Internet Appendix

The Internet Appendix has five parts, in the order of the paper. The first holds the tables behind the data and the design of Section II, with the hypotheses of Section I, a glossary and the family of headline tests. The second holds the price tables of Section III and the third the flow tables of Section IV. The fourth holds the household tables of Section V, and the fifth the invasion tables of Section VI. The five figures are the timeline, the slope day by day, the gap after the crash windows, net purchases by class, and the add rate against the price paid. A sentence above each table says what it holds and which part of the text it supports.

Tables for Sections I and II: hypotheses, data and design. The tables follow the order of Section II: the flow basis, the four shocks, the terms, and the family of headline tests. Table IA.I comes first. It sets the six hypotheses of Section I side by side, and its second panel gives the verdict on each.

Table IA.I

The six hypotheses: predictions, measures, comparisons and verdicts

hypothesis	prediction	what is measured	compared with	section
Panel A. Predictions				
H1, reversal	A crash-day move of 5% or more partly reverses within five trading days; an earnings-day move of the same size does not	Slope of a share's return over its next five priced days on its return on the day of the move, at register prices, from day 0, in the most-traded shares and in the other listed shares	Earnings-day moves of the same size, by the interaction of the day-0 return with a crash indicator in the pooled regression that also has the indicator; the slopes from a day-1 start, at ten days and net of the market are checks	III

Table IA.I (continued)

hypothesis	prediction	what is measured	compared with	section
H2, the other side	On crash down days households buy more, and foreign nominee accounts sell more on the exchange, than on other down days; as a corollary, domestic financial institutions sell on the exchange with the foreign nominee accounts	Net purchases on the exchange by class and day	Down days outside the crash windows, in the same shares; every down day of the four falls as a crash down day is a check; the corollary is judged on a sign	IV
H3, speed	The gap between the net purchases of households and of foreign nominee accounts closes more slowly after a crash than after an earnings day	The gap between the daily net purchases of the two classes in the weeks after	The same gap in the weeks after earnings days	IV.D
H4, structure	Inside a crash window the elasticity of a share's abnormal volume to its absolute return is lower, and returns across shares on one day are more negatively skewed	In the most-traded shares: the elasticity of abnormal volume to the absolute return, and the quantile skewness of returns across shares, by day	Other trading days: all trading days outside the four crash windows, the October 2020 fall among them	III.G
H5, which households	An account's trading in regular weeks predicts net buying in a crash window; skill, a second reading, predicts purchases followed by higher returns than the market and than sales, and coming back in the next crash after a gain	Net buying by account trait, among accounts with enough trades in regular weeks to score; returns after purchases and sales; trading in the next crash after a gain	Regular weeks outside October 2020; accounts whose purchases lost; estates; domestic financial institutions	V

Table IA.I (continued)

hypothesis	prediction	what is measured	compared with	section
H6, the invasion	Exposure is priced in the invasion weeks and not in the weeks before; households sell exposed shares more than unexposed shares in the four weeks from 24 February 2022	Slope of a share's return on its exposure score, at register prices across the shares with a score; sale rates of household positions	The weeks before the invasion, 3 January to 18 February 2022; unexposed shares	VI
Panel B. Verdicts				
hypothesis	verdict	decided by	reported in	in the family
H1, reversal	other listed shares only	Two five-day tests from day 0, each on its wild bootstrap p by trading date: the crash slope and the interaction in the pooled regression with a crash indicator. Both are negative and reject in the other listed shares; in the most-traded shares neither rejects. The day-1 slope and the midpoint do not enter the verdict and do not detect a five-day reversal	Table III, Panels A and C	yes
H2, the other side	fails	The difference in mean daily net purchases, crash down days less other down days, on Welch's t: it cannot be told from zero for households or for foreign nominee accounts. The corollary fails on a sign: the mean net purchases of domestic financial institutions on crash down days are positive	Table VII, Panel A	no

Table IA.I (continued)

hypothesis	prediction	what is measured	compared with	section
H3, speed	fails	The change in the gap, crash less earnings day, on its permutation p: it is negative and cannot be told from zero	Table VIII	no
H4, structure	fails	The elasticity of volume and the quantile skewness of returns, crash-window days less other trading days, each on its permutation p: neither can be told from other trading days at closes or at register prices	Table V	no
H5, which households	holds	The coefficients on the contrarian measure and on the disposition measure in the pooled regression, on HC1 t: both have the predicted sign and reject. The return prediction of skill is detected in no fall, and the coming back is not detected	Table IX, column 1; skill in Table XI, Panel C, and in Table X	The traits, the COVID-19 return net of the index and the coming back from 2018 to the COVID-19 crash: yes. The other three falls, the comparison with sales and the other two pairs: no
H6, the invasion	first part only	Each part on two p-values. The slope on exposure in the invasion weeks is negative and rejects on both. The slope before less that slope rejects on its HC3 p and not on its wild bootstrap p. The gap in sale rates rejects on neither	Table XII, Table XIII, Table IA.CXI	The first two parts: yes, on the larger of the two p-values. The third: no

Notes. The six hypotheses of Section I. Panel A gives the prediction, the measure, the comparison that separates the prediction from its alternative, and the section. Panel B gives the verdict by the rule of Section I, the tests that decide it, their table, and whether they are in the family. Each rule is read at the 5% level, two-sided, on the unadjusted p-value of the test that it names, and a test rejects when it also has the predicted sign. The corollary of H2 is judged on a sign. A part that fails is not shown to be zero. The register records no mandate and no funding, so the constraints behind H2 and H3 are an interpretation.

Table IA.II
Exchange trades by reference code

reference code	legs	legs in listed shares	without a register price	share	valued at closes	gross at register prices	gross at closes
01, marketplace trade	474,356	72,454	8,202	11.3%	8,202	2,058.4	3.0
02, other trade	86,286,189	72,103,728	742,694	1.0%	670,365	10,224,175.8	262,515.6

Notes. Legs under the two reference codes that the register marks as exchange trades, with settlement from January 2018 to December 2022. The fourth column counts legs in listed shares for which the register records no price, and the fifth is their share of the legs in listed shares. The sixth counts those of them with a close on the trade day, which are valued at it. The rest of the fourth column have neither price and are not counted. The two gross columns cover legs in listed shares of every size, as shares times price in EUR million. Every other reference code is left out of the flows.

A verdict reads the rule and not every estimate of its quantity. Where another estimate disagrees, the section that states the verdict reports it. For H1 it is the comparison in the most-traded shares on its clustered p-value (Table IA.XXIX). For H2 it is the foreign nominee difference without the invasion fall (Section IV.B). For H5 it is the coming back, whose estimate has the sign against learning (Section V.C). For H6 it is the gap in sale rates with the exposed group cut at five points (Table IA.CXI).

Section I.F names two comparisons that bound the reading of H5. The recorded owner of an estate has died, though an executor still decides. Buying by estates that matches that of living owners therefore needs no change in the recorded owner's beliefs. Domestic financial institutions act under mandates and risk limits, not personal habits. If households add more to positions near the price paid than to those far below it and institutions do not, the ordering is a household trait. If institutions add in the same order, it may be a market-wide response to a crash.

Table IA.II counts the legs under the two reference codes that the register marks as exchange trades (Section II.B). Nearly all of them carry code 02. We cannot check the venue of a leg. The sixth and eighth columns give the legs valued at the close of their trade day and their euros. The close is as traded and not adjusted for later splits.

The third rule of Section II.B dates a leg two settlement days before its settlement day. The

closing days of TARGET are New Year's Day, Good Friday, Easter Monday, 1 May, 25 December and 26 December. They are from the long-term calendar in the European Central Bank's press release of 14 December 2000. The Helsinki exchange is closed on those days and on six more: Epiphany, Ascension Day, Midsummer Eve, Independence Day, Christmas Eve and New Year's Eve. Settlement runs on the six, so they count toward the two days although the exchange is closed. A leg that the count puts on an exchange holiday moves to the last trading day before it, so every leg is dated on a trading day.

Table IA.III sets the rule against a count of weekdays, on the trade dates that the register does record. The flows use the rule of the last row. The recorded dates run from 8 December 2017 to 2 May 2018. The exchange holidays that the rule steps over for these legs are New Year's Day, Good Friday, Easter Monday and 1 May 2018, all TARGET closing days. The table therefore tests only how the rule treats a closing day.

The rule gives the recorded date for 98.4% of the legs that have one. A count of weekdays, the rule of the register price series, dates 2,119,709 exchange legs differently, 2.4% of them. Among those legs the rule gives the recorded date for 97.9% of the legs that have one, and the count of weekdays for none. The recorded dates end before Ascension Day 2018, the first exchange holiday on which settlement runs. They therefore cannot tell a count of settlement days from a count of trading days.

Table IA.IV holds the evidence that the recorded trade dates cannot give (Section II.B). Panel A counts the exchange holidays on which the register settles legs. Panels B and C set the count of settlement days against a count of trading days, which would step over every exchange holiday. The two counts reproduce the same share of the recorded trade dates.

The settlement dates can tell the two counts apart, and the register holds one for every leg of every year. The sample has 47 exchange holidays. The register settles legs on 25 of them and none on the other 22, the TARGET closing days. Those 22 are the only weekdays of the sample without a settled leg. A count of trading days would step over the 25 as well.

Such a count would leave 21 trading days with under 20% of a median day's legs, each the last

Table IA.III

The two trade-day rules against the trade dates the register records

	all exchange legs	legs the two rules date differently
Exchange legs	86,760,545	2,119,709
With a recorded trade date	474,327	29,974
Recorded date given by settlement less two weekdays	92.2%	0.0%
Recorded date given by settlement less two settlement days	98.4%	97.9%

Notes. Exchange legs in the register with settlement from January 2018. The register records a trade date for few legs, and every other leg is dated by rule from its settlement date. The first column holds all exchange legs and the second the legs that the two rules date differently. The last two rows give the share of recorded trade dates that each rule reproduces. The first rule counts back two weekdays. The second is the rule of Section II.B: two settlement days before the settlement day, on a trading day of the Helsinki exchange.

trading day before one of the 25. Under the count of settlement days no trading day is that thin.

The two counts date 1,474,760 of the 72,075,567 legs of the flow basis differently, 2.05%. By class the share lies between 1.64% and 2.08%.

Panel B counts every leg of the flow basis that the register settles in the sample. Of its legs 113,515 were traded in December 2017 and settled in January 2018 or later. Table I counts the legs with a trade day in the sample years, 71,990,338 of every size, and 28,286 of them are over the limit.

The register price series dates a leg two weekdays before settlement, and not by the rule of Section II.B (Section II.C). The two rules differ only next to an exchange holiday, for the legs that settle just after it. After a TARGET closing day the count of weekdays steps over a day without settlement. It then dates the legs traded just before the closing day one or two days late. After an exchange holiday on which settlement runs, the count of weekdays is right for the trades of the days before it. It differs only for the few legs that settle two settlement days after the holiday. The series dates those on the holiday, and the flows on the last trading day before it. In the sample the two rules differ for the legs of 43 trading days, which the series puts on 57 days. The two sets hold 91 days, and none is inside a crash window (Panel D of Table IA.IV). No exchange holiday falls in the week before a crash window, inside one, or in the three weeks after.

Table IA.IV

Settlement on exchange holidays and the count of days that dates a leg

count	number	share
Panel A. Every leg of the register, by settlement day		
Exchange holidays	47	
Exchange holidays on which legs settle	25	
Exchange holidays on which no leg settles	22	
Settlement days two settlement days after a holiday with settlement	25	
Median legs settled on those days	10,859	
Median legs settled on a settlement day	91,870	
Largest of those days over the median settlement day		37.9%
Panel B. Legs of the flow basis, by trade day		
Trading days	1,255	
Days under 20% of the median day, count of trading days	21	
Days under 20% of the median day, count of settlement days	0	
Legs	72,075,567	
Dated differently by the two counts	1,474,760	2.05%
of which households, the highest share	363,756	2.08%
of which foreign nominee accounts	1,063,899	2.05%
of which domestic financial institutions, the lowest share	9,199	1.64%
Panel C. Legs of the flow basis with a recorded trade date		
Legs, with trade dates from 8 December 2017 to 2 May 2018	72,421	
Recorded date given by the count of settlement days		94.8%
Recorded date given by the count of trading days		94.8%
Legs settled on a day the two counts date differently	0	
Panel D. Days that the register price series dates by two weekdays before settlement		
Trading days with legs that the series dates on a later day	43	
Days on which the series dates those legs	57	
Days in either set	91	
of which inside a crash window	0	

Notes. Settlement days from 2 January 2018 to 30 December 2022, weekdays that are not TARGET closing days. Panel A counts every leg of the register by settlement day. Panel B holds every leg of the flow basis, those with a recorded trade date and the 113,515 traded in December 2017 included. Settlement days count by the rule of Section II.B, and trading days step back two Helsinki trading days. Panel B's rows of days leave out the last two trading days. Panel C applies each count to the flow-basis legs with a recorded trade date. Panel D counts the trading days whose legs the register price series dates on another day, and those other days.

