investor-level information. Portfolio size is recorded at the beginning of the purchase month. Portfolio size and dividend yield are winsorized at the 99.9% level. All data are in percent except where noted otherwise.

that 65% of purchases are stock purchases, of which 9% are purchases of lottery stocks (based on above-median idiosyncratic skewness and volatility and below-median price). Warrants make up 14% of purchases, while funds, investment certificates, and bonds account for just 10%, 7%, and 5%, respectively. The low fraction of fund purchases is mechanically driven by our exclusion of funds eligible for the bank's savings plans.

Panels C and D show that the median age is 50 years and 65% of investors are male. The median portfolio size is 26,800 euros, the median dividend yield 1.1%, and the

median number of buy orders per year is 8.8. According to the EU MiFID guidelines, only 0.6% of investors score low in terms of financial literacy based on self-reported financial knowledge and experience. In sum, the sample mostly consists of financially literate, middle-aged investors that have sizeable portfolios and trade actively. Because each observation correspond to a purchase, our sample is mechanically tilted toward active investors, which is well suited to our research question, as (i) we aim to study how investors behave when they actively handle their dividends and (ii) these investors are the ones who may generate price pressure (Hartzmark and Solomon 2025).

1.2 Brokerage data: Results

First, we document that retail investors gamble with their dividends. Second, we analyze potential reasons why they might do so. Third, we examine the characteristics of investors who gamble with their dividends.

1.2.1 Documenting that retail investors gamble with their dividends

In Table 2, we analyze which fraction of stock purchases is in lottery stocks and how this fraction changes if the purchase is dividend-induced. The table presents the results of regressions, in which the dependent variable is 1 if a stock is a lottery stock (based on above-median idiosyncratic skewness and volatility and below-median price) and 0 otherwise.[2] In column 1, the independent variable is a dummy that is 1 if dividends received in the purchase month cover more than 50% of the purchase amount and 0 otherwise. The intercept indicates that, without such dividends, 9.3% of stock purchases

[2]Stock purchases for which we have insufficient data on these characteristics are excluded. Analyses of individual characteristics and alternative definitions of lottery stocks are reported in Table A3 of the Internet Appendix. The results across all individual characteristics and alternative definitions suggest that dividends are invested in stocks that are more lottery-like than those the same investors buy with similar amounts of non-dividend funds.

Table 2: Brokerage data: Dividend-induced purchases of lottery stocks

	DepVar: 1 for purchases of lottery stocks, 0 otherwise						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	9.3***						
	(0.6)						
Prch < €1k				9.3***	9.2***	9.1***	9.2***
				(0.6)	(0.6)	(0.6)	(0.6)
Div > 0.5*Prch	7.9***	10.0***	10.5***	7.8***			
	(1.8)	(1.3)	(1.3)	(1.2)			
Prch < €1k & Div > 0.5*Prch					11.9***		
					(1.8)		
Prch ≥ €1k & Div > 0.5*Prch					3.9***		
					(1.0)		
Div3Months > 0.5*Prch						5.5***	
						(0.6)	
Div3Months > 0.1*Prch							2.9***
							(0.4)
Investor FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.00	0.15	0.16	0.17	0.17	0.17	0.17
Within R^2	0.00	0.00	0.00	0.01	0.01	0.01	0.01
N	133,122	129,469	129,469	129,469	129,469	121,870	121,870

This table reports the results of 7 regressions, in which each observation corresponds to a stock purchase. The dependent variable is 1 if the purchased stock is a lottery stock and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. E.g., "Div > 0.5*Prch" is 1 if dividends received in the purchase month cover more than 50% of the purchase amount. "Div3Months" is the sum of dividends received in the purchase month and the preceding 2 months. Coefficient estimates and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

are in lottery stocks. The coefficient on the dummy indicates that this fraction increases by 7.9pp to 17.2% among dividend-induced purchases. On the one hand, the entire 17.2% can be viewed as additional investments in lottery stocks due to the dividend payment, because the funds are held as cash by the dividend-paying companies prior to payment (implying that 0% of dividends are invested in lottery stocks). On the other hand, the 7.9pp coefficient also shows that lottery stocks are substantially overrepresented among dividend-induced purchases relative to dividend-unrelated purchases.

In column 2, we add investor-fixed effects. The coefficient on the dividend-induced-purchase dummy increases to 10.0pp and indicates that the probability of buying a lottery stock is 10.0pp higher when the same investor funds a purchase with dividends rather than other funds. The increase in the coefficient relative to column 1 suggests that investors who make dividend-induced purchases tend to invest less in lottery stocks in their dividend-unrelated purchases than investors who do not make dividend-induced purchases. This is consistent with the evidence from Table 5 that dividend gamblers are less gambling-prone than typical lottery-stock investors, who generally receive much fewer dividends to gamble with.

In column 3, we additionally include year-month fixed effects, which further raises the coefficient on the dividend-induced-purchase dummy to 10.5pp. Given the seasonality of dividends in Germany, these fixed effects ensure that our results are not driven by dividend-unrelated demand for lottery stocks during the dividend season.

Dividend-induced purchases are smaller than other purchases, on average. For example, when dividends received in the purchase month cover more than 50% of the purchase amount, the median purchase amount is 1,000 euros, which corresponds to the 25th percentile among all purchases. In columns 4 and 5, we test whether gambling with dividends simply reflects a mental-accounting framework in which investors gamble with smaller amounts. In column 4, we add a dummy that is 1 for purchases below 1,000 euros and 0 for purchases of 1,000 euros or more. If dividend-induced purchases were more lottery-like only because they usually involve smaller amounts, the inclusion of the small-purchase dummy should render the dividend-induced-purchase dummy insignificant. Yet, we still find that the probability of buying a lottery stock is 7.8pp higher when the same investor funds a purchase with dividends rather than other funds of a similar amount. Column 5 separates the effect of dividends for purchases below and above 1,000 euros and

shows that dividends increase the probability of buying a lottery stock by 11.9pp among purchases below 1,000 euros and by 3.9pp among purchases above 1,000 euros. Thus, the tendency to gamble with dividends is particularly pronounced for small purchases but remains present even for larger purchases.[3]

Columns 6 and 7 present results for broader definitions of dividend-induced purchases as purchases that occur in months in which the dividends received in the contemporaneous month and the previous 2 months cover more than 50% or 10% of the purchase amount, respectively. Even under these broader definitions, the coefficients of 5.5pp and 2.9pp remain economically substantial relative to the average lottery-stock share of 9.3%, albeit naturally smaller due to the increased risk of misidentification, which generally biases estimates toward 0. This finding is consistent with dividends acting as a mental-accounting trigger: receiving a dividend may prompt investors to make a lottery-like investment, even if they supplement the dividend with substantial additional funds.[4]

In Table 3, we consider all dividend-induced purchases, without restricting the sample to stock purchases, and analyze the asset classes of the purchased securities. The table presents regressions in which the dependent variable is 1 if the purchased security is a stock/fund/..., and 0 otherwise. As before, the independent variable is a dummy that is 1 if dividends received in the purchase month cover more than 50% of the purchase amount and 0 otherwise. The left half of the table does not include fixed effects or control variables, while the right half includes investor fixed effects, year-month fixed effects and a dummy indicating purchases below 1,000 euros.

[3]Note that these analyses also rule out the possibility that investors use dividends to buy lower-priced lottery stocks simply because the dividends are too small to buy a whole share of a higher-priced non-lottery stock.

[4]Table A1 of the Internet Appendix includes additional regression specifications with more granular breakdowns by order size and further alternative definitions of dividend-induced purchases. The results remain qualitatively unchanged across these specifications.

Table 3: Brokerage data: Dividend-induced purchases across asset classes

	DepVar: 1 for purchases in the indicated asset class, 0 otherwise									
	Stock	Fund	Bond	Certificate	Warrant	Stock	Fund	Bond	Certificate	Warrant
Intercept	64.6***	9.7***	5.3***	6.6***	13.8***					
	(0.8)	(0.7)	(0.3)	(0.4)	(0.6)					
Prch < €1k						-2.6***	-5.4***	-1.8***	-2.6***	12.4***
						(0.7)	(0.4)	(0.2)	(0.3)	(0.6)
Div > 0.5*Prch	3.7	-5.8***	-2.6***	-4.5***	9.3***	-0.7	-0.8	-1.5***	-2.6***	5.6***
	(2.3)	(0.9)	(0.6)	(0.5)	(2.0)	(1.5)	(0.5)	(0.5)	(0.6)	(1.1)
Investor FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Year-month FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.00	0.00	0.00	0.00	0.00	0.49	0.41	0.40	0.34	0.57
Within R^2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03
N	255,927	255,927	255,927	255,927	255,927	251,640	251,640	251,640	251,640	251,640

This table reports the results of 10 regressions, in which each observation corresponds to a security purchase. The dependent variable in a given regression is 1 if the purchased security is in the indicated asset class and 0 otherwise. The independent variables are a dummy that is 1 if the purchase amount is smaller than 1,000 euros and a dummy that is 1 if dividends received in the purchase month cover more than 50% of the purchase amount. Coefficient estimates and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

First, the left half of the table documents that stocks are overrepresented and funds are underrepresented among dividend-induced purchases. The right half shows that these patterns are largely explained by investor fixed effects, indicating that investors who make dividend-induced purchases differ in their general propensity to invest in stocks and funds from investors who do not. Thus, the probability that an investor uses dividends to purchase stocks overall remains in line with the same investor's other purchases; it is the gambling within the asset class of stocks that increases when investing dividends.

Second, the left half of the table documents that bonds and investment certificates (e.g., index-tracking certificates) are each significantly underrepresented among dividend-induced purchases compared with other purchases (2.7% = 5.3% - 2.6% and 2.1% = 6.6% - 4.5%, respectively). Conversely, warrants are significantly overrepresented (23.1% = 13.8% + 9.3%). The right half of the table shows that these patterns remain economically substantial and statistically significant after controlling for investor-fixed effects, year-month fixed effects, and order size. The coefficients indicate that the same investor is 1.5pp less likely to buy bonds, 2.6pp less likely to buy investment certificates, and

5.6pp more likely to buy warrants when investing dividends rather than other funds of a similar amount. With warrants generally being more lottery-like than bonds and investment certificates, these results demonstrate that the propensity to gamble with dividends extends to investors' choice across asset classes.

Replication with US data: In Table A5, we repeat the analyses in the US brokerage sample. Among stock purchases that are not dividend-induced, the fraction of lottery stock purchases is 10.4%. Among dividend-induced stock purchases (that are more than 50% covered by dividends received in the last 30 days), this fraction increases by 11.3pp to 21.7%. Controlling for household fixed effects, date fixed effects, and a dummy indicating purchases below 1,000 US dollars, dividend-induced purchases are associated with a 7.3pp higher likelihood of buying lottery stocks. Among dividend-unrelated purchases across asset classes, the fraction of warrant purchases is 8.8%. Among dividend-induced purchases, this fraction increases by 19.5pp to 28.3%. Controlling for household fixed effects, date fixed effects, and a dummy indicating purchases below 1,000 US dollars, dividend-induced purchases are associated with an 8.0pp higher likelihood of buying warrants. Overall, the results are in line with those for the German sample and show that dividend gambling can be observed in different time periods and countries.

1.2.2 Potential explanations for gambling with dividends

In this section, we explore potential explanations for why dividends increase investors' propensity to buy lottery stocks and warrants. To do so, we repeat the regression design from above and allow for economically meaningful interactions and case distinctions. All regressions include investor fixed effects, year-month fixed effects, and a dummy indicating purchases below 1,000 euros, allowing us to interpret the effects as increases in the propensity to gamble when the same investor invests dividends rather than other

Table 4: Brokerage data: Potential explanations for div-induced lottery stock purchases

	DepVar: 1 for purchases of lottery stocks, 0 otherwise					
	(1)	(2)	(3)	(4)	(5)	(6)
Prch < €1k	9.2***	9.2***	9.4***	8.0***	9.3***	9.3***
	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
BoMCash < Prch	-1.2***	-1.2***				
	(0.3)	(0.3)				
HotCash > 0.5*Prch			1.0***			
			(0.2)			
Prch < €1k & HotCash > 0.5*Prch				2.7***		
				(0.6)		
Prch ≥ €1k & HotCash > 0.5*Prch				0.5***		
				(0.2)		
Div > 0.5*Prch		7.4***	7.4***			7.2***
		(1.3)	(1.2)			(1.2)
Prch ≤ BoMCash & Div > 0.5*Prch	7.4***					
	(1.3)					
Prch > BoMCash & Div > 0.5*Prch	9.6***	2.2				
	(2.5)	(2.7)				
Prch < €1k & Div > 0.5*Prch				10.5***		
				(1.9)		
Prch ≥ €1k & Div > 0.5*Prch				3.7***		
				(1.0)		
DivOrdinary > 0.5*Prch					7.3***	
					(1.2)	
DivSpecial > 0.5*Prch					22.4**	16.5*
					(8.4)	(8.5)
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.17	0.17	0.17	0.17	0.17	0.17
Within R^2	0.01	0.01	0.01	0.01	0.01	0.01
N	129,469	129,469	129,469	129,469	129,469	129,469

This table reports the results of 6 regressions, in which each observation corresponds to a stock purchase. The dependent variable is 1 if the purchased stock is a lottery stock and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. E.g., "Div > 0.5*Prch" is 1 if dividends received in the purchase month cover more than 50% of the purchase amount. "BoMCash" is the brokerage cash balanace at the beginning of the purchase month. "HotCash" is the sum of sales proceeds and dividends in the purchase month. All regressions include investor- and year-month fixed effects. Coefficient estimates and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

funds of a similar amount, controlling for general lottery-stock demand at the time of purchase. In Table 4, we perform the analyses for lottery stocks. In Table A4 of the

Internet Appendix, we repeat the analyses for warrants and arrive at the same conclusions that we present in the following.

First, it may be that investors gamble with any funds that sit in the brokerage cash balance, rather than specifically with dividends. To test this potential alternative explanation, we use the fact that the German dataset contains monthly observations of each investor's brokerage cash balance. Columns 1 and 2 distinguish cases in which the brokerage cash balance before the dividend receipt was already sufficient to cover the purchase amount (which is the case for 77% of dividend-induced purchases). In such cases, we find that dividend-induced purchases are still associated with a 7.4pp higher probability of purchasing lottery stocks, which is not significantly different from the 9.6pp higher probability in cases, in which the brokerage cash balance before the dividend receipt was insufficient to fund the purchase. Thus, dividends are associated with an increase in the propensity to purchase lottery stocks, even if the purchases could already have been funded with the pre-dividend brokerage cash balance. If investors simply gamble with any funds available in their brokerage cash balance, receiving a dividend should not affect their propensity to purchase lottery stocks in such cases.

Second, we test if the propensity to gamble with dividends is higher than the propensity to gamble with other sources of "hot cash". He and Zhu (2026) define hot cash as the sum of sales proceeds and dividends and find that recently received hot cash is invested in stocks that are more volatile, although the authors do not investigate whether this extends to other lottery characteristics or lottery-likeness as a compound measure. Because the authors show that hot cash in their sample is almost entirely composed of sales proceeds, "given the relatively small magnitude of dividend payments in the Chinese stock market" (He and Zhu 2026, p. 9), their results are mostly informative about the reinvestment of sales proceeds but not of dividends. Still, it could be that dividends are gambled to the

same extent as sales proceeds and gambling with dividends could be subsumed under a broader phenomenon of gambling with hot cash. Columns 3 and 4 show that this is not the case. In line with He and Zhu (2026), Column 3 shows that hot-cash-induced purchases (for which more than 50% of the amount is covered by same-month sales proceeds and dividends) have a 1.0pp higher propensity to be in lottery stocks. Yet, when this hot cash comes in the form of dividends, the probability increases by an additional 7.4pp. In column 4, we find that the additional gambling with dividends persists when separating purchases below and above 1,000 euros. Moreover, Table A2 of the Internet Appendix shows that dividends are gambled more readily than any other individual source of funds (e.g., interest payments), supporting that dividends are assigned to a distinct mental account (Shefrin and Statman 1984).

Third, we test whether our results only apply to investors who consciously seek dividend income because they plan to gamble with the dividends (similar to the results in Bräuer, Hackethal, and Hanspal 2022, where investors seek dividend income because they plan to spend the dividends) or whether the results also apply to investors for whom the dividend payment comes as an unplanned, plausibly exogenous income shock. As candidates for such a shock, we examine special dividends (following Baker, Nagel, and Wurgler 2007; Kaustia and Rantapuska 2012). In columns 5 and 6, we separately consider purchases for which more than 50% of the purchase amount is covered by ordinary or special dividends received in the purchase month. We find that ordinary dividends are associated with a 7.3pp increase in the fraction of lottery-stock purchases and special dividends with a 22.4pp increase. Together with the evidence from our experiment in Section 3, the gambling with plausibly exogenous special dividends supports a causal interpretation of the effect of dividend receipt on gambling-like purchases. Additionally, the finding that investors gamble even more with special dividends than with ordinary

dividends is consistent with a mental-accounting framework in which special dividends are even more readily allocated to a "fun money" account.

Prior research provides further evidence that our finding of a tendency to gamble with dividends reflects a distinct mental accounting of dividends rather than the house money effect (Thaler and Johnson 1990) or the mental accounting of windfall gains (Arkes et al. 1994). Jelschen and Schmidt (2023) distinguish between the two phenomena by defining house money as the "positive difference between the current stake and the initial stake that has been acquired by previously taking risk" (Jelschen and Schmidt 2023, p. 216) and windfall gains as unexpected risk-free gains. First, Hartzmark and Solomon (2019) provide ample evidence of a mental separation between dividends and capital gains, suggesting that dividends are not perceived as part of the "current stake" and therefore not as house money. Second, Bräuer, Hackethal, and Hanspal (2022) provide survey evidence that only 14% of investors view dividends as windfall gains (12% as salary, 24% as an irrelevant payment), while 49% view them as an expected bonus, consistent with a separate mental account.

1.2.3 Characteristics of dividend gamblers

In Table 5, we analyze (i) the characteristics of investors who reinvest their dividends in lottery stocks/warrants ("dividend gamblers") and compare them with (ii) the characteristics of investors who reinvest their dividends in other securities ("dividend non-gamblers") as well as (iii) the characteristics of investors who purchase lottery stocks/warrants with non-dividend funds ("dividend-unrelated gamblers").

The results indicate that (i) dividend gamblers are generally in the middle between (ii) dividend non-gamblers and (iii) dividend-unrelated gamblers, often with a stronger tilt towards dividend non-gamblers, importantly also in terms of portfolio holdings prior

Table 5: Brokerage data: Characteristics of dividend gamblers

	Purchases of stocks					Purchases across asset classes				
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(4)	(5)	(6)	(4)-(5)	(4)-(6)
Div-induced prch	Yes	Yes	No			Yes	Yes	No		
Prch of lottery	Yes	No	Yes							
Prch of warrant						Yes	No	Yes		
Panel A: Demographics										
Age (years)	53.6	54.8	49.4	-1.1**	4.2***	52.4	54.8	50.1	-2.3**	2.4**
Sex: Male	67.3	62.6	67.6	4.7**	-0.3	65.5	63.7	72.1	1.7	-6.6**
Sex: Female	10.2	13.4	12.1	-3.2**	-1.8	9.2	12.4	8.6	-3.3	0.6
Sex: Shared acc	22.4	23.9	20.3	-1.5	2.1	25.4	23.8	19.3	1.5	6.0**
Married	61.7	63.0	56.3	-1.3	5.4**	64.8	63.0	58.2	1.8	6.6**
Retired	16.7	17.5	11.5	-0.8	5.2***	12.8	17.1	10.5	-4.2*	2.3
Panel B: Portfolio characteristics										
Portf. (€100k)	1.0	1.2	0.4	-0.2***	0.6***	1.1	1.4	0.4	-0.2	0.7***
DY p.a.	1.8	2.1	1.1	-0.3***	0.7***	1.5	1.9	0.8	-0.4***	0.8***
Num buys p.a.	23.7	18.6	15.4	5.0**	8.3***	31.6	21.5	23.9	10.2***	7.8**
Fin. inexp.	0.3	0.4	0.8	-0.1	-0.5**	0.1	0.4	0.1	-0.3**	0.0
Panel C: Beginning-of-month holdings										
Stocks	79.0	75.3	77.9	3.6***	1.1	60.3	69.9	34.7	-9.5***	25.6***
...in lottery	12.9	4.0	23.7	8.8***	-10.8***	8.5	5.4	18.8	3.0***	-10.3***
Funds	12.7	15.1	13.9	-2.3**	-1.2	17.4	18.0	13.9	-0.6	3.6***
Bonds	3.1	5.0	1.8	-1.8***	1.4***	3.6	6.3	2.1	-2.7***	1.5*
Certificates	3.5	3.5	3.3	0.0	0.1	6.2	4.7	7.4	1.5**	-1.1
Warrants	1.7	1.2	3.1	0.6***	-1.4***	12.5	1.2	42.0	11.3***	-29.5***
N	1,992	20,418	9,692	22,410	11,684	5,526	34,925	28,786	40,451	34,312

This table compares mean characteristics between investors who purchase lottery stocks/warrants with their dividends (1 and 4), investors who purchase other securities with their dividends (2 and 5), and investors who purchase lottery stocks/warrants with non-dividend funds (3 and 6). For this table, purchases are dividend-induced if dividends received in the purchase month and the preceding 2 months cover more than 10% of the purchase amount. Portfolio size and holdings are recorded at the beginning of the purchase month. Portfolio size and dividend yield are winsorized at the 99.9% level. All data are in percent except where noted otherwise. Standard errors are clustered by investor and year-month for portfolio size and holdings. Standard errors are clustered by investor for all other variables. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

to the respective dividend-induced purchase/dividend-unrelated purchase: The left half of the table shows that the stock holdings of investors who purchase lottery stocks with dividends are 12.9% lottery stocks (before the purchase), which is 8.8pp more than those of investors who purchase non-lottery stocks with dividends and 10.8pp less than those of investors who purchase lottery stocks with dividend-unrelated funds. The right half

of the table shows that the holdings of investors who buy warrants with dividends are 12.5% warrants, which is 11.3pp more than those of investors who buy non-warrants with dividends and 29.5pp less than those of investors who buy warrants with dividend-unrelated funds. Reassuringly, these patterns also hold in reverse: Investors who buy lottery stocks with dividends hold 0.6pp more warrants than investors who buy other stocks with dividends and 1.4pp less warrants than investors who buy lottery stocks with dividend-unrelated funds. Investors who buy warrants with dividends hold 3.0pp more lottery stocks than investors who buy non-warrants with dividends and 10.3pp less lottery stocks than investors who buy warrants with dividend-unrelated funds. In sum, the investor-level differences suggest that it is not "notorious gamblers" who gamble with dividends but rather investors who otherwise invest more prudently but use dividends as fun money, in line with two separate mental accounts for principal and dividends (Shefrin and Statman 1984). This is unsurprising as gambling with dividends requires dividend income, which mechanically implies substantial holdings of dividend-paying stocks and mutual funds rather than lottery stocks and warrants.

2 Asset pricing

In the previous section, we find that retail investors invest a disproportionate share of their dividends in lottery stocks. In this section, we test an implication of this finding. Specifically, we analyze whether the concentration of investments in lottery stocks leads to a particularly pronounced price pressure in lottery stocks based on marketwide dividend payments. First, we present the data for our analyses. Second, we report the results.

2.1 Asset pricing: Data

We use German stock market data from Datastream and process the data using the script provided by Landis and Skouras (2021). Details about the data processing are in Section B.1 of the Internet Appendix. German data have two main advantages for our purposes. First, the data match our German brokerage sample, which mostly consists of German securities. Second, German companies usually pay dividends once a year, in spring (especially in May), producing a short time period, during which large amounts of dividends flood the market: an ideal setting for price pressure to develop. As an out-of-sample test, we also replicate our results for the US using CRSP data in Section 2.2.4.

We separate the German stock market into two portfolios, a lottery portfolio and a non-lottery portfolio (consisting of all stocks that do not qualify as lottery stocks, not to be confused with the "anti-lottery" non-lottery stocks in Kumar 2009). For our baseline results, we follow Liu et al. (2020) and Jiang, Zhou, and Zhu (2024) and combine the lottery stock definitions by Kumar (2009) and Bali, Cakici, and Whitelaw (2011), s.t. the lottery portfolio consists of stocks with above-median idiosyncratic volatility and skewness, below-median price and a prior-month maximum one-day return above the 80th percentile.[5] The portfolios are value-weighted and re-sorted monthly. For our baseline results, we exclude stocks on their ex-dividend day and on their dividend-payment day to make sure that portfolio returns are not driven by stocks' ex- or payment-day returns. In

[5]In Figure B11 of the Internet Appendix we also report results based on the uncombined lottery stock definitions for Germany and the US. Based on each definition, we estimate return differences between the lottery and the non-lottery portfolio until 20 days after the market pays out 1% of its value in dividends (like in Section 2.2.3 for the combined lottery stock definition). In Germany, the combined definition, the volatility-skewness-price definition, and the max-return definition lead to maximum price pressure differences of 5.18pp, 3.41pp, and 1.19pp (p-values: 0.02, 0.05, and 0.48). In the US, the respective values are 5.22pp, 4.80pp, and 4.24pp (p-values: 0.00002, 0.000003, and 0.00002). Thus, in both countries, the results are stronger, the more characteristics are used to classify lottery stocks, consistent with the benefits of composite measures, which are especially pronounced for non-US stock markets, like Germany, that have a smaller cross section and a shorter time series to average out misclassifications.

Figure B10, we repeat our main analyses including such stocks and find that the results are virtually unchanged. We use data from January 2000 until April 2025, s.t., the first portfolios are formed in July 2000 (given the six-month estimation period for the lottery characteristics). We start in 2000 to ensure that we have at least 25 stocks in the lottery portfolio at all times (see Figure B1 for the number of stocks per portfolio over time).

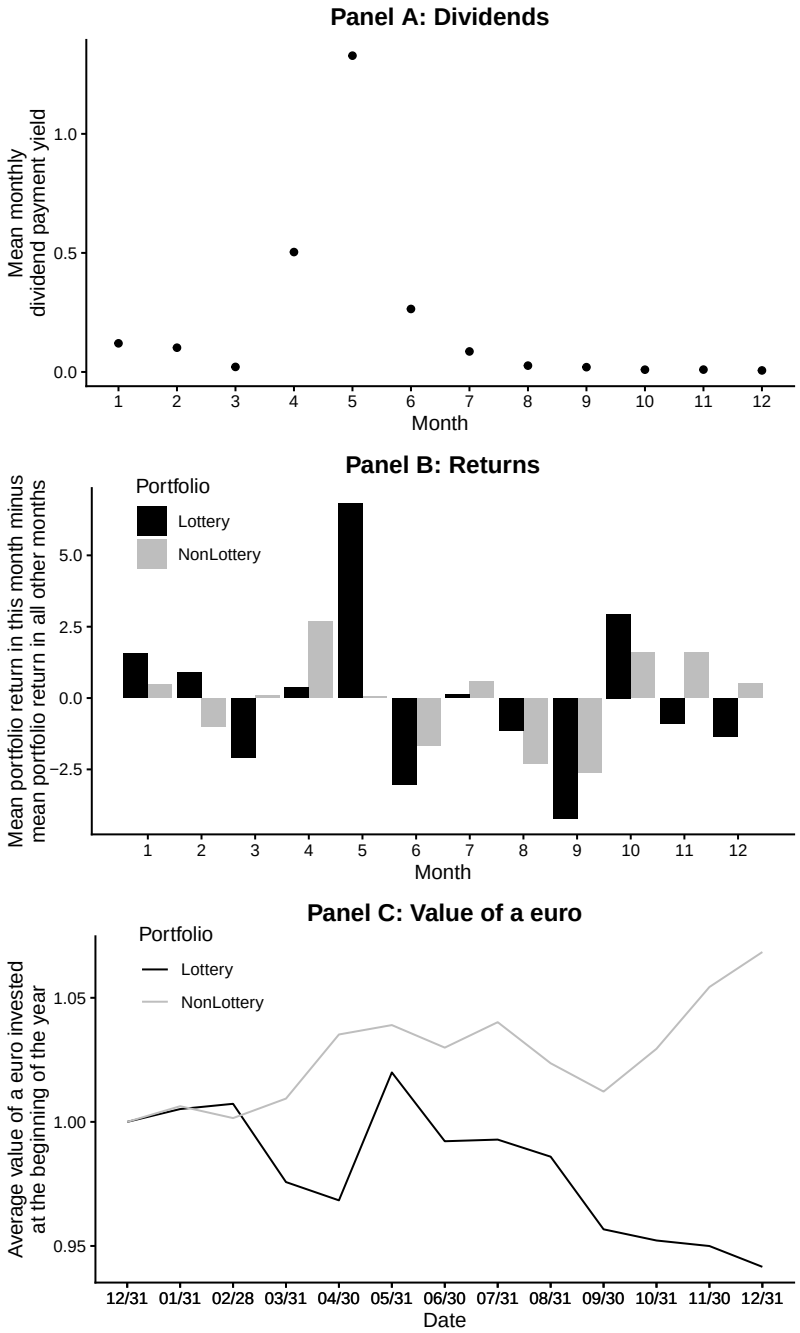
2.2 Asset pricing: Results

First, we study the performance of lottery stocks during the German dividend season. Second, we evaluate investment strategies that exploit the temporary outperformance of lottery stocks. Third, we quantify the price pressure in lottery stocks based on marketwide dividend payments. Fourth, we replicate our results for the US. Fifth, we test if the price pressure in lottery stocks can be explained by illiquidity, alone. Sixth, we perform a back-of-the-envelope calculation of the price multiplier that is necessary to produce the observed price pressure.

2.2.1 Lottery stock performance during the German dividend season

The perhaps simplest and most natural way to study portfolio price pressure from dividend reinvestments is to analyze the portfolios' performance during the German dividend season. Figure 1 presents dividend yields for each month, alongside the performance of the lottery portfolio and the non-lottery portfolio. Panel A plots the marketwide dividend yield and shows a substantial peak in May, when on average more than 1.3% of the German stock market's value is paid out in dividends. Panel B plots each portfolio's return in a given month in excess of the return in all other months (to account for the average underperformance of lottery stocks). Clearly standing out is the 6.80% excess return of the lottery portfolio in May, which is 6.76pp larger than the 0.04% excess return

Figure 1: Asset pricing: Dividends and portfolio returns by month



Panel A shows the mean monthly dividend yield of the German stock market (in pp). Panel B shows the mean return that each portfolio earns in a given month in excess of the portfolio's mean return in all other months (in pp). Panel C shows how a euro invested in each portfolio at the beginning of the year develops over the course of the year, averaged over all full years in the sample (2001-2024).