Two sets of results that use register prices next to such days have been recomputed without them. The first is the benchmark of earnings-day moves, whose days come from every year. No crash-day move is dated on such a day, and 4 of the 259 earnings-day moves in all listed shares are. Without them the five-day crash slope and earnings slope are −0.232 and 0.263, as on every move (Table IA.XXVIII). One crash-day move in the other listed shares has a five-day return that ends on such a day, weeks after the window. A forward return counts the share's priced days.

A return over five trading days thus runs to the share's fifth later priced day (Section II.F). In the most-traded shares that day is five trading days later for each of the 289 crash-day moves. In the other listed shares it is later for 47 of the 302, for 7 of them by more than ten trading days, and the longest return spans 21. H1 holds in the sample in which the horizon is the less exact.

Table IA.XXIX repeats the comparison of the rule in the other listed shares on the reduced samples. On every move its q is 0.063. It is 0.066 without the earnings-day moves dated on such a day, and 0.097 without every move whose return starts or ends on one. On p-values clustered by date the three are 0.053, 0.056 and 0.076. The comparison rejects on each unadjusted p-value and passes the adjustment on no sample and on neither p-value. Without the earnings-day move that changes the earnings slope most, it no longer rejects on its bootstrap p-value, a row of the same table.

The second is the slope in the weeks before the invasion, which hold the holiday of 6 January. No share takes its first or last price of those weeks from such a day. The controls of the test of the two slopes do use such prices. Without them the difference between the slopes is 0.45% (wild bootstrap p = 0.086), against 0.46% (p = 0.067) (Table IA.CV).

We have not rebuilt the series itself. A return measured more than three weeks after a window can also start or end next to such a day, and no such return has been recomputed. The account traits of Section V do not use the rule of Section II.B either. The contrarian measure dates trades by the count of weekdays, and the disposition measure by settlement date.

Table IA.V holds three counts behind Section II. They are the legs whose register price equals the close, the legs with a recorded trade date by year, and the identifiers of listed shares. Of the

Table IA.V

Counts behind the dating and the pricing of a leg

count	number
Code 01 legs with a register price and a close	61,981
Code 01 legs, register price equal to the close	51,743
Code 02 legs with a register price and a close	61,774,930
Code 02 legs, register price equal to the close	39,914,103
Exchange legs of 2018 with a recorded trade date	474,327
Exchange legs of 2019 with a recorded trade date	0
Exchange legs of 2020 with a recorded trade date	0
Exchange legs of 2021 with a recorded trade date	0
Exchange legs of 2022 with a recorded trade date	0
Identifiers of listed shares in the price samples	269
Identifiers of listed shares with a register price	217

Notes. January 2018 to December 2022. The first four rows count exchange legs in listed shares: by reference code, the legs with both a register price and a close on the trade day, and those whose register price equals that close. The next five count the exchange legs of every security with a recorded trade date, by year of settlement. The last two count the identifiers of listed shares in the price samples and those with a register price. Nordea has two identifiers.

61,774,930 code 02 legs in listed shares with a register price and a close, 39,914,103 carry a register price equal to the close. Nordea changed its identifier in October 2018 and is kept under both, and the replication files list the identifiers. There are 269 of them in the price samples, and 217 have a register price.

Table IA.VI splits the legs priced at the close by investor class (Section II.C). The share is close to two thirds in the two classes that the paper compares most, households and foreign nominee accounts. It is lowest for general government. For most household legs the price paid of Section II.A therefore rests on the close and not on the price of the trade. With many legs recorded at the close, a register price also damps the bounce between the bid and the ask less.

Register prices are not adjusted for dividends or splits (Section II.C). A return from them falls by the dividend on an ex-dividend day, and a split gives a large negative return. Table IA.VII counts the large moves of the reversal tests that fall on such a day, by the Compustat factors of the share. No move falls on a split day. Of the 591 crash-day moves in all listed shares 10 fall on an ex-dividend day, and of the 259 earnings-day moves 4 do.

Table IA.VI

Legs with a register price equal to the close, by investor class

investor class	legs with a register price and a close	register price equal to the close	share
Households	14,814,561	9,955,716	67.2%
Foreign nominee accounts	44,757,569	28,479,424	63.6%
Domestic financial institutions	496,846	347,951	70.0%
General government	28,914	12,654	43.8%
Non-financial corporations	1,195,941	789,223	66.0%
Non-profit institutions	114,921	86,556	75.3%
Foreign accounts held directly	339,257	225,423	66.4%
Accounts without a class	26,921	17,156	63.7%
Every class	61,774,930	39,914,103	64.6%

Notes. Exchange legs in listed shares under reference code 02, other trade, dated by trade day, from January 2018 to December 2022, of every size. The second column counts the legs that have a register price and a close on the trade day. The third counts those whose register price equals that close. The last column is the third as a share of the second.

The price tests also drop a daily return of 50% or more in absolute value, as an error (Section II.F). That filter drops 31 of 195,314 daily returns at register prices, on 22 shares, and 13 of the 31 are negative.

Without the moves on ex-dividend days the five-day crash slope in the other listed shares is −0.353, as with them. The interaction of the rule's test is −0.419 against −0.408, and its wild bootstrap p-value 0.026 against 0.028. By the rule of Section I.A, H1 holds in that sample either way.

In the most-traded shares the crash slope is −0.026 against 0.008. The interaction is −0.299 against −0.259, and its p-value 0.054 against 0.063, so H1 fails in that sample either way. The table also gives the interaction without the crash indicator, which is not the test of the rule. A move of a share without Compustat factors cannot be checked and is kept, and the table counts the moves that have them.

The traced position and the price paid count shares with no adjustment for splits (Section II.A). Of the 220 listed shares with a household leg, 212 have Compustat adjustment factors, and the factor of 28 changes in the sample years, on 40 days. The factor changes on a split and on any

Table IA.VII

Large moves at register prices on split and ex-dividend days, and the slopes without them

	Most-traded shares	Other listed shares	All listed shares
Crash-day moves	289	302	591
Crash-day moves with Compustat factors	265	285	550
Crash-day moves on a split day	0	0	0
Crash-day moves on an ex-dividend day	9	1	10
Earnings-day moves	149	94	259
Earnings-day moves with Compustat factors	128	88	230
Earnings-day moves on a split day	0	0	0
Earnings-day moves on an ex-dividend day	4	0	4
Crash slope	0.008	−0.353	−0.232
	[0.928]	[0.011]	[0.030]
Crash slope, without those moves	−0.026	−0.353	−0.243
	[0.794]	[0.011]	[0.029]
Pooled interaction, with crash indicator (the rule's test)	−0.259	−0.408	−0.407
	[0.063]	[0.028]	[0.002]
Pooled interaction, with crash indicator (the rule's test), without those moves	−0.299	−0.419	−0.425
	[0.054]	[0.026]	[0.002]
Pooled interaction, no crash indicator	0.040	−0.462	−0.274
	[0.750]	[0.022]	[0.046]
Pooled interaction, no crash indicator, without those moves	0.007	−0.469	−0.295
	[0.962]	[0.021]	[0.039]

Notes. Crash-day and earnings-day moves of 5% or more at register prices, from the day-0 price. A split day is a day on which the Compustat adjustment factor of the share changes, and an ex-dividend day one on which its total return factor changes. A move of a share without Compustat factors is kept. Slopes are five-day slopes with firm fixed effects. The pooled interaction is that of the day-0 return with a crash indicator, in a regression with and without the indicator itself. Brackets hold wild bootstrap p-values by trading date. The 16 earnings-day moves before July 2018 are in all listed shares only, so that column exceeds the sum of the other two.

other issue that Compustat adjusts for. Of household legs, 11.8% are in such a share on or after its first change.

After a split of one share into several, a purchase made before it counts too few shares at too high a price. Sales can then exceed the purchases counted, so the traced position ends too early. While it lasts, the price lies further below the price paid than the holder's loss. The add rates and the disposition measure of Section V carry that error, and they have not been recomputed without those shares.

Table IA.VIII

The OMXH25 series against the returns of the largest shares with and without dividends

	value
Coefficient on the price return	0.925
	[<0.001]
Coefficient on the dividend return	−0.053
	[0.654]
p-value, coefficient on the dividend return equal to one	<0.001
Shares	25
Days	1,257
Days on which one of the shares pays a dividend	109
Summed daily return of the OMXH25 series	30.5%
Summed return of the shares, no dividends	29.7%
Summed return of the shares with dividends	46.0%
Dividend return of the shares per year	3.3%

Notes. Daily return of the OMXH25 series on the price return and the dividend return of the 25 listed shares with the largest median daily traded value over 2018 to 2022, weighted by that value, from Compustat. Ordinary least squares with a constant; brackets hold p-values from HC1 errors for a coefficient of zero. A price index has a coefficient of zero on the dividend return and a total return index a coefficient of one. Summed returns add the daily returns of the sample, and the last row divides the summed dividend return by the five years.

Table IA.VIII tests which version of the OMXH25 we hold (Section II.C). Our source records none. A price index falls when its shares go ex-dividend, and a total return index does not. The daily return of the series has a coefficient of −0.053 on the dividend return of the 25 largest shares ($p = 0.654$) and of 0.925 on their price return. A coefficient of one on the dividend return is rejected ($p < 0.001$). We therefore read the series as the price index.

A share return from closes includes dividends, so a return net of the market is too high by the market's dividend yield, 3.3% a year on these shares. The bias raises every return net of the market. The 90-day returns after crash purchases, which Section V does not detect as positive, would be lower without it.

Table IA.IX counts the tickets that the limit of EUR 25 million leaves out, among the legs with a register price (Section II.B). The count on the flow basis, which adds the legs valued at a close, is in Table I. Table IA.LIX gives the headline flow results with those tickets counted. The register does not say whether a leg is a block crossing, a tender or an order worked through the book.

Table IA.IX

Tickets of EUR 25 million or more left out of the flows

sample	legs	legs of foreign nominee accounts	gross
Listed shares	27,033	26,270	1,612,050.7
Every security	30,843	30,068	1,857,924.6

Notes. Exchange legs of EUR 25 million or more at register prices, January 2018 to December 2022, which the flow basis leaves out. Legs of that size valued at a close are left out as well and are not in this count. The first row holds listed shares and the second every security in the register. Gross is shares times price in EUR million.

Table IA.X

Net purchases of foreign nominee accounts in each crash window at other ticket limits

limit on a ticket	legs left out	2018 sell-off	COVID-19 crash	2021 scare	invasion of Ukraine
EUR 10 million	114,515	−168.0	−445.2	341.3	−86.4
EUR 25 million (flow basis)	28,286	−170.5	−914.8	148.2	130.8
EUR 50 million	7,245	−121.0	−1,063.2	70.5	52.5
EUR 100 million	1,911	−121.0	−1,197.7	−32.4	206.7
No limit	0	−770.1	−2,454.1	75.5	23.7

Notes. Net purchases of foreign nominee accounts on the exchange in listed shares over each crash window, in EUR million, counting the legs under each limit. Legs left out counts the exchange legs in listed shares at or over the limit, with a trade day in 2018 to 2022. Household net purchases are the same at every limit.

Table IA.X sets that limit against four others. Household net purchases are the same at every limit. The net purchases of foreign nominee accounts on the exchange are not. In the COVID-19 crash window they are EUR −445.2 million under a limit of EUR 10 million and EUR −914.8 million on the flow basis. With no limit they are EUR −2,454.1 million. They are negative at every limit in the 2018 sell-off and in the COVID-19 crash. In the 2021 scare and in the invasion crash window their sign depends on the limit.

Table IA.XI sets register gross trading against Compustat turnover, year by year (Section II.B). Register gross divided by two is several times turnover in every year. With a purchase and a sale of the same share on the same account and day set against each other, on every account, the ratio lies between 0.70 and 1.35.

Table IA.XI

Register gross trading against Compustat turnover, by year

year	register gross	foreign nominee accounts	every class, net	foreign nominee accounts, net	Compustat	half gross over Compustat	half net gross over Compustat
2018	2,164.1	2,083.2	235.3	171.3	130.1	8.32	0.90
2019	2,616.3	2,532.3	246.5	190.7	130.4	10.03	0.94
2020	2,117.2	2,038.1	216.9	163.0	154.6	6.85	0.70
2021	1,939.8	1,860.2	419.7	356.4	154.9	6.26	1.35
2022	1,493.9	1,442.8	200.0	151.4	141.6	5.27	0.71
2018 to 2022	10,331.3	9,956.6	1,318.4	1,032.9	711.7	7.26	0.93

Notes. Exchange trades in listed shares in EUR billion, with every ticket counted unless the column says otherwise. Gross sums shares times price over legs, and a leg without a register price is valued at the close of its trade day. Compustat turnover is the close times the shares traded and counts a trade once, so register gross is halved against it. Net sets a purchase against a sale of the same share on the same account on the same day. The fourth column nets every account of every class, and the last column is half of it over Compustat turnover. The rows cover the share-days with a Compustat price and volume, 98.6% of register gross.

Table IA.XII

Stock loans left out of the flows in the COVID-19 crash window

sample	legs	gross	foreign nominee accounts, net	households, net	all classes, net
Listed shares, tickets under EUR 25 million	5,346	3,886.2	689.7	−3.6	684.5
Every security, every ticket	5,444	4,290.4	824.5	−3.6	819.3

Notes. Legs with the reference codes for a stock loan and for the return of one, dated inside the COVID-19 crash window, in EUR million at register prices. The register does not mark these codes as exchange trades, so the flow basis does not count them. The nets over every class differ from zero, so the other side of these legs is not among them. Net is purchases less sales, as the register signs the legs. The first row holds listed shares in tickets under EUR 25 million, and the second every security and every ticket.

Table IA.XII sizes the stock loans that the flows leave out, in the COVID-19 crash window (Section II.B). In listed shares the net of these legs is EUR 689.7 million on foreign nominee accounts and EUR −3.6 million on household accounts. They are not exchange trades. The register does not say which shares settled which sale.

The detection rule of Section II.D runs on the register market factor. A share enters when it has a register price on at least 250 days of the sample period. Its median daily traded value must

Table IA.XIII
The crash windows

shock	first calendar date	last calendar date	trading days
2018 sell-off	2018-10-08	2018-10-14	5
COVID-19 crash	2020-02-24	2020-03-15	15
2021 scare	2021-09-13	2021-09-19	5
invasion of Ukraine	2022-02-28	2022-03-06	5

Notes. The crash windows are the weeks that the detection rule flags, in calendar dates with the first and the last day included. Trading days counts the days of the window on which the Helsinki exchange was open. The price tests on single days and the daily flows by class use these windows. The longer falls of the OMXH25 from peak to trough, used for comparisons over weeks, are in Table II.

also clear the floor that the source study set. Its register price on a day needs at least three priced legs. The weight is the share's median traded value over the last 20 days. The standard deviation of weekly returns in the rule needs at least eight weeks. Table IA.XIII dates the crash windows that the rule returns. The invasion began on Thursday 24 February 2022. The rule does not flag that week and flags the next, so the crash window of the invasion starts on 28 February. The rule is applied to the factor, and each fall is dated on the index. The COVID-19 crash and the invasion have the two deepest falls, and the 2021 scare has the shallowest.

Table IA.XIV lists the five weeks that come near the detection rule and are not flagged (Section II.D). Four lie inside a fall that the rule flags in another week. The week of 26 October 2020 is the nearest on the return threshold. It is the robustness window. The household accounts of the weekly panel bought EUR 86.0 million net on the exchange in it. It is a regular week, and the regular weeks outside October 2020 leave it out.

Table IA.XV applies 27 variants of the detection rule to the register market factor and to the OMXH25 (Section II.D). The 27 include the rule as used. Every variant finds the COVID-19 crash and the invasion. On the factor, 15 variants find the 2018 sell-off, 12 the 2021 scare and 15 October 2020. On the OMXH25 every variant finds October 2020 and three find the 2021 scare.

The rule as used returns October 2020 and not the 2021 scare when it is applied to the

Table IA.XIV

Weeks near the detection rule that it does not flag, and where they lie

week starting	weekly return	return over trailing standard deviation	household net purchases (EUR m)	where the week lies
3 September 2018	−2.90%	−2.22	16.4	fall of the 2018 sell-off
1 October 2018	−2.78%	−2.03	29.0	fall of the 2018 sell-off
26 October 2020	−5.98%	−2.31	86.0	regular week
17 January 2022	−4.01%	−2.21	31.4	fall of the invasion
21 February 2022	−4.57%	−2.32	−43.3	fall of the invasion

Notes. Weeks of the register market factor that the detection rule does not flag and that come near it. A week is near when its return is within one percentage point of the return threshold, or its ratio within 0.5 of the ratio threshold. Household net purchases are on the exchange, in EUR million, for the weekly panel of natural persons and estates. The panel leaves out the 264 other accounts of the household class. Those accounts are inside the household total of Table VI. The last column places the week: inside the fall of a shock whose crash window is another week, or among the regular weeks.

Table IA.XV

Crash windows found by variants of the detection rule

window	rule as used, factor	rule as used, OMXH25	variants, factor	variants, OMXH25
2018 sell-off	yes	yes	15	17
COVID-19 crash	yes	yes	27	27
2021 scare	yes	no	12	3
invasion	yes	yes	27	27
October 2020 (robustness window)	no	yes	15	27
The four crash windows and no other week			2	0
Variants tried			27	27

Notes. The first two columns say whether the rule as used flags a week inside the window, on weekly returns of each series, 2018 to 2022. The last two count the variants that do, of 27 on each series, the rule as used among them. The variants cross return thresholds of −5%, −6% and −7%, thresholds of −2, −2.5 and −3 on the return over its trailing standard deviation, and volatility windows of 13, 26 and 52 weeks. The sixth row counts the variants that find the four crash windows and no other week. October 2020 is a robustness window.

OMXH25. Two variants on the factor return the four shocks and no other week, and one of the two is the rule as used. None of the 27 on the OMXH25 does. The four shocks are therefore one choice among several, and the choice depends on the series as well as on the thresholds.

Table IA.XVI counts the weeks of the sample by period (Section II.D). The 208 regular weeks

run from the week of 4 December 2017 to the week of 26 December 2022. The weeks of a fall and the two weeks either side of it are not regular weeks. The two weeks either side enter neither side of a comparison of weeks.

The October 2020 fall stays in every measure that is scored on regular weeks or regular days. The contrarian measure of Section V is scored on all 208 regular weeks. The disposition measure and the same-day return slope are scored on trades, those more than 14 days from every fall. The regular-period beta of Table IA.XVIII uses the days at that distance, which the text above that table counts. A baseline built from regular weeks outside October 2020 or from regular days outside October 2020 leaves that fall out. Other trading days and all regular weeks keep it. The regular days outside October 2020 leave out the days of a fall only. They keep the two weeks either side, which the regular weeks outside October 2020 drop. Not every baseline is built from regular weeks or regular days, and the notes to each table name its baseline.

The regular week with the largest household net sales is the week of 11 January 2021 (Figure IA.1). On 15 January 188 household accounts sold EUR 472.9 million of one share on the exchange.

The sales were at prices from EUR 18.06 to 18.20, and foreign nominee accounts bought EUR 605.5 million of the share on the exchange that day. The register does not say what the event was, and we did not look it up. The legs carry the mark of an exchange trade, so the week stays in the flow basis and among the regular weeks.

The weekly regressions on market returns leave that week out, and the pandemic regression is shown with and without it (Table IA.LXXVI). Two comparisons with all regular weeks have also been run without it (Table IA.XVII). No account measure scored on regular weeks has been recomputed without it. Against all regular weeks, household net purchases in the weeks of the COVID-19 fall are higher by EUR 57.8 million a week. Without that week and the week of 4 December 2017, in which one account trades, the figure is EUR 55.6 million. For the weeks of the invasion fall the two figures are EUR 31.5 million and EUR 29.3 million. None of the four can be told from zero on Welch's t. Table IA.LXVII compares each fall with the regular weeks before it,

Table IA.XVI
The weeks of the sample by period

weeks	number	first week starts	last week starts
Regular weeks	208	4 December 2017	26 December 2022
Regular weeks outside October 2020	201	4 December 2017	26 December 2022
Weeks of the fall, 2018 sell-off	18	27 August 2018	24 December 2018
Weeks of the fall, COVID-19 crash	6	10 February 2020	16 March 2020
Weeks of the fall, 2021 scare	5	6 September 2021	4 October 2021
Weeks of the fall, invasion	10	3 January 2022	7 March 2022
Two weeks either side of a fall	16	13 August 2018	21 March 2022

Notes. Weeks run Monday to Sunday and are named by their Monday. The weeks of a fall run from the week of its peak to that of its trough. The two weeks either side of a fall are in no comparison. Regular weeks are all other weeks, the week of 26 October 2020 among them. The regular weeks outside October 2020 leave out seven: the three weeks of that fall and the two either side. The first weeks start in December 2017, when legs settled in early January 2018 were traded. One account trades in the week of 4 December 2017. The weeks of 11 and 18 December have no row in the weekly series and are not counted.

Table IA.XVII
Household net purchases in the weeks of a fall against all regular weeks

fall and regular weeks	weeks of the fall	regular weeks	mean, regular weeks	mean, weeks of the fall	difference	t	p-value
COVID-19 crash, all regular weeks	6	208	−3.3	54.6	57.8	1.39	0.223
COVID-19 crash, without the two weeks	6	206	−1.1	54.6	55.6	1.34	0.238
invasion, all regular weeks	10	208	−3.3	28.2	31.5	2.16	0.057
invasion, without the two weeks	10	206	−1.1	28.2	29.3	2.03	0.072

Notes. Household net purchases on the exchange per week, in EUR million, for the household accounts of the weekly panel. The means are over the weeks of the fall and over the regular weeks. The difference is the first less the second, with Welch's t across weeks and its p-value. The first row of each fall uses all regular weeks. The second leaves out the week of 11 January 2021, in which one share is most of household gross trading, and the week of 4 December 2017, in which one account trades.

another baseline, so its figures differ.

Table IA.XVIII sets each fall against the S&P 500 and the VIX over the same dates (Section II.D). At the regular-period beta the S&P 500 return over the same dates corresponds to between 18.2% and 38.2% of each fall. The VIX peak is taken over the days on which both markets were open. Over every day of the VIX series the peak of the 2018 sell-off is 36.07, on 24 December, a

Table IA.XVIII
The four falls against the S&P 500 and the VIX

shock	fall of the OMXH25	S&P 500, same dates	VIX peak	daily correlation	share at the regular-period beta	fall left over
2018 sell-off	−17.0%	−14.1%	30.11	0.46	38.2%	−10.5%
COVID-19 crash	−36.6%	−28.6%	82.69	0.66	36.0%	−23.4%
2021 scare	−8.8%	−3.5%	25.71	0.63	18.2%	−7.2%
invasion of Ukraine	−23.9%	−10.6%	36.45	0.34	20.5%	−19.0%

Notes. Columns two to five cover each fall. They give the fall of the OMXH25, the return of the S&P 500, the highest VIX close on a day when both markets were open (the regular-period median is 19.46) and the correlation of the two indexes' daily returns. The sixth column is the regular-period beta of the OMXH25 on the S&P 500 (0.461, estimated on 1,016 regular days) times the S&P 500 return, as a share of the fall. The seventh is the fall less that part. The share measures co-movement, not a cause. The beta uses the regular days more than 14 days from every fall; 980 of them are in 2018 to 2022.

Helsinki holiday. The other three peaks do not change. Helsinki ends its trading day before New York, which lowers a same-day beta.

The beta is estimated on 1,016 days, which run from December 2017 to January 2023 because neither index series is cut to the sample years. Of them 980 lie in the sample years. On those days the beta is 0.466 against 0.461, and the median VIX close is 19.60 against 19.46.

Table IA.XIX collects the terms that Section II defines, and three that Section V defines. A table that departs from a definition says so in its notes.