Table 6: Asset pricing: Portfolio returns by month

	m=1	m=2	m=3	m=4	m=5	m=6	m=7	m=8	m=9	m=10	m=11	m=12
Int	-1.80***	-1.87***	-1.53***	-1.53***	-2.26***	-1.60***	-1.67***	-1.81***	-1.57***	-1.83***	-1.50***	-1.55***
	(0.53)	(0.55)	(0.54)	(0.53)	(0.50)	(0.53)	(0.55)	(0.55)	(0.55)	(0.54)	(0.53)	(0.55)
Month=m	1.09	1.93	-2.18	-2.29	6.76**	-1.35	-0.45	1.16	-1.60	1.37	-2.48	-1.84
	(2.19)	(1.28)	(1.51)	(2.10)	(2.66)	(2.12)	(1.21)	(1.52)	(1.37)	(1.80)	(1.97)	(1.37)
Adj R^2	-0.002	0.000	0.001	0.002	0.040	-0.002	-0.003	-0.002	-0.001	-0.002	0.003	0.000

All stocks in the German stock market are separated into a lottery portfolio and a non-lottery portfolio which are used to form a long-short portfolio (long lottery, short non-lottery). The table shows the output of 12 regressions of monthly returns of the long-short portfolio on a dummy that is 1 if the current month is m and 0 if it is any of the other 11 months. Returns are in percent. Newey-West standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. N = 297.

of the non-lottery portfolio in May. Notably, there is no single large negative return in any individual month (e.g., in June) that would reverse the lottery portfolio gains from May. Panel C plots the average development of one euro invested in each portfolio at the beginning of the year and held until the end of the year. On the one hand, the plot highlights the striking return of the lottery portfolio in May. On the other hand, the plot shows how this return does not translate into a permanent outperformance. Although there is no clear-cut reversal in any particular month, the lottery portfolio continuously underperforms, on average, leading to a slow decay of the gains from May.

In Table 6, we test for each month, whether the return difference between the lottery portfolio and the non-lottery portfolio is different from the difference in all other moths. First, the negative intercepts indicate the average underperformance of the lottery portfolio of -1.71% per month (averaged over all months), in line with previous studies (e.g., Kumar 2009). Second, we find that May is the only month in which the performance difference between the lottery and non-lottery portfolio is systematically different from all other months with a difference of 6.76pp (p-value: 0.01).

A potential concern is that the results could be confounded by annual general meetings (AGMs), which generally take place shortly before dividend payments in Germany and are thus also clustered in May. In Table B1 of the Internet Appendix, we repeat our analyses with portfolios that exclude stocks during windows around their AGMs, ranging from

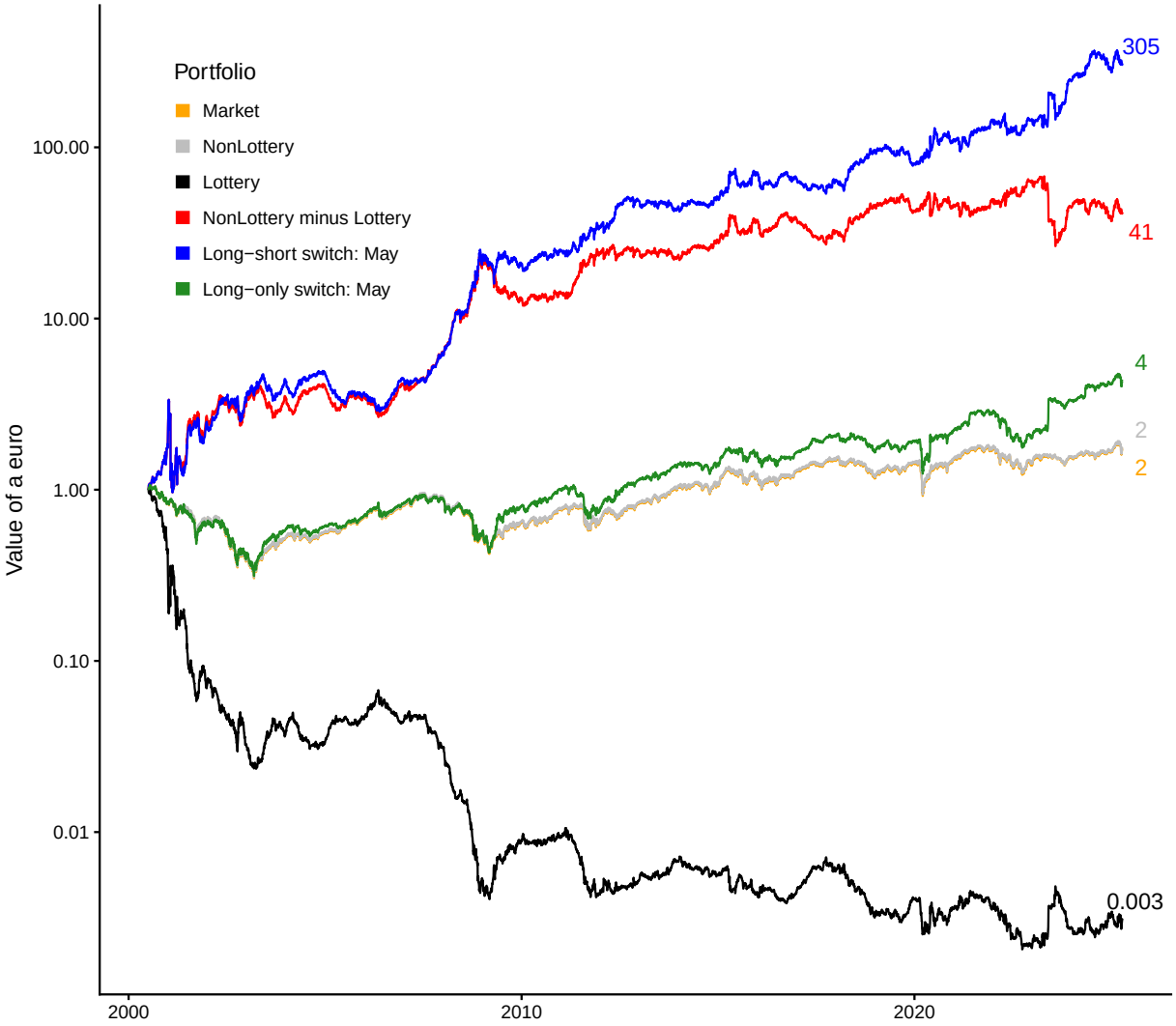
the AGM date itself to 10 days before and after the AGM. Across these specifications, the lottery-minus-non-lottery portfolio continues to perform approximately 6pp better in May than in other months. These findings suggest that our results are unlikely to be driven by news or trading activity surrounding AGMs.

2.2.2 Investment strategies

Building on the prior results, we evaluate a simple, ex-ante implementable investment strategy that switches from investing in the non-lottery portfolio (which usually outperforms the lottery portfolio) to investing in the lottery portfolio during May. We implement the strategy as zero-net investment portfolios in two versions: In the first implementation, the strategy switches between being long lottery, short non-lottery in May and being long non-lottery, short lottery in all other months. In the second implementation, the strategy is always short the risk-free rate and only the long leg switches between the lottery portfolio in May and the non-lottery portfolio in all other months. While the first implementation uses the return differences between lottery and non-lottery stocks maximally, the second implementation minimizes transaction costs.

Figure 2 plots how a euro invested in each strategy develops from 2000 through 2025. The first set of lines indicates the development of the base portfolios. As a benchmark, the orange line shows that an investment in the German market minus the risk-free rate grows from 1 euro to 1.73 euros (2.2% geometric average return p.a.) during the sample period. Because of the large overlap, especially given value-weighting, a static investment in the non-lottery portfolio minus the risk-free rate (gray line) performs almost the same as the market and grows to 1.75 euros (2.3% return p.a.). By contrast, a static investment in the lottery portfolio minus the risk-free rate (black line), loses almost all of its value and leaves just 0.3 cents of the initially invested euro (-20.7% return p.a.). In consequence, a

Figure 2: Asset pricing: Investment strategies over time



All stocks in the German stock market are separated into a lottery portfolio and a non-lottery portfolio. The portfolios are value-weighted and re-sorted monthly. Each line corresponds to a zero-net investment strategy involving these portfolios: "Market" ("NonLottery"; "Lottery") is long the market (non-lottery portfolio; lottery portfolio) and short the risk-free rate. "NonLottery minus Lottery" is long the non-lottery portfolio and short the lottery portfolio. "Long-short switch: May" is long lottery, short non-lottery in May and long non-lottery, short lottery in all other months. "Long-only switch: May" is always short the risk-free rate and is long lottery in May and long non-lottery in all other months.

strategy that is always long the non-lottery portfolio and short the lottery portfolio (red line) performs very well, growing 1 euro to 41.22 euros (16.0% return p.a.).

The second set of lines indicates the May-based switching strategies. The long-short switching strategy grows 1 euro into 305 euros, which corresponds to a strikingly large geometric average return of 25.7% p.a. (blue line). Of course the performance is mostly based on the 11 months per year when the lottery portfolio is shorted, which likely incurs substantial transaction costs.[6] Thus, the green line indicates the development of the strategy that is always short the risk-free rate and only switches the long position from the non-lottery portfolio to the lottery portfolio in May. The long-only switching strategy grows 1 euro into 4.33 euros (6.0% geometric average return p.a.), more than doubling the performance of a passive investment in the German market. This performance is achieved with only negligible transaction costs incurred to buy (sell) the lottery (non-lottery) portfolio at the end of April and sell (buy) again at the end of May.[7]

Note that the outperformance of the switching strategies (blue and green lines) vs. the static strategies (red and gray lines) becomes larger over time (i.e., the lines diverge more strongly), indicating that the dividend-reinvestment-based price pressure in lottery stocks increases over time. This finding is in line with the increase in marketwide price pressure that Hartzmark and Solomon (2025) document. Moreover, the finding is consistent with the proliferation of online- and neo-brokers that a) pay out dividends to the brokerage cash balance, favoring reinvestments (Müller-Dethard, Reinhardt, and Weber 2025), and that b) promote gambling-like trading behavior (Barber and Odean 2002; Kalda et al. 2021; Bryzgalova, Pavlova, and Sikorskaya 2023; Freibauer, Grawert, and Rieger 2024).

[6]Still, in comparison with the static non-lottery minus lottery strategy, the long-short switching strategy is likely cheaper to implement because the switched positions (long lottery, short non-lottery) presumably have lower transaction costs. This means the outperformance of the switching strategy over the static non-lottery minus lottery strategy is likely *larger* after transaction costs.

[7]In Figure B5 of the Internet Appendix, we perform a placebo test, in which we repeat the long-only switching strategy with each other month (e.g., long lottery in January and long non-lottery in all other months). We find that the May-based switching strategy is far superior to all placebo strategies and that it is the only strategy that beats a market investment.

In Table B2 of the Internet Appendix, we perform additional performance analyses for the May-based switching strategies. First, we regress the strategies' returns on the Carhart (1997) four factors. Second, we additionally control for the return of the static non-lottery minus lottery (NML) strategy (similar to Hartzmark and Solomon 2025, who regress the returns of their market timing strategies on the returns of the equity risk premium). Third, we test the ability of the switching strategies to time NML returns by regressing the strategy returns on a) NML and NML^2 (following Treynor and Mazuy 1966) and b) NML and $max(NML, 0)$ (following Henriksson and Merton 1981).[8] We find that the outperformance of lottery stocks in May cannot be explained by the included factors (and rather increases, controlling for them) and that the May-based switching strategies succeed in timing their investments in the lottery vs. non-lottery portfolios.

Moreover, in Figure B7, Figure B8, and Figure B9 of the Internet Appendix, we find that the distributions of monthly and daily lottery portfolio returns during May exhibit a rare combination of characteristics that investors generally find attractive (Holzmeister et al. 2020; Ungeheuer and Weber 2023): The distributions are positively skewed while simultaneously exhibiting a lower loss frequency and a higher outperformance frequency compared with the distributions of non-lottery portfolio returns. For example, the lottery portfolio outperforms the non-lottery portfolio 14 out of 24 times in May (58%) with a maximum outperformance of 50pp (minimum -12pp). In all other months, the positive skewness of lottery portfolio returns comes at the expense of more frequent losses and a frequent underperformance of the non-lottery portfolio.

[8] In these regressions, not the intercept but positive coefficients for a) NML^2 and b) $max(NML, 0)$ indicate timing ability as they measure convexity in strategy returns relative to NML. Our results show that the switching strategies have positive and significant timing coefficients, in line with the v-shaped relationship when plotting NML returns on the x-axis and strategy returns on the y-axis in Figure B6 of the Internet Appendix.

2.2.3 Price pressure in lottery stocks based on marketwide dividends

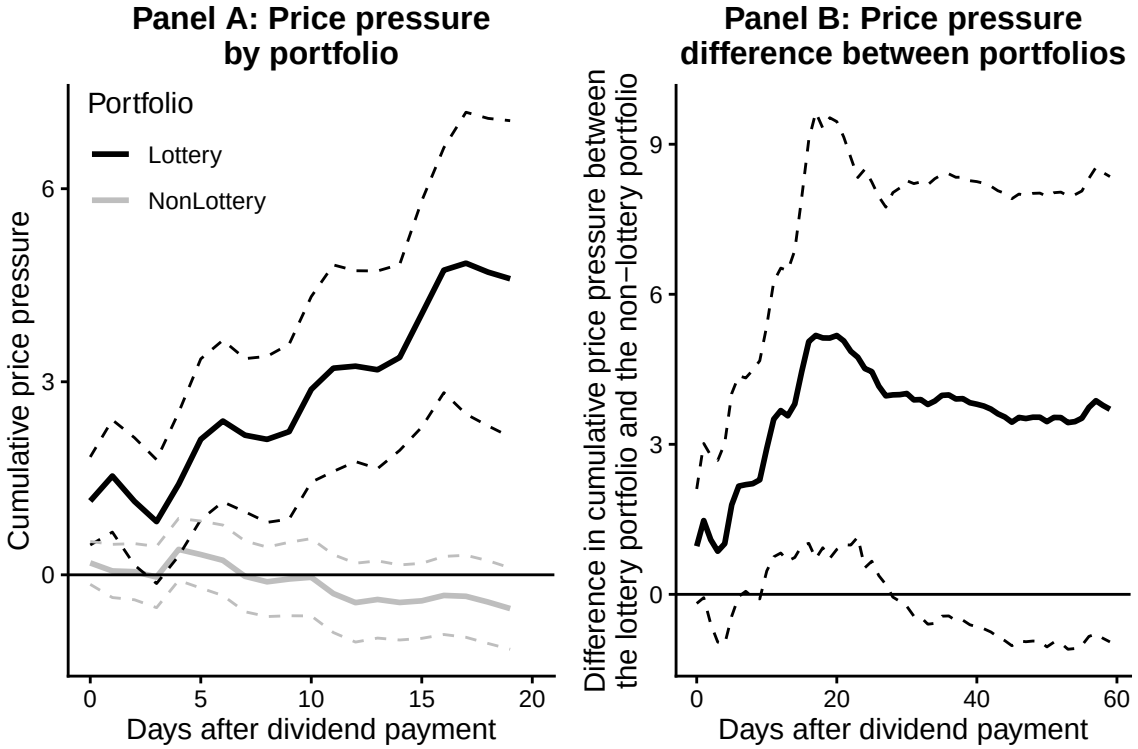
Next, we use the methodology from Hartzmark and Solomon (2025) to compute a measure of price pressure that expresses by how many percentage points the value of a portfolio increases per 1% of capitalization that the market pays out in dividends. This measure has the advantages of being more precise regarding the timing of price pressure and being applicable in markets that have no dividend season (like the US).

Hartzmark and Solomon (2025) regress daily returns of the US stock market on the aggregate amount of dividends paid out by the US stock market on that day scaled by the market capitalization of the US stock market on the prior day. First, we modify this methodology by changing the dependent variable from the market return to the returns of the lottery portfolio, the non-lottery portfolio, and the difference between the two, s.t., we can measure portfolio price pressure and differences in portfolio price pressure. Second, to study the n-day cumulative price pressure from delayed reinvestments until $n-1$ days after the dividend payment, we regress day t portfolio returns on marketwide dividend payments averaged over the last n days from day $t-n+1$ until day t and scaled by the market capitalization on day $t-1$. This allows us to estimate by how many percentage points the value of each portfolio increases over n days when the market pays out 1% of its value in dividends.[9]

Figure 3 presents the results. Panel A shows the cumulative price pressure for the lottery portfolio and the non-lottery portfolio until 20 days after the dividend payment. We find that the cumulative price pressure in the lottery portfolio grows steadily in the month after the dividend payment, reaching its peak 17 days after the payment at a value

[9] A simple example helps illustrate this estimation: Assume the true effect is that 1% of dividends produces cumulative portfolio returns of 1.5pp over the course of 2 days. Dividends are 0, 0, 1, 0, 0 and returns are 0, 0, 0.75, 0.75, 0. The right-hand-side variable in our regressions is the average dividend payment yield over 2 days which is 0, 0, 0.5, 0.5, 0. Regressing returns on the 2-day average payment yield gives a coefficient estimate of 1.5 (i.e., it recovers the true effect).

Figure 3: Asset pricing: Price pressure in lottery stocks after dividend payments



Daily portfolio returns are regressed on average dividends paid by the German stock market over the last n days, scaled by the prior day's capitalization of the German stock market. The portfolios in Panel A are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panel B is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. Panel A (B) shows standard error bars (95% confidence intervals) using Newey-West standard errors.

of 4.84pp. This value indicates that for each 1% of dividends that the market pays, the lottery portfolio earns a return of 4.84pp until 17 days after the payment, on average. By contrast, the price pressure in the non-lottery portfolio remains close to zero and has a point estimate of -0.33pp 17 days after payment.[10]

[10]On the dividend payment day and the following day, we estimate cumulative price pressure of 0.19pp and 0.06pp, respectively, for the non-lottery portfolio (which closely resembles the German market portfolio). For international markets, Hartzmark and Solomon (2025) report price pressure of 0.20pp per 1% of dividends on the first 2 days after payment (i.e., 0.40pp cumulatively). Thus, our payment-day estimate for the German market closely matches their findings, while our cumulative estimate for the following day is somewhat lower, although its standard error of 0.41pp makes it statistically indistinguishable from their estimate.

Panel B plots the difference in the cumulative price pressure between the two portfolios until 60 days after the dividend payment. Given that lottery stocks experience strong price pressure and non-lottery stocks experience price pressure close to zero, the first 20 days closely resemble Panel A with the peak price pressure difference reached after 17 days at a return difference of 5.18pp per 1% of dividends (p-value: 0.01).

From 20 to 60 days after payment, the price pressure difference between the two portfolios first declines slightly and then stabilizes around 3.7pp per 1% of dividends. The duration of the price pressure and its permanence are in line with Hartzmark and Solomon (2025), who find that marketwide price pressure also peaks around 20 days after the dividend payment and who also find no evidence of a complete reversal afterwards. Importantly, as already discussed in Section 2.2.1, our finding of permanent price pressure in the lottery portfolio does not mean that the lottery portfolio continues to outperform the non-lottery portfolio indefinitely. Over longer horizons, the stable price pressure wedge between the lottery portfolio and the non-lottery portfolio is offset by the lottery portfolio's average return disadvantage of -1.7pp per month that continuously eats away at the performance of the lottery portfolio and that is represented through a negative intercept in the regressions that underlie the plot.

2.2.4 Replication in the US

In this section, we replicate the increased price pressure in the lottery stock portfolio for the US stock market. We use CRSP data from 1927-2024, process the data as in Hartzmark and Solomon (2025), and separate the market into a value-weighted lottery portfolio and a value-weighted non-lottery portfolio, as we do for the German market.[11]

[11] As for the German data, we require that returns are non-missing and non-zero on at least 75% of trading days in the past 6 months and the past 1 month to estimate the stock's lottery characteristics. In Figure B12 of the Internet Appendix, we change this requirement to 25% or 0% and show that our results are robust to this choice.

Then, we regress portfolio returns on average dividends paid by the US stock market in the past $n \in [0, 19]$ days, scaled by the capitalization of the market on the prior day.[12] The results are presented in Figure 4.

First, in Panel A, we replicate the marketwide price pressure from Hartzmark and Solomon (2025). The authors report price pressure of 0.56, 0.60, 0.24, 0.15, and 0.54 on the first 5 days after payment, corresponding to a cumulative price pressure of 0.56, 1.16, 1.40, 1.55, and 2.09 for the market. As the non-lottery portfolio is very close to the market, our cumulative price pressure estimates of 0.58, 1.17, 1.33, 1.45, and 1.90 for the non-lottery portfolio are very close to the results of Hartzmark and Solomon (2025).[13]

Second, in Panel A, we replicate our finding of increased price pressure in the lottery portfolio. Until 20 days after payment, the lottery portfolio increases by 4.82pp for each 1% of dividends, while the non-lottery portfolio increases by 1.93pp. Panel B shows that the difference of 2.88pp is significant with a p-value of 0.004 and that the difference is the result of a steadily increasing price pressure wedge between the two portfolios.

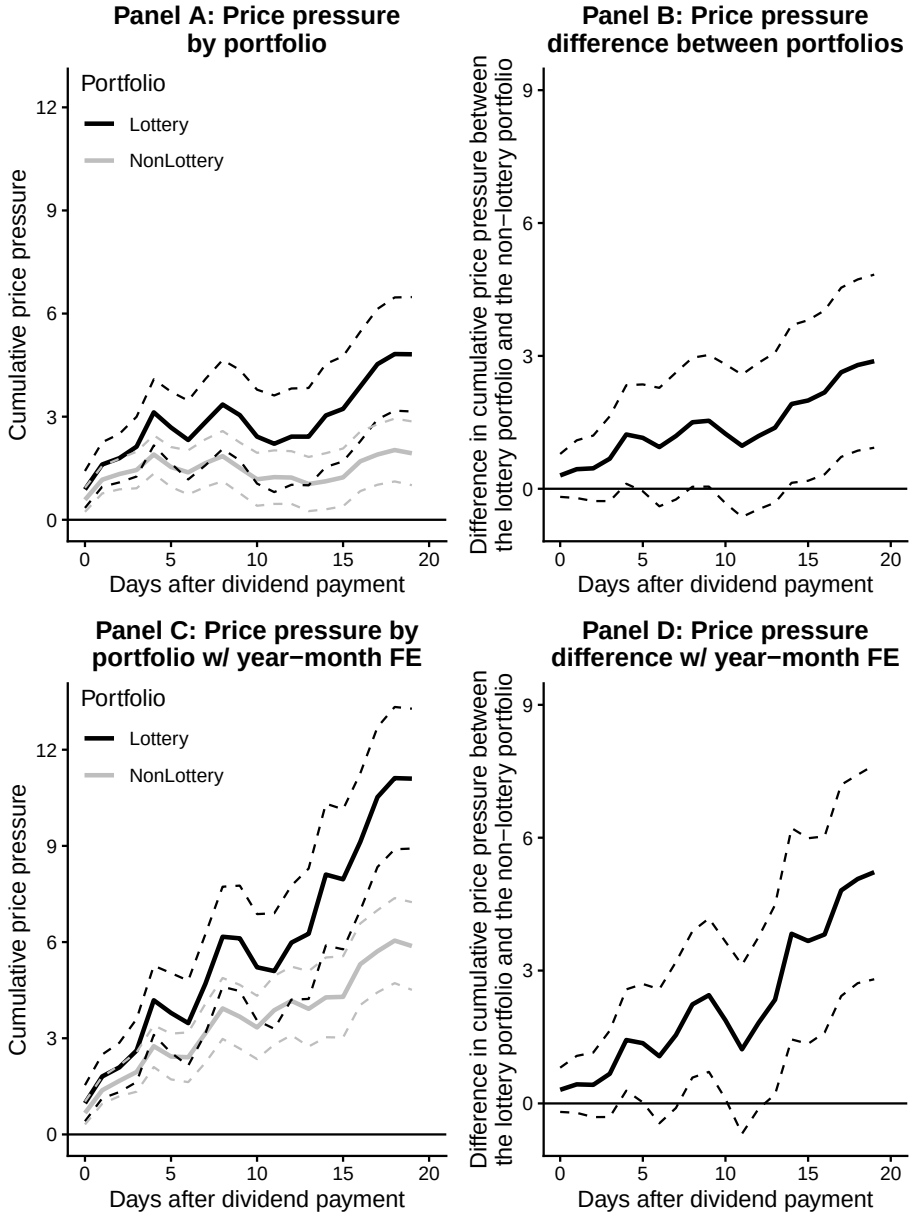
Third, in Panels C and D, we follow Hartzmark and Solomon (2025) and include year-month fixed effects to make sure that our results are not driven by time trends or seasonalities that correlate with dividends.[14] Consistent with Hartzmark and Solomon

[12]For the US, we do not extend our results until 60 days after payment because of the quarterly payment frequency. As Figure B4 of the Internet Appendix shows, the quarterly payment frequency means that 60-day average dividend payments have very little variation within a year. Thus, variation in the 60-day dividend yield mostly reflects variation in the denominator (market capitalization).

[13]The small differences can be explained by a) the non-lottery portfolio not being exactly the same as the market, b) our sample extending until 2024 while that of Hartzmark and Solomon (2025) ends in 2018, and c) a regression including the averaged dividend lags not being exactly the same as a regression including the individual dividend lags.

[14]In our analyses of the German market, we do not include year-month fixed effects because of the clustering of dividend payments in May. In light of this clustering, the year-month fixed effects would essentially absorb all of the variation in dividend payments that we want to study (see Figure B4 of the Internet Appendix). As an alternative, we can just include year fixed effects to account for potential correlations among time trends. When we do so, the results change very little (e.g., the maximum price pressure difference between the lottery and non-lottery portfolio is 4.93pp per 1% of dividends with a p-value of 0.02), which makes sense because there is no substantial time trend in annual dividends over the sample period from 2000 until 2025 (see Figure B3 of the Internet Appendix).

Figure 4: Asset pricing: Price pressure in lottery stocks in the US



Daily portfolio returns are regressed on average dividends paid by the US stock market over the last n days, scaled by the prior day's capitalization of the US stock market. The portfolios in Panels A and C are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panels B and D is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. Panels A and B include no year-month fixed effects, Panels C and D include year-month fixed effects. Panels A and C (B and D) show standard error bars (95% confidence intervals) using Newey-West standard errors.

(2025), including year-month fixed effects leads to higher price pressure estimates for both portfolios. 20 days after payment, the results indicate that the value of the lottery (non-lottery) portfolio increases by 11.10pp (5.88pp) per 1% of dividends. This leads to a price pressure difference of 5.22pp (p-value: 0.00002) between the two portfolios.

In Figure B13 of the Internet Appendix, we repeat the price pressure tests only including data from 2000 onward (when our German sample starts). Consistent with our previous results, we find a price pressure difference between the lottery and non-lottery portfolio of 8.80pp per 1% of dividends 20 days after payment, albeit with large standard errors, resulting in a p-value of 0.41. The large standard errors are in line with Hartzmark and Solomon (2025), who estimate marketwide price pressure by decade and find a substantial increase in standard errors starting 2000. We believe that the increase in standard errors is driven by the strong decrease in dividend yields, which means that return differences per dividend are estimated with much less variation in dividends.[15] The decreasing variation in US dividend yields is illustrated in Figure B4 of the Internet Appendix. The figure also shows that this is not a problem for the German market due to the large variation in dividends between the dividend season and the rest of the year.[16]

[15]To verify that the decrease in dividend yields can explain the increase in the standard errors of price pressure estimates, we run a simulation in Figure B14 of the Internet Appendix. In the simulation, we use actual data on dividend payments by the US stock market and simulate return data with a random component and a price pressure component. The simulation successfully replicates a) the increase in standard errors comparing our post-2000 US analysis in Figure B13 with our full-sample US analysis in Figure 4 and b) the increase in standard errors that Hartzmark and Solomon (2025) report for their decade-wise estimation of 2-day marketwide price pressure. Regarding the latter, we find that, e.g., the standard errors from 2000-2010 are 4 times larger than those from 1950-1960.

[16]Although there is no simple analogue to the May-based investment strategies in Germany from Section 2.2.2, we also experimented with investment strategies for the US (e.g., going long lottery, short non-lottery on the 20 days that have the highest 20-day dividend yield each year and long non-lottery, short lottery on all other days). We find that such strategies can similarly produce significant alphas in the US but that the success is mostly concentrated in the early sample, when dividend yields were particularly high. Note that the performance concentration early in the sample is not inconsistent with an increased price pressure late in the sample. While price pressure is a measure of return per dividend, a large return not only requires a large return per dividend but also large dividends. Thus, even if the return per 1% of dividend yield is twice as large since 2000, the dividend yield since 2000 is only one half to one third that of prior years (see Figure B3 of the Internet Appendix).

2.2.5 Price pressure in illiquidity-matched non-lottery stocks

Price pressure is the product of excess demand and the price multiplier (i.e., by how many dollars the market value of the portfolio increases per additional dollar invested). Hartzmark and Solomon (2025) find that price pressure is generally stronger in smaller stocks, consistent with small stocks' higher illiquidity and higher price multipliers. As lottery stocks are, on average, smaller and more illiquid than non-lottery stocks, we make sure that the stronger price pressure in lottery stocks cannot be explained by a higher price multiplier alone, but instead also reflects the higher excess demand that we observe from the tendency to gamble with dividends.

To do so, we compare price pressure in the lottery portfolio with price pressure in an illiquidity-matched non-lottery portfolio (for which we would expect the same price multiplier). For the US, we measure illiquidity with stocks' Amihud (2002) illiquidity measure, averaged over the prior month. For Germany, we proxy for illiquidity using stocks' prior-day market capitalization (due to limitations in trading volume data coverage in Datastream). The matching procedure is straightforward: First, each lottery stock on each day is matched with the least illiquid non-lottery stock that is more illiquid than the lottery stock (with illiquidity measured using high Amihud (2002) illiquidity/low market capitalization in the US/Germany).[17] Second, the lottery stocks and the illiquidity-matched non-lottery stocks are used to form value-weighted portfolios. Third, we test for a difference in dividend-payment related price pressure between the two portfolios.

If price multipliers were the only explanation for our previous results, the null hypothesis is that we find no difference in price pressure between the two portfolios, as the

[17] For the Amihud (2002) matching, we follow Klos, Koehl, and Rottke (2023) and only match stocks with a difference in market capitalization of less than 10%. If no such match exists, we gradually increase the allowed deviation by 10pp (i.e., to 20%, 30% etc.) until a match is found. This procedure makes sure that the value-weighted Amihud (2002) illiquidity measures of the portfolios match.

excess demand from marketwide dividend reinvestments should be spread evenly between the two portfolios. Instead, if there is additional dividend-gambling-based excess demand for lottery stocks, the alternative hypothesis is that the price pressure is stronger for the lottery portfolio than the illiquidity-matched non-lottery portfolio.