Table IA.XIX
Terms defined in Sections II and V

term	definition	defined in
leg	One side of a trade on one account	II.A
households	Accounts of the household class, nearly all of them natural persons or estates; the weekly panel of Section V holds those of natural persons and of estates only	II.A
foreign nominee accounts	Accounts that a custodian holds in its own name for clients abroad; the owners behind them are not seen	II.A
traced position	A share in which an account's purchases on the exchange since January 2018 exceed its sales, in shares with no adjustment for splits; not a holding	II.A
price paid	The euros of an account's purchases of a share on the exchange since January 2018 divided by the shares bought, on the legs of the flow basis; an average over every purchase, shares since sold included	II.A
listed share	A security with a daily close on the Helsinki exchange in Compustat Global, or a register security matched to one	II.B
ticket	One leg, sized by its euro value at the price that values it	II.B
settlement day	A weekday on which the register settles legs: every weekday but the closing days of TARGET	II.B
trade day	The recorded trade date of a leg; without one, two settlement days before its settlement day, or the last trading day before that day when it is an exchange holiday	II.B
flow basis	The legs that the five rules of Section II.B count: exchange trades in listed shares, dated by trade day, valued at the register price or else at the close, in tickets under EUR 25 million	II.B
on the exchange	Resting on the legs the flow basis counts: exchange trades in listed shares, dated by trade day, in tickets under EUR 25 million	II.B
net purchases	Purchases less sales in euros, on the flow basis	II.B
gross trading	Purchases plus sales in euros	II.B
register prices	For a share and a day, the volume-weighted average price of the day's exchange legs in the register, on days with at least three priced legs	II.C
closes	Last prices of the day on the Helsinki exchange, from Compustat Global	II.C
day-1 start	The day-1 price, one trading day after the move, as the start of a return; it leaves the first day's bounce out	II.C
register market factor	The weighted daily return of Finnish shares at register prices on which the detection rule runs	II.C
shock	A group of weeks that the detection rule flags, no more than three weeks apart	II.D
crash window	The trading days of the weeks that the detection rule flags in one shock	II.D

Table IA.XIX (continued)

term	definition	defined in
fall	The decline of the OMXH25 from its peak to its trough around a shock	II.D
invasion crash window	28 February to 4 March 2022, five trading days	II.D
invasion weeks	21 February to 15 March 2022, 17 trading days; the event window of Section VI	II.D
regular weeks	Weeks with no day inside one of the four falls or within 14 days of one; 208 weeks	II.D
regular weeks outside October 2020	Regular weeks with no day inside the October 2020 fall, 12 to 29 October 2020, or within 14 days of it; 201 weeks; the baseline of the weekly household comparisons	II.D
regular days	Trading days outside the four falls; the regular-period beta and the account measures scored on trades use a subset, the days more than 14 days from every fall	II.D
regular days outside October 2020	Regular days less the 14 trading days of the October 2020 fall; 1,067 days; the baseline of the daily flow comparisons	II.D
other trading days	All trading days outside the four crash windows, the days of a fall outside its crash window and the days of October 2020 among them; the comparison of the H4 tests and of the down-day tests	II.D
traded value	The close times the shares traded on the day, from Compustat Global	II.E
most-traded shares	The 100 listed shares with the largest median daily traded value over their last 250 priced days, of which at least 120 must have volume; ranked before each window and at each month end; the Seligson OMX Helsinki index fund is not ranked	II.E
other listed shares	Listed shares outside the most-traded shares on that day	II.E
fixed list of 55 shares	A sample drawn up after the sample period, the same in every year; a labeled comparison only	II.E
large move	A daily return of 5% or more in absolute value	II.F
crash-day move	A large move inside a crash window	II.F
earnings-day move	A large move on the day of a company's earnings announcement, outside the crash windows	II.F
five trading days	The next five priced days of the share; in the most-traded shares these are the next five trading days	II.F
down day	A day on which the OMXH25 returns −2% or less	II.F

contrarian measure	The correlation of an account's weekly net purchases with the market return at register prices in the week before, over regular weeks; needs at least 20 such weeks; a lower value is an account that buys after falls	V.B
disposition measure	The proportion of gains realized minus the proportion of losses realized, against the price paid in the register since January 2018	V.B
add rate	The share of an account's traced positions with a purchase in a week; a position is traced from the account's exchange trades since January 2018	V.B

Notes. Terms of Sections II and V, by the section that defines them. The register has no opening positions, so no term in the paper measures holdings, wealth or ownership.

Some details of Section II.G belong here. With one regressor measured with classical error, the bias from an estimated regressor is toward zero. Our models hold several estimated regressors, so the direction of the bias is not known. The wild cluster bootstrap enumerates every weight vector when the clusters are few, five dates among them, and otherwise draws 9,999. The bootstrap of Table IA.XCIX differs: it uses two-point weights and fewer draws. It is printed beside test 26 of the family, which enters on its t clustered by security. In the cross-sections of Section VI, with one observation per share, the bootstrap redraws across shares. With the four shocks as clusters, six-point weights give far more distinct p-values than two-point weights would. The grid is fine, and the open question is the size of the test. Some tables add a permutation test, which their notes describe, and every table states its own lag length.

Table IA.XX lists the family of headline tests (Section II.G). For each test it gives the estimate, the p-value on which the test enters the family and q, the value adjusted for the false discovery rate. Section II.G names that p-value for the four reversal tests and for the two slopes of H6. The family holds the tests that pass and the tests that do not, and the notes give the counts. Table IA.XXI follows with the design of each test, by the same number.

With the four reversal tests on p-values clustered by date, 20 tests pass against 19 (Table IA.XXIX). The comparison in the most-traded shares passes on its clustered p (0.013, q = 0.030) and not on its bootstrap p (0.063, q = 0.118). The comparison in the other listed shares fails on both. The rule of Section I.A names the bootstrap p, and the clustered result is reported beside it.

Fourteen of the tests belong to none of the six hypotheses, and six of the 14 pass. One is on guidance changes, four are on pandemic news, and six are on which households sold exposed shares. Two are on general government trading in the weeks to 20 February 2022, and one is on exits from Russia. Section II.G gives the other counts.

Table IA.XX

False-discovery-rate adjustment across the headline tests

no.	test	estimate	p	q	passes at 5% FDR
Panel A. Prices after a crash					
1	Five-day crash slope, most-traded shares at register prices	0.008	0.928	1.000	no
2	Crash slope less earnings-day slope, pooled interaction with a crash indicator in the regression, five days, most-traded shares at register prices	−0.259	0.063	0.118	no
3	Five-day crash slope, other listed shares at register prices	−0.353	0.011	0.025	yes
4	Crash slope less earnings-day slope, pooled interaction with a crash indicator in the regression, five days, other listed shares at register prices	−0.408	0.028	0.063	no
5	Return net of the market five days after a drop of 5% or more, most-traded shares	0.00%	>0.999	1.000	no
6	Next-day return on the return times market volume, crash-window days	−0.201	0.475	0.689	no
7	Reversal-book return on the previous month-end VIX	−0.013%	0.530	0.723	no
8	Twenty-day return after the heaviest first-time household buying, crash-window dates	−4.32%	<0.001	<0.001	yes
9	Volume response to the absolute return, days of the crash windows less other trading days	−6.16	<0.001	<0.001	yes
10	Signed return drift after guidance changes	1.82%	0.006	0.015	yes
Panel B. Who trades in a crash					
11	Household net purchases on the market return of the same day	−3.15	<0.001	<0.001	yes
12	Market returns lead household net purchases	joint test	0.528	0.723	no
13	Change in the household same-day slope inside a crash window	6.61	0.196	0.305	no
14	Foreign nominee accounts sell on the exchange and households buy on the same days, 2018 sell-off	60.0%	0.125	0.212	no
15	Foreign nominee accounts sell on the exchange and households buy on the same days, COVID-19 crash	66.7%	0.002	0.005	yes
16	Foreign nominee accounts sell on the exchange and households buy on the same days, 2021 scare	20.0%	>0.999	1.000	no
17	Foreign nominee accounts sell on the exchange and households buy on the same days, invasion	40.0%	0.615	0.791	no
18	Household net purchases on the accumulated loss, the four falls	0.819	0.004	0.012	yes
19	Foreign nominee net purchases on the accumulated loss, the four falls	−0.045	0.964	1.000	no

Table IA.XX (continued)

no.	test	estimate	p	q	passes at 5% FDR
Panel C. Which households buy					
20	Crash buying on the contrarian measure	−0.041	<0.001	<0.001	yes
21	Crash buying on the disposition measure	0.026	<0.001	<0.001	yes
22	Crash buying on age	−0.028	<0.001	<0.001	yes
23	Crash buying of accounts aged 70 or over, COVID-19 crash	−0.045	<0.001	<0.001	yes
24	Step in the add rate at the price paid, COVID-19 crash against regular weeks outside October 2020	−0.80	<0.001	<0.001	yes
25	Return net of the market on purchases in the COVID-19 fall after 90 days	0.2%	0.940	1.000	no
26	Ninety-day return on purchases in the COVID-19 fall, 70 or over against younger	−0.3	0.736	0.872	no
27	Trading in the COVID-19 crash after a 2018 purchase that gained against one that lost	−0.138	0.052	0.102	no
28	Change in the net-buyer share from regular weeks outside October 2020, estates less living owners	6.3	<0.001	<0.001	yes
29	Sales below the price paid, December less the other months	12.3	0.127	0.212	no
30	Trading in the 12 trading days from the invasion with a loss above 30%, less 10 trading days of November 2021	−0.017	<0.001	<0.001	yes
Panel D. Pandemic news					
31	Weekly household flow on Finnish death innovations	−1.6	0.837	0.966	no
32	Weekly household flow on signal weeks	20.9	0.139	0.224	no
33	Weekly household flow on world death innovations	85.7	0.001	0.005	yes
34	District cases and household net flow, week fixed effects	−42.6	0.359	0.538	no
Panel E. The invasion					
35	Return on Russia exposure in the invasion weeks, register prices	−0.52%	0.031	0.063	no
36	Exposure slope before the invasion less the slope in the invasion weeks	0.46%	0.067	0.120	no
37	Sale of an exposed share from 21 February to 22 April 2022, on age	0.81%	0.004	0.012	yes
38	Sale of an exposed share from 21 February to 22 April 2022, on being a woman	−0.95%	<0.001	<0.001	yes
39	Sale of an exposed share from 21 February to 22 April 2022, on being a Swedish speaker	−0.21%	0.010	0.024	yes
40	Sale of an exposed share from 21 February to 22 April 2022, on years since first seen	0.42%	0.031	0.063	no
41	Sale of an exposed share from 21 February to 22 April 2022, on log postcode income	0.01%	0.678	0.825	no
42	Sale of an exposed share from 21 February to 22 April 2022, on the postcode's share with higher education	−0.37%	<0.001	<0.001	yes
43	General government net purchases of exposed shares in the eight weeks to 20 February 2022 against earlier windows	placebo windows	0.566	0.749	no

Table IA.XX (continued)

no.	test	estimate	p	q	passes at 5% FDR
44	General government flow into exposed shares with momentum and beta controls	−0.022	0.916	1.000	no
45	Five-day abnormal return after exit announcements	−0.58%	0.655	0.819	no

Notes. The 45 headline tests, of which 19 have a q-value below 0.05. Each row gives the estimate and the p-value on which the test enters the family, in the units of its table. The four reversal tests enter on their wild bootstrap p-values by trading date; on p-values clustered by date 20 tests pass, the comparison in the most-traded shares among them. The two slopes of H6 enter on the larger of two p-values. The q-value is Benjamini-Hochberg over the whole family. A test passes when its q-value is below 0.05; one that does not pass has not been shown to be zero. Joint test and placebo windows mark tests with no single coefficient.