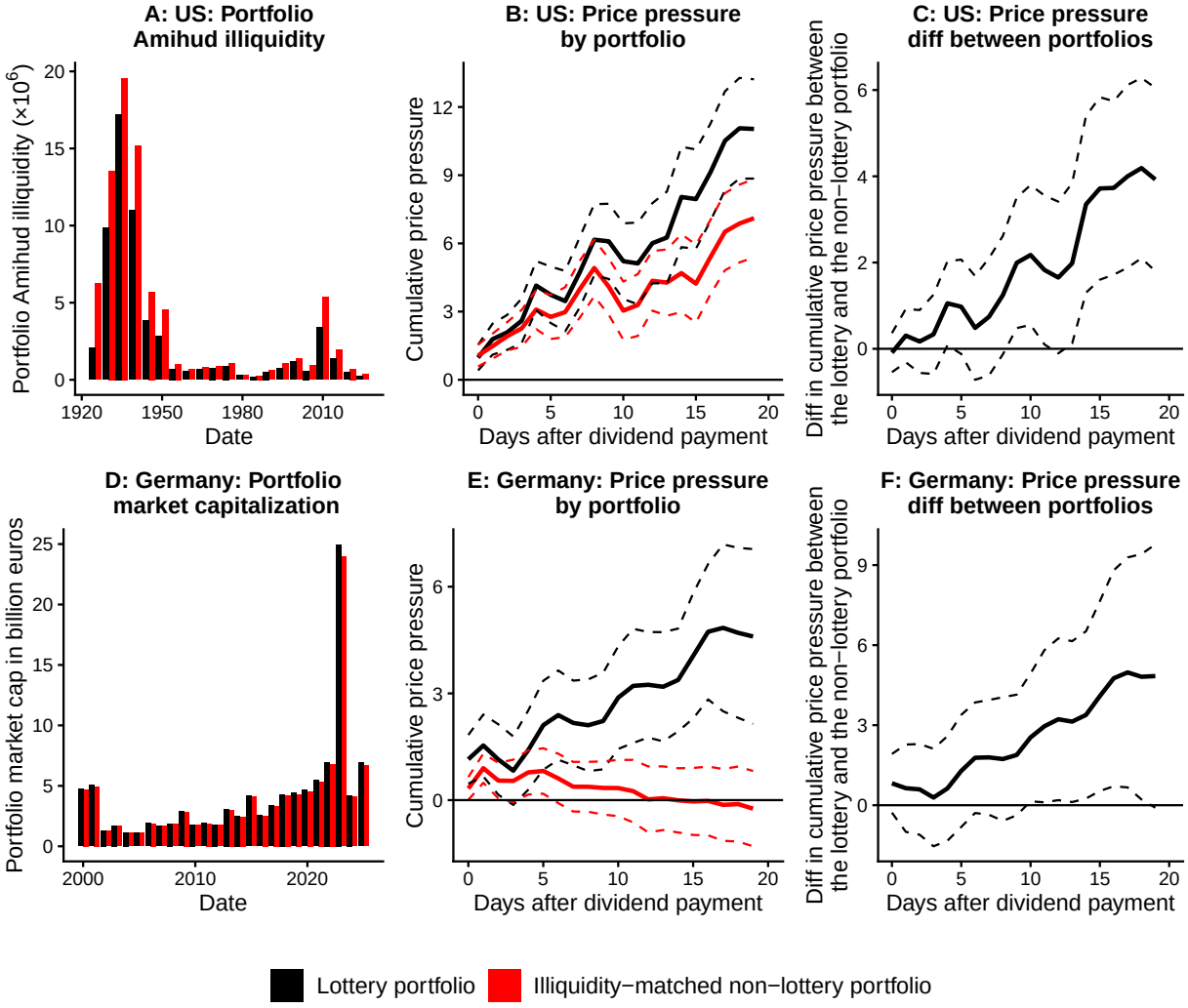
The results are presented in Figure 5. Panels A and D plot the illiquidity measures of the different portfolios over time. The plots shows that the matching works well as the Amihud (2002) illiquidity in Panel A (market capitalization in Panel D) of the matched non-lottery portfolio is close to that of the lottery portfolio but always a bit larger (smaller).[18] Next, we repeat our price pressure tests from Figure 3 with the illiquidity-matched non-lottery portfolio replacing the all-encompassing non-lottery portfolio. On the one hand, Panels B and E show that the price pressure is stronger in the illiquidity-matched non-lottery portfolios than in the all-encompassing non-lottery portfolios from

[18]In Panel D, the large portfolio capitalizations of the German lottery portfolio in 2023 are driven by Uniper, one of the largest European energy companies. In December 2022, amid the European gas crisis, the German government bailed out Uniper by purchasing 99.12% of Uniper's stock, leaving just 0.88% as free float (see https://www.uniper.energy/investors/share/shareholder-structure, as of 2026-05-07). This circumstance entails two considerations for our analysis.

First, Uniper is a prime example for dividend-reinvestment-induced price pressure in lottery stocks. The uncertain business situation and the increased return volatility, driven by the low free float, make Uniper a prominent lottery stock in 2023. Additionally, the low free float makes Uniper particularly susceptible to price pressure. Thus, based on the findings in this paper, there is a strong case to expect a large return for Uniper in May, 2023. Indeed, we find a return of 60% for Uniper in May, 2023! Consistent with price pressure, this performance is significantly driven by a streak of increasingly large one-day returns from May 25 through June 1 (2%, 3%, 9%, 15%, 15%, and 28%). Directly afterwards, from June 2 through 5, the price pressure is partially reversed with large negative one-day returns of -21% and -20% (though it takes until December for Uniper to entirely drop back to its pre-May price levels, in line with our previous findings). We search the internet for fundamental news that could explain this episode of extreme returns, but find none. Instead, the only explanation we discover is based on volatility due to Uniper's low free float, consistent with price pressure (https://www.tagesschau.de/wirtschaft/finanzen/marktberichte/marktbericht-dax-dow-jones-boerse-114.html, as of 2026-05-07). Moreover, we find that other German energy companies, that do not qualify as lottery stocks in 2023, have a very different performance during Uniper's price pressure episode. E.g., E.ON has a return of -1% in May 2023, and one-day returns between -1% and 1% from May 25 through June 5.

Second, although the Uniper observations are accurate, we make sure that our results also hold up when we exclude Uniper in light of its low free float, paired with its large portfolio weight in 2023. We find that our price pressure estimates decrease a bit when we exclude Uniper but that they all remain economically large and highly statistically significant (e.g., the mean return difference between the lottery and the non-lottery portfolio increases by 5pp during May with a p-value of 0.009).

Figure 5: Asset pricing: Price pressure in illiquidity-matched non-lottery stocks



The first (second) row presents results for the US (German) market, measuring illiquidity with a higher Amihud (2002) illiquidity measure (lower market capitalization). In both markets, each lottery stock on each day is matched with the least illiquid non-lottery stock that is more illiquid than the lottery stock. On each day, the lottery stocks and the illiquidity-matched non-lottery stocks are used to form value-weighted portfolios. Panels A and D plot the portfolios' illiquidity measures over time. For Panels B and C (E and F), daily portfolio returns are regressed on average dividends paid by the US (German) stock market over the last n days, scaled by the prior day's capitalization of the US (German) stock market. The portfolios in Panels B and E are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panels C and F is the lottery portfolio minus the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. Panels B and C include year-month fixed effects. Panels B and E (C and F) show standard error bars (95% confidence intervals) using Newey-West standard errors.

Figure 3 and Figure 4. This is consistent with the stronger price pressure in small stocks reported by Hartzmark and Solomon (2025) and with the notion that more illiquid stocks have higher price multipliers and therefore experience stronger price pressure.

On the other hand, Panels C and F show that the price pressure is still substantially larger in the lottery portfolios than in the illiquidity-matched non-lottery portfolios. In consequence, the price pressure difference between the portfolios grows steadily over the first month after the dividend payment and reaches a maximum of 4.19pp per 1% of dividends in the US in Panel C with a p-value of 0.00009 (4.98pp in Germany in Panel F with a p-value of 0.02). Therefore, the results indicate that the stronger price pressure in lottery stocks cannot be explained by a higher price multiplier alone but is instead also driven by the excess demand from investors who gamble their dividends.

2.2.6 Price multiplier

Is it plausible that dividend-gambling-based excess demand drives up the prices of lottery stocks to such a large extent? In the following, we perform a back-of-the-envelope calculation, which suggests that it is plausible. The intuition is that marketwide dividends are so large and lottery stocks so small that even a fraction of dividend recipients investing their dividends in lottery stocks suffices to drive up prices substantially.

To assess the plausibility of our results, we estimate the price multiplier that our results imply and compare it with multipliers from prior studies. The price multiplier that we estimate indicates by how many euros the market capitalization of the lottery portfolio increases for each euro of dividends that is invested in the lottery portfolio.

Capital gains of the lottery portfolio: The stock market data show that the average amount of capital gains of the German lottery portfolio in May is 88.0 million euros during the 2007-2011 period (the time period of the brokerage sample).

Dividends invested in the lottery portfolio: We distinguish between the dividend reinvestment behavior of two groups of investors: households and institutions. First, we estimate the amount of dividends invested in German lottery stocks by households using information on A) dividends paid out by German stocks in May, B) the fraction paid out to households, C) the ratio of dividends received to dividends paid out (considering withholding taxes and dividends from non-German stocks), and D) the fraction of dividends that the investors in our brokerage sample invest in the lottery portfolio.

A) the sum of dividend payments by the German stock market in May is 16.8 billion euros on average over the 2007-2011 period.

B) statistics published by the German Bundesbank (reproduced in Table B3 of the Internet Appendix) indicate that 12.5% of the German stock market are held by German households directly (i.e., not through fund holdings or other intermediaries).

C) as dividends are subject to withholding taxes in Germany, a fraction of dividends paid out is not received by households. Considering tax-free allowances and a differing tax regime before and after 2009 (see Müller-Dethard, Reinhardt, and Weber 2025, for details), we estimate that 16.4% of dividends in our brokerage sample are withheld. Moreover, households not only receive dividends from German stocks, but also from non-German stocks. We use the brokerage data to calculate how many euros of dividends households receive from non-German stocks for each euro of dividends they receive from German stocks in May. We find that this ratio is 13.4%.

D) we use the German brokerage data to calculate the fraction of households that buy at least one German lottery stock in months in which they receive dividends from their stock portfolio (with observations weighted by the amount of dividends to ensure that the result reflects the distribution of dividend euros across households). For this purpose,

we consider all dividend recipients, including those who do not make any purchases in the dividend-payment month. The resulting fraction is 0.432%.[19]

Taking A, B, C, and D together, we estimate that households invest 8.6 million euros (=16.8 billion euros*0.125*(1-0.164)*(1+0.134)*0.00432) of dividends in the German lottery portfolio in May, on average over the 2007-2011 period.

Second, we estimate the amount of dividends invested in German lottery stocks by institutions under the assumption that institutions reinvest dividends proportionally in their stock holdings, consistent with the documentation of such behavior by Schmickler and Tremacoldi-Rossi (2023). In Section B.2 of the Internet Appendix, we provide details on our estimation. Key figures from the estimation for the 2007-2011 period include A) total dividends of 41.8 billion euros received (net of withholding taxes) in May from German and non-German stocks by institutional investors who hold German stocks, B) an aggregate reinvestment rate in the stock market of 68% in the payment month, C) a German stock share of 21% in the aggregate dividend-weighted stock portfolio of institutional investors who hold German stocks, and D) a lottery stock share of 0.103% in the German stock holdings of institutions. Taking A, B, C, and D together, we estimate that institutions invest 6.1 million euros (=41.8 billion euros*0.68*0.21*0.00103) of dividends in the German lottery portfolio in May, on average over the 2007-2011 period.

Price multiplier: Combining the 88.0 million euros of capital gains with the 14.7 (=8.6+6.1) million euros of dividends invested in the lottery portfolio, the resulting price

[19]This fraction is much lower than the fraction of lottery stocks among dividend-induced stock purchases in Section 1.2.1 for multiple reasons: First, the former fraction also considers investor-months without any purchase, whereas the latter fraction is calculated conditional on investors making a stock purchase that has a similar amount as the dividend payment in that month. Second, to ensure that the lottery stocks in which the dividends are invested in the brokerage data are the same as the lottery stocks for which we observe price pressure in the stock market data, we only consider lottery stocks that are in the lottery portfolio that we analyze for our asset pricing results in Section 2.2.1. In particular, this excludes non-German lottery stocks and uses the stricter lottery stock definition that combines idiosyncratic volatility, skewness, and price with maximum one-day returns.

multiplier is 6.0 (=88.0/14.7). This value indicates that the market capitalization of the lottery portfolio increases by 6 euros for each euro of dividends that is invested in the portfolio. This is consistent with prior research on price multipliers of factor portfolios, e.g., Ben-David et al. (2022), Li (2022), and Peng and Wang (2026), who estimate multipliers between 5 and 7 for value, size, and momentum portfolios. In Section B.2 of the Internet Appendix, we perform sensitivity analyses using economically plausible alternatives to the central assumptions in our back-of-the-envelope calculation. The resulting multipliers remain similar, ranging from 4.6 to 5.4. For our paper, the key insight is that the dividend-gambling-based excess demand for lottery stocks is sufficient to generate the excess returns we observe, assuming a price multiplier that is in line with prior research.

3 Experiments

In this section, we conduct two experiments to replicate dividend-gambling behavior in the lab and to test how an educational intervention about dividends affects such behavior.

3.1 Experiment 1: Replication

In this section, we present the setup and results of our first experiment, in which we replicate dividend-gambling behavior in the lab.

3.1.1 Setup

In 2024, we recruit 529 participants from Prolific, a large, UK-based crowdsourcing platform. We require that participants are invested in the stock market and we exclude

participants who take less than four minutes to complete the experiment. After application of these filters, 400 participants remain.[20]

To test the causal effect between dividend payments and gambling behavior, we design a setting with the following features: a) dividends are exogenously assigned to participants, b) the investment task is simple, transparent, and incentivized to ensure truthful reporting of investments, and c) beliefs about return distributions of assets are controlled. Participants receive an endowment of 1,000 CU (currency units), which can be invested over 12 rounds of returns. The value after the 12 rounds determines the final payoff from the experiment (1000 CU correspond to 1 GBP). Initially, 500 CU are invested in Stock A (which investors know to increase by 8% with 60% probability or decrease by 6% with 40% probability in each round) and 500 CU are in risk-free, interest-free cash. Participants can trade (i.e., reallocate their endowment between stocks and cash) at three points in the experiment: at the beginning of rounds 1, 5, and 9. In between these rounds, participants are shown the returns of their stock investments but cannot trade.

There are four treatments (two-by-two design) characterized by whether a dividend is paid after round 8 (dividend vs. no dividend) and the return profile of a new Stock B (lottery vs. non-lottery) which is tradeable at the beginning of round 9. First, the dividend treatment consists of a dividend payment between 10% and 20% (randomly determined) of the value of the Stock A holdings at the end of round 8. The dividend works like a real dividend (neglecting frictions such as taxes): The cash position increases by the amount of the dividend and the value of Stock A decreases by the amount of the dividend. E.g., if a participant holds 1,100 CU of Stock A and is assigned a 20% dividend, the participants' cash (Stock A) holdings increase (decrease) by 220 CU. In the no dividend treatment,

[20] Table C1 of the Internet Appendix presents summary statistics. In both of our experiments, the filtering rates are similar across treatments and in line with prior experiments that recruit participants from crowdsourcing platforms (e.g., Hartzmark, Hirshman, and Imas 2021).

nothing happens. Second, in the lottery treatment, the new Stock B (introduced after the dividend), has a zero expected return, high variance and positive skewness. It increases by 90% with 10% probability or decreases by 10% with 90% probability in each of the rounds 9 through 12. In the non-lottery treatment, Stock B also has a zero expected return but has a low variance and zero skewness (increasing or decreasing by 5% with 50% probability each). Before they can trade, participants are informed about the return profiles of the different assets and, if a dividend is paid, they are informed that Stock A has paid out a dividend of x CU, which is transferred to their cash balance.

To measure the propensity with which participants gamble their dividends (GwD), we compare the fractions of participants buying Stock B in the four treatments ($BuyB_{i,j}$) and calculate the difference in differences:

$$GwD = (BuyB_{Div,Lottery} - BuyB_{NoDiv,Lottery}) - (BuyB_{Div,NonLot} - BuyB_{NoDiv,NonLot}) \quad (1)$$

The first difference separates dividend-induced purchases of the lottery stock from purchases of the lottery stock that occur regardless of the dividend. The second difference accounts for experimenter demand effects and novelty effects, i.e., the possibility that the dividend drives participants to buy any new stock, regardless of lottery characteristics.

Note that the dividend-treatment dimension does not affect the portfolio choice set. Participants who receive a dividend can reinvest it in Stock A and participants who do not receive a dividend can home-make their dividend with a partial sale of Stock A. Thus, any non-zero difference in Equation 1 can only be explained by a mechanism in which dividends are accounted for in a non-trivial way.

3.1.2 Results

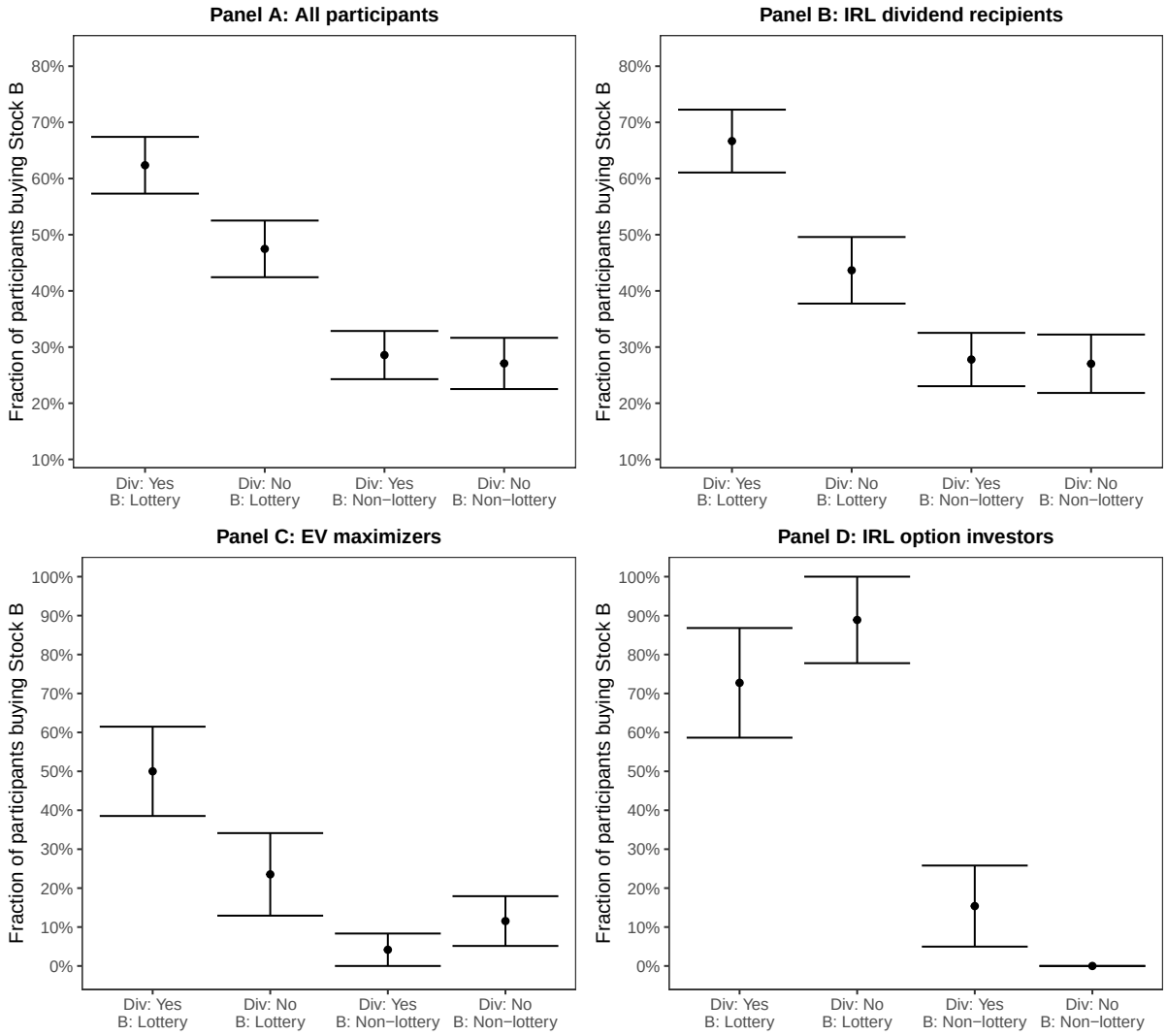
Figure 6 plots the fraction of participants buying Stock B, separated by treatment.[21] Panel A reports the results for all participants and Panels B through D report the results for relevant subsamples of participants. Panel A shows that 62% of participants buy Stock B if B is lottery-like and if participants receive a dividend. This is 15pp more than the 47% of participants that buy lottery Stock B without a dividend. The right-hand side of Panel A shows that the dividend-induced buys of B are not explained by dividend-induced demand or novelty effects as there is only a small difference of 2pp (29% - 27%) in the buys of B between dividend recipients and non-recipients if B is non-lottery-like. The difference in differences (DiD) in Panel A is 13pp (15pp - 2pp) which indicates a dividend-induced propensity to gamble that is similar in magnitude to the effect in our brokerage sample (p-value for testing if the DiD is positive: 8%).

In Panel B, we focus on the subsample of participants who receive dividends in real life (IRL), which are 307 participants or 77% of our total sample. Because these participants are the ones that have already handled real-life dividends, they comprise an important subsample for the external validity of our experiment. The results for real-life dividend recipients are even stronger than our baseline results: 67% (44%) of participants buy Stock B if B is lottery-like and they are (are not) paid a dividend in the experiment. Together with the 28% (27%) of participants buying non-lottery B with (without) a dividend, this yields a DiD of 22pp (p-value: 2%).

In Panel C, we test if the tendency to gamble with dividends is also present among EV maximizers (i.e., participants who fully invest their endowment in Stock A since round

[21] In the Internet Appendix, Figure C1 plots equivalent fractions for Stock A. Figure C3 plots joint choices for A and B. Figure C4 plots portfolio developments over all trading rounds. In Section C.1, we discuss results for analyzing amounts invested, which reflect the binary buy/non-buy decisions in conjunction with the trading mechanism in our experiment, which we explain in detail in Section C.2.

Figure 6: Experiment 1: Dividend gambling in the lab



In the dividend (non-dividend) treatments, participants (do not) receive a dividend from Stock A after eight rounds of investing in Stock A vs. cash. Afterwards, participants can reallocate their portfolio once more between cash, Stock A, and a newly offered Stock B that either has lottery-like payoffs or non-lottery-like payoffs depending on the treatment. The figure plots the fraction of participants buying B in each treatment. Panel A includes all 400 participants, Panel B the 307 participants who receive dividends in real life (IRL), Panel C the 87 participants who fully invest in Stock A and hold zero cash prior to the introduction of Stock B, and Panel D the 39 participants who invest in warrants IRL. The bars indicate standard errors.

1). Given that it is still the EV-maximizing strategy to invest everything in A (EV of 2.4) and nothing in B (EV of 0.0), one might expect fewer EV maximizers to buy B. Indeed, the results show that much fewer EV maximizers buy B overall, only 12% for

the no-dividend-non-lottery treatment, 4% for the dividend-non-lottery treatment, and 24% for the non-dividend-lottery treatment. Yet in the dividend-lottery treatment, the fraction of EV maximizers buying B increases by 34pp (p-value: 2%) on top of the isolated dividend and lottery effects, s.t. we obtain a fraction of 50% of dividend recipients buying lottery Stock B against their prior strategy of EV maximization.

In Panel D, we focus on participants that invest in warrants IRL (with data from Prolific on participants' investments in different asset classes). Among warrant investors, we find a strong tendency to gamble, irrespective of the dividend. If B is lottery-like, 73% (89%) of participants buy B in the dividend (no-dividend) treatment. If B is non-lottery-like, 15% (0%) buy B in the dividend (no-dividend) treatment. This result supports the external validity of our experiment as it suggests that the gambling behavior we observe in the experiment is reflected in gambling behavior in real-life financial markets.

3.2 Experiment 2: Intervention

In this section, we present the setup and results of our second experiment, in which we test how an educational intervention about dividends affects dividend-gambling behavior.

3.2.1 Setup

In 2025, we recruit 776 participants from Prolific. As in the first experiment, we require that participants are invested in the stock market and we exclude participants who take less than four minutes to complete the experiment (five minutes for the participants in the education treatment). After application of these filters, 600 participants remain.

The setup for our second experiment is the same as for our first experiment in Section 3.1.1, except for the following modifications: First, all participants receive a dividend from Stock A (as before, between 10% and 20% of the Stock A holdings from round 8).

Second, the asset that is introduced to all participants in round 9 is lottery Stock B (i.e., there is no non-lottery Stock B). Third, the treatment is that half of the participants are subjected to an educational intervention about dividends, while the other half is not.

The intervention is taken from Hackethal et al. (2026) (with minor modifications presented in Figure C9 of the Internet Appendix). It first asks two questions about dividends to identify participants who suffer from the free dividends fallacy (i.e., the failure to understand that dividend payments reduce the stock price) before the intervention. The intervention then educates participants that dividend payments (in general as in the experiment) reduce the stock price. The intervention is placed at the beginning of the experiment and later reinforced when the dividend payment occurs, where it is highlighted to participants in the education treatment that the dividend has reduced their holdings of Stock A (see Figure C10 of the Internet Appendix). The success of the intervention is verified at the end of the experiment, where participants in both treatments are asked what usually happens to stock prices on the ex-dividend day.[22]

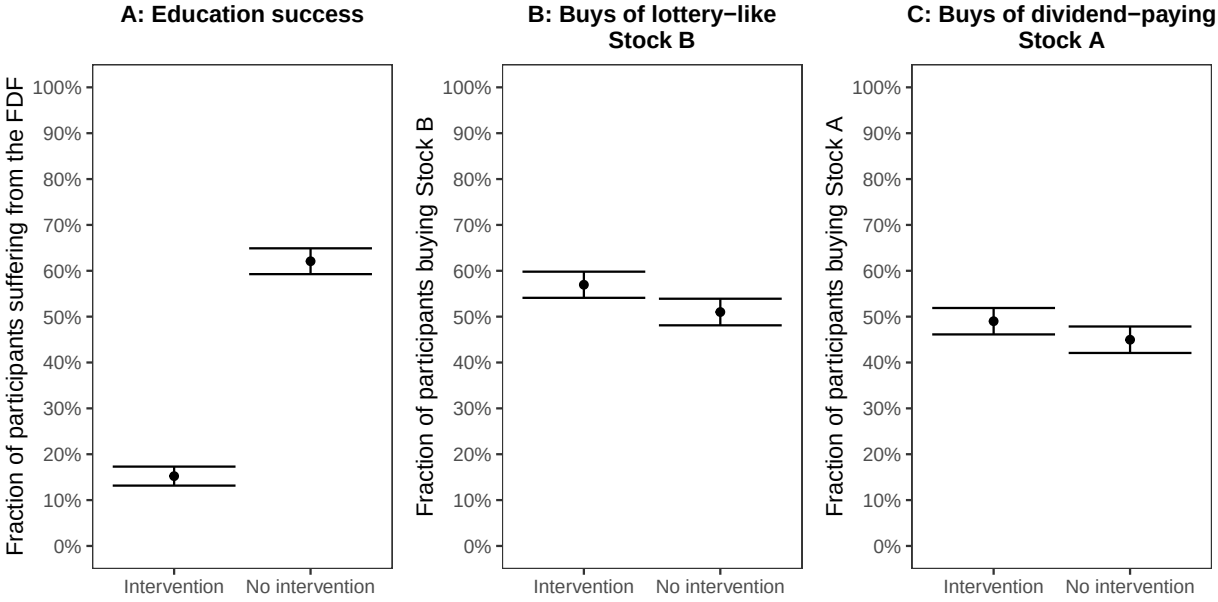
The main hypothesis we test is whether the mental accounting that drives investors to gamble with their dividends (as documented in Section 1.2.2) is rooted in the free dividends fallacy and whether educating investors about dividends can thus reduce dividend gambling. Specifically, we test whether fewer participants buy lottery Stock B in the intervention treatment than in the no-intervention treatment.

3.2.2 Results

Figure 7 presents the results. Panel A shows that the educational intervention works in strongly reducing the free dividends fallacy. At the end of the experiment, only 15% of

[22]In particular, we asked whether the stock price on the ex-dividend day is usually higher, unchanged, or lower compared with the previous day's price. Participants could also answer with "no general statement possible" or "I do not know". Participants who did not answer with "lower" are classified as suffering from the free dividends fallacy.

Figure 7: Experiment 2: Educational intervention and dividend gambling



In the intervention (no-intervention) treatment, participants are (are not) subjected to an intervention at the beginning of the experiment, which informs participants that dividend payments reduce stock prices. Panel A shows the fraction of participants who, at the end of the experiment, suffer from the free dividends fallacy (FDF) and do not know that dividend payments reduce stock prices. During the experiment, participants trade Stock A, which pays a dividend. Afterwards, the lottery-like Stock B is introduced and participants can choose to buy/not buy Stock B and/or to buy/hold/sell Stock A. Panels B and C present those choices. N = 600. The bars indicate standard errors.

participants in the intervention treatment do not know that dividends reduce stock prices, compared with 62% of participants in the no-intervention treatment. Panel B analyzes the effect of the intervention on the buys of lottery Stock B. We find that the intervention does not reduce buys but instead increases them relative to the no-intervention treatment (57% vs. 51%). Panel C shows that the intervention similarly increases the buys of the dividend-paying Stock A (49% vs. 45%). Taken together, our results indicate that the educational intervention leads to an overall increase in reinvestments (in line with the results of Hackethal et al. 2026), but not to a reduction in dividend-gambling behavior.[23]

[23]In Figure C7 of the Internet Appendix, we find that the increases in reinvestments are concentrated among participants who suffer from the free dividends fallacy before the intervention and that the intervention does not change the reinvestments of participants who do not suffer from the fallacy before the intervention. This speaks against the higher reinvestments being caused by first-order experimenter demand effects (which would be driven by the intervention regardless of participants' prior knowledge).

4 Conclusion

Taken together, our findings provide comprehensive evidence of a novel behavioral pattern from multiple perspectives across independent datasets. Using two complementary brokerage samples, two laboratory experiments, and stock market data from Germany and the US, we examine dividend-induced gambling at the level of individual trades, experimental investment decisions, and aggregate stock prices. While each dataset and analysis has its own strengths and weaknesses, the findings converge on a coherent story: Mental accounting leads investors to gamble with their dividends, generating excess demand for lottery-like securities and ultimately affecting their prices.

Interestingly, the excess returns generated by an investment strategy that exploits this temporary price pressure appear to have increased over time. This finding adds to a growing body of evidence challenging the notion that financial markets necessarily become more efficient over time (Jensen, Kelly, and Pedersen 2023; Daniel, Klos, and Rottke 2025), particularly in segments related to retail lottery demand (Gordon, Schneider, and Strauss 2025). One possible explanation is the rise of neo-brokers, which (i) increase the salience of dividend receipts through real-time notifications, (ii) facilitate the reinvestment of small amounts through low trading fees, and (iii) tend to gamify the investment experience, promoting demand for lottery-like securities. While we cannot establish whether these developments explain the apparent increase in dividend-season lottery-stock excess returns, our findings raise the possibility that technological developments may exacerbate certain forms of mispricing rather than eliminate them.