Table IA.XXI

The headline tests: hypothesis, source table, observations and p-value

no.	hypothesis	named in Section I	reported in	N	p-value from
1	H1	yes	Table III	289	wild cluster bootstrap by trading date
2	H1	yes	Table III	438	wild cluster bootstrap by trading date
3	H1	yes	Table III	302	wild cluster bootstrap by trading date
4	H1	yes	Table III	396	wild cluster bootstrap by trading date
5	H1	no	Table IA.XLIII	325	wild cluster bootstrap by trading date
6	H1	yes	Table IV	3,000	wild cluster bootstrap by trading date
7	H1	yes	Table IV	54	Newey-West errors, 5 lags
8	H1	yes	Table IV	25	wild cluster bootstrap by trading date, one observation per date
9	H4	no	Table V	1,133	Welch t-test across dates
10	none	no	Table IA.XLII	144	errors clustered by date
11	H2	no	Table IA.LXXII	1,257	Newey-West errors, 5 lags
12	H2	no	Table IA.LXXII	1,253	joint Wald test, Newey-West errors, 5 lags
13	H2	no	Table IA.LXVIII	1,258	Newey-West errors, 5 lags
14	H2	no	Table IA.LXV	1,070	Fisher exact test
15	H2	no	Table IA.LXV	1,080	Fisher exact test
16	H2	no	Table IA.LXV	1,070	Fisher exact test
17	H2	no	Table IA.LXV	1,070	Fisher exact test
18	H2	no	Table IA.LXXIV	172	Newey-West errors, 5 lags
19	H2	no	Table IA.LXXIV	172	Newey-West errors, 5 lags
20	H5	yes	Table IX	39,314	HC1 errors
21	H5	yes	Table IX	39,314	HC1 errors
22	H5	no	Table IX	39,314	HC1 errors

Table IA.XXI (continued)

no.	hypothesis	named in Section I	reported in	N	p-value from
23	H5	no	Table IA.LXXXVI	71,339	HC1 errors
24	H5	no	Table IA.XC	3,386,413	errors clustered by account
25	H5	yes	Table XI, Panel C (count in Table IA.XCVI)	321,188	errors clustered by security
26	H5	no	Table IA.XCIX	336,667	errors clustered by security
27	H5	yes	Table X	11,129	errors clustered by security
28	H5	no	Table IA.LXXXVII	1,765	two proportions compared, errors clustered by account
29	H5	no	Table IA.XCI	5	t-test across years
30	H5	no	Table IA.XCIV	192,816	HC1 errors
31	none	no	Table IA.LXXVI	74	Newey-West errors, 4 lags
32	none	no	Table IA.LXXVI	74	Newey-West errors, 4 lags
33	none	no	Table IA.LXXVI	74	Newey-West errors, 4 lags
34	none	no	Table IA.LXXVI	2,016	HC1 errors
35	H6	yes	Table XII	148	the larger of the HC3 p and the wild bootstrap p
36	H6	yes	Table XIII	148	the larger of the HC3 p and the wild bootstrap p
37	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
38	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
39	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
40	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
41	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
42	none	no	Table IA.CXVI	805,998	errors clustered by postcode and share
43	none	no	Table IA.CXII	152	earlier windows of the same length
44	none	no	Table IA.CXIV	228	errors clustered by firm
45	none	no	Table IA.CXVIII	12	bootstrap over firms

Notes. The tests of Table IA.XX, by the same number. None marks a test that belongs to none of the six hypotheses. The third column says yes when a rule or a prediction of Section I names the test. The tests marked H2 describe its setting; its stated test, the down-day difference, is outside the family. N counts the observations behind the test, both sides of a comparison, and for estates their account-weeks in the COVID-19 crash window. A wild cluster bootstrap redraws the t-statistic by trading date with the null imposed, on six-point weights. Test 8 has one observation per date. Test 26 also has a bootstrap p-value by trade date of 0.415, on two-point weights.

Table IA.XXII counts the most-traded shares before each window and how many of them are on the fixed list of 55 shares (Section II.E).

Tables for Section III: prices after a crash. The tables come in five groups: the samples, the reversal slopes and their checks, returns after drops, the explanations of a reversal, and H4. Most

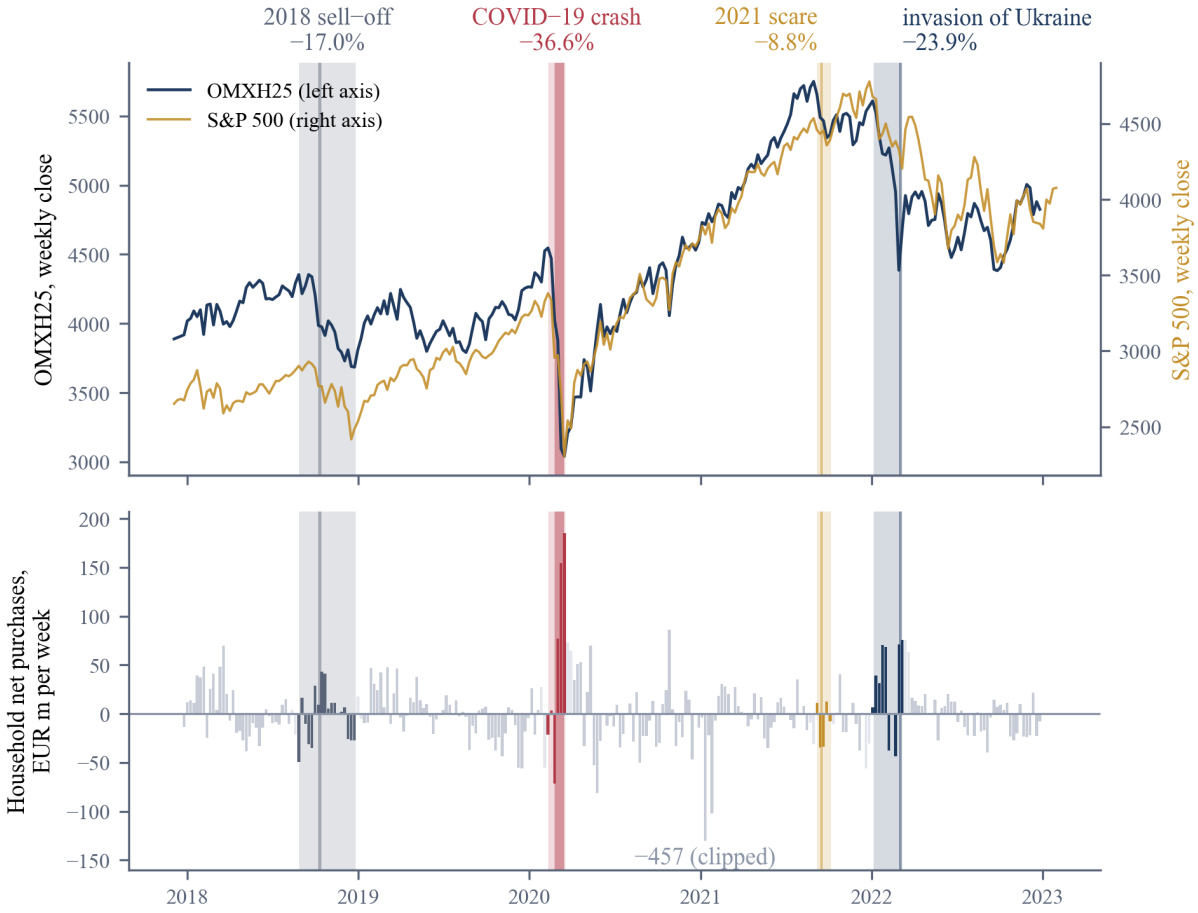

Figure IA.1. The four shocks in the OMXH25, the S&P 500 and household net purchases. Notes. Top: weekly closes of the OMXH25 (left axis) and of the S&P 500 (right axis), 2018 to 2022. Bottom: household net purchases on the exchange per week, in EUR million. A light band marks each fall from peak to trough, and the darker band inside it marks the crash window. In the week of 11 January 2021 one share is 64.0% of household gross trading, and households sold EUR 457.1 million net; its bar is clipped and labeled with its value. The week is a regular week, and the text beside Table IA.XVI gives what the register shows of it.

Table IA.XXII

The most-traded shares before each window and the fixed list of 55 shares

	Shares ranked	Most traded	On the fixed list	Not on the fixed list	Fixed list left out	Median rank of the fixed list
2018 sell-off	151	100	35	65	20	64
COVID-19 crash	157	100	37	63	18	68
2021 scare	160	100	35	65	20	76
invasion	168	100	34	66	21	77
October 2020 (robustness window)	159	100	36	64	19	69

Notes. On the last trading day before each window, listed shares are ranked as in Section II.E. The one index fund among the listings, the Seligson OMX Helsinki index fund, is not ranked. The most-traded shares are the first 100. The fixed list of 55 shares is the same in every year. The last column is the median rank of its shares among those ranked, and the other cells count shares.

slopes at register prices come before those on closes. Two sets go beyond the tests of Section III: trading by investor class on the day of a move, and returns by household net buying. Section II defines the samples and the two price series.

A crash slope has up to three p-values in these tables. The text reads the wild bootstrap p by trading date (Section II.G), and calls a slope detected on it alone. The asymptotic p clustered by date is smaller in most cells, and a t in parentheses can pass 1.96 where the bootstrap p is above 0.05. The bootstrap p with the four shocks as clusters is a guide only. Where one of the three disagrees with a sentence at 5%, the sentence or the table beside it says so.

Table IA.XXIII shows where households traded. The most-traded shares carry about nine tenths of household gross trading in every row.

Table IA.XXIV counts the moves behind each slope on closes, and sets the same stock-days beside register prices. Two shocks have fewer than 30 moves in the most-traded shares and are not estimated alone. The October 2020 window, the last column, has 39 moves on five trading dates.

The invasion has 96 moves on closes, and 39 of them are moves at register prices too. A register price averages the day's trades (Section II.C), so the median move of the same stock-days is smaller there in three of the four shocks. The invasion's moves on closes have a median size of 6.32% on closes and 4.77% at register prices. The two prices also pick different stock-days. Over

Table IA.XXIII
Household trading inside and outside the most-traded shares

	Household gross (EUR m)	Most-traded shares	Other listed shares	Not listed	Fixed list of 55 shares (comparison)
The four crash windows	2,326.1	90.2%	4.2%	5.5%	57.4%
COVID-19 fall, 11 February 2020 to 18 March 2020	2,109.8	88.8%	4.7%	6.4%	57.3%
Invasion fall, 5 January 2022 to 7 March 2022	3,296.9	90.4%	3.4%	6.1%	57.4%
October 2020 (robustness window)	350.6	90.6%	6.0%	3.5%	61.6%

Notes. Household gross trading is purchases plus sales by household accounts in exchange trades of every security, by trade day, in EUR million. The next three columns split it into the most-traded shares, other listed shares, and instruments outside the listed shares; they sum to 100% before rounding. The last column is the part in the fixed list of 55 shares, a comparison sample. The list omits Nordea. The two dated rows are the falls of Table II. October 2020 is a robustness window outside the four crash windows.

the four shocks, 214 of the 289 moves at register prices are moves on closes too.

Of the 384 moves on closes, 22 have no register price that day, in 8 shares. Fourteen of them are moves of 4 shares that the register price series never carries under the identifier of the close series. For the other 8 the series has no return that day. We cannot name the cause from the files we hold, and the slopes at register prices leave these moves out.

Table IA.XXV splits the most-traded shares by shock, on closes and at register prices. Brackets hold wild bootstrap p-values by trading date. The invasion has five dates, so its p-values are a guide only (Section II.G). Beneath each p-value the table gives the t clustered by date and, for comparison, by security. With so few dates the t clustered by date can overstate precision, and the text uses the bootstrap p.

At five days and at register prices the two estimated shocks have slopes of opposite sign, and the pooled slope, on all four shocks, is 0.008. At ten days the slope is −0.828 in the COVID-19 crash ($p = 0.023$) and 1.632 in the invasion ($p = 0.094$). On closes neither ten-day slope is distinguishable from zero.

Table IA.XXVI gives the ten-day slopes that go with the five-day slopes of Table III, with their p-values. In the most-traded shares the ten-day crash slope at register prices, from day 0, is −0.437.

Table IA.XXIV

Crash-day moves of 5% or more in the most-traded shares, on closes and at register prices, by shock

	2018 sell-off	COVID-19 crash	2021 scare	Invasion	Four shocks	October 2020
Moves on closes	25	253	10	96	384	39
Trading dates	3	14	4	5	26	5
Shares	18	94	8	68	115	31
With a register price	23	238	8	93	362	
Without a register price	2	15	2	3	22	
Shares without one	2	6	2	3	8	
Of which, share never in the series	1	8	2	3	14	
Shares never in the series	1	3	2	3	4	
Also a register-price move	13	156	6	39	214	
Moves at register prices	17	216	9	47	289	25
Median size on closes	5.79%	7.31%	6.33%	6.32%	6.80%	
Median size, register prices	5.15%	5.98%	6.39%	4.77%	5.60%	
All listed shares: moves	55	476	24	155	710	71
Fixed list of 55: moves	17	148	7	55	227	18

Notes. A move is a stock-day inside a crash window with an absolute return of 5% or more. The first three rows count the moves on closes, their dates and their shares. Rows 4 to 8 count those with and without a register price that day, and those of a share the register price series never carries under the close series' identifier. The next two count the moves on closes that are also moves at register prices, and all moves at register prices. Median size is the median absolute return of the moves on closes with a register price. The last two rows use other samples. October 2020, a robustness window, is outside the four shocks.