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Internet Appendix

Section A: Brokerage data

Section B: Asset pricing

Section C: Experiments

A Brokerage data

Table A1: Brokerage data: Div-induced purchases of lottery stocks: Additional specs

	DepVar: 1 for purchases of lottery stocks, 0 otherwise					
	(1)	(2)	(3)	(4)	(5)	(6)
€0 < Prch < €250	22.1***					
	(1.4)					
€250 ≤ Prch < €500	12.7***					
	(0.9)					
€500 ≤ Prch < €1,000	6.9***					
	(0.5)					
€0 < Prch < €250 & Div > 0.5*Prch	10.4***					
	(3.3)					
€250 ≤ Prch < €500 & Div > 0.5*Prch	6.7**					
	(2.7)					
€500 ≤ Prch < €1,000 & Div > 0.5*Prch	5.9**					
	(2.7)					
€1,000 ≤ Prch & Div > 0.5*Prch	3.7***					
	(1.0)					
Prch < €1k		9.3***	9.4***	9.3***	9.2***	9.2***
		(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
Div > 0.5*Prch		7.8***			8.7***	
		(1.2)			(1.2)	
Div ≥ Prch			9.6***			
			(1.7)			
Div > 0.1*Prch				3.3***		
				(0.5)		
Div > 0.1*Prch & Div ≤ 0.5*Prch					2.5***	
					(0.5)	
Div2Months > 0.5*Prch						6.4***
						(0.8)
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.17	0.17	0.17	0.17	0.17	0.17
Within R^2	0.02	0.01	0.01	0.01	0.01	0.01
N	129,469	129,469	129,469	129,469	129,469	129,469

This table reports the results of 6 regressions, in which each observation corresponds to a stock purchase. The dependent variable is 1 if the purchased stock is a lottery stock and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. E.g., "Div > 0.5*Prch" is 1 if dividends received in the purchase month cover more than 50% of the purchase amount. "Div2Months" is the sum of dividends received in the purchase month and the preceding month. Coefficient estimates and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A2: Brokerage data: Purchases of lottery stocks by source of funds

	DepVar: 1 for purchases of lottery stocks, 0 otherwise			
	(1)	(2)	(3)	(4)
Prch < €1k		9.3***		7.6***
		(0.6)		(0.8)
Div > 0.5*Prch	10.4***	7.8***		
	(1.3)	(1.2)		
Interest > 0.5*Prch	4.7***	2.5**		
	(1.1)	(1.2)		
SalesProceeds > 0.5*Prch	1.0***	1.1***		
	(0.2)	(0.2)		
Deposits > 0.5*Prch	1.1***	0.6***		
	(0.2)	(0.2)		
FlowFromTermDeposits > 0.5*Prch	0.2	0.0		
	(0.5)	(0.5)		
CashReduction > 0.5*Prch	0.3	0.1		
	(0.2)	(0.2)		
Prch < €1k & Div > 0.5*Prch			12.9***	11.7***
			(1.7)	(1.8)
Prch < €1k & Interest			3.8**	2.7*
			(1.7)	(1.6)
Prch < €1k & SalesProceeds > 0.5*Prch			5.7***	2.8***
			(0.6)	(0.6)
Prch < €1k & Deposits > 0.5*Prch			3.8***	0.8
			(0.5)	(0.6)
Prch < €1k & FlowFromTermDeposits > 0.5*Prch			0.9	-2.0
			(1.9)	(1.9)
Prch < €1k & CashReduction > 0.5*Prch			3.6***	0.3
			(0.5)	(0.6)
Prch ≥ €1k & Div > 0.5*Prch			3.7***	3.9***
			(1.0)	(1.0)
Prch ≥ €1k & Interest > 0.5*Prch			2.3**	2.5**
			(1.1)	(1.1)
Prch ≥ €1k & SalesProceeds > 0.5*Prch			-0.2	0.6***
			(0.2)	(0.2)
Prch ≥ €1k & Deposits > 0.5*Prch			-0.1	0.5**
			(0.2)	(0.2)
Prch ≥ €1k & FlowFromTermDeposits > 0.5*Prch			-0.3	0.3
			(0.5)	(0.5)
Prch ≥ €1k & CashReduction > 0.5*Prch			-0.8***	0.0
			(0.2)	(0.2)
Adj. R^2	0.16	0.17	0.17	0.17
Within R^2	0.00	0.01	0.01	0.01
N	129,469	129,469	129,469	129,469

This table reports the results of 4 regressions, in which each observation corresponds to a stock purchase. The dependent variable is 1 if the purchased stock is a lottery stock and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. The sources of funds are dividends, interest (paid on the brokerage cash balance and credited annually on December 31), sales proceeds, deposits into the brokerage account, cash flows from fixed-term deposits, and reductions of the brokerage cash balance (all in the purchase month). All regressions include investor- and year-month fixed effects. Coefficients and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A3: Brokerage data: Additional characteristics of div-induced stock purchases

		(1)	(2)	
	Mean	Div > 0.5*Prch	Prch < €1k	Div > 0.5*Prch
$\text{Lottery}_{IVolaISkewPrc}$	9.4	10.5***	9.3***	7.8***
		(1.3)	(0.6)	(1.2)
$\text{Lottery}_{MaxRet80}$	11.3	6.4***	9.1***	3.8***
		(1.3)	(0.8)	(1.3)
$\text{Lottery}_{MaxRet90}$	3.9	4.0***	5.1***	2.5**
		(1.0)	(0.4)	(1.0)
$\text{Lottery}_{IVolaISkewPrcMaxRet80}$	4.7	5.3***	6.0***	3.6***
		(0.9)	(0.5)	(0.9)
$\text{Lottery}_{IVolaISkewPrcMaxRet90}$	2.3	3.1***	3.7***	2.1***
		(0.7)	(0.4)	(0.7)
Idiosyncratic volatility	2.5	0.9***	0.9***	0.6***
		(0.1)	(0.0)	(0.1)
Total volatility	3.1	0.8***	0.8***	0.6***
		(0.1)	(0.0)	(0.1)
Idiosyncratic skewness	25.7	14.3***	7.8***	12.1***
		(3.2)	(1.5)	(3.2)
Total skewness	20.0	15.4***	7.1**	13.4***
		(3.5)	(2.8)	(3.5)
Price (€)	38.6	-13.8**	-19.4***	-8.3
		(5.5)	(2.0)	(5.6)
Max one-day return	6.9	2.3***	2.1***	1.7***
		(0.5)	(0.1)	(0.5)

A given row corresponds to the indicated stock characteristic, for which the mean among all stock purchases is reported, and which is the dependent variable in regression specifications (1) and (2). In the first 5 rows, the characteristics are dummies that are 1 for purchases of lottery stocks according to the indicated definition and 0 otherwise. E.g., $\text{Lottery}_{IVolaISkewPrcMaxRet80}$ is 1 for stocks with above median idiosyncratic skewness and volatility, below median price, and a maximum one-day return above the 80th percentile. In the remaining rows, the characteristics are continuous attributes of the purchased stock. The independent variables are a dummy that is 1 if dividends received in the purchase month cover more than 50% of the purchase amount and a dummy that is 1 if the purchase amount is smaller than 1,000 euros. All regressions include investor- and year-month fixed effects. Coefficient estimates and standard errors are in pp except where noted otherwise. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. N = 129,469.

Table A4: Brokerage data: Potential explanations for div-induced warrant purchases

	DepVar: 1 for purchases of warrants, 0 otherwise					
	(1)	(2)	(3)	(4)	(5)	(6)
Prch < €1k	12.3***	12.3***	12.4***	8.5***	12.4***	12.4***
	(0.6)	(0.6)	(0.6)	(0.4)	(0.6)	(0.6)
BoMCash < Prch	-1.1***	-1.1***				
	(0.2)	(0.2)				
HotCash > 0.5*Prch			3.5***			
			(0.2)			
Prch < €1k & HotCash > 0.5*Prch				8.2***		
				(0.6)		
Prch ≥ €1k & HotCash > 0.5*Prch				2.1***		
				(0.2)		
Div > 0.5*Prch		6.4***	4.4***			5.3***
		(1.2)	(1.1)			(1.1)
Prch ≤ BoMCash & Div > 0.5*Prch	6.4***					
	(1.2)					
Prch > BoMCash & Div > 0.5*Prch	1.6	-4.7***				
	(1.5)	(1.4)				
Prch < €1k & Div > 0.5*Prch				4.0**		
				(1.5)		
Prch ≥ €1k & Div > 0.5*Prch				2.8**		
				(1.4)		
DivOrdinary > 0.5*Prch					5.4***	
					(1.1)	
DivSpecial > 0.5*Prch					10.7***	6.8
					(3.8)	(4.1)
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.57	0.57	0.57	0.57	0.57	0.57
Within R^2	0.03	0.03	0.03	0.04	0.03	0.03
N	251,640	251,640	251,640	251,640	251,640	251,640

This table reports the results of 6 regressions, in which each observation corresponds to a security purchase. The dependent variable is 1 if the purchased security is a warrant and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. E.g., "Div > 0.5*Prch" is 1 if dividends received in the purchase month cover more than 50% of the purchase amount. "BoMCash" is the brokerage cash balanace at the beginning of the purchase month. "HotCash" is the sum of sales proceeds and dividends in the purchase month. All regressions include investor- and year-month fixed effects. Coefficient estimates and standard errors are in pp. Standard errors are clustered by investor and year-month and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A5: Brokerage data: Dividend-gambling in the US brokerage sample

	The dependent variable is a dummy (1 or 0) that is 1 for purchases of...							
	...lottery stocks				...warrants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	10.4***				8.8***			
	(0.1)				(0.3)			
Prch < $1k		22.8***	22.3***	22.8***		17.6***	17.7***	17.7***
		(0.5)	(0.5)	(0.5)		(0.5)	(0.5)	(0.5)
HotCash > 0.5*Prch				0.2**				1.1***
				(0.1)				(0.1)
Div > 0.5*Prch	11.3***	7.3***		7.1***	19.5***	8.0***		7.1***
	(1.5)	(1.4)		(1.4)	(1.7)	(0.9)		(0.9)
Div3Months > 0.1*Prch			5.0***				1.5***	
			(0.3)				(0.2)	
Investor FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year-month FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.00	0.16	0.16	0.16	0.00	0.63	0.63	0.63
Within R^2	0.00	0.02	0.02	0.02	0.00	0.05	0.05	0.05
Purchase sample	Stocks	Stocks	Stocks	Stocks	All	All	All	All
N	670,398	652,850	619,141	652,850	1,165,219	1,147,596	1,091,642	1,147,596

This table reports the results of 8 regressions. In 1 through 4 (5 through 8), each observation corresponds to the purchase of a stock (a security in any asset class). and the dependent variable is 1 if the purchased stock (security) is a lottery stock (warrant) and 0 otherwise. The independent variables are dummies that are 1 if the indicated condition is true and 0 otherwise. "Prch < $1k" is 1 if the purchase amount is smaller 1,000 US dollars. "HotCash > 0.5*Prch" is 1 if the dividends and sales proceeds received in the last 30 days (but only since the most recent prior purchase) cover more than 50% of the purchase amount. "Div > 0.5*Prch" is 1 if the dividends received in the last 30 days (but only since the most recent prior purchase) cover more than 50% of the purchase amount. "Div3Months > 0.1*Prch" is 1 if the dividends received in the last 90 days (but only since the most recent prior purchase) cover more than 10% of the purchase amount. Coefficient estimates and standard errors are in pp. Standard errors are clustered by household and date and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

B Asset pricing

B.1 Data processing

In this section, we provide a detailed description of our data processing for the German stock market data. In general, we retrieve the data from Datastream as outlined by Landis and Skouras (2021) and run the authors' Matlab script to process the data. We make some modifications to get the script to run and to improve the data quality even further.

First, we make the following modifications for downloading the data from Datastream:

1. In Appendix A.5 Step 4, Landis and Skouras (2021) tell users to use the following folder structure: "UserDirectory/data/raw/equities/001". In Figure A.15, there is no "equities" folder, i.e., the folder structure is: "UserDirectory/data/raw/001". We use the structure including the "equities" folder, i.e., "UserDirectory/data/raw/equities/001".

2. In Appendix A.2 Step 8, Landis and Skouras (2021) write: "If all is visible in the DFO Navigator then click it. (The visibility of 'All' depends on the number of stocks in an exchange.) Otherwise, tick the box next to 'Use' (as marked in Figure 10) and then click 'Next' and iterate this until all stocks in all pages have been ticked. After all iterations, click 'Use' (see Figure 10, illustrating this example for South Korea)." For our case, "All" is available if you select exactly one exchange (e.g., XETRA) and "All" is not available if you select multiple exchanges at the same time (e.g., Frankfurt, Hamburg, Stuttgart, ...). Knowing this saves users a lot of time because they can select one exchange at a time and click "All" instead of having to click through several hundreds of pages when selecting multiple exchanges simultaneously.

3. In Appendix A.3 Step 10, Landis and Skouras (2021) tell users to save a list with a maximum of 2,000 stocks because the requests get too big otherwise. From our experience, 2,000 is too big already and we use a limit of 1,000 instead.

4. In Appendix A.5 Step 5 of Landis and Skouras (2021), data for multiple lists are supposed to be downloaded with one processing of the request table. What does not work is to download data for list "#001" and list "#002" at the same time if the data are saved in two files with the same name, e.g., "001/up.xlsx" and "002/up.xlsx". The problem here is that Excel does not open two files with the same name at the same time. To solve this, we changed the names to "up1.xlsx" and "up2.xlsx" for the processing and then changed them back to "up.xlsx" afterwards.

5. Before we could process the request table in Appendix A.5 of Landis and Skouras (2021), we had to create the target files (e.g., "up1.xlsx") manually. To do so, we created an empty file with one sheet ("Sheet1"), duplicated this file and gave the duplicates the required file names (af1.xlsx, ..., up9.xlsx).

6. The static request in Appendix Figure A.15 of Landis and Skouras (2021) needs "TRAD" as an additional variable between "TRAC" and "TYPE". Without "TRAD", the Matlab script will throw an error.

Second, we make the following modifications to run the Matlab script from Landis and Skouras (2021):

1. The system language needs to be set to English (for processing dates).

2. If a file only has missing values (e.g., because Datastream had no data for the respective variable for all the stocks), the file does not contain a column with dates. This will cause the Matlab script to throw an error. To solve this problem, we copy-and-pasted the date column from another file into the affected file.

3. We believe, the home currency filter in the Matlab script chooses the entry for "PCUR" in the first row of "static.xlsx" as the home currency and throws out all observations where "PCUR" is different. This is problematic for two reasons: First, if the first row is an entry with a wrong "PCUR", e.g., "U$" although the market is Germany, the filter

will remove all euro observations. Second, the filter removes all observations for which "PCUR" is "DM" (i.e., German mark) for Germany which should not happen because that is Germany's true currency for observations before the euro was introduced. We use the following workaround: A) we make sure the first entry is "E" (for euro). B) in "PCUR" in the "static.xlsx" files, we replace all "DM" entries with "E". Note: The currency filter only cares about "PCUR" in "static.xlsx". The currencies in the time series files (e.g. "up.xlsx") are no grounds for filtering (i.e., if there is a "U$" entry for price data in a file for the German market, that does not result in the affected stock being excluded).

4. Values in the time series files that are not in home currencies (e.g., "U$") are converted to the home currency (i.e., euros in our case). This works for all currencies except pre-euro currencies (e.g., "DM" = German mark) and British pound. For German mark and British pound, we use the following workarounds:

   (a) For German mark, we A) search and replace "DM" with "XX" in the time series files and B) change "DM" to "XX" in "tds_currencySymbols.csv".

   (b) For British pound, we A) search and replace "£" with "GBP" in the time series files. B) in " tds_currencySymbols.csv", we add a new row [BRPOUND, British Pound, GBP]. C) in "exhange_rates.xlsx" in "Sheet1", we add a new column [DPL#(BRPOUND(ER),6), DPL#(BRPOUND(ER),6), £, 1, 1, 1, ...].

5. The script only processes variables that are part of the instructions of Landis and Skouras (2021). If the user wants to process other variables, the user has to do this on his own. In our case, we process "UDD" (the unadjusted amount of dividends per share paid out on a given date) following the instructions in Landis and Skouras (2021) and merge the "UDD"-data with the rest of the data.

Third, we add the following steps to process the data that are returned by the Matlab script:

1. By analyzing year-on-year growth in dividends for each individual stock, we find that data before a certain date are in German mark and data after a certain data are in euros, regardless of what the Datastream currency entry says. In general, we find that dividend data until 1999-12-31 are in German mark and dividend data thereafter in euros. We manually check for exceptions and find that, e.g., SAP already has euro data in 1999, while Thyssenkrupp still has German mark data in 2000. Thus, we use an individual German mark-to-euro transition date for each stock to convert dividend data from German mark to euros.

2. We set the 1997 dividend data for Heidelberger Druckmaschinen to missing because they appear to be payments that were made to shareholders prior to the IPO of the company in December of 1997 (see https://www.heidelberg.com/global/media/global_media/investor_relations/annual_general_meeting_1/2004_2/hv2004_geschaeftsbericht_2001_2002.pdf, as of 2026-05-07).

3. There are some dates that are excluded by the Matlab script although we believe that they are regular trading days based on many non-zero returns on these days and the days being weekdays and no holidays. We add data for these dates back into the dataset. The specific dates are: 1989-12-27, 1990-01-02, 2011-12-27, 2013-01-02, 2014-01-02, 2015-01-02, 2015-12-28, 2016-01-04, 2016-12-27, 2018-01-02, 2019-01-02, 2020-01-02, 2020-12-28, 2021-01-04, 2022-12-27, 2024-01-02, 2025-01-02.

4. There are some dates that are not excluded by the Matlab script although we believe that they are no trading days based on many zero returns on these days. We exclude days on which more than 95% of returns are within 0.5% of zero which is true for 226 dates in the entire dataset and 112 dates in our sample form 2000 until 2025. We allow some deviation from zero due to exchange rate fluctuations that produce small non-zero returns without trading. The fraction of returns that are *exactly* zero on the days that we exclude from our sample is between 71% and 98%. The day with the

lowest fraction of exactly-zero returns that we exclude is 2025-04-18, which is Good Friday, a public holiday in Germany that should be excluded as it is no trading day.

5. We exclude 377 securities that we identify as securities other than ordinary shares based on their "ENAME" containing: "GENUSSCHEIN", "REGISTER", "ADR", "BOND", "ETF" (and "TRAC" $\neq$ "ORD"), "INDEX", "STOXX", "ISHARES", "XTRACKER", "X-TRACKER", "NAV" (and "TRAC" $\neq$ "ORD"), "%", "STEIGENBERGER HOTELGESELLSCHAFT DEAD - DELIST.01/01/86". We additionally exclude 5 securities that we identify as securities other than ordinary shares based on their "TYPE" being "ADR" or "ET".

6. We generally handle duplicate listings as Landis and Skouras (2021) do. Most notably we also switch from using listings on FRA to using listings on XET starting 2000. Yet, there are some dual listings that have much fewer valid observations for their XET listing than for their FRA listing after 2000 which would unnecessarily shrink the sample. Thus, we do not make the switch from FRA to XET if a stock has more than 50 additional observations on FRA vs. XET. This affects 634 dual-listed stocks, most of which are small, with only one DAX stock being affected (Sartorius).

B.2 Price multiplier: Institutional investors

In this section, we provide details on the estimation of the amount of dividends that institutions invest in lottery stocks in May during the 2007-2011 period. First, we present the ownership structure of the German stock market. Second, we estimate the share that lottery stocks make up of institutions' German stock holdings. Third, we estimate the aggregate institutional reinvestment rate. Fourth, we estimate the amount of dividends invested in German lottery stocks by mutual funds. Fifth, we estimate the amount of dividends invested in German lottery stocks by other institutions. Sixth, we present sensitivity analyses.

B.2.1 Ownership structure of the German stock market: Table B3 reproduces Bundesbank financial accounts data on the ownership structure of the German stock market.[24] In the following, the data will be used for multiple purposes, including the estimation of the lottery stock share in institutional portfolios, the distribution of dividends among the different investor types, and the computation of the proportions of dividends reinvested in German vs. non-German stocks.

B.2.2 Institutional lottery share: In this section, we estimate the share that lottery stocks make up of institutions' German stock holdings. Throughout the price multiplier calculation, we define lottery stocks as stocks with above-median idiosyncratic volatility and skewness, below-median price and a prior-month maximum one-day return above the 80th percentile to focus on those stocks for which we document the strongest price pressure in Section 2.

First, we calculate the share that lottery stocks make up of the German stock market. Over the 2007-2011 period, the average market share at the beginning of May is 0.165%. Second, we estimate the share that lottery stocks make up of German households' German stock holdings during the same time period. In the German brokerage data, we calculate a (value-weighted) share of 0.602%. Third, assuming that this share is representative for German households and using ownership rates from Table B3, we calculate the share of lottery stocks in non-households' German stock portfolios from the residual of lottery stocks that are not held by households:

$$\frac{Lottery}{Market} = \frac{LotteryOwnedByHH}{StocksOwnedByHH} \cdot \frac{StocksOwnedByHH}{Market} + \frac{LotteryOwnedByNonHH}{StocksOwnedByNonHH} \cdot \frac{StocksOwnedByNonHH}{Market} \tag{2}$$

[24] The data are downloaded from https://statistiken.bundesbank.de/statistiken-en/search/W68/W60 (as of 2026-10-23). They represent values for the first quarter of 2013, which is the earliest point in time with sufficiently granular data for our analysis. Earlier, less granular data suggest that the ownership structure in 2013 is similar to the 2007-2011 period (see, e.g., the household share closely fluctuating around 12% in Deutsche Bundesbank 2014).

$$\frac{LotteryOwnedByNonHH}{StocksOwnedByNonHH} = \left(\frac{Lottery}{Market} - \frac{LotteryOwnedByHH}{StocksOwnedByHH} \cdot \frac{StocksOwnedByHH}{Market}\right) / \frac{StocksOwnedByNonHH}{Market} \tag{3}$$

$$0.103\% = (0.165\% - 0.602\% \cdot 12.50\%)/(1 - 12.50\%) \tag{4}$$

For simplicity, we assume that this proportion is constant across the German stock portfolios of all non-household investor types.

B.2.3 Institutional reinvestment rate: In this section, we estimate the aggregate dividend reinvestment rate of institutions in May. We use Bundesbank data from 2010 and 2011 (the earliest available) to estimate the reinvestment rate of German equity mutual funds and also apply this rate to other institutional investors, following Hartzmark and Solomon (2025) who estimate the reinvestment rate of US mutual funds and apply the rate to other institutional investors.[25] The estimation is presented in Table B4.

First, we estimate dividend income before taxes in May by multiplying beginning-of-month holdings of German stocks, euro area stocks (ex Germany), and global stocks (ex euro area) by region-specific dividend yields (DYs). The DY for Germany is calculated from our German stock market data. The DYs for the euro area ex Germany (world ex euro area) correspond to the DY of the Euro Stoxx 50 ex Germany (MSCI AC World ex euro area) multiplied by the ratio of the DY of the entire German stock market to the DY of the DAX.[26] Multiplying by this ratio accounts for the fact that the Euro Stoxx 50 and the MSCI AC World cover only large-caps or large- and mid-caps, respectively, while we aim to estimate the DY of the entire stock market in the respective region. Our calculation

[25] The Bundesbank data are downloaded from https://statistiken.bundesbank.de/statistiken-en/search/W12, as of 2026-10-23.

[26] Using Datastream data, the index DY in a given month is calculated as the return-index return minus the price-index return. To calculate the DY of an index ex Germany, we decompose the index DY into a German component (with the DAX DY and Germany's index share from Dimson, Marsh, and Staunton 2009) and a residual component, which represents the index ex Germany, s.t., the index DY is the index-share-weighted average of the German DY and the index-ex-Germany DY. See also Equation 7 and Table B6.

assumes that the market-wide DY is a scaled version of the respective index DY, with the scaling factor corresponding to that of the German stock market relative to the DAX.

Second, we subtract withholding taxes of 26.375% for dividends from German stocks and 15% for dividends from non-German stocks. Even though these taxes may eventually be reimbursed, they are generally not immediately available for reinvestment.[27]

Third, we calculate the amount of dividends reinvested in May as the residual of the total net dividends received in May after subtracting fund distributions (i.e., dividends paid by mutual funds to their investors) and excess net cash increases in May. Excess net cash increases in May are defined as cash increases from April to May that exceed the cash increases that would be expected based on net investor inflows in May and the ratio of cash to cash plus stocks in April.

Fourth, we calculate the reinvestment rate as the ratio of dividends reinvested to dividends received, which is 73.8% in May 2010, 62.0% in May 2011, and 68%, on average. For comparison, Hartzmark and Solomon (2025) and Schmickler and Tremacoldi-Rossi (2023) estimate reinvestment rates of 53% and 83% for US mutual funds in the month of payment and quarter of payment, respectively. That reinvestment rates may be slightly lower in the US is plausible given that US mutual funds "are legally required to distribute all dividends and capital gains to the fund's investors by the end of the year to avoid paying income tax at the fund level" (Hartzmark and Solomon 2019, p. 2177). In contrast, no comparable general distribution requirement exists in Germany or the EU more broadly. Indeed, many European mutual funds are structured as accumulating funds that generally retain their dividend income rather than distributing it to investors, making high immediate reinvestment rates plausible.

[27] Paragraphs 2 and 82 of a ruling by the German Federal Fiscal Court (https://www.bundesfinanzhof.de/de/entscheidung/entscheidungen-online/detail/STRE202410139/) establish that dividends paid by German stocks to German and non-German mutual funds were initially subject to a withholding tax of 26.375%. For dividends from non-German stocks, 15% were often withheld as part of double tax treaties, e.g., for the US (see Article 10 of https://www.germany.info/us-en/service/09-taxes/taxes-income-913924) and France (see Section I.C of https://bofip.impots.gouv.fr/bofip/2537-PGP.html/identifiant=BOI-INT-CVB-DEU-10-20-20120912, all links as of 2026-10-27).

B.2.4 Dividends invested in lottery stocks by mutual funds: In this section, we estimate the amount of dividends invested in German lottery stocks by mutual funds in May, on average over the 2007-2011 period. Mutual funds are comprised of German mutual funds and non-German mutual funds, which we assume to correspond to the entirety of non-german owners in Table B3. This assumption is supported by Dahlquist and Robertsson (2001), whose results suggest that foreign investors in Swedish stocks are predominantly mutual funds, and by a report from the Bundesbank which states that "it can plausibly assumed that the non-resident investors are almost entirely institutional investors" (Deutsche Bundesbank 2014, p. 23).[28] Taking German mutual funds and non-German owners together, Table B3 indicates that 62% of the German stock market is owned by mutual funds.

Our central assumption is that mutual funds reinvest dividends proportionally in their stock holdings, consistent with the documentation of such behavior by Schmickler and Tremacoldi-Rossi (2023).[29] In Section B.2.2, we estimated the fraction that lottery stocks make up of mutual funds' German stock holdings. Next, we estimate the fraction that German stocks make up of the total (dividend-weighted) stock holdings of mutual funds that hold German stocks.[30] To do so, we use the breakdown of the global mutual fund market by their target portfolio from Appendix B of Cremers et al. (2011) (a working paper version of Cremers et al. 2016). This Appendix contains the net asset values (NAVs) invested globally in mutual funds with a given benchmark, e.g., the DAX, in December 2007. For our estimation, we assume that the aggregate share that mutual funds with a given benchmark invest in a country corresponds to the share that the country makes up of the benchmark.

[28] To the extent that foreign investors are not mutual funds, our assumption only requires that they behave as we model mutual funds in the following.

[29] To the extent that dividends are invested in new positions, our assumption only requires that these positions have the same average characteristics as the existing holdings.

[30] Note that it makes a substantial difference for the amount of dividends reinvested in German stocks whether, e.g., all German stocks are held by German-focused mutual funds who reinvest 100% of dividends back in German stocks or whether all German stocks are held by globally diversified mutual funds who only reinvest 4% of dividends back in German stocks.

In Table B5, we use the data from Cremers et al. (2011) to calculate the average amount of May dividend payments from German stocks to mutual funds with a given benchmark over the 2007-2011 period. Column 1 reproduces the NAVs of mutual funds whose benchmarks contain German stocks. Column 2 reports the fraction that German stocks make up of each benchmark using data from Dimson, Marsh, and Staunton (2009). In column 3, we calculate the fraction of the aggregate German stock holdings of mutual funds that is attributable to funds with a given benchmark:

$$\%OfGermanStocksAmongFunds_i = \frac{NAV_i \cdot \%InGermanStocks_i}{\sum_{j=1}^{N} NAV_j \cdot \%\text{InGermanStocks}_j} \tag{5}$$

In column 4, we multiply the values from column 3 by the 62% share of German stocks held by mutual funds to calculate the fraction of the aggregate German stock holdings (including those held by non-fund investors) that is attributable to funds with a given benchmark. In column 5, we calculate the euro amount of dividends paid by German stocks to mutual funds with a given benchmark by multiplying the values from column 4 by the average May dividend payments of 16,760 million euros by German stocks over the 2007-2011 period.

In addition to the dividend income from German stocks, mutual funds also receive dividend income from non-German stocks, which we estimate in three steps. First, we calculate the DY of the non-German holdings of each benchmark by decomposing the benchmark DY into the DY of German stocks and the DY of non-German stocks in May:

$$DY_i = \%InGermanStocks_i \cdot DYDAX + (1 - \%InGermanStocks_i) \cdot DYExGermany_i \tag{6}$$

$$DYExGermany_i = \frac{DY_i - \%InGermanStocks_i \cdot DYDAX}{1 - \%InGermanStocks_i} \tag{7}$$

Second, we estimate how many euros of dividends funds with a given benchmark receive from non-German stocks for each euro of dividends they receive from German stocks in May:

$$RatioNonGermanToGermanDivs = \frac{(1 - \%InGermanStocks_i) \cdot DYExGermany_i}{\%InGermanStocks_i \cdot DYDAX} \quad (8)$$

Third, we multiply this ratio by the euro amount of dividends from German stocks to estimate the euro amount of dividends that mutual funds with a given benchmark receive from non-German stocks in May. The results of the first two steps are documented in Table B6, the results of the third step in Table B7.

Finally, in Table B7, we deduct withholding taxes from the dividends. For German dividends, we deduct 24.068% (which is the dividend-weighted average of the 21.1% tax rate for 2007-2008 and the 26.375% tax rate for 2009-2011, using German stock market dividends paid in May of each year as weights). For non-German dividends, we deduct 15% (see Section B.2.3). We then aggregate the after-tax dividends to obtain the total dividends received in May by mutual funds with a given benchmark. Multiplying these dividends by the 68% reinvestment rate (estimated in Section B.2.3), the respective benchmark's German stock share, and the 0.103% lottery stock share in institutions' German stock holdings (estimated in Section B.2.2), we estimate the amount of dividends invested in German lottery stocks by mutual funds with a given benchmark in May, on average over the 2007-2011 period. Summing across all mutual funds yields 4.2 million euros.

B.2.5 Dividends invested in lottery stocks by other institutional investors: In this section, we estimate the amount of dividends invested in lottery stocks by German institutional investors other than mutual funds in May, on average over the 2007-2011 period. For these investor types, we only have the Bundesbank data on German stock shares and lack the more granular benchmark portfolio data that we use for mutual funds in Section B.2.4. For simplicity, we assume homogeneous portfolio allocations within each investor type (e.g.,

that every bank owns 47.4% German and 52.6% non-German stocks) and approximate the DY of non-German stocks with the DY of the euro area ex Germany. Moreover, we follow Hartzmark and Solomon (2025) and assume that the 68% reinvestment rate we estimate for mutual funds also applies to other institutional investors, with the exception of non-profits and the government, for which we assume a reinvestment rate of 0%.