Its bootstrap p by date is 0.191 and its p clustered by date is 0.030; the text reads the bootstrap p.

In the most-traded shares the ten-day earnings slope is 0.342 from day 0 and 0.147 from day 1. More than half of it is thus the first day. In the other listed shares the slope is larger from day 1 (0.430, p = 0.019).

The p-values with the four shocks as clusters are a guide only (Section II.G), and they do not all point one way. In the other listed shares the ten-day crash slope at register prices, from day 1, has a p of 0.313 by date and of 0.011 by shock. From day 0 the two are 0.002 and 0.046.

Table IA.XXVII splits the other listed shares by shock. The five-day slope is negative in both estimated shocks. Its p is 0.023 in the invasion, a window of five trading days, and 0.211 in the COVID-19 crash. From day 1 neither five-day slope is distinguishable from zero. From day 1 the

Table IA.XXV

Crash reversal by shock, most-traded shares

	Closes: 5 days	Closes: 10 days	Closes: moves	Register prices: 5 days	Register prices: 10 days	Register prices: moves
2018 sell-off	not estimated	not estimated	25	not estimated	not estimated	17
COVID-19 crash	−0.173	−0.966	253	−0.215	−0.828**	216
	[0.214]	[0.130]		[0.389]	[0.023]	
(t, clustered by date)	(−2.23)	(−3.31)		(−1.93)	(−4.18)	
(t, clustered by security)	(−2.97)	(−7.08)		(−2.70)	(−6.27)	
Trading dates	14	14		15	15	
2021 scare	not estimated	not estimated	10	not estimated	not estimated	9
Invasion	0.052	0.104	96	1.640	1.632*	47
	[0.768]	[0.647]		[0.110]	[0.094]	
(t, clustered by date)	(0.26)	(0.49)		(4.74)	(5.66)	
(t, clustered by security)	(0.23)	(0.55)		(3.20)	(3.58)	
Trading dates	5	5		5	5	
Four shocks together	−0.006	−0.479	384	0.008	−0.437	289
	[0.926]	[0.192]		[0.928]	[0.191]	
(t, clustered by date)	(−0.08)	(−2.01)		(0.09)	(−2.16)	
(t, clustered by security)	(−0.09)	(−3.58)		(0.09)	(−2.94)	
Trading dates	26	26		29	29	
October 2020 (robustness window)	−0.580**	−0.819**	39	not estimated	not estimated	25
	[0.011]	[0.016]				
(t, clustered by date)	(−6.72)	(−7.25)				
(t, clustered by security)	(−4.08)	(−5.35)				
Trading dates	5	5				

Notes. Each cell is the slope of the forward return on the day-0 return across one crash window's moves of 5% or more, with firm fixed effects. The row for the four shocks together pools the four crash windows. Brackets hold wild cluster bootstrap p-values by trading date; stars use them. Parentheses hold the t clustered by trading date and, for comparison only, the t clustered by security. Moves are stock-days; a window with fewer than 30 moves is not estimated. October 2020 is a robustness window outside the four crash windows. A negative slope is a reversal. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XXVI

Ten-day slopes after crash-day and earnings-day moves at register prices, by sample and by start

	Most-traded shares: from day 0	Most-traded shares: from day 1	Other listed shares: from day 0	Other listed shares: from day 1	All listed shares: from day 0	All listed shares: from day 1
Panel A. Crash-day moves, ten days						
Crash slope	−0.437	−0.372	−0.504***	−0.168	−0.446***	−0.199
(standard error)	(0.202)	(0.192)	(0.143)	(0.143)	(0.137)	(0.139)
[p, wild bootstrap]	[0.191]	[0.178]	[0.002]	[0.313]	[0.009]	[0.218]
[p, clustered by date]	[0.030]	[0.053]	[<0.001]	[0.241]	[0.001]	[0.151]
[p, wild bootstrap by shock]	[0.869]	[0.880]	[0.046]	[0.011]	[0.188]	[0.355]
Moves	289	289	302	302	591	591
Trading dates	29	29	29	29	30	30
Panel B. Earnings-day moves, ten days						
Earnings slope	0.342***	0.147	0.286	0.430**	0.273***	0.238**
(standard error)	(0.093)	(0.094)	(0.191)	(0.218)	(0.097)	(0.105)
[p, wild bootstrap]	[0.002]	[0.156]	[0.149]	[0.019]	[0.007]	[0.015]
[p, clustered by date]	[<0.001]	[0.117]	[0.134]	[0.048]	[0.005]	[0.023]
Moves	149	149	94	94	259	259
Trading dates	110	110	82	82	175	175

Notes. Slopes of the return over the next ten trading days on the day-0 return, across moves of 5% or more at register prices, with firm fixed effects. Crash-day moves lie inside the crash windows; earnings-day moves lie on earnings days outside them. Columns from day 1 start the forward return at the next day's price. Standard errors are clustered by trading date. Stars use the wild bootstrap p by trading date; the row by shock has four clusters. Earnings-day moves before July 2018 are in all listed shares only. A negative slope is a reversal and a positive slope a continuation. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

ten-day slope in the invasion is −0.214 (p = 0.032); from day 0 it is −0.500 (p = 0.007).

The series and the flows date a leg by different rules next to an exchange holiday (see the text after Table IA.IV). Table IA.XXVIII takes out the moves next to such a day. Panel A takes out a move dated on one, and Panel B also a move whose five-day return starts or ends on one. No crash-day move is dated on such a day. In the other listed shares one crash-day move has a five-day return that ends on one, weeks after the window, because a forward return counts the share's priced days.

In the most-traded shares, from day 0, one earnings-day move is taken out, and no slope or test

Table IA.XXVII

Crash reversal by shock and by start, other listed shares at register prices

	From day 0: 5 days	From day 0: 10 days	From day 0: moves	From day 1: 5 days	From day 1: 10 days	From day 1: moves
2018 sell-off	not estimated	not estimated	28	not estimated	not estimated	28
COVID-19 crash	−0.317 [0.211]	−0.579* [0.085]	206	−0.090 [0.702]	−0.205 [0.546]	206
2021 scare	not estimated	not estimated	14	not estimated	not estimated	14
Invasion	−0.534** [0.023]	−0.500*** [0.007]	54	−0.131 [0.413]	−0.214** [0.032]	54
October 2020 (robustness window)	not estimated	not estimated	29	not estimated	not estimated	29

Notes. Each cell is the slope of the forward return on the day-0 return across one crash window's moves of 5% or more in the other listed shares, at register prices, with firm fixed effects. The columns from day 1 start the forward return at the next day's price. Brackets hold wild cluster bootstrap p-values by trading date; stars use them. Moves are stock-days; a window with fewer than 30 moves is not estimated. October 2020 is a robustness window outside the four crash windows. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

changes to two decimals. In the other listed shares Panel B takes out seven earnings-day moves and one crash-day move. The earnings slope at register prices is then 0.246 in place of 0.266, and the crash slope is unchanged.

The four reversal tests enter the family of Table IA.XX on their wild bootstrap p-values, by which the text reads a crash slope. The comparison with earnings days enters as the rule's test. The slope and the rule's test of the other listed shares then have q-values of 0.025 and 0.063, and only the slope passes.

Table IA.XXIX adds the check, the same family with p-values clustered by date on the four tests. The q-values are then 0.001 and 0.053. On the check 20 tests pass in place of 19, because the rule's test of the most-traded shares passes there (q = 0.030, against 0.118 on its bootstrap p).

Panel B of Table IA.XXIX puts the rule's test of each reduced sample into the family in place of the headline estimate. Without the three earnings-day moves of Panel A of Table IA.XXVIII its q is 0.066, and 0.056 on p-values clustered by date. Without the moves of Panel B the rule's test is

−0.395 (p = 0.048), with q of 0.097 and 0.076. It passes on none of the four.

Panel C takes out one earnings-day move instead: in each column, the move whose removal changes that column's earnings slope most. In the other listed shares it is the move of 18 December 2020, a day-0 return of 12.5% followed by a five-day return of 94.4%. That move is not among the moves of Panels A and B.

On closes the two returns are 17.3% and 153.6%. The share's Compustat adjustment factor and total-return factor do not change from the day before that move to eleven trading days after it (last row of Panel C). The files we hold therefore record no split and no dividend in those days, and we do not name a cause. Without the move the earnings slope is 0.086.

Without that move the rule's test is −0.297 (p = 0.061) and no longer rejects at 5%. Its q is 0.118, and 0.068 on p-values clustered by date.

The difference of the two slopes is −0.439 (p = 0.005). The comparison of the other listed shares with earnings days therefore rests on a benchmark that one move carries. The crash slope does not depend on it.

In the most-traded shares the move taken out is a different one, dated in Panel C. The rule's test is then −0.235 (p = 0.081) and the difference of the two slopes −0.266 (p = 0.061). Neither the rule's test nor the difference of the two slopes in Panel C rejects at 5% from day 0. Without the crash indicator the pooled interaction is 0.059. A difference in mean returns between the two kinds of day then loads on the interaction, which is why the rule's test has the indicator.

From day 1 the earnings slope in the other listed shares is 0.456 in Panel B and 0.202 in Panel C (p = 0.011). The difference of the two slopes is −0.557 in Panel B and −0.304 (p = 0.032) in Panel C. More than half of the day-1 earnings slope thus comes from the one move, and little of it from the dating rule.

Table IA.XXVIII

Five-day slopes at register prices without the moves next to an exchange holiday and without one move

	Most-traded shares: from day 0	Most-traded shares: from day 1	Other listed shares: from day 0	Other listed shares: from day 1	All listed shares: from day 0	All listed shares: from day 1
Panel A. Without the moves dated next to a holiday						
Crash slope	0.008	−0.047	−0.353**	−0.102	−0.232**	−0.081
	[0.928]	[0.576]	[0.011]	[0.379]	[0.030]	[0.377]
Earnings slope	0.315***	0.094	0.267	0.471**	0.263***	0.229**
	[<0.001]	[0.233]	[0.198]	[0.029]	[0.007]	[0.033]
Pooled, crash indicator (rule's test)	−0.262*	−0.160	−0.408**	−0.327	−0.408***	−0.254*
	[0.063]	[0.188]	[0.032]	[0.177]	[0.002]	[0.082]
Pooled, no crash indicator	0.040	0.053	−0.464**	−0.372	−0.274**	−0.156
	[0.746]	[0.637]	[0.025]	[0.132]	[0.046]	[0.264]
Difference of the two slopes	−0.307**	−0.141	−0.620***	−0.573**	−0.495***	−0.310**
	[0.036]	[0.252]	[0.003]	[0.029]	[<0.001]	[0.045]
Crash moves taken out	0	0	0	0	0	0
Crash moves kept	289	289	302	302	591	591
Earnings moves taken out	1	1	3	3	4	4
Earnings moves kept	148	148	91	91	255	255
Panel B. Also without the moves with a five-day return next to one						
Crash slope	0.008	−0.047	−0.353**	−0.101	−0.232**	−0.080
	[0.928]	[0.576]	[0.011]	[0.383]	[0.032]	[0.379]
Earnings slope	0.315***	0.090	0.246	0.456**	0.253**	0.226**
	[<0.001]	[0.264]	[0.300]	[0.045]	[0.010]	[0.050]
Pooled, crash indicator (rule's test)	−0.262*	−0.139	−0.395**	−0.315	−0.408***	−0.241
	[0.063]	[0.233]	[0.048]	[0.209]	[0.004]	[0.120]
Pooled, no crash indicator	0.040	0.079	−0.445**	−0.350	−0.266*	−0.140
	[0.746]	[0.465]	[0.036]	[0.168]	[0.053]	[0.337]
Difference of the two slopes	−0.307**	−0.137	−0.598***	−0.557**	−0.484***	−0.306*
	[0.036]	[0.267]	[0.006]	[0.035]	[<0.001]	[0.055]
Crash moves taken out	0	0	1	1	1	1
Crash moves kept	289	289	301	301	590	590
Earnings moves taken out	1	5	7	7	8	18

Table IA.XXVIII (continued)