The step-by-step estimation is presented in Table B8. First, we calculate the average May dividends paid by German stocks to each investor type by multiplying its share of the German stock market by the average May dividend payments of 16,760 million euros by German stocks over the 2007-2011 period. Second, we insert the respective German stock shares and the average May DYs of the DAX and the Euro Stoxx 50 ex Germany into Equation 8 to calculate the ratio of non-German to German dividends received by each investor type. We then multiply this ratio by the respective income from German dividends to obtain the income from non-German dividends for each investor type. Third, we subtract withholding taxes from German and non-German dividends and sum the remaining amounts to calculate total net dividends received by each investor type. Fourth, we multiply these dividends by the 68% reinvestment rate (estimated in Section B.2.3), the respective investor type's German stock share, and the 0.103% lottery stock share in institutions' German stock holdings (estimated in Section B.2.2) to estimate the amount of dividends invested in German lottery stocks by each investor type. Summing across all investor types yields 2.2 million euros. Together with the 4.4 million euros invested by mutual funds (estimated in Section B.2.4), we obtain an estimated 6.6 million euros invested in German lottery stocks by institutional investors in May, on average over the 2007-2011 period.[31]

[31] In the paragraph on institutional reinvestments in Section 2.2.6, Component A) refers to 41.8 billion euros of dividends received by institutions net of withholding taxes in May. This number corresponds to the sum of net dividends received by mutual funds (column 4 in Table B7) and other institutional investors (column 6 in Table B8). The number excludes dividends received by non-profits and the government, for which we assume zero reinvestment. Component C) refers to a 21% German stock share in the aggregate dividend-weighted stock portfolio of institutional investors who hold German stocks. To calculate the share, we combine the German stock shares and total net dividends received by mutual funds (columns 5 and 4 of Table B7) with the corresponding values for other institutions (columns 1 and 6 of Table B8) and then take the weighted average of the German stock shares, using total net dividends received as weights.

B.2.6 Sensitivity analyses: In this section, we perform sensitivity analyses by considering economically plausible alternatives to the central assumptions in our back-of-the-envelope calculation of the price multiplier. For our first variation, we assume that institutions reinvest dividends in the country from which they originate (e.g., to maintain constant regional allocations). This assumption greatly simplifies the back-of-the-envelope calculation. Table B3 shows that 84.77% (=1-0.1250-0.0054-0.0219) of German stocks are held by institutional investors (including non-Germans but excluding non-profits and the government, for which we assume zero reinvestment). Correspondingly, these institutions receive 14.2 billion euros (=0.8477*16.8) of the 16.8 billion euros paid by the German stock market in May, on average for the 2007-2011 period. Following our prior assumptions, we deduct average withholding taxes of 24.068% and apply a 68% reinvestment rate. With a lottery share of 0.103% in institutions' German stock holdings, we estimate reinvestments in German lottery stocks of 7.6 million euros by institutions (=14.2 billion euros*(1-0.24068)*0.68*0.00103). Together with the 8.6 million euros invested by retail investors (which remain unaffected by our variation in assumptions), total reinvestments in German lottery stocks sum to 16.2 million euros (=8.6+7.6). Combined with the unchanged capital gains of 88.0 million euros of the German lottery portfolio, the resulting price multiplier is 5.4 (=88.0/16.2).

For our second variation, we assume A) that non-German investors are made up of households and institutions in the same proportions that German investors are made up of households and institutions. Moreover, we assume B) that non-German households with German stock holdings behave like German households with German stock holdings. Table B3 shows that German households account for 27.98% (=0.1250/(1-0.5532)) of the German stock holdings by German investors. Per assumption A), this 27.98% household share also applies to non-German investors, and therefore the market as a whole. Per assumption B), the lottery share in non-German investors' German stock portfolios is the same as that

in German investors' German stock portfolios, i.e., 0.602% (estimated in Section B.2.2). Per Equation 3, this results in an institutional lottery share of

$$0.00\% = (0.165\% - 0.602\% \cdot 27.98\%)/(1 - 27.98\%) \tag{9}$$

Thus, our set of assumptions incidentally produces a lottery share of zero in institutions' portfolios, which means we also assume zero reinvestments in lottery stocks by institutions, which, again, greatly simplifies the back-of-the-envelope calculation. Repeating our calculation of the amount of dividends reinvested in lottery stocks by households from Section 2.2.6 with the updated household share of 27.98%, we estimate reinvestments in lottery stocks of 19.3 million euros (=16.8 billion euros*0.2798*(1-0.164)*(1+0.134)*0.00432). Combined with the unchanged capital gains of 88.0 million euros of the German lottery portfolio, the resulting price multiplier is 4.6 (=88.0/19.3).

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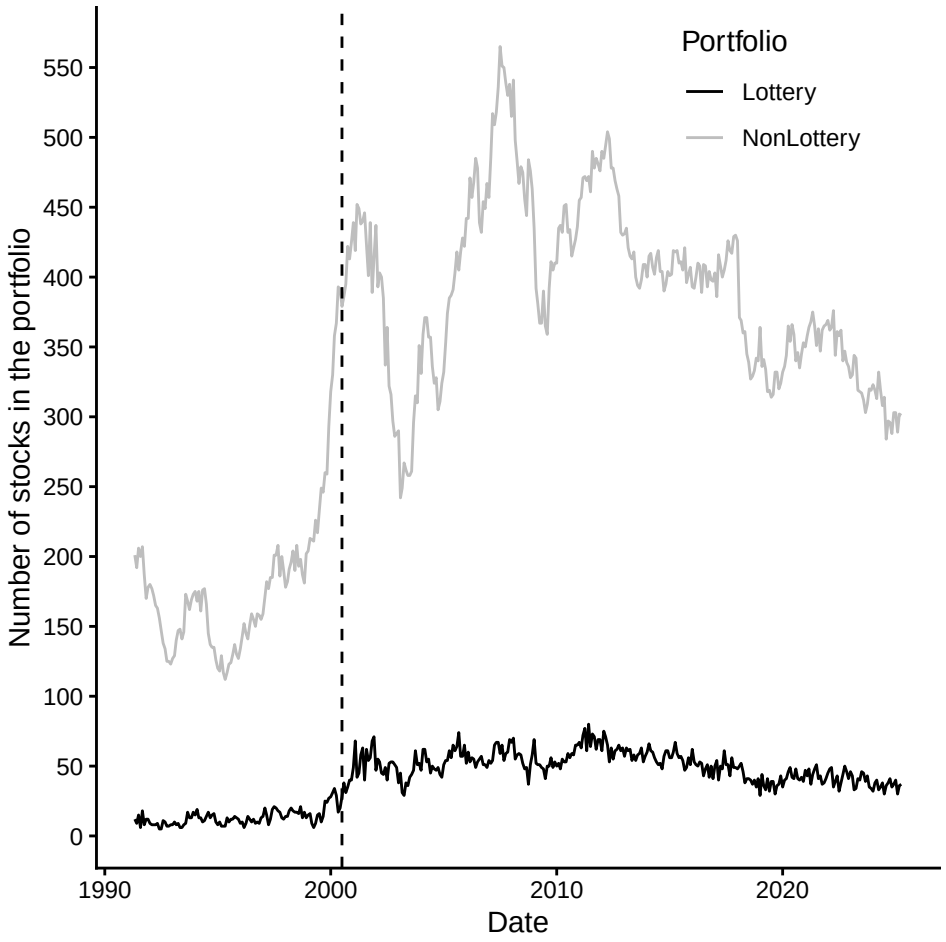
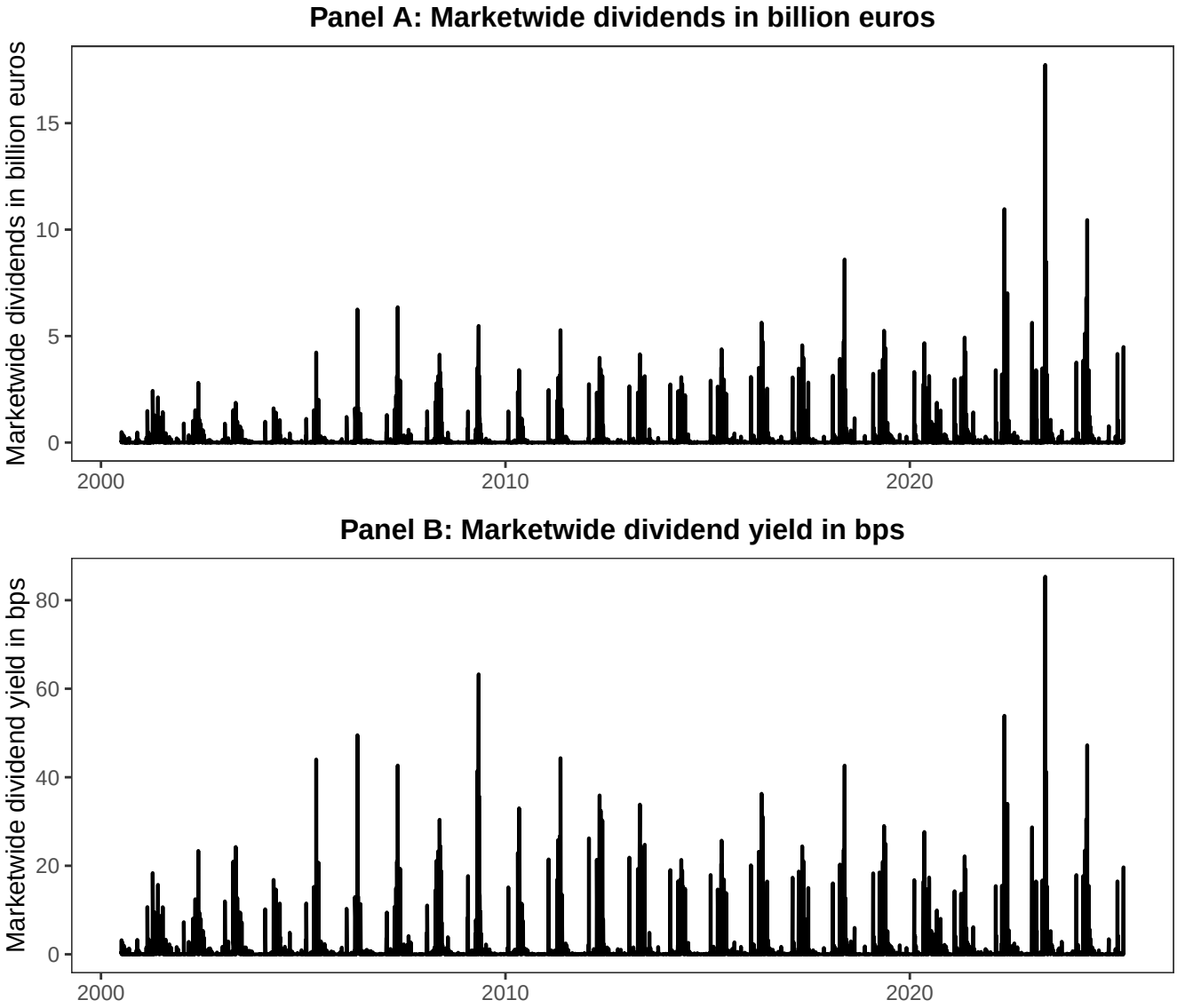
Figure B1: Asset pricing: Number of stocks per portfolio over time



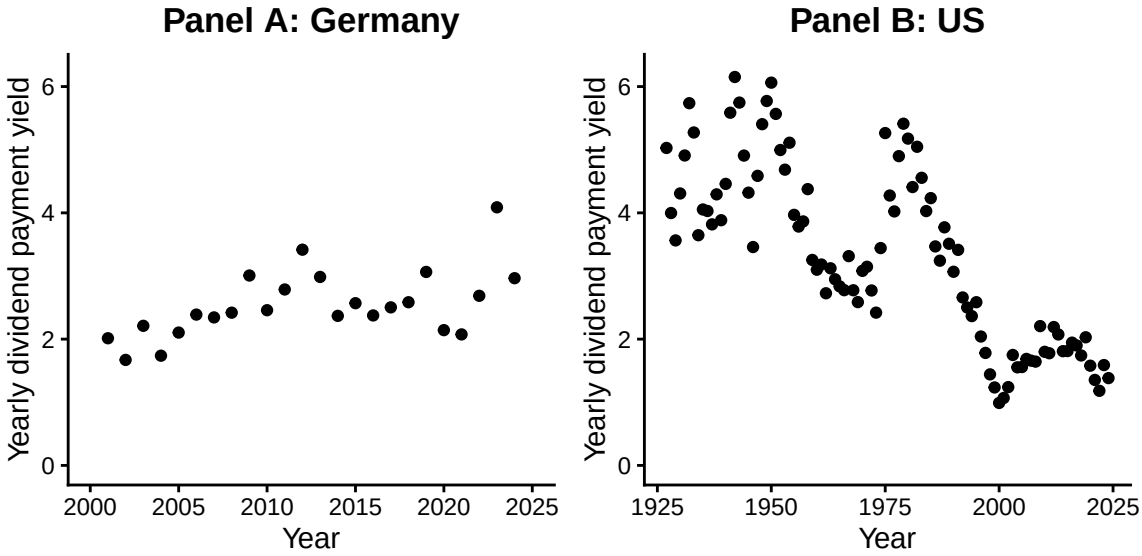
All stocks in the German stock market are separated into a non-lottery portfolio and a lottery portfolio. This figure plots the number of stocks in each portfolio over time. The dashed line marks the beginning of our sample in July 2000 (which is six months after January 2000, with six months being the time period that we need to evaluate the lottery characteristics of a stock).

Figure B2: Asset pricing: Dividends over time



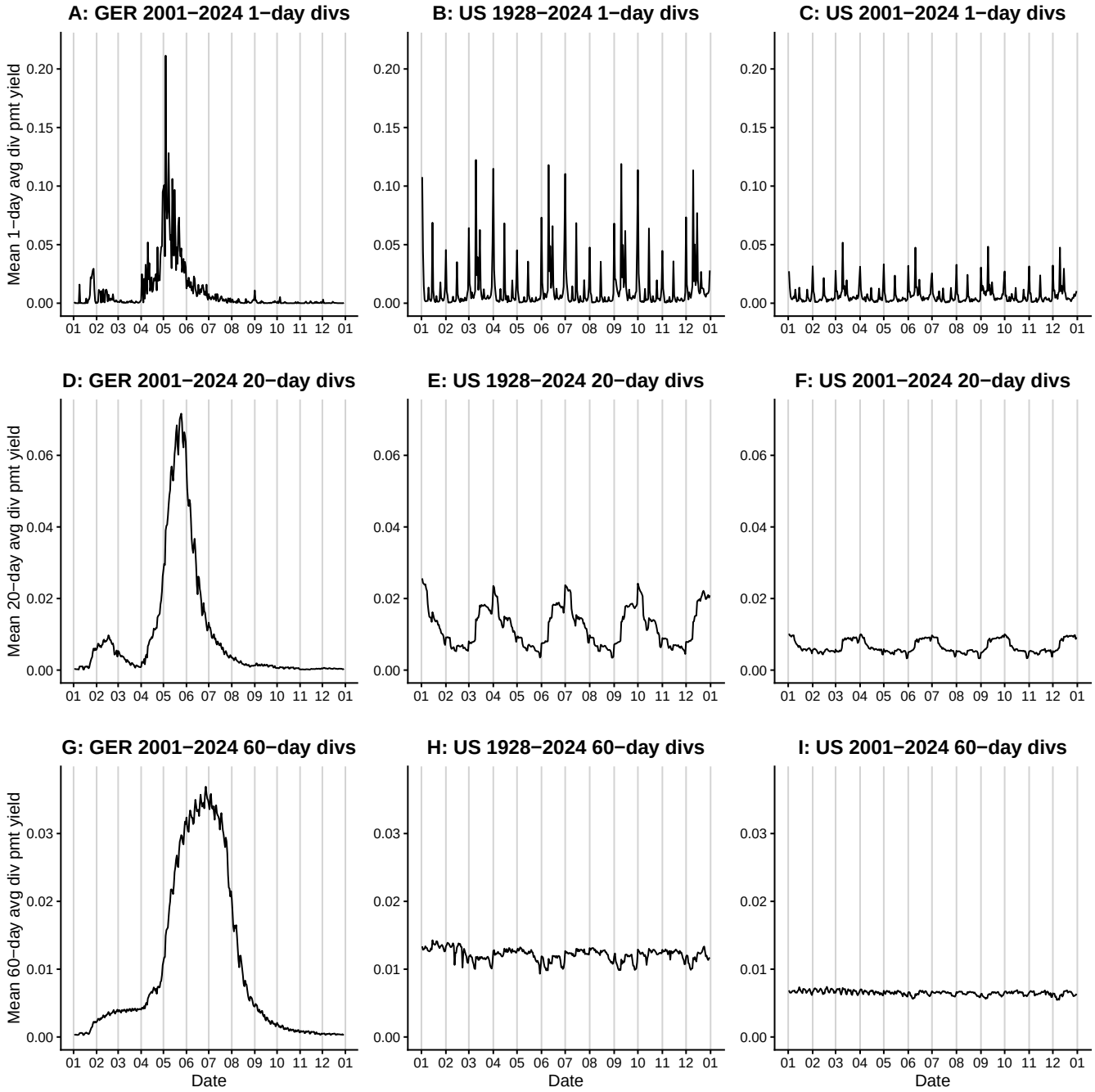
This figure plots daily dividend payments of the German stock market over time. Panel A shows payments in billion euros. Panel B shows payments scaled by the market capitalization of the German stock market on the prior day.

Figure B3: Asset pricing: Dividends by year



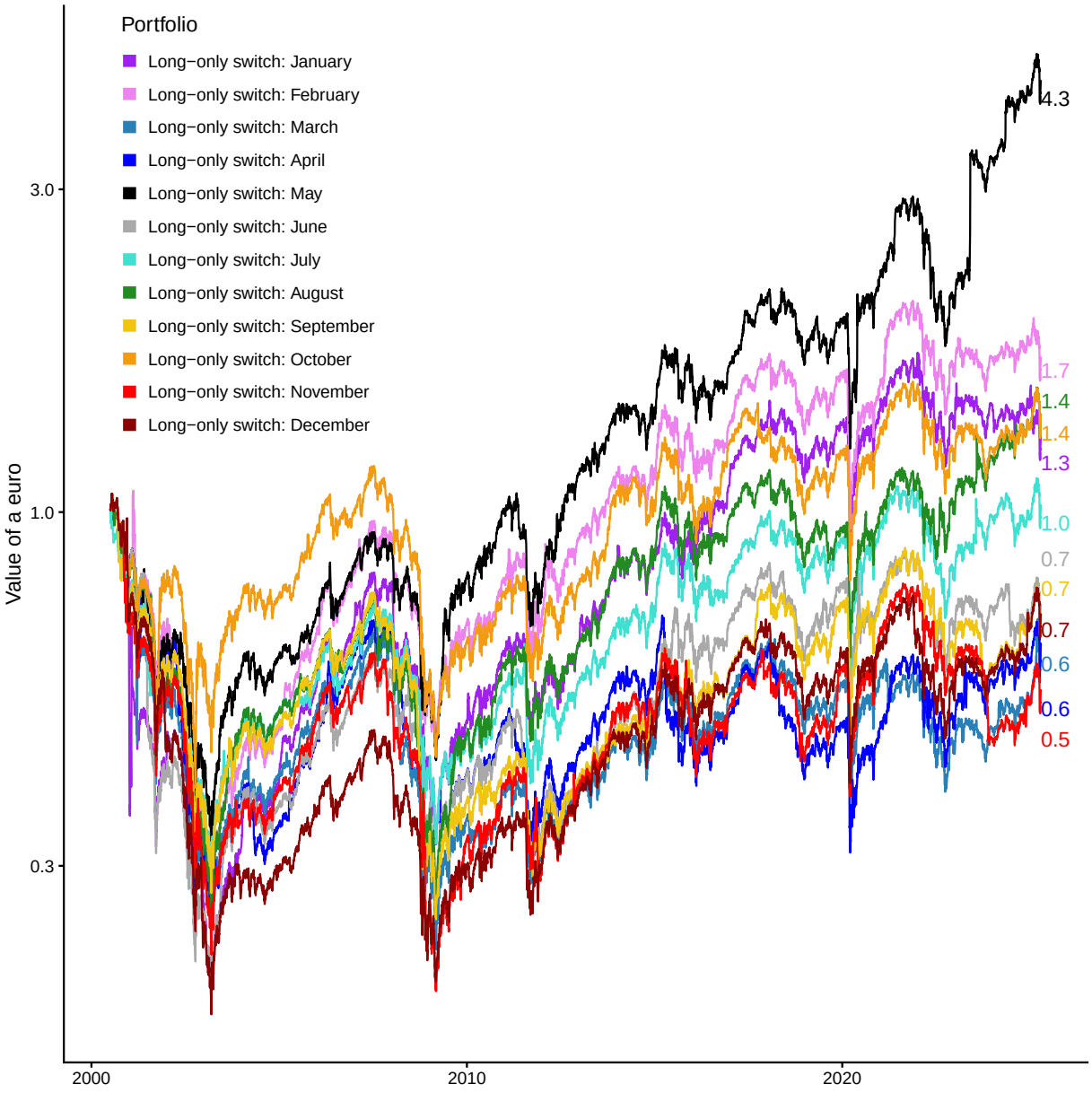
In Panel A (B), all dividend payments made by German (US) stocks in a given year are cumulated and divided by the market capitalization of the German (US) stock market at the beginning of the year.

Figure B4: Asset pricing: Dividends by date



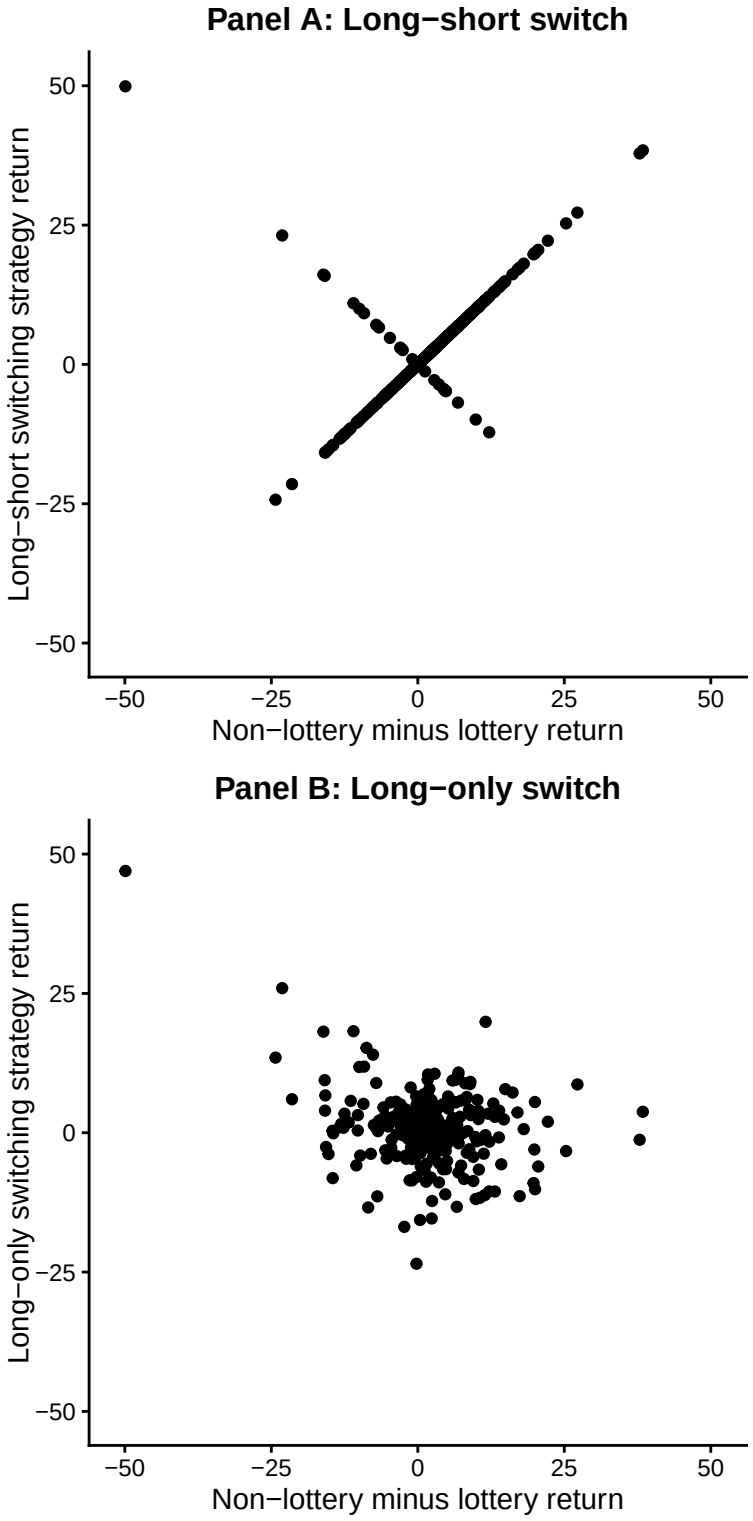
For each date in the indicated country and time period, dividend payments over the past $n \in \{1, 20, 60\}$ days are averaged and divided by the market capitalization on the prior day. The figure plots the value of this n-day average dividend payment yield on the respective date, averaged over all years in the indicated time period.

Figure B5: Asset pricing: Investment strategies over time: Placebos



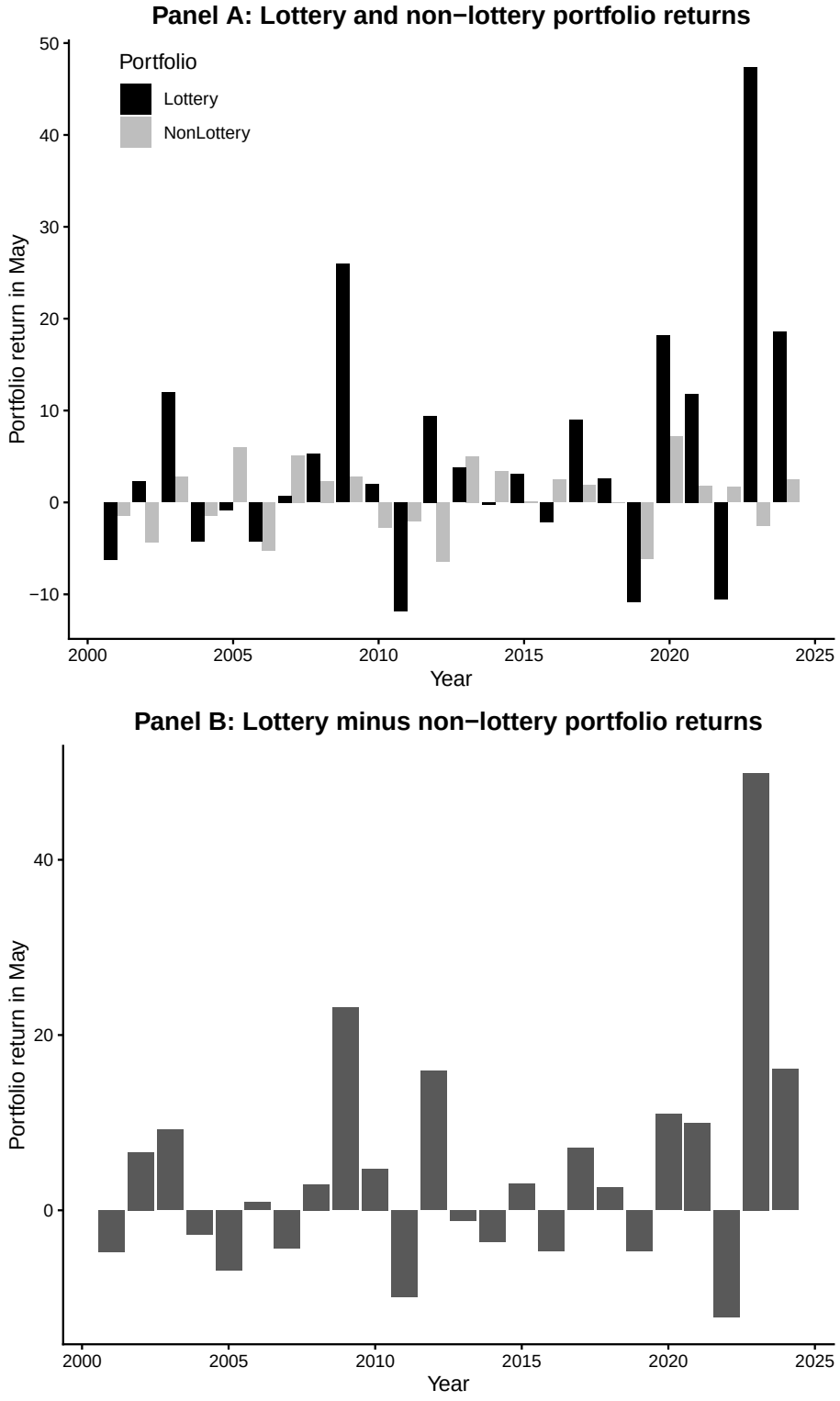
All stocks in the German stock market are separated into a lottery portfolio and a non-lottery portfolio. The portfolios are value-weighted and re-sorted monthly. Each line corresponds to a zero-net investment strategy involving these portfolios. The short position is always the risk-free rate. The long position is the lottery portfolio in the indicated month and the non-lottery portfolio in all other months.

Figure B6: Asset pricing: Timing ability of the May-based switching strategies



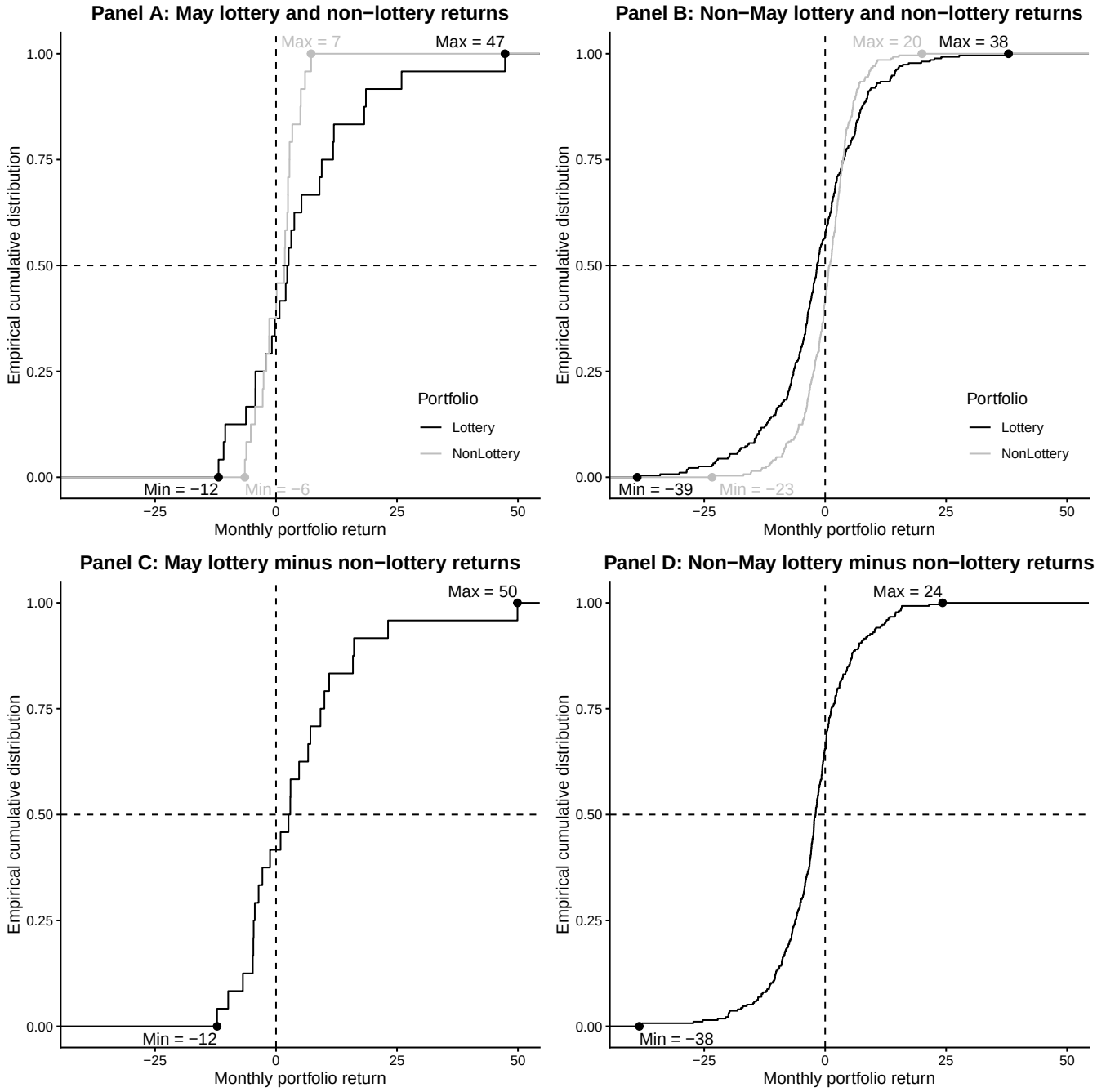
This figure plots non-lottery minus lottery returns against returns of the strategy that is long lottery, short non-lottery (the risk-free rate) in May and long non-lottery, short lottery (the risk-free rate) in all other months in Panel A (B). Returns are in percent.

Figure B7: Asset pricing: Lottery portfolio returns in May of each year



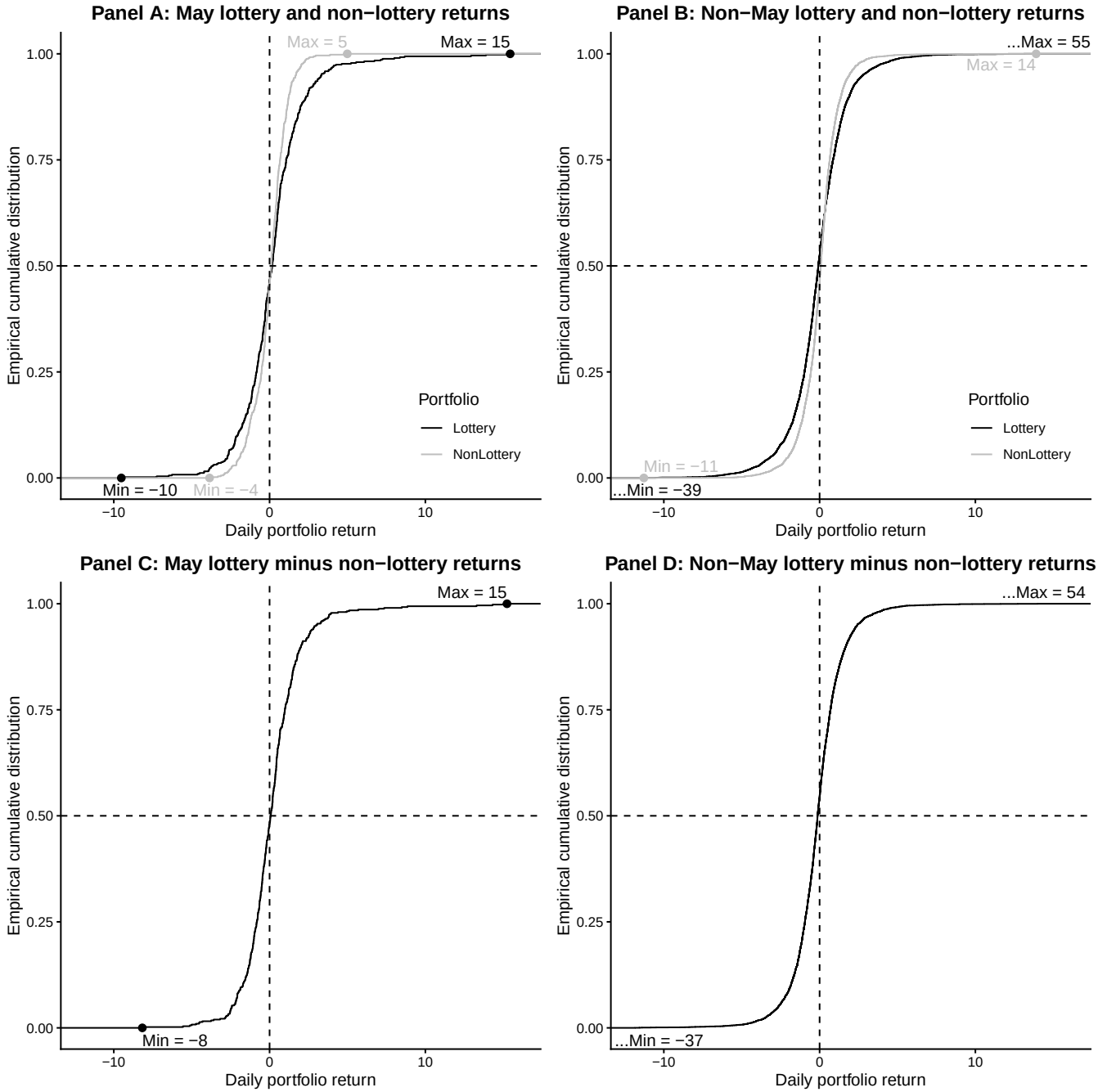
This figure shows portfolio returns in May of each year for the lottery and non-lottery portfolio in Panel A and for a strategy that goes long the lottery portfolio and short the non-lottery portfolio in Panel B. Returns are in percent.

Figure B8: Asset pricing: Monthly lottery portfolio returns in May: CDFs



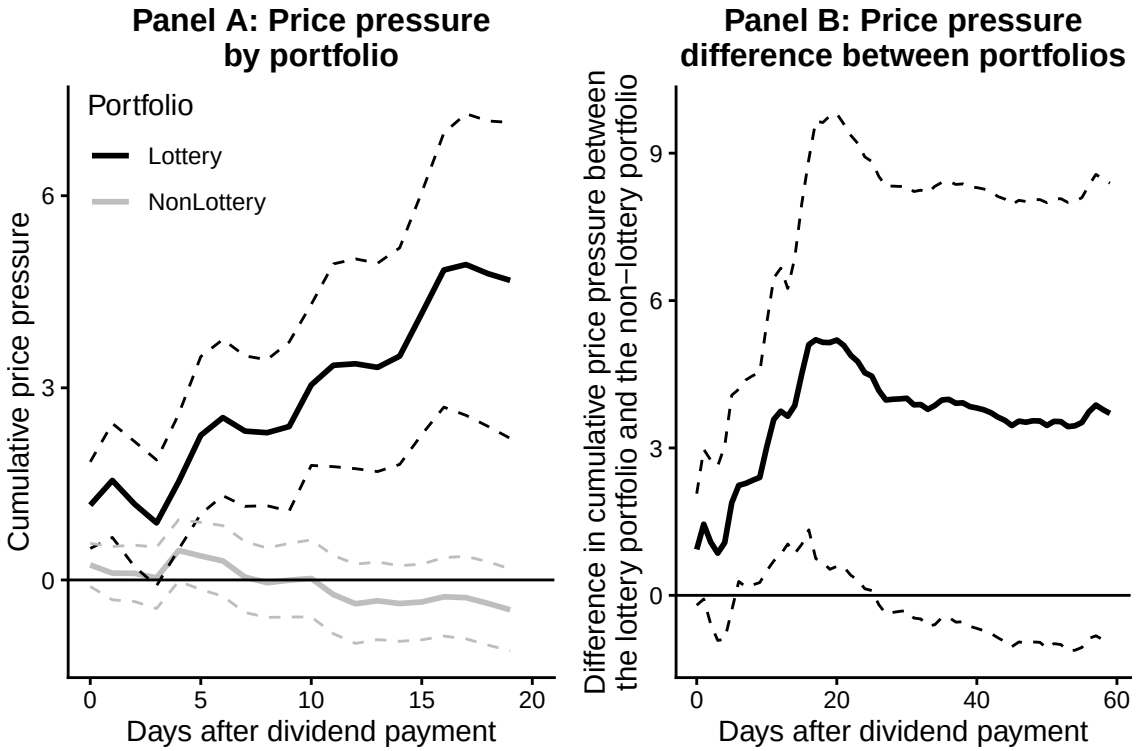
This figure shows cumulative distribution functions for monthly portfolio returns in May (Panels A and C) vs. all other months (Panels B and D). In Panels A and B, the returns are for the lottery and non-lottery portfolio. In Panels C and D, the returns are for a strategy that goes long the lottery portfolio and short the non-lottery portfolio. Returns are in percent.

Figure B9: Asset pricing: Daily lottery portfolio returns in May: CDFs



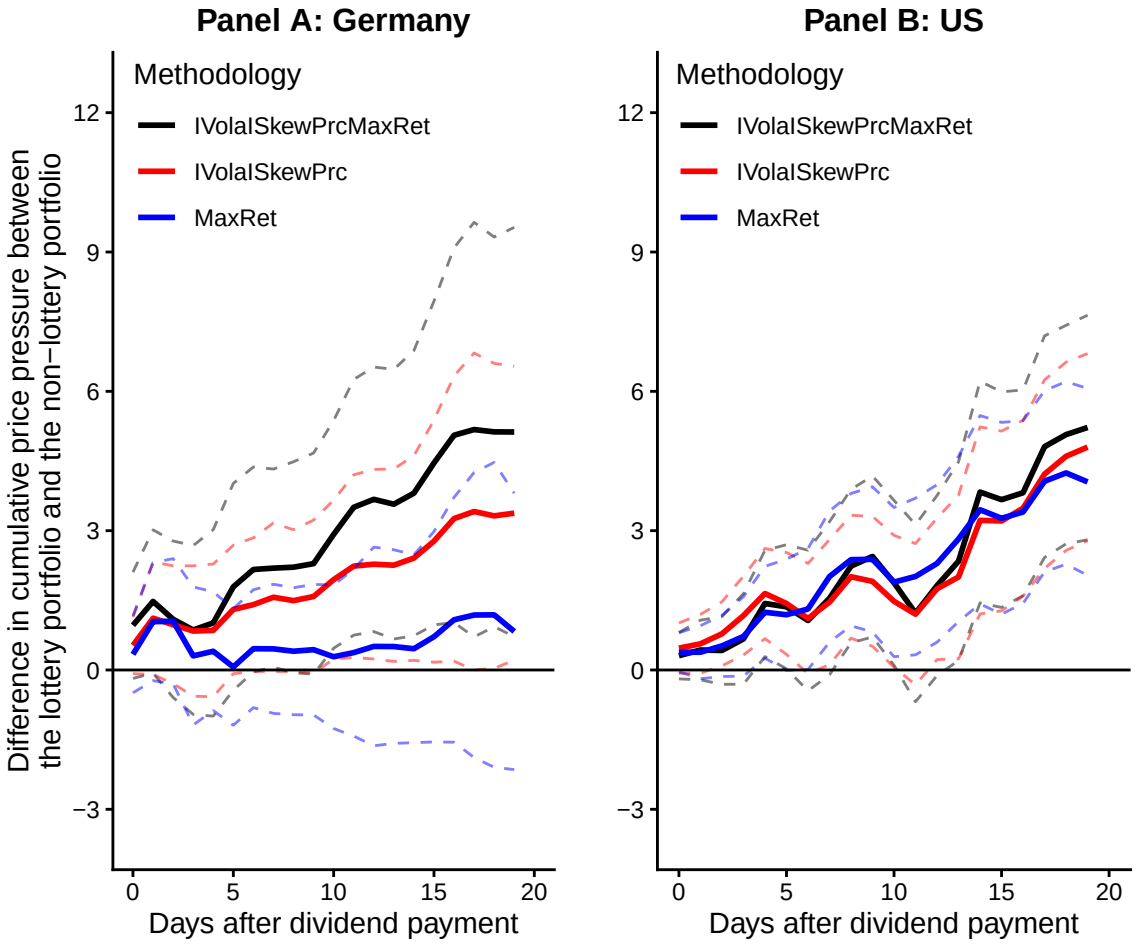
This figure shows cumulative distribution functions for daily portfolio returns in May (Panels A and C) vs. all other months (Panels B and D). In Panels A and B, the returns are for the lottery and non-lottery portfolio. In Panels C and D, the returns are for a strategy that goes long the lottery portfolio and short the non-lottery portfolio. Returns are in percent.

Figure B10: Asset pricing: Price pressure:
Robustness: Including stocks on their ex- and payment dates



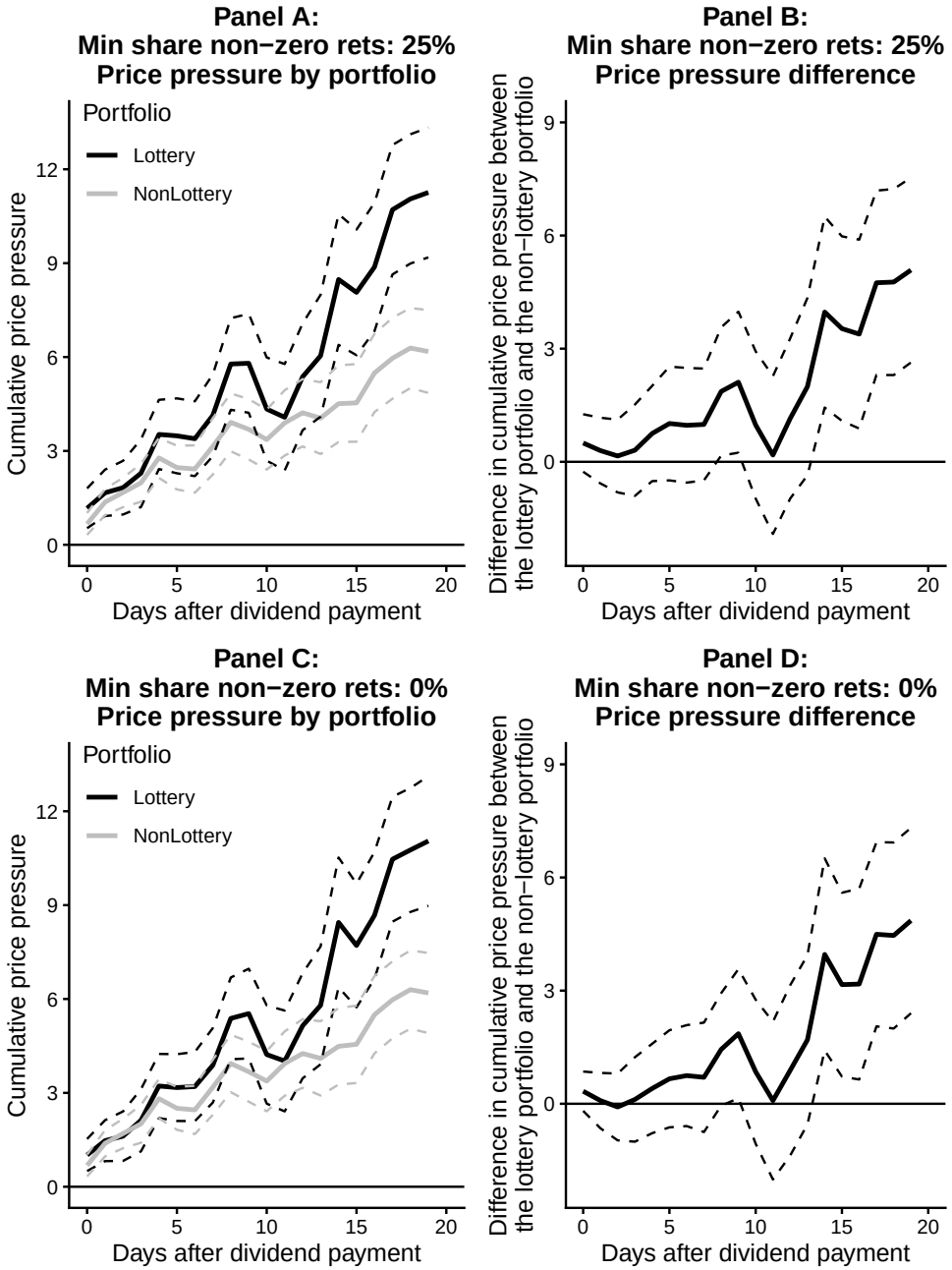
Daily portfolio returns are regressed on average dividends paid by the German stock market over the last n days, scaled by the prior day's capitalization of the German stock market. The portfolios in Panel A are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panel B is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. For this figure, stocks are not excluded from the portfolios on the stocks' ex-dividend date or on their dividend-payment date. Panel A (B) shows standard error bars (95% confidence intervals) using Newey-West standard errors.

Figure B11: Asset pricing: Price pressure:
Robustness: Alternative lottery stock definitions



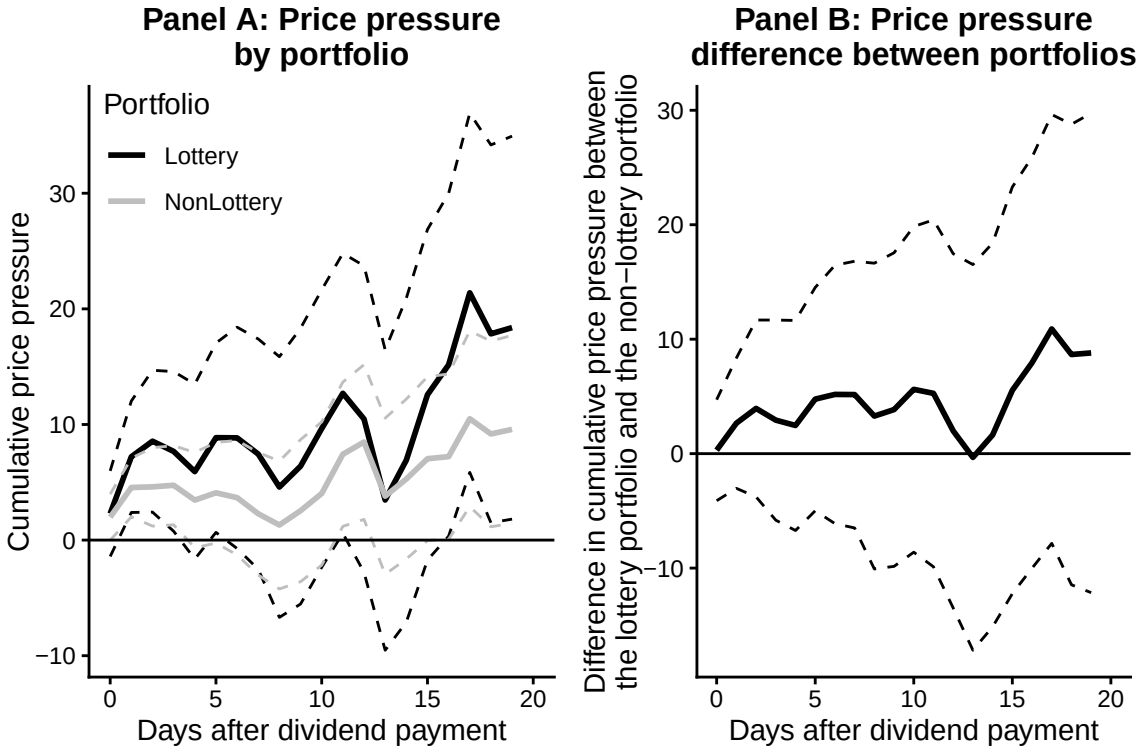
In Panel A (B), German (US) portfolio returns are regressed on average dividends paid by the German (US) stock market over the last n days, scaled by the prior day's capitalization of the German (US) stock market. The portfolios are the lottery portfolio minus the non-lottery portfolio, according to the indicated definition, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the respective lottery portfolio vs. the non-lottery portfolio. "IVolaISkewPrcMaxRet" identifies lottery stocks as stocks with above median idiosyncratic volatility and skewness, below median price, and a maximum one-day return above the 80th percentile in the respective country. "IVolaISkewPrc" identifies lottery stocks as stocks with above median idiosyncratic volatility and skewness and below median price. "MaxRet" identifies lottery stocks as stocks with a maximum one-day return above the 80th percentile. Panel A includes no year-month fixed effects, Panel B includes year-month fixed effects. The figure shows 95% confidence intervals using Newey-West standard errors.

Figure B12: Asset pricing: Price pressure in the US:
Robustness: Alternative minimum shares of non-zero returns



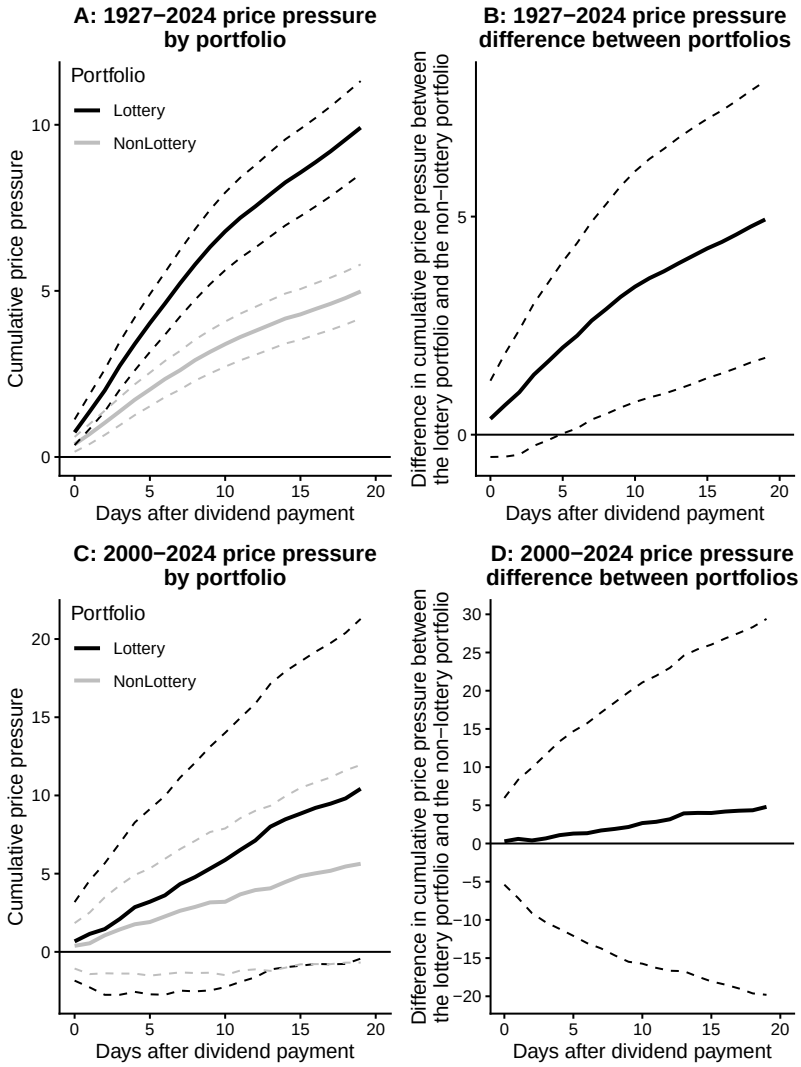
Daily portfolio returns are regressed on average dividends paid by the US stock market over the last n days, scaled by the prior day's capitalization of the US stock market. The portfolios in Panels A and C are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panels B and D is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. In Panels A and B, lottery characteristics are only calculated for stocks with at least 25% non-zero returns in the past 6 months and the past 1 month. In Panels C and D, there is no requirement for a minimum share of non-zero returns to calculate lottery characteristics. All regressions include year-month fixed effects. Panels A and C (B and D) show standard error bars (95% confidence intervals) using Newey-West standard errors.

Figure B13: Asset pricing: Price pressure in the US from 2000-2024



Daily portfolio returns are regressed on average dividends paid by the US stock market over the last n days, scaled by the prior day's capitalization of the US stock market. The portfolios in Panel A are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panel B is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. The sample is limited to data between July 2000 and December 2024. Panel A (B) shows standard error bars (95% confidence intervals) using Newey-West standard errors.

Figure B14: Asset pricing: Price pressure in simulated US data



This figure plots price pressure estimates for simulated data. In the simulation, the dividend data are the actual dividends paid by the US stock market on each day. Returns for the lottery and non-lottery portfolio are simulated by drawing returns from a normal distribution that has the mean and standard deviation of the actual portfolios in the US stock market. The randomly generated returns are overlaid with a dividend-payment-based price pressure, according to which the returns of the lottery (non-lottery portfolio) increase by 10pp (5pp) over 20 days per 1% of dividends that the market pays out in dividends. To estimate price pressure, daily portfolio returns are regressed on average dividends paid by the US stock market over the last n days, scaled by the prior day's capitalization of the US stock market. The portfolios in Panels A and C are the lottery portfolio and the non-lottery portfolio, s.t., the coefficients indicate by how many percentage points the value of each portfolio increases over n days for each 1% that the market pays out in dividends. The portfolio in Panels B and D is the lottery portfolio minus the non-lottery portfolio, s.t., the regression coefficients indicate by how many percentage points more the portfolio value increases for the lottery portfolio vs. the non-lottery portfolio. Panels A and B (C and D) use data between May 1927 and December 2024 (July 2000 and December 2024). We repeat the simulation with new draws for the random component of the returns in 100 simulation rounds. The figure plots the average coefficient estimates over those 100 rounds and in Panels A and C (B and D) the average standard errors (95% confidence intervals) over those 100 rounds using Newey-West standard errors.

Table B1: Asset pricing: May returns excluding stocks surrounding their AGM

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Int	-1.17**	-1.10**	-1.11**	-1.09**	-1.04*	-1.04*	-0.93*
	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.53)
Month=5	7.03**	6.96**	5.89**	5.90**	5.71**	5.07**	5.92**
	(3.10)	(3.00)	(2.82)	(2.70)	(2.48)	(2.34)	(2.35)
Excl w/o AGM info	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Excl AGM date	No	Yes	Yes	Yes	Yes	Yes	Yes
Excl AGM date +/-	-	0 days	1 day	2 days	3 days	5 days	10 days
Adj R^2	0.041	0.040	0.029	0.030	0.028	0.022	0.031

All stocks in the German stock market are separated into a lottery portfolio and a non-lottery portfolio which are used to form a long-short portfolio (long lottery, short non-lottery). The table shows the output of regressions of monthly returns of the long-short portfolio on a dummy that is 1 if the current month is May and 0 if it is any of the other 11 months. Returns are in percent. Stocks are excluded in years, in which we have no information on the date of their annual general meeting (AGM) during that year. Except in (1), stocks are excluded on the date of their AGM and the indicated number of trading days surrounding the AGM, e.g., 10 days before and 10 days thereafter in (7). AGM data include ordinary and extraordinary meetings between 2003 and 2025 and are collected from LSEG Workspace, https://www.hvinfo.sdk.org, and https://www.hauptversammlung.de/hv-termine.html (as of 2026-11-19). Newey-West standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. N = 267.

Table B2: Asset pricing: Investment strategies

	Mean	α	β_{RMRF}	β_{SMB}	β_{HML}	β_{WML}	β_{NML}	β_{NML^2}	$\beta_{max(NML,0)}$	R^2
Panel A: Base portfolios										
Lottery	-1.36	-1.17*	0.76***	0.73**	-0.40	-0.51***				0.25
		(0.64)	(0.13)	(0.33)	(0.24)	(0.19)				
NonLottery	0.35	0.26	0.78***	-0.29***	-0.20**	-0.19***				0.71
		(0.18)	(0.05)	(0.10)	(0.08)	(0.06)				
NML	1.71	1.43**	0.02	-1.03***	0.20	0.32*				0.05
		(0.57)	(0.12)	(0.29)	(0.21)	(0.17)				
Panel B: May strategies: Alphas										
Long-short switch	2.44	2.27***	0.04	-0.72**	-0.03	0.26				0.02
		(0.55)	(0.13)	(0.30)	(0.23)	(0.17)				
Long-only switch	0.71	0.68**	0.79***	-0.14	-0.31***	-0.22***				0.49
		(0.30)	(0.08)	(0.13)	(0.09)	(0.07)				
Long-short switch	2.44	1.42**	0.02	-0.10	-0.15	0.07	0.60***			0.37
		(0.67)	(0.10)	(0.18)	(0.12)	(0.09)	(0.20)			
Long-only switch	0.71	0.96**	0.80***	-0.34***	-0.27***	-0.16**	-0.20*			0.55
		(0.39)	(0.07)	(0.13)	(0.09)	(0.08)	(0.10)			
Panel C: May strategies: Timing ability										
Long-short switch	2.44	-0.28					0.59***	0.02***		0.65
		(0.39)					(0.09)	(0.01)		
Long-only switch	0.71	0.21					-0.22***	0.01***		0.21
		(0.36)					(0.05)	(0.00)		
Long-short switch	2.44	-1.92**					0.01		1.09**	0.54
		(0.93)					(0.35)		(0.43)	
Long-only switch	0.71	-0.87*					-0.56***		0.64***	0.18
		(0.53)					(0.15)		(0.19)	

All stocks in the German stock market are separated into a lottery portfolio and a non-lottery portfolio. The portfolios are value-weighted and re-sorted monthly. One row corresponds to one regression in which the monthly returns of zero-net investment strategies involving these portfolios are regressed on the Carhart (1997) four factors, the NML return (= non-lottery minus lottery return), NML squared, and the maximum of NML and 0. The zero-net investment strategies are as follows: NonLottery (Lottery) is long the non-lottery (lottery) portfolio and short the risk-free rate. NML is long the non-lottery portfolio and short the lottery portfolio. "Long-short switch" is long lottery, short non-lottery in May and long non-lottery, short lottery in all other months. "Long-only switch" is long lottery, short the risk-free rate in May and long non-lottery, short the risk-free rate in all other months. Returns are in percent. Newey-West standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. N = 297.