	Most-traded shares: from day 0	Most-traded shares: from day 1	Other listed shares: from day 0	Other listed shares: from day 1	All listed shares: from day 0	All listed shares: from day 1
Earnings moves kept	148	144	87	87	251	241
Panel C. Without the most influential earnings-day move						
Crash slope	0.008	−0.047	−0.353**	−0.102	−0.232**	−0.081
	[0.928]	[0.576]	[0.011]	[0.379]	[0.030]	[0.377]
Earnings slope	0.274***	0.143**	0.086	0.202**	0.182***	0.104**
	[<0.001]	[0.045]	[0.379]	[0.011]	[0.007]	[0.044]
Pooled, crash indicator (rule's test)	−0.235*	−0.195	−0.297*	−0.160	−0.349***	−0.163
	[0.081]	[0.125]	[0.061]	[0.310]	[0.005]	[0.153]
Pooled, no crash indicator	0.059	0.013	−0.341**	−0.191	−0.221*	−0.077
	[0.627]	[0.901]	[0.043]	[0.236]	[0.069]	[0.479]
Difference of the two slopes	−0.266*	−0.190	−0.439***	−0.304**	−0.414***	−0.185*
	[0.061]	[0.122]	[0.005]	[0.032]	[<0.001]	[0.077]
Earnings moves taken out	1	1	1	1	1	1
Earnings moves kept	148	148	93	93	258	258
Date of the move taken out	6 Nov 2019	22 Jul 2022	18 Dec 2020	18 Dec 2020	18 Dec 2020	18 Dec 2020
Its day-0 return, register prices	−18.3%	−13.4%	12.5%	12.5%	12.5%	12.5%
Its five-day return, register prices	−10.8%	10.0%	94.4%	142.1%	94.4%	142.1%
Its day-0 return, closes	−18.5%	−14.9%	17.3%	17.3%	17.3%	17.3%
Its five-day return, closes	−10.7%	11.3%	153.6%	100.0%	153.6%	100.0%
Days with a change of factor	0	0	0	0	0	0

Notes. Five-day slopes at register prices across moves of 5% or more, with firm effects. Next to a holiday, the series' weekday rule and Section II.B date a leg differently. Panel C takes out the earnings-day move whose removal changes each column's earnings slope most. Its last rows give that move and the days around it, one before to eleven after, on which a Compustat factor changes. Day-1 returns start at the next day's price. Earnings-day moves before July 2018 are in all listed shares only, so its counts exceed the other two's sum. Brackets hold wild bootstrap p-values by trading date; stars use them. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XXX repeats the crash and earnings slopes of Table III on closes, with drops shown apart. The pattern is the same: a five-day slope near zero in the most-traded shares, and a negative slope in the other listed shares that weakens from day 1.

Table IA.XXIX

The four reversal tests in the family of headline tests, on wild bootstrap p-values and on p-values clustered by date

	Estimate	Bootstrap: p	Bootstrap: q	Bootstrap: tests that pass	By date: p	By date: q	By date: tests that pass
Panel A. The four reversal tests, headline estimates							
Most-traded, crash slope	0.008	0.9278	1.000	19	0.9315	1.000	20
Most-traded, less earnings	−0.259	0.0631	0.118	19	0.0134	0.030	20
Other listed, crash slope	−0.353	0.0107	0.025	19	0.0003	0.001	20
Other listed, less earnings	−0.408	0.0283	0.063	19	0.0246	0.053	20
Panel B. Other listed, less earnings, on fewer moves							
Without the 3 moves dated next to a holiday	−0.408	0.0321	0.066	19	0.0261	0.056	20
Without the 8 moves with a date or return next to one	−0.395	0.0475	0.097	19	0.0389	0.076	20
Without the most influential earnings-day move	−0.297	0.0605	0.118	19	0.0348	0.068	20

Notes. The family is the 45 headline tests of Table IA.XX; q is Benjamini-Hochberg over all of them. Bootstrap is that family: the four reversal tests enter with wild bootstrap p-values by trading date. By date is the check, with p-values clustered by trading date. Tests that pass counts those with q below 0.05. 'Less earnings' is the rule's test of Table III. Each row of Panel B replaces the last row of Panel A by its estimate in Panel A, B or C of Table IA.XXVIII, in that order. The table carries no stars.

The midpoint is the last quote of the day with a bid below the ask. A bounce between the bid and the ask cannot move it. The close beside it is the Compustat close of the same share on the same day.

Neither price detects a five-day reversal. In the most-traded shares the midpoint slope is 0.032 (p = 0.471) and the close slope is 0.015 (p = 0.812; Table IA.XXXI).

In the other listed shares the midpoint slope is −0.140 (p = 0.484) and the close slope is −0.157 (p = 0.163; Table IA.XXXI).

The rule's test is not detected on either price in any sample. It comes nearest on the close in all listed shares, at −0.240 (p = 0.054), a sample on which Section I does not judge H1. The calls on the two samples Section I reads are the same on both prices, and the family stays at 45. From day

Table IA.XXX

Crash reversal on closes, by sample and by start

	Most-traded shares: from day 0	Most-traded shares: from day 1	Other listed shares: from day 0	Other listed shares: from day 1	All listed shares: from day 0	All listed shares: from day 1
Crash, 5 days	−0.006	−0.064	−0.258**	−0.112	−0.130*	−0.082
	(−0.08)	(−0.66)	(−2.62)	(−1.01)	(−1.58)	(−0.81)
	[0.926]	[0.418]	[0.032]	[0.365]	[0.095]	[0.427]
Crash, 10 days	−0.479	−0.381	−0.481***	−0.171	−0.423**	−0.220
	(−2.01)	(−1.67)	(−3.64)	(−1.38)	(−2.65)	(−1.42)
	[0.192]	[0.161]	[<0.001]	[0.232]	[0.050]	[0.183]
Crash, day-1 return	−0.122		−0.265***		−0.181*	
	(−1.56)		(−4.94)		(−2.85)	
	[0.283]		[<0.001]		[0.055]	
Crash moves	384	384	326	326	710	710
Trading dates	26	26	29	29	30	30
Crash drops only, 5 days	0.155	−0.005	−0.168	0.049	0.116	0.119
	(0.39)	(−0.01)	(−0.70)	(0.23)	(0.40)	(0.44)
	[0.689]	[0.990]	[0.610]	[0.797]	[0.695]	[0.654]
Crash drops only, 10 days	−1.205	−0.797	−1.128**	−0.448	−0.976	−0.468
	(−2.36)	(−1.50)	(−4.49)	(−2.03)	(−2.63)	(−1.39)
	[0.159]	[0.200]	[0.014]	[0.140]	[0.114]	[0.208]
Crash drops	325	325	238	238	563	563
Earnings, 5 days	0.175	0.036	0.455	0.425	0.248	0.132
	(3.80)	(0.81)	(1.47)	(2.20)	(2.55)	(1.98)
Earnings, 10 days	0.124	0.019	0.253	0.257	0.162	0.087
	(2.02)	(0.33)	(1.72)	(2.81)	(2.88)	(1.91)
Earnings moves	226	226	88	88	336	336
Securities, crash move	115	115	83	83	170	170
Securities, crash or earnings	143	143	133	133	209	209
Firm effects	yes	yes	yes	yes	yes	yes

Notes. Each regression is the forward return on the day-0 return among moves of 5% or more on closes, with firm effects. Columns from day 1 start the forward return at the day-1 close. The day-1 return row regresses that day's return on the day-0 return. Parentheses hold t-statistics clustered by trading date; brackets, wild bootstrap p-values by date, which the stars use. Earnings rows carry no stars: no bootstrap p is computed for them on closes. The securities rows count the shares with a crash-day move, and with a crash-day or earnings-day move. Earnings-day moves before July 2018 are in all listed shares only. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

1 the midpoint slope is not detected in either sample. From day 0, date effects on the close reject in the other listed shares, at −0.281 (p = 0.012). Firm effects on that close do not.

In the other listed shares the ten-day close slope is −0.442 (p = 0.007). The midpoint slope is −0.126 (p = 0.483; Table IA.XXXI).

After a drop the close is down a further 2.3% at 20 days, 5.6% at 60 and 7.3% at 90, less the index.

At the midpoint the returns at those horizons are 2.6%, 0.3% and 1.9%, and none is detected (Table IA.XXXI).

In the most-traded shares the quoted half-spread is 0.368% on crash-window days and 0.317% on other days (p = 0.005; Table IA.XXXII).

The invasion-week slope of the midpoint return on exposure is −0.54% per point (HC3 p = 0.028; wild bootstrap p = 0.016). It has the sign of the invasion-week slopes of Section VI.B. It is a check, and it is not in the family.

Table IA.XXXIII gives the crash slope on closes in the most-traded shares by specification, the table that Section III.A reads. Over drops only, the raw five-day slope with date effects is −0.675 (wild bootstrap p = 0.016 by date, 0.335 with the four shocks as clusters). On market-model returns no reversal is detected, so we do not read the raw slope as one. Market betas that differ across shares could produce the difference.

The table gives three p-values for a raw slope, and they do not agree. Clustered by date, which the text does not read, the ten-day slope with firm effects rejects at 5% over all moves and over drops. On the bootstrap p by date neither rejects, and with the four shocks as clusters no cell of the table does.

Table IA.XXXIV repeats Table IA.XXXIII for the other listed shares, with the same three p-values.

For all moves the slope of the four crash windows is negative and distinguishable from zero in every specification. With the four shocks as clusters, a guide only, no slope of the table rejects at 5%. Over drops only the slope is not distinguishable from zero at five days, and it rejects at ten

Table IA.XXXI

Crash reversal on the midpoint and on the close, same names and days

	Midpoint	Wild p	Close	Wild p
Panel A. Five-day crash slope				
Most-traded shares, from day 0	0.032	0.471	0.015	0.812
Most-traded shares, from day 1	−0.014	0.832	−0.049	0.505
Other listed shares, from day 0	−0.140	0.484	−0.157	0.163
Other listed shares, from day 1	−0.144	0.484	−0.077	0.597
Most-traded shares, ten days	−0.294	0.372	−0.459	0.239
Other listed shares, ten days	−0.126	0.483	−0.442	0.007
Other listed shares, close, date effects, from day 0			−0.281	0.012
Panel B. Crash slope less the earnings slope				
Most-traded shares	−0.111	0.150	−0.127	0.160
Other listed shares	−1.346	0.286	−0.453	0.096
All listed shares	−0.429	0.123	−0.240	0.054
Panel C. Further loss after a drop, less the index				
20 days	2.6%	0.954	−2.3%	0.022
60 days	0.3%	0.996	−5.6%	<0.001
90 days	1.9%	0.933	−7.3%	<0.001

Notes. Panel A is the crash slope at five and at ten days, with firm effects. Wild p is the bootstrap by trading date. From day 1 starts the forward return at the next price. Panel B is the crash slope less the earnings slope. Panel C is the mean return after a fall of 5% or more, less the OMXH25. The midpoint is the last quote with a bid below the ask. The close is the Compustat close on the same day. A day with one price only is left out. 167 of 190 LSEG codes match an ISIN. Five yearly quote files break off within the year; the days before the break are kept.

Table IA.XXXII

Quoted half-spread on crash-window days and on other days

	Crash windows	Other days	Difference	Welch p
Most-traded shares	0.368%	0.317%	0.051%	0.005
Other listed shares	1.310%	1.068%	0.242%	0.002
All listed shares	0.665%	0.559%	0.107%	0.002

Notes. Half the gap from the bid to the ask, over the midpoint, at the last two-sided quote. Each date is the mean across the shares in the row. The p-value is Welch's t on the daily means.