Table B3: Asset pricing: Multiplier: Ownership of German stocks

Owner	(1) Stocks Germany	(2) Stocks total	(3) % in German stocks	(4) % of German stocks	(5) % of German in lottery
German owners					
Households	149.4	200.4	74.6	12.50	0.602
Mutual funds	79.6	245.4	32.4	6.66	0.103
Banks	16.2	34.2	47.4	1.36	0.103
Insurers	11.3	14.4	78.5	0.95	0.103
Pension funds	0.3	0.5	60.0	0.03	0.103
Other fin	18.1	19.5	92.8	1.51	0.103
Non-fin corps	226.2	277.1	81.6	18.93	0.103
Non-profits	6.5	8.3	78.3	0.54	0.103
Government	26.2	29.8	87.9	2.19	0.103
Non-German owners					
Non-Germans	661.0	31,462.3	2.1	55.32	0.103
All owners					
Market	1,194.8	32,291.9	3.7	100.00	0.165

This table presents the ownership structure of the German stock market based on Bundesbank financial accounts statistics from Q1, 2013. (1) and (2) indicate German stock holdings and total stock holdings, respectively (in billions of euros). All values represent Bundesbank data, except for the total stock market capitalization, which is calculated by dividing Germany's market capitalization by its global stock market share of 3.7% (Dimson, Marsh, and Staunton 2009), and total stock holdings by non-Germans, which are the residual of the total market capitalization that is not held by Germans. (3) shows the percentage of total stock holdings that are in German stocks. (4) shows the percentage of the German stock market that is held by a given type of owner. (5) shows the percentage of German stock holdings that are in lottery stocks. In (5), the value for households is calculated from the German brokerage data. The value for the market is calculated from the German stock market data. The value for all other owner types represents the remainder of lottery stocks that must be held by them (on aggregate, assuming the same percentage for each non-household owner type), given the lottery market share and the lottery holdings by households (see Section B.2.2).

Table B4: Asset pricing: Multiplier: Institutional reinvestment rate

	2010	2011
€ stocks Germany (April)	33,894	45,629
€ stocks euro area ex Germany (April)	20,275	20,665
€ stocks world ex euro area (April)	38,910	40,620
% DY Dax (May)	1.8	2.1
% DY Euro Stoxx 50 ex Germany (May)	2.2	2.2
% DY MSCI AC World ex euro area (May)	0.1	0.1
% DY Germany (May)	1.3	1.6
% DY euro area ex Germany (May)	1.5	1.6
% DY world ex euro area (May)	0.1	0.1
€ gross dividends Germany (May)	433	743
€ gross dividends euro area ex Germany (May)	314	340
€ gross dividends world ex euro area (May)	27	43
€ total net dividends received (May)	609	873
€ cash (April)	3,840	4,895
€ cash (May)	4,187	5,214
€ net cash increase (May)	347	319
€ net investor inflows (May)	5,258	1,466
% in cash (April)	4.0	4.4
€ expected net cash increase (May)	208	64
€ excess net cash increase (May)	139	255
€ fund distributions (May)	21	77
€ dividends reinvested (May)	449	541
% dividend reinvestment rate (May)	73.8	62.0

This table presents the estimation of the dividend reinvestment rate by institutions. All inputs (except the dividend yields, DYs) represent aggregate Bundesbank data for German equity mutual funds. Index DYs are from Datastream. DYs for the euro area ex Germany (world ex euro area) are calculated from the DY of the Euro Stoxx 50 ex Germany (MSCI AC World ex euro area) multiplied with the ratio of the DY of the entire German stock market to the DY of the DAX. Gross dividends from each region are the product of stock holdings in the region and the DY of the region. Total net dividends received represent the total dividend income from stocks of all regions after deducting withholding taxes of 26.375% from dividends paid by German stocks and 15% from dividends paid by non-German stocks. The expected net cash increase in May is the product of net investor inflows in May and the ratio of cash to cash plus stocks in April. The excess net cash increase is the actual net cash increase minus the expected net cash increase. Dividends reinvested are net total dividends received minus the excess cash increase and minus fund distributions. The dividend reinvestment rate is the ratio of dividends reinvested to net total dividends received. Euro values are in millions of euros.

Table B5: Asset pricing: Multiplier: Mutual funds: German dividends

Benchmark	(1) $ NAV	(2) % in GER stocks	(3) % of GER stocks among funds	(4) % of GER stocks	(5) € GER divs
DAX 30 TR	61	100.0	21.32	13.22	2,215
Dow Jones Euro Stoxx 50 NR	196	22.8	15.65	9.70	1,626
Dow Jones Stoxx 50 CR	404	13.4	18.87	11.69	1,960
MSCI AC World TR	306	3.7	3.96	2.45	411
MSCI EAFE NR	227	7.0	5.58	3.46	580
MSCI EASEA (EAFE ex Japan) NR	61	8.7	1.85	1.15	192
MSCI Europe Small Cap TR	50	13.4	2.33	1.45	243
MSCI Europe ex Switzerland TR	4	15.2	0.21	0.13	22
MSCI Europe ex UK TR	90	18.9	5.94	3.68	617
MSCI Kokusai (World ex Japan) TR	6	4.1	0.09	0.05	9
MSCI World (GDP Weighted) CR	99	3.7	1.28	0.79	133
MSCI World TR	614	3.7	7.94	4.92	825
MSCI World Value CR	64	3.7	0.83	0.51	86
MSCI World ex USA NR	496	6.7	11.54	7.15	1,199
MSCI World ex USA Small Cap NR	51	6.7	1.19	0.74	123
MSCI World ex USA TR	51	6.7	1.19	0.74	123
MSCI World/Consumer Staples TR	4	3.7	0.05	0.03	5
MSCI World/Health Care TR	14	3.7	0.18	0.11	19

This table presents the estimation of dividend payments from German stocks to mutual funds with a given benchmark in May, on average over the 2007-2011 period. Cremers et al. (2011) provide an overview of the global mutual fund market, reporting the aggregate net asset values (NAV) that are invested in funds with a given benchmark as of December 2007. This table considers the subset of benchmarks that contain German stocks. (1) reproduces the NAVs (in billion US dollars) invested in funds with these benchmarks. (2) shows the percentage that German stocks make up of each benchmark, using data from Dimson, Marsh, and Staunton (2009). (3) uses the data from (1) and (2) to calculate the percentage of fund holdings of German stocks that is accounted for by funds with a given benchmark. (4) shows the percentage of German stocks that is held by mutual funds with a given benchmark (also accounting for German stock holdings by non-funds). The values are calculated by multiplying (3) by the 62% share of German stocks that is held by mutual funds (German mutual funds and foreign investors in Table B3). (5) shows the amount of dividend payments (in millions of euros) from German stocks to funds with a given benchmark in May, on average over the 2007-2011 period. The values are calculated by multiplying (4) by the 16,760 million euro average dividend payment by the German stock market in May for the 2007-2011 period.

Table B6: Asset pricing: Multiplier: Mutual funds: Non-German dividends

Benchmark	(1) % in GER stocks	(2) DS series	(3) % DY	(4) % DY ex GER	(5) Ratio non-GER to GER divs
DAX 30 TR	100.0	DAX	1.94	0.00	0.00
Dow Jones Euro Stoxx 50 NR	22.8	EURO STOXX 50	2.07	2.11	3.68
Dow Jones Stoxx 50 CR	13.4	STOXX EUROPE 50	1.32	1.23	4.10
MSCI AC World TR	3.7	MSCI AC WORLD	0.48	0.42	5.65
MSCI EAFE NR	7.0	MSCI EAFE	0.79	0.70	4.77
MSCI EASEA (EAFE ex Japan) NR	8.7	MSCI EASEA	1.00	0.91	4.92
MSCI Europe Small Cap TR	13.4	MSCI EUROPE	1.08	0.94	3.15
MSCI Europe ex Switzerland TR	15.2	MSCI EUROPE EX SWITZERLAND	1.17	1.03	2.94
MSCI Europe ex UK TR	18.9	MSCI EUROPE EX UK	1.37	1.24	2.74
MSCI Kokusai (World ex Japan) TR	4.1	MSCI WORLD EX JP	0.54	0.48	5.75
MSCI World (GDP Weighted) CR	3.7	MSCI WORLD	0.49	0.43	5.78
MSCI World TR	3.7	MSCI WORLD	0.49	0.43	5.78
MSCI World Value CR	3.7	MSCI WORLD ENHANCED VALUE	0.68	0.63	8.46
MSCI World ex USA NR	6.7	MSCI WORLD EX USA	0.70	0.61	4.39
MSCI World ex USA Small Cap NR	6.7	MSCI WORLD EX USA	0.70	0.61	4.39
MSCI World ex USA TR	6.7	MSCI WORLD EX USA	0.70	0.61	4.39
MSCI World/Consumer Staples TR	3.7	MSCI WORLD CONS STAPLES	0.25	0.18	2.47
MSCI World/Health Care TR	3.7	MSCI WORLD HEALTH CARE	0.37	0.31	4.14

This table presents the estimation of the ratio of dividend payments from non-German stocks to dividend payments from German stocks for funds with a given benchmark in May for the 2007-2011 period. Cremers et al. (2011) provide an overview of the global mutual fund market, reporting the aggregate net asset values (NAV) that are invested in funds with a given benchmark index as of December 2007. This table considers the subset of benchmarks that contain German stocks. (1) shows the percentage that German stocks make up of the respective benchmark, using data from Dimson, Marsh, and Staunton (2009). (2) presents the Datastream series whose dividend yield (DY) we use for a given benchmark index. In (2), the MSCI WORLD EX USA is constructed using the MSCI WORLD, the MSCI USA, and the US share of the global stock market. (3) shows the indices' DYs in May, averaged over the 2007-2011 period. (4) uses (1), (3), and the 1.94% DY of the DAX to calculate the DY of the non-German stocks in a given index in May. (5) uses (1), (4), and the 1.94% DY of the DAX to calculate the ratio of non-German to German dividends in May.

Table B7: Asset pricing: Multiplier: Mutual funds: Dividends invested in lottery stocks

Benchmark	(1) € GER divs	(2) Ratio non-GER to GER divs	(3) € non-GER divs	(4) € total divs (net)	(5) % in GER stocks	(6) € divs inv in GER lottery
DAX 30 TR	2,215	0.00	0	1,682	100.0	1.1762
Dow Jones Euro Stoxx 50 NR	1,626	3.68	5,981	6,319	22.8	1.0090
Dow Jones Stoxx 50 CR	1,960	4.10	8,042	8,324	13.4	0.7774
MSCI AC World TR	411	5.65	2,325	2,288	3.7	0.0592
MSCI EAFE NR	580	4.77	2,768	2,794	7.0	0.1374
MSCI EASEA (EAFE ex Japan) NR	192	4.92	947	951	8.7	0.0578
MSCI Europe Small Cap TR	243	3.15	763	833	13.4	0.0778
MSCI Europe ex Switzerland TR	22	2.94	65	72	15.2	0.0077
MSCI Europe ex UK TR	617	2.74	1,689	1,904	18.9	0.2513
MSCI Kokusai (World ex Japan) TR	9	5.75	52	51	4.1	0.0015
MSCI World (GDP Weighted) CR	133	5.78	769	755	3.7	0.0195
MSCI World TR	825	5.78	4,771	4,682	3.7	0.1211
MSCI World Value CR	86	8.46	727	683	3.7	0.0177
MSCI World ex USA NR	1,199	4.39	5,258	5,379	6.7	0.2503
MSCI World ex USA Small Cap NR	123	4.39	541	553	6.7	0.0257
MSCI World ex USA TR	123	4.39	541	553	6.7	0.0257
MSCI World/Consumer Staples TR	5	2.47	13	15	3.7	0.0004
MSCI World/Health Care TR	19	4.14	78	81	3.7	0.0021
Sum						4.0178

This table presents the estimation of the amount of dividends invested in German lottery stocks by mutual funds in May, on average over the 2007-2011 period. Cremers et al. (2011) provide an overview of the global mutual fund market, reporting the aggregate net asset values (NAV) that are invested in funds with a given benchmark index as of December 2007. This table considers the subset of benchmarks that contain German stocks. (1) shows the amount of dividends (in millions of euros) paid by German stocks to funds with a given benchmark in May (estimated in Table B5). (2) shows the ratio of Non-German to German dividends in May (estimated in Table B6). (3) multiplies (1) by (2) to calculate the amount of dividends (in millions of euros) paid by non-German stocks in May. (4) uses (1) and (3) to calculate the total dividend income received from German and non-German stocks in May after deducting withholding taxes of 24.068% from dividends paid by German stocks and 15% from dividends paid by non-German stocks. 24.068% is the dividend-weighted average of the 21.1% tax rate for 2007-2008 and the 26.375% tax rate for 2009-2011, using German stock market dividends paid in May of each year as weights. (5) shows the percentage that Germans stock make up of each benchmark, using data from Dimson, Marsh, and Staunton (2009). (6) calculates the amount of dividends (in millions of euros) invested in German lottery stocks in May by multiplying total net dividends received in May (4) by the 68% reinvestment rate (estimated in Section B.2.3), the German stock share of the respective benchmark (5), and the 0.103% lottery stock share in instiutions' German stock holdings (estimated in Section B.2.2).

Table B8: Asset pricing: Multiplier: Other institutions

Owner	(1) % in GER stocks	(2) % of GER stocks	(3) € GER divs	(4) Ratio non-GER to GER divs	(5) € non-GER divs	(6) € total divs (net)	(7) € divs inv in GER lottery
Banks	47.4	1.36	227	1.21	275	406	0.1346
Insurers	78.5	0.95	159	0.30	47	161	0.0881
Pension funds	60.0	0.03	4	0.73	3	6	0.0024
Other fin	92.8	1.51	254	0.08	21	211	0.1369
Non-fin corps	81.6	18.93	3,173	0.25	778	3,070	1.7524
Sum							2.1144

This table presents the estimation of the amount of dividends invested in German lottery stocks by German institutional investors other than mutual funds in May, on average over the 2007-2011 period. (1) and (2) reproduce values from Table B3 that indicate, respectively, the share of German stocks in each institution type's stock holdings and the share of the German stock market held by each institution type. (3) shows the amount of dividend payments (in millions of euros) from German stocks to the different institution types in May, on average over the 2007-2011 period. The values are calculated by multiplying (2) by the 16,760 million euro average dividend payment by the German stock market in May for the 2007-2011 period. (4) shows the ratio of non-German to German dividends during this time period. The values are calculated using (1) and the dividend yields of 1.94% and 2.11% for the DAX and the EURO STOXX 50 ex Germany, respectively, from Table B6. (5) multiplies (3) by (4) to calculate the amount of dividend payments (in millions of euros) from non-German stocks in May, on average over the 2007-2011 period. (6) uses (4) and (5) to calculate the total dividend income received from German and non-German stocks in May after deducting withholding taxes of 24.068% from dividends paid by German stocks and 15% from dividends paid by non-German stocks. 24.068% is the dividend-weighted average of the 21.1% tax rate for 2007-2008 and the 26.375% tax rate for 2009-2011, using German stock market dividends paid in May of each year as weights. (7) calculates the amount of dividends (in millions of euros) invested in German lottery stocks in May by multiplying total net dividends received in May (6) by the 68% reinvestment rate (estimated in Section B.2.3), the German stock share in the respective investor type's stock holdings (1), and the 0.103% lottery stock share in instiutions' German stock holdings (estimated in Section B.2.2).

C Experiments

C.1 Experiment 1: Cash flows of dividends in the alternative experimental assets

In the main text, we have looked at the binary decision to buy or not to buy Stock B. Figure C2 presents cash flows between rounds 8 and 9 for the first experiment. The top left panel shows the amount of dividends paid. In the dividend-lottery (dividend-non-lottery) treatment, the average dividend is 125 CU (132 CU). In the two non-dividend treatments, dividends are zero by construction. The top right panel shows the amounts invested in Stock B. The results closely resemble those for the binary buy/do-not-buy decision with a large difference in investments between the dividend-lottery treatment (145 CU) and the remaining treatments (78 CU, 58 CU, and 42 CU), giving a DiD of 51 CU (p-value for testing if the DiD is positive: 0.06). The bottom left panel shows the net amounts invested in Stock A. In the two lottery treatments, average net investments are similar and slightly negative at -27 CU and -17 CU. In the two non-lottery treatments, the amounts invested in A are strongly influenced by the dividend payment: In the dividend (non-dividend) treatment, average investments in A are 95 CU (5 CU). The result is a large negative DiD of -100 CU (p-value for a two-sided test: 0.02), meaning that much fewer dividends are reinvested back in the dividend payer, Stock A, if a lottery-like Stock B is offered. The bottom right panel shows the net increase in cash, which is larger in the two dividend treatments than in the two non-dividend treatments (8 CU vs. -61 CU for the lottery treatments and -22 CU vs. -47 CU for the non-lottery treatments) with a DiD of 44 CU (p-value for a two-sided test: 0.24).

Based on these numbers, we can calculate the average rates of dividends invested in Stock B, A, or remaining as cash. We can do so by taking the difference in average investments between the respective dividend and non-dividend treatment and dividing the difference by the average dividend in the dividend treatment (e.g., for B investments in the lottery

treatment [145 CU - 78 CU] / 125 CU = 54%). Proceeding like this for Stock B, A, and cash in the lottery and the non-lottery treatment gives the following results: In the lottery (non-lottery) treatment, 54% (12%) of dividends are invested in B, -9% (69%) are reinvested in A, and 55% (19%) remain as cash. Overall, the propensity to gamble with dividends replaces reinvestments in the dividend-paying stock.

C.2 Experiment 1: Trading mechanism

To better understand the amounts invested, it is helpful to know how the trading mechanism in our experiments work. The trading mechanism closely resembles those at actual brokers and consists of a two-step process. First, participants choose whether to buy, hold, or sell Stock A/B. Second, given the choice to buy A and B, for example, participants are directed to a trading screen which resembles trading screens from real-life brokers. The screen shows the cash balance and the current positions in A/B. Below that, participants enter the amount of A/B they would like to buy (or sell). Figure C8 presents the screens displayed to participants.

Müller-Dethard, Reinhardt, and Weber (2025) analyze how dividends are reinvested at a broker where investors face a similar choice architecture. The study provides evidence that reinvestments are rarely made through buy orders that have the exact same amount as the dividends. Instead, dividends are initially parked as brokerage cash which is then used to top up trade sizes. Similarly, we argue that participants in our experiment base the investment amounts on their cash balance. Although this still means that investments increase with dividends on average (as dividends raise the cash balance), we do not expect that participants set their investments exactly equal to the dividend amount. One important reason (in real life as well as in our experiment) is that the cash amount is displayed to participants during the trading process while the dividend amount is not.

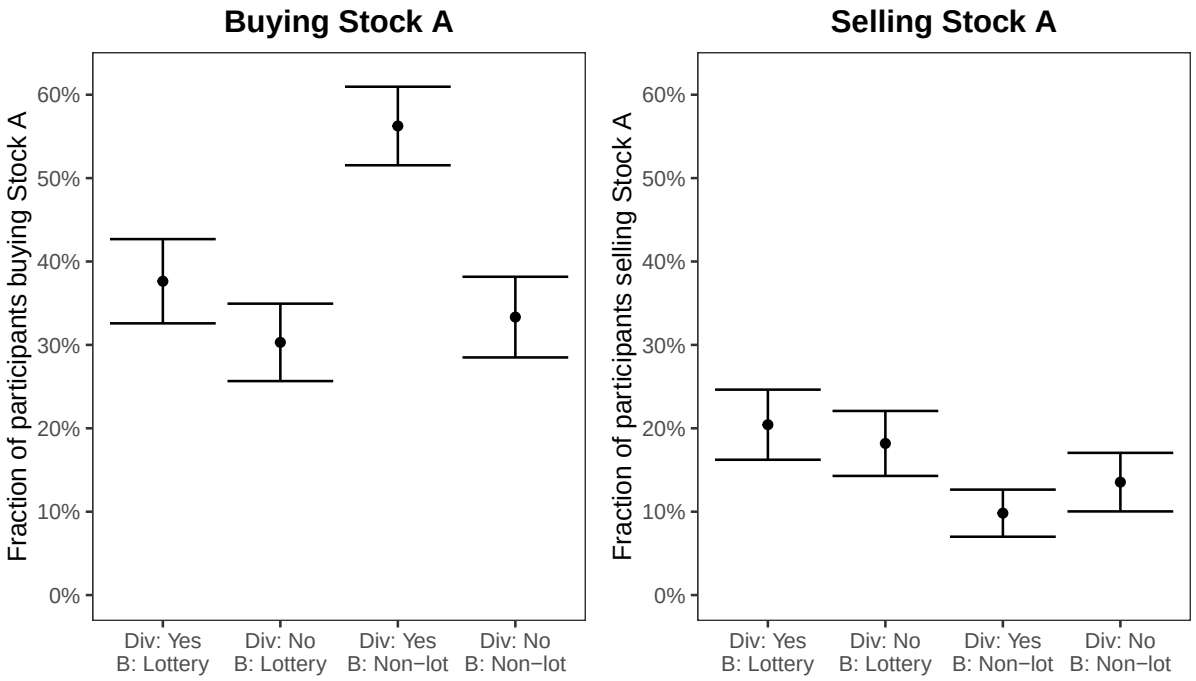
As a test for this mechanism, we compare each participants' investment amounts with their cash/dividends in the first experiment. To differentiate whether investments follow

cash or dividends, we focus on participants who receive dividends and for whom cash and dividends are not equal (which is true if the participant has non-zero cash prior to the dividend payment). Figure C5 presents the results, which support our mechanism. The upper (lower) panel shows that the investments of 18 (8) out of the 108 participants are exactly equal to the cash balance (dividend amount). When investments do not exactly equal cash or dividends, the amounts are usually multiples of 50 CU or 100 CU, often the closest multiples below the cash balance. In Figure C6, we repeat this analysis but also include participants with zero dividends and participants where cash and dividends are equal. In line with our mechanism, the investments for many of the additionally included participants are exactly equal to the cash balance (although not testably different from dividends).

References

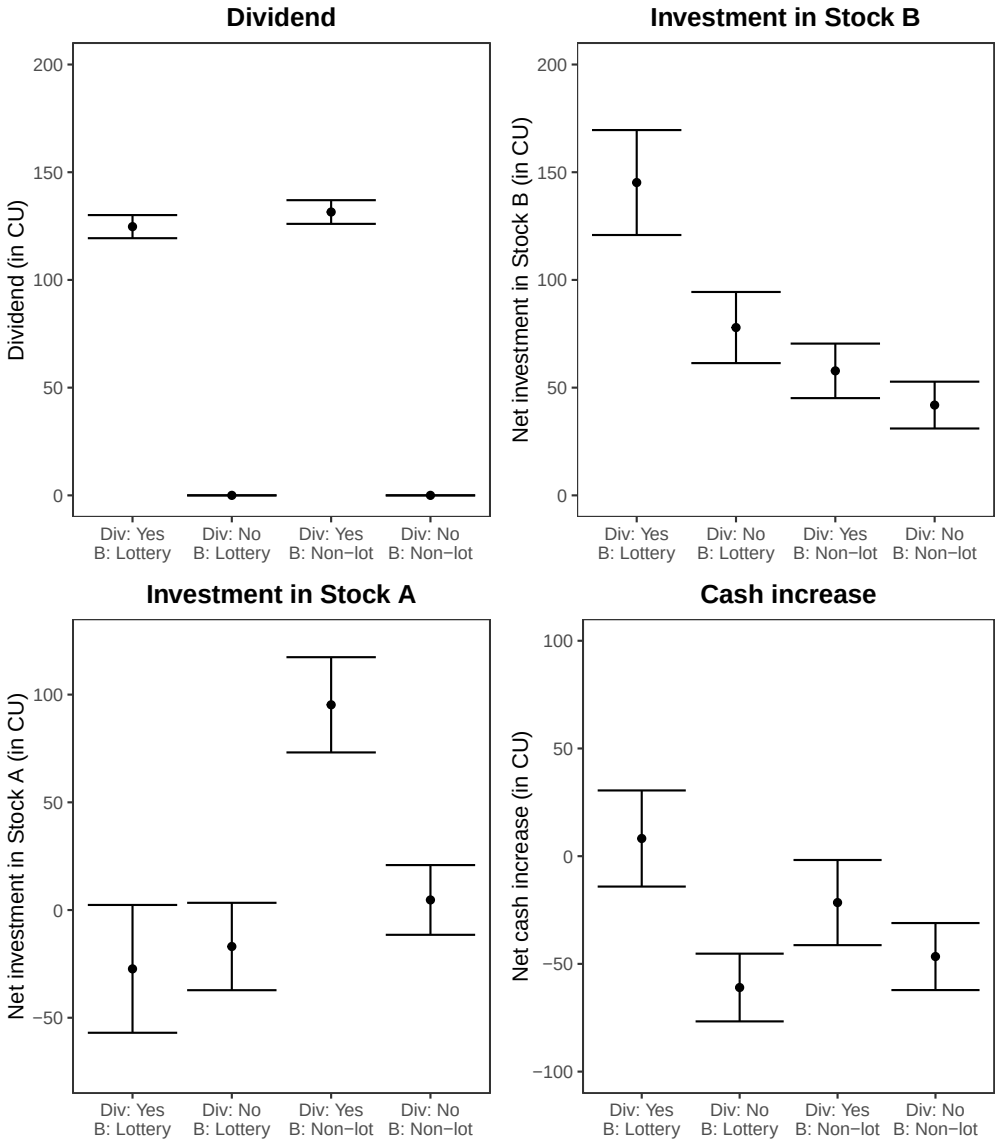
Müller-Dethard, Jan, Niklas Reinhardt, and Martin Weber, 2025, Reinvesting or consuming dividends: Account structure matters, *Review of Finance* 29, 1467–1495.

Figure C1: Experiment 1: Buys and sales of Stock A



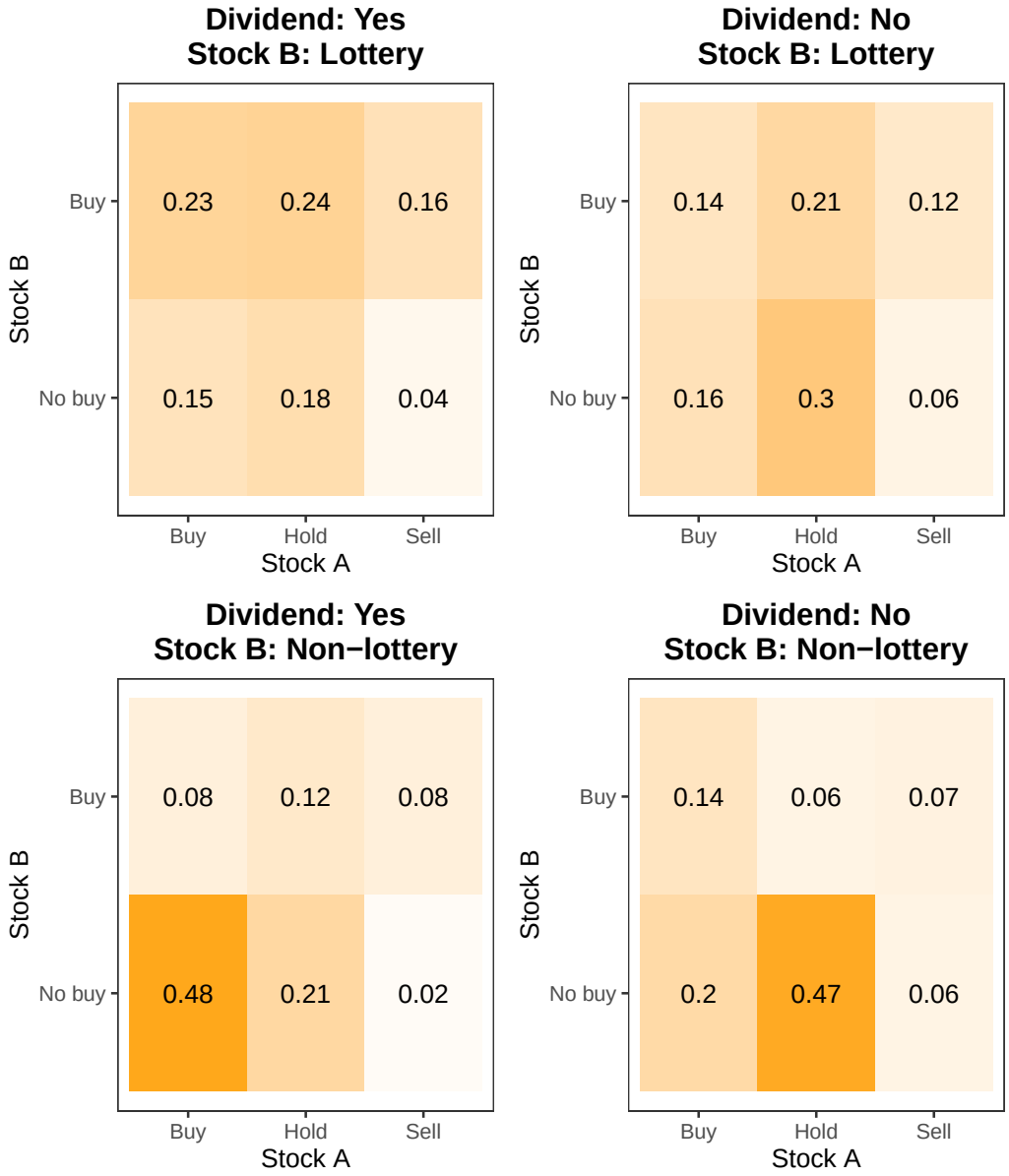
This figure shows the fraction of participants in the first experiment that buy/sell Stock A at the beginning of round 9, separated by treatment. After round 8, a dividend was paid (conditional on the treatment) and Stock B was introduced to the participants (with Stock B having lottery-like payoffs or non-lottery-like payoffs conditional on the treatment). N = 400. The bars indicate standard errors.

Figure C2: Experiment 1: Cash flows



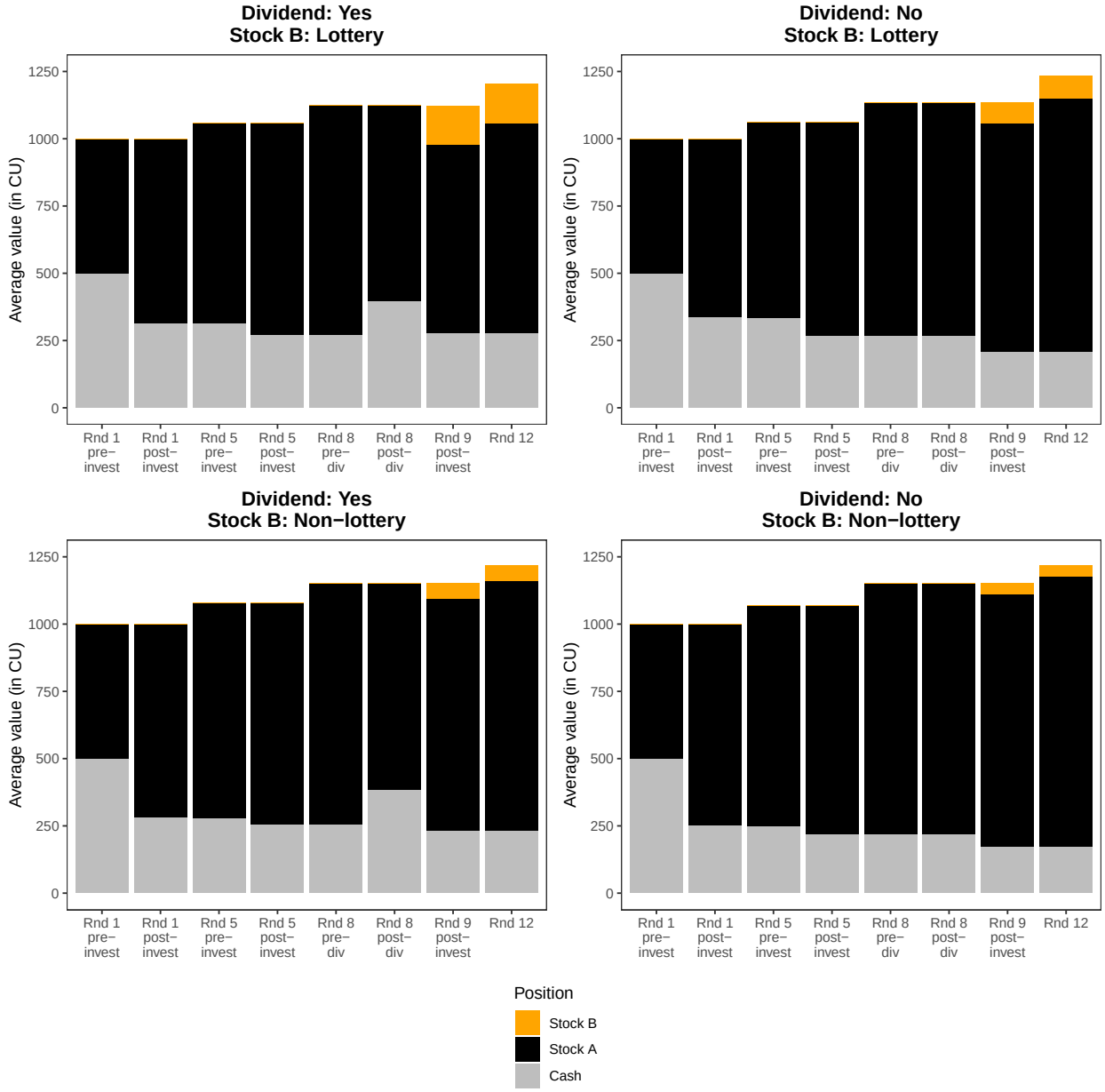
In the dividend (non-dividend) treatments, participants (do not) receive a dividend from Stock A after eight rounds of investing in Stock A vs. cash. Afterwards, participants can reallocate their portfolio once more between cash, Stock A, and a newly offered Stock B that either has lottery-like payoffs or non-lottery-like payoffs depending on the treatment. The figure plots the cash inflows from dividends by treatment and the net cash flows into Stock B, Stock A, and cash by treatment. N = 400.

Figure C3: Experiment 1: Trading decisions



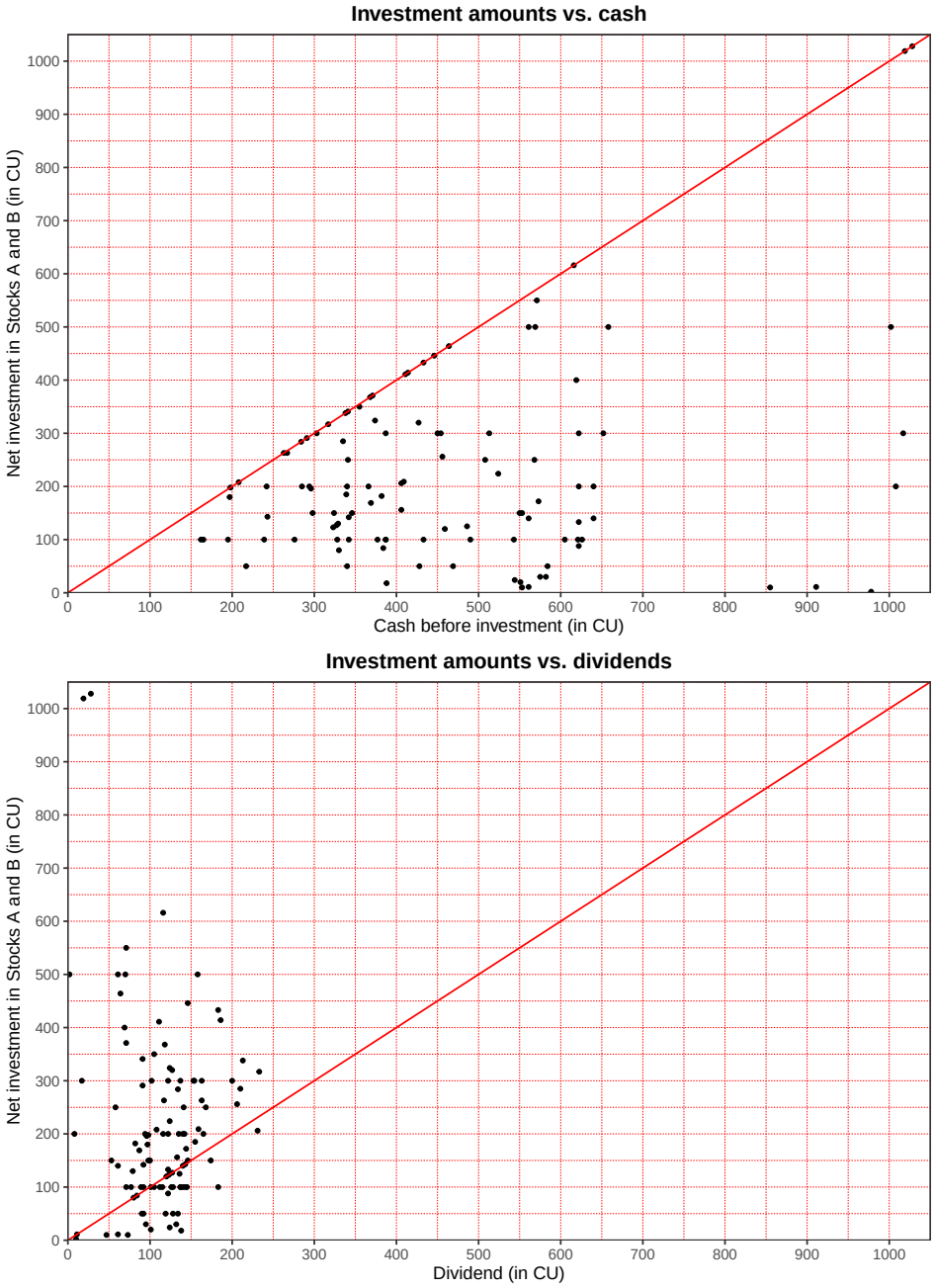
This figure shows the fraction of participants in the first experiment that buy/hold/sell Stock A and buy/do not buy Stock B at the beginning of round 9, separated by treatment. After round 8, a dividend was paid (conditional on the treatment) and Stock B was introduced to the participants (with Stock B having lottery-like payoffs or non-lottery-like payoffs conditional on the treatment). N = 400.

Figure C4: Experiment 1: Portfolio developments



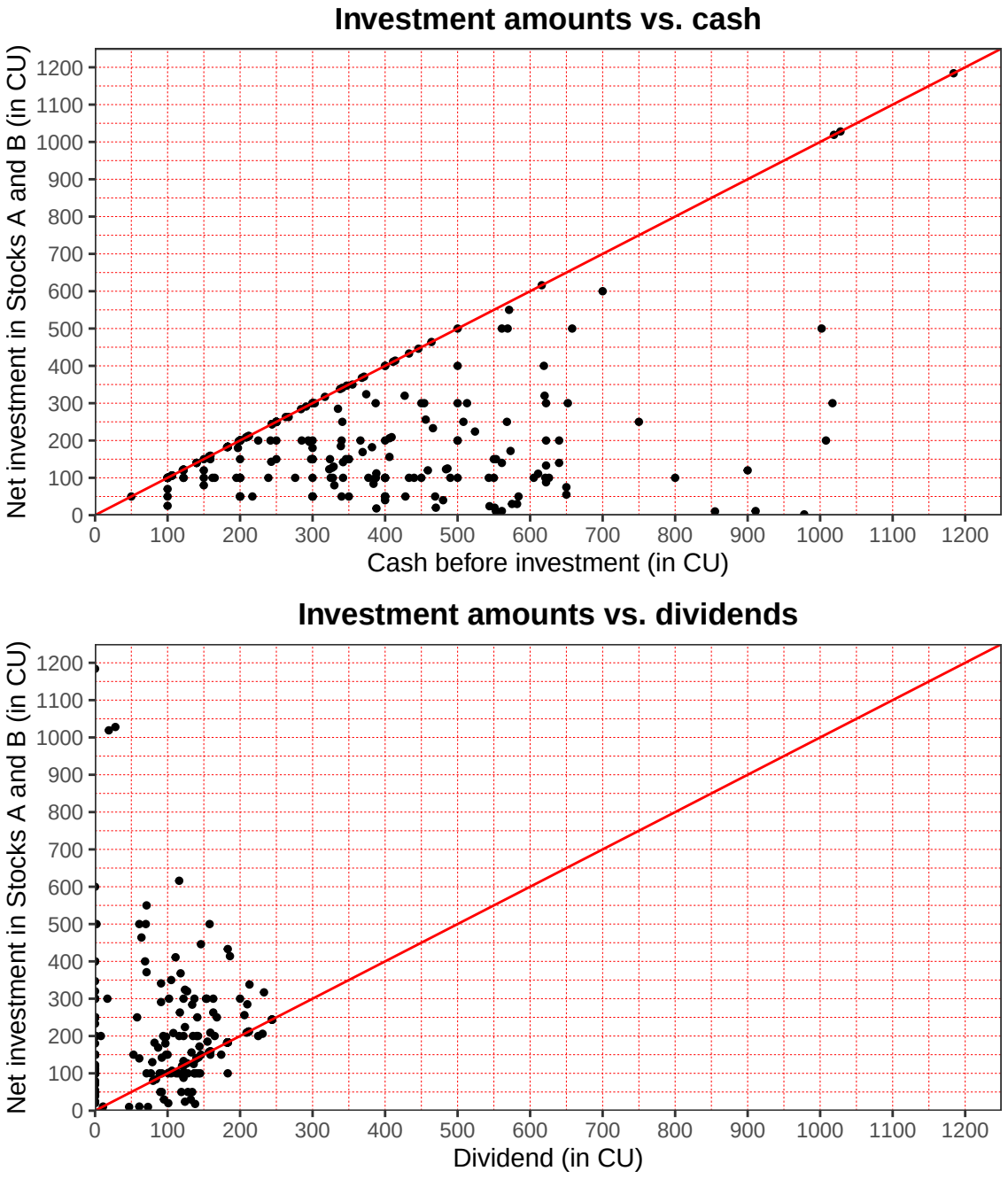
This figure shows the development of the average portfolio over the rounds of the first experiment, separated by treatment. The experiment had 12 rounds of returns. Participants could trade at the beginning of rounds 1, 5, and 9. In between rounds 1, 5, 9, and 12, participants could observe returns but could not trade. "Pre-invest" ("post-invest") shows portfolios before (after) participants trade in the respective round. Conditional on the treatment, Stock A pays a dividend at the end of round 8 which is transferred to the cash balance. "Pre-div" ("post-div") shows portfolios before (after) the dividend payment. Stock B is first introduced to participants at the beginning of round 9. N = 400.

Figure C5: Experiment 1: Investment amounts vs. cash/dividends



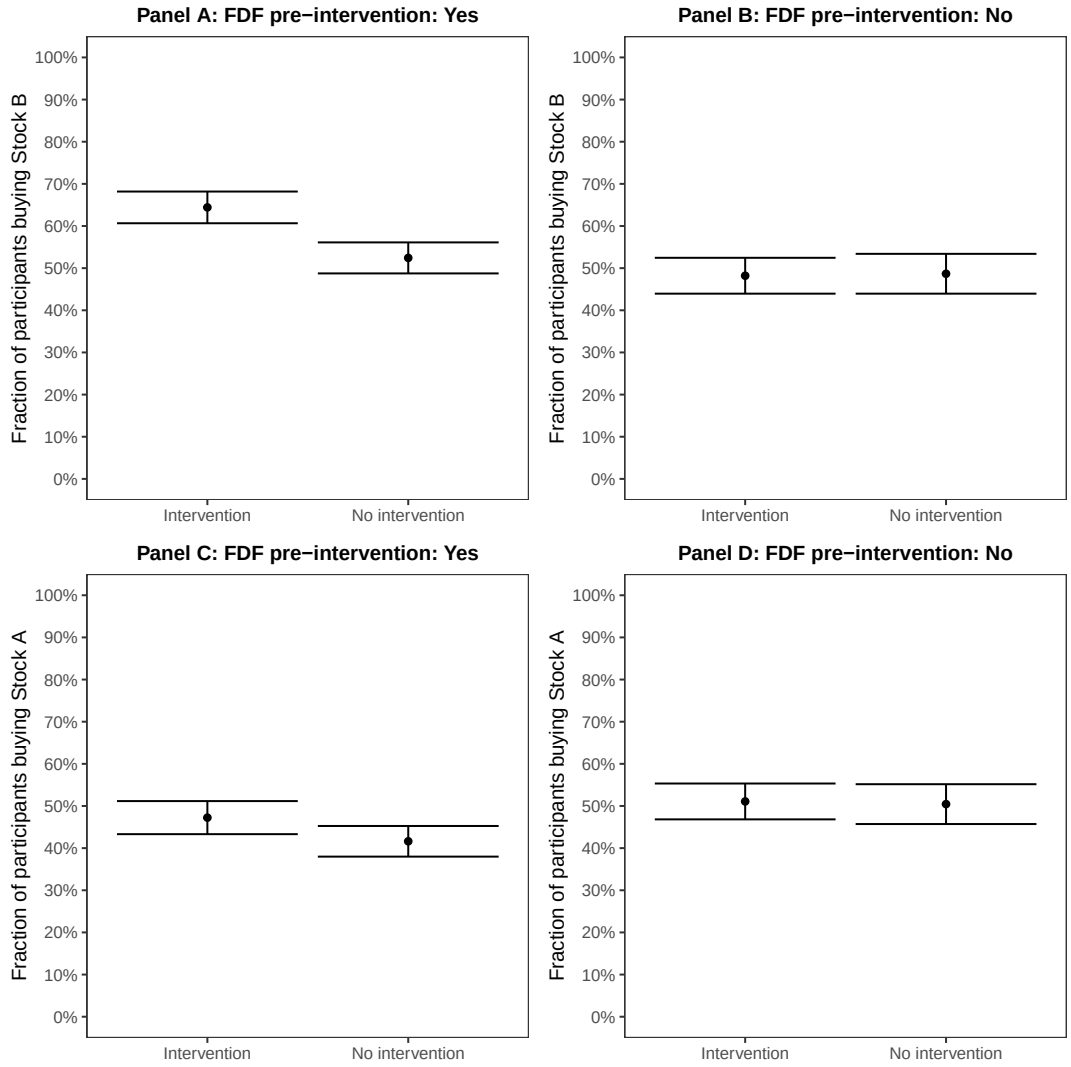
Participants receive a dividend payment between 10% and 20% of their stock holdings. After the dividend payment, participants can reallocate their portfolio between cash and stocks. The figure plots the amounts invested in stocks and compares those amounts with participants' cash balances (before the investment but after the dividend) in the top part and with dividend amounts in the bottom part. One point corresponds to one participant. N = 108 as only participants are included who make positive net investments, who receive a dividend, and for whom the cash balance (including the dividend) is not equal to the dividend.

Figure C6: Experiment 1: Investment amounts vs. cash/dividends w/o dividend-based filters



Participants receive a dividend payment between 0% and 20% of their stock holdings. Afterwards, participants can reallocate their portfolio between cash and stocks. The figure plots the amounts invested in stocks and compares those amounts with participants' cash balances (before the investment but after the dividend payment) in the top part and with dividend amounts in the bottom part. One point corresponds to one participant. N = 240 as only participants are included that make positive net investments.

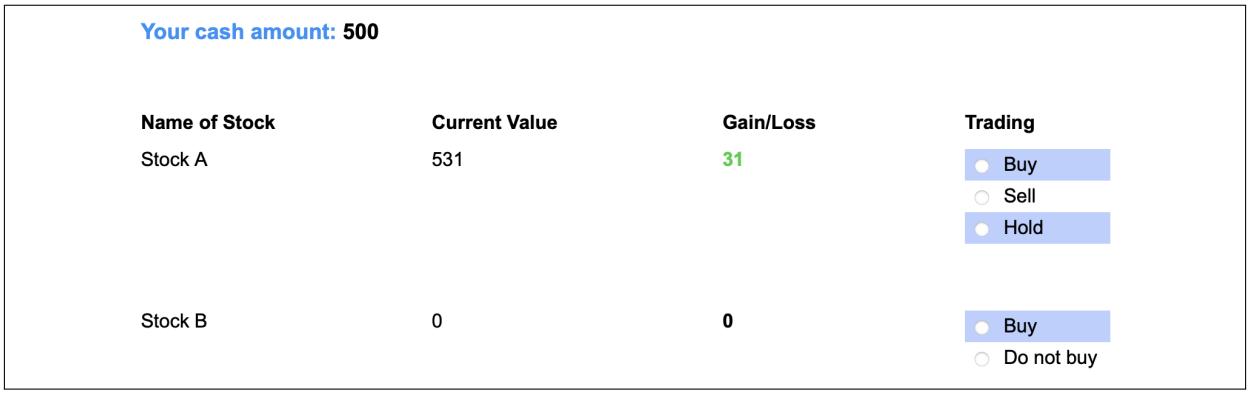
Figure C7: Experiment 2: Choices based on the pre-intervention free dividends fallacy



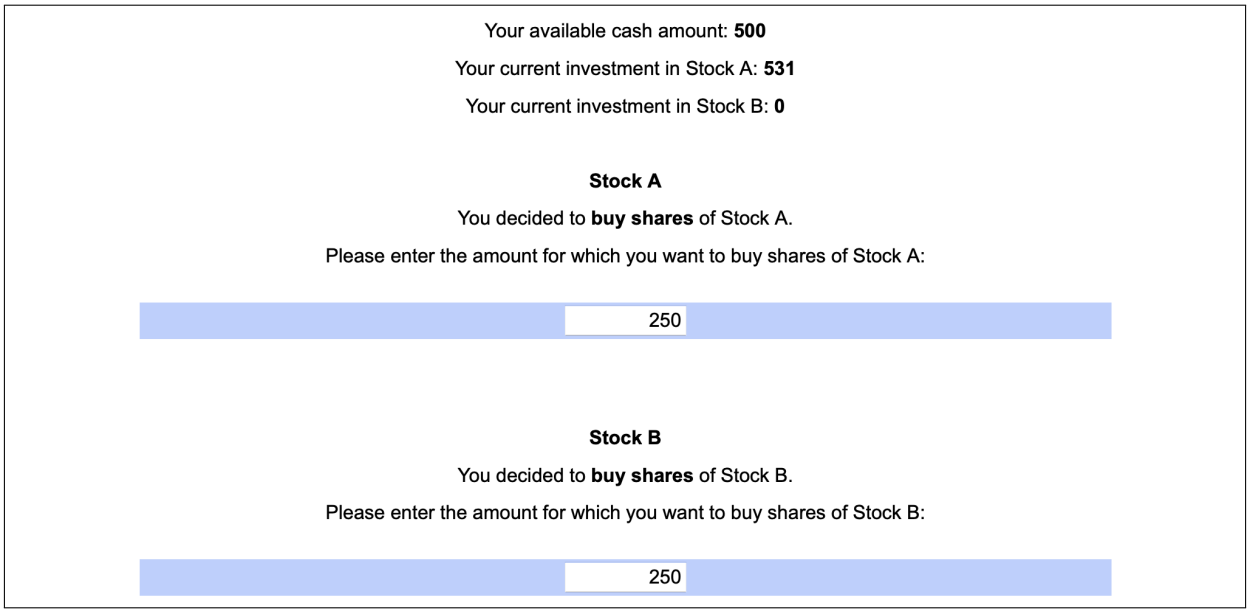
In the intervention (no-intervention) treatment, participants are asked about the relationship between dividend payments and stock prices at the beginning (end) of the experiment. In this figure, participants are separated by whether or not they answer these questions correctly (dividend payments reduce stock prices). Participants who answer incorrectly (correctly) are indicated to suffer (not suffer) from the free dividends fallacy and are represented in Panels A and C (B and D). In the intervention (no intervention) treatment, participants are (are not) informed that dividend payments reduce stock prices before continuing with the rest of the experiment. During the experiment, participants trade Stock A, which pays a dividend. Afterwards, the lottery-like Stock B is introduced and participants can choose to buy/not buy Stock B and/or to buy/hold/sell Stock A. The choices for Stock B (A) are presented in Panels A and B (C and D). N = 600. The bars indicate standard errors.

Figure C8: Experiments 1 and 2: Trading screens

Step 1: Buy/hold/sell decision



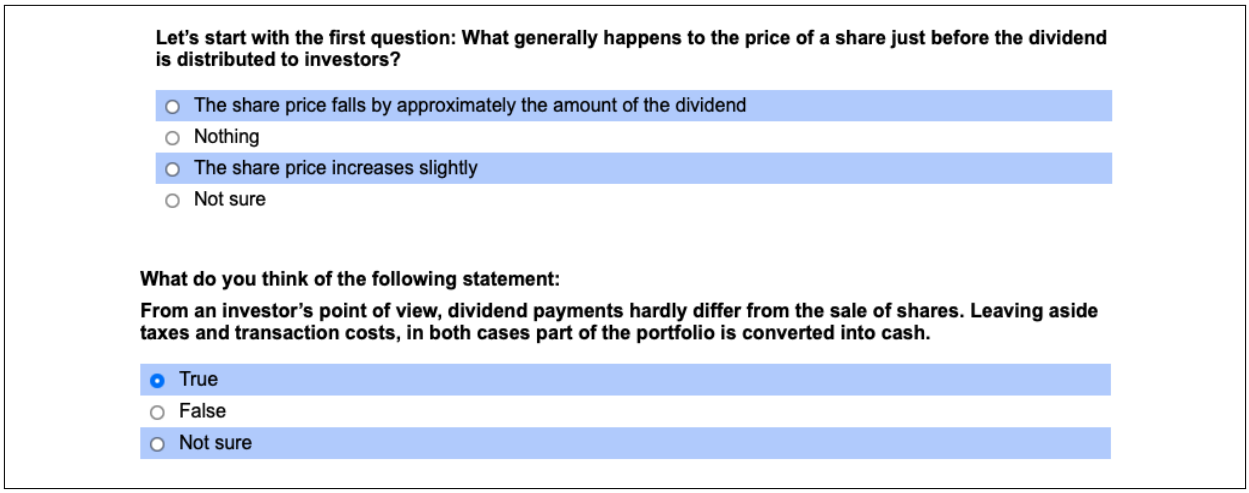
Step 2: Amount decision



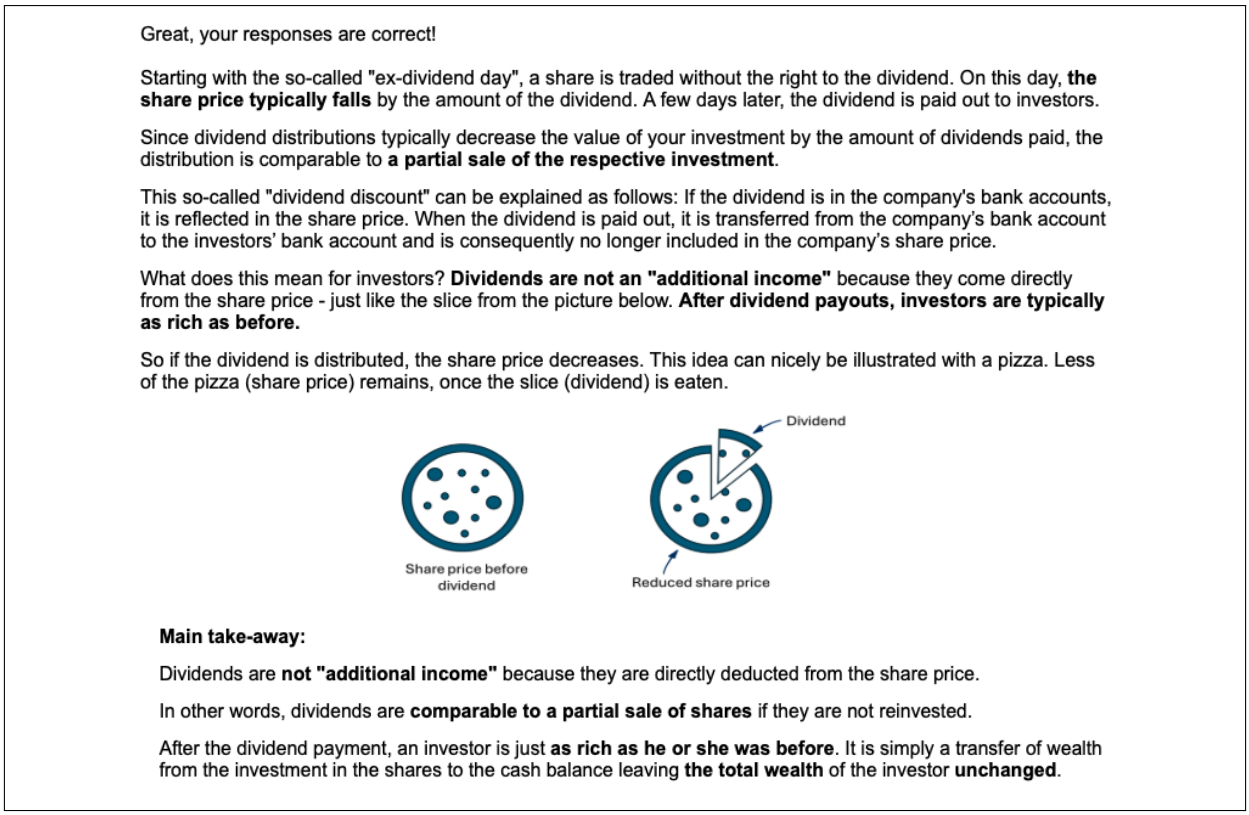
The figure shows the trading screens that were displayed to participants. In the first screen, participants choose between buying, holding, or selling Stock A and between buying or not buying Stock B. Depending on the choices (buying A and buying B in the example shown), the second screen is displayed, on which participants enter the amount of A/B they want to buy or sell.

Figure C9: Experiment 2: Intervention design

A: Quiz questions



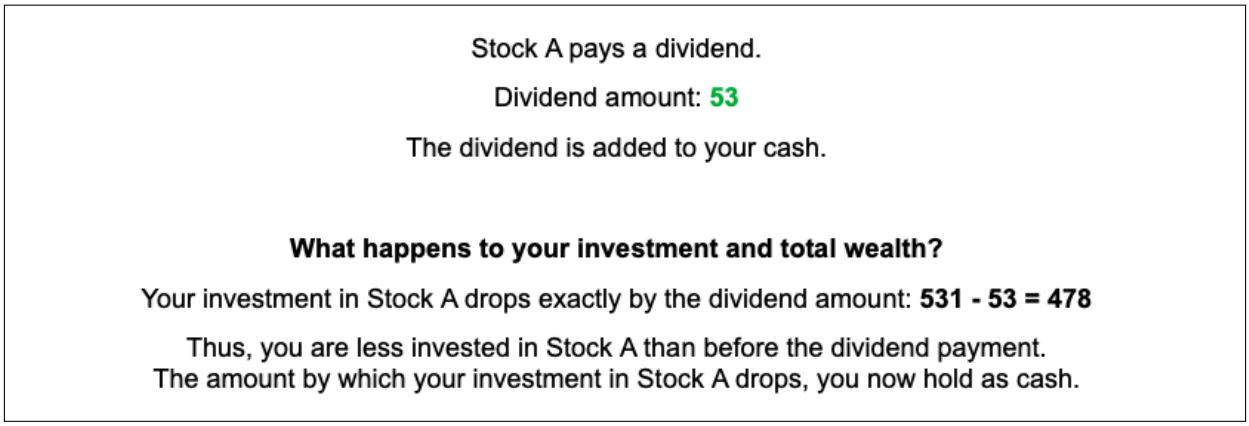
B: Explanations



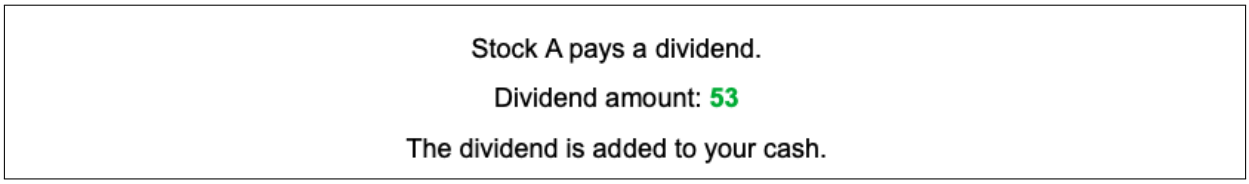
In the intervention treatment, the experiment started with the quiz questions displayed in Panel A. Afterwards, participants saw the explanations for the correct answers displayed in Panel B.

Figure C10: Experiment 2: Dividend announcement

A: Intervention treatment



B: No-intervention treatment



Panel A (B) shows how the dividend payment in the second experiment was displayed to participants in the intervention (no-intervention) treatment.

Table C1: Experiment 1: Summary statistics

Variable	Min	P25	Median	Mean	P75	Max
Panel A: Demographics and real-life investments						
Age (in years)	19	29	35	39	48	81
Sex: Male	0	0	100	72	100	100
Sex: Female	0	0	0	28	100	100
Invests in:						
Stock market	100	100	100	100	100	100
Options	0	0	0	10	0	100
Government bonds	0	0	0	30	100	100
ETF or ETC	0	0	0	29	100	100
Unit trusts	0	0	0	15	0	100
Crowdfunding	0	0	0	20	0	100
Private equity fund	0	0	0	15	0	100
Venture capital fund	0	0	0	7	0	100
Angel syndicate	0	0	0	1	0	100
Panel B: Decisions in the experiment						
Round 1 Stock A:						
Buy	0	0	100	71	100	100
Hold	0	0	0	25	25	100
Sell	0	0	0	4	0	100
Net investment (in CU)	-500	0	200	205	400	500
Round 5 Stock A:						
Buy	0	0	0	43	100	100
Hold	0	0	0	46	100	100
Sell	0	0	0	12	0	100
Net investment (in CU)	-1,184	0	0	41	100	600
Round 9 Stock A:						
Buy	0	0	0	40	100	100
Hold	0	0	0	45	100	100
Sell	0	0	0	15	0	100
Net investment (in CU)	-1,219	0	0	17	100	1,028
Round 9 Stock B:						
Buy	0	0	0	41	100	100
Hold	0	0	100	59	100	100
Net investment (in CU)	0	0	0	79	100	1,220
Panel C: Post-experiment survey						
Receives dividends in real life: Yes	0	100	100	77	100	100
Believes the ex-dividend price is:						
Lower	0	0	0	37	100	100
The same	0	0	0	6	0	100
Higher	0	0	0	14	0	100
No general statement possible	0	0	0	21	0	100
I do not know	0	0	0	22	0	100

This table presents summary statistics for the participants in the first experiment. Data in Panel A (B and C) are from Prolific (our experiment). All data are in percent except where noted otherwise. N = 400.