Table IA.XXXIII

Crash reversal on closes by specification, most-traded shares

	All moves: 5 days	All moves: 10 days	Drops: 5 days	Drops: 10 days
Panel A. The four crash windows				
Firm effects	–0.006	–0.479	0.155	–1.205
	[0.926]	[0.192]	[0.689]	[0.159]
[p, clustered by date]	[0.938]	[0.044]	[0.695]	[0.018]
[p, shocks as clusters]	[0.890]	[0.866]	[0.676]	[0.840]
Firm and date effects	–0.101	–0.096	–0.675**	–0.404*
	[0.598]	[0.609]	[0.016]	[0.085]
[p, clustered by date]	[0.546]	[0.497]	[<0.001]	[0.029]
[p, shocks as clusters]	[0.841]	[0.693]	[0.335]	[0.343]
Market-model returns	–0.011	–0.259	0.109	–0.207
	[0.912]	[0.174]	[0.649]	[0.636]
Market-model returns, date effects	0.078	–0.084	–0.027	–0.194
	[0.716]	[0.887]	[0.942]	[0.758]
Moves	384	384	325	325
Trading dates	26	26	21	21
Panel B. The four crash windows without 12 March 2020				
Firm effects	0.035	–0.186	0.893	–0.325
	[0.917]	[0.601]	[0.193]	[0.783]
[p, clustered by date]	[0.874]	[0.562]	[0.150]	[0.754]
[p, shocks as clusters]	[0.935]	[0.363]	[0.127]	[0.667]
Firm and date effects	0.134	0.097	–0.403	–0.314
	[0.413]	[0.517]	[0.192]	[0.329]
[p, clustered by date]	[0.291]	[0.495]	[0.098]	[0.298]
[p, shocks as clusters]	[0.144]	[0.321]	[0.407]	[0.366]
Moves	292	292	234	234
Trading dates	25	25	20	20

Notes. Each cell is the slope of the forward return on the day-0 return across crash-day moves of 5% or more in the most-traded shares, from closes and from day 0. Every regression has firm effects. Date effects drop a date with one move. A market-model return subtracts the share's beta times the OMXH25 return. Panel B leaves out the moves of 12 March 2020. Brackets hold wild bootstrap p-values by trading date; stars use them. The labeled rows give the p clustered by date and with the four shocks as clusters, a guide only. Moves and dates count the firm-effects regressions. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XXXIV

Crash reversal on closes by specification, other listed shares

	All moves: 5 days	All moves: 10 days	Drops: 5 days	Drops: 10 days
Panel A. The four crash windows				
Firm effects	−0.258**	−0.481***	−0.168	−1.128**
	[0.032]	[<0.001]	[0.610]	[0.014]
[p, clustered by date]	[0.009]	[<0.001]	[0.485]	[<0.001]
[p, shocks as clusters]	[0.162]	[0.100]	[0.620]	[0.420]
Firm and date effects	−0.414***	−0.487***	−0.382	−0.840***
	[<0.001]	[<0.001]	[0.393]	[0.005]
[p, clustered by date]	[<0.001]	[<0.001]	[0.247]	[<0.001]
[p, shocks as clusters]	[0.133]	[0.182]	[0.340]	[0.083]
Market-model returns	−0.297***	−0.445***	−0.030	−0.480
	[0.005]	[<0.001]	[0.938]	[0.277]
Market-model returns, date effects	−0.424***	−0.482***	−0.360	−0.732**
	[<0.001]	[<0.001]	[0.499]	[0.028]
Moves	326	326	238	238
Trading dates	29	29	26	26
Panel B. The four crash windows without 12 March 2020				
Firm effects	−0.245	−0.363***	0.328	−0.532
	[0.137]	[0.001]	[0.631]	[0.282]
[p, clustered by date]	[0.074]	[0.002]	[0.438]	[0.255]
[p, shocks as clusters]	[0.116]	[0.147]	[0.787]	[0.130]
Firm and date effects	−0.399***	−0.446***	0.030	−0.621***
	[<0.001]	[<0.001]	[0.919]	[0.006]
[p, clustered by date]	[<0.001]	[<0.001]	[0.918]	[<0.001]
[p, shocks as clusters]	[0.130]	[0.193]	[0.866]	[0.134]
Moves	276	276	188	188
Trading dates	28	28	25	25

Notes. Each cell is the slope of the forward return on the day-0 return across crash-day moves of 5% or more in the other listed shares, from closes and from day 0. Every regression has firm effects. Date effects drop a date with one move. A market-model return subtracts the share's beta times the OMXH25 return. Panel B leaves out the moves of 12 March 2020. Brackets hold wild bootstrap p-values by trading date; stars use them. The labeled rows give the p clustered by date and with the four shocks as clusters, a guide only. Moves and dates count the firm-effects regressions. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

days in three of four specifications. Without 12 March 2020 the five-day slope on closes with firm effects is −0.245 ($p = 0.137$), and with date effects it is −0.399 ($p < 0.001$).

Table IA.XXXV gives the slope over drops at the two longest horizons, which the rule of H1 does not read. In the most-traded shares the raw slope with firm effects is −2.838 at 60 days ($p =$

Table IA.XXXV

Slopes over drops at 60 and 90 days on closes, by specification

	Most-traded shares: 60 days	Most-traded shares: 90 days	Other listed shares: 60 days	Other listed shares: 90 days
Firm effects	−2.838**	−3.260***	−3.042***	−2.523**
[p, wild bootstrap by date]	[0.033]	[0.008]	[0.006]	[0.018]
[p, clustered by date]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
[p, shocks as clusters]	[0.324]	[0.267]	[0.113]	[0.079]
Firm and date effects	−0.907*	−0.915*	−1.922***	−0.759*
[p, wild bootstrap by date]	[0.069]	[0.075]	[0.003]	[0.085]
[p, clustered by date]	[0.014]	[0.031]	[<0.001]	[0.028]
[p, shocks as clusters]	[0.389]	[0.344]	[0.116]	[0.457]
Net of the market, firm effects	0.154	0.246	−0.724**	−0.060
[p, wild bootstrap by date]	[0.640]	[0.713]	[0.047]	[0.797]
[p, clustered by date]	[0.527]	[0.589]	[0.010]	[0.792]
[p, shocks as clusters]	[0.110]	[0.475]	[0.131]	[0.779]
Less beta × market, firm effects	−1.109**	−1.189**	−2.277***	−1.591**
[p, wild bootstrap by date]	[0.029]	[0.034]	[0.010]	[0.032]
[p, clustered by date]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
[p, shocks as clusters]	[0.366]	[0.330]	[0.099]	[0.076]
Drops	324	324	238	238

Notes. Each cell is the slope of the 60-day or 90-day forward return on the day-0 return across crash-day drops of 5% or more, from closes and from day 0. Every regression has firm effects. Net of the market subtracts the OMXH25 return, and less beta × market subtracts it times the share's market beta. Stars use the wild bootstrap p by trading date. The next rows give the asymptotic p clustered by date and the bootstrap p with the four shocks as clusters, a guide only (Section II.G). Drops count the first row; a share without a beta leaves the last. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

0.033) and −3.260 at 90 (p = 0.008). A larger drop was followed by a higher return than a smaller one.

The slope less beta times the market rejects on its bootstrap p by date too. In the most-traded shares the slope net of the market does not, nor the slope with date effects; in the other listed shares both reject at 60 days (p = 0.047 and p = 0.003). Clustered by date, every raw slope of the table rejects. With the four shocks as clusters no cell of the table does. We read these slopes as mixed evidence and not as a reversal.

Table IA.XXXVI adds a day-1 start at ten days to the slopes of Table IA.XXXIII and Table IA.XXXIV, with t-statistics. From day 1 no ten-day slope is distinguishable from zero at 5%.

Table IA.XXXVI

Ten-day crash slopes from day 1 on closes: date effects and market-model returns

	Raw, date effects: most-traded shares	Raw, date effects: other listed shares	Market model: most-traded shares	Market model: other listed shares	Market model, date effects: most-traded shares	Market model, date effects: other listed shares
All moves, 10 days, day 1	−0.134	−0.158*	−0.263	−0.120	−0.153	−0.148
	(−1.18)	(−1.78)	(−1.85)	(−1.27)	(−0.97)	(−1.67)
	[0.355]	[0.080]	[0.104]	[0.229]	[0.473]	[0.103]
Drops, 10 days, day 1	−0.465	−0.245	−0.312	0.061	−0.262	−0.243
	(−1.67)	(−1.80)	(−1.06)	(0.30)	(−0.84)	(−1.80)
	[0.121]	[0.113]	[0.369]	[0.758]	[0.546]	[0.143]
Crash moves	384	326	384	326	384	326
Crash drops	325	238	325	238	325	238
Firm effects	yes	yes	yes	yes	yes	yes
Date effects	yes	yes	no	no	yes	yes

Notes. Moves of 5% or more inside the crash windows, on closes: the ten-day forward return from the day-1 close on the day-0 return, with firm effects. The raw columns with date effects compare each share with the day's other movers. The market-model columns replace every return by the return less beta times the OMXH25 return, beta estimated before the window. Parentheses hold t-statistics clustered by trading date, brackets wild bootstrap p-values by date; stars use the latter. A date with one move drops under date effects; counts are those with firm effects. Table IA.XXXIII and Table IA.XXXIV give the day-0 slopes and the trading dates. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XXXVII repeats the test on five-factor returns. Fama and French (2015) define the five factors on US data. The factors used here are the developed-Europe daily series from Kenneth French's data library (French (2026)), converted to euros. The slopes below are on closes.

In the most-traded shares the five-factor slope at five days is 0.114 (p = 0.278). With date effects it is 0.461 (p = 0.009), a continuation and not a reversal. Over drops alone the five-factor slope of the first column is 0.594 (p = 0.010).

Table IA.XXXVIII changes the crash windows: windows extended by five trading days, each window's five worst days, and stricter and looser cut-offs. In no column is the five-day slope in the most-traded shares distinguishable from zero. The looser cut-offs flag seven windows, so column 5 is the one price test in which the week of 26 October 2020 is pooled with the shocks. The other

Table IA.XXXVII

Crash reversal on five-factor returns, closes

	(1) Five-factor, most-traded shares	(2) Five-factor, other listed shares	(3) Five-factor, date effects, most-traded shares	(4) Five-factor, date effects, other listed shares	(5) Market model, most-traded shares	(6) Market model, other listed shares
All moves, 5 days	0.114	−0.396***	0.461***	−0.478***	−0.009	−0.279***
	(1.11)	(−2.89)	(2.51)	(−4.83)	(−0.10)	(−3.26)
	[0.278]	[0.009]	[0.009]	[<0.001]	[0.925]	[0.007]
All moves, 10 days	−0.164	−0.490***	0.162	−0.455***	−0.262	−0.434***
	(−0.82)	(−4.78)	(0.42)	(−4.57)	(−1.79)	(−4.81)
	[0.493]	[<0.001]	[0.706]	[<0.001]	[0.169]	[<0.001]
All moves, 10 days, day 1	−0.197	−0.165**	0.105	−0.119	−0.266	−0.108
	(−1.46)	(−2.12)	(0.46)	(−1.30)	(−1.87)	(−1.12)
	[0.181]	[0.042]	[0.663]	[0.209]	[0.101]	[0.290]
Drops, 5 days	0.594**	−0.276	0.701**	−0.264	0.118	0.069
	(2.58)	(−0.68)	(2.40)	(−0.94)	(0.50)	(0.24)
	[0.010]	[0.852]	[0.045]	[0.518]	[0.630]	[0.829]
Drops, 10 days	0.045	−0.706	0.234	−0.700*	−0.218	−0.400
	(0.09)	(−2.39)	(0.38)	(−2.78)	(−0.61)	(−1.40)
	[0.936]	[0.126]	[0.740]	[0.086]	[0.629]	[0.401]
Drops, 10 days, day 1	−0.113	−0.179	0.200	−0.274*	−0.322	0.132
	(−0.39)	(−0.97)	(0.49)	(−2.07)	(−1.11)	(0.61)
	[0.708]	[0.360]	[0.640]	[0.097]	[0.352]	[0.526]
Crash moves	383	297	383	297	383	297
Crash drops	324	214	324	214	324	214
Firm effects	yes	yes	yes	yes	yes	yes
Date effects	no	no	yes	yes	no	no

Notes. Crash-day moves of 5% or more on closes: the forward five-factor return on the day-0 one, with firm effects. A five-factor return is the share's euro return over the euro overnight rate, less its loadings times the five developed-Europe factors of Fama and French. That rate is the euro short-term rate from October 2019, the ECB deposit facility rate before. Table IA.LV names the factor files. Loadings are estimated before the window; short histories drop. Columns 5 and 6 repeat the market model on these moves. Day-1 rows start at the day-1 close. Parentheses hold date-clustered t-statistics; brackets, wild bootstrap p-values, which the stars use. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XXXVIII

Crash reversal under alternative crash windows, most-traded shares on closes

	(1) crash windows	(2) extended 5 days	(3) 5 worst days	(4) stricter cut-offs	(5) looser cut-offs
Crash, 5 days	−0.006	0.103	0.016	−0.025	−0.060
	(−0.08)	(0.74)	(0.14)	(−0.29)	(−0.54)
	[0.926]	[0.484]	[0.859]	[0.714]	[0.692]
Crash, 10 days	−0.479	−0.058	−0.184	−0.579	−0.211
	(−2.01)	(−0.39)	(−0.86)	(−2.24)	(−1.29)
	[0.192]	[0.701]	[0.479]	[0.160]	[0.304]
Crash moves	384	771	294	349	516
Trading dates	26	64	17	19	47
Crash drops only, 5 days	0.155	0.273	−0.075	0.011	0.267
	(0.39)	(1.11)	(−0.13)	(0.03)	(1.08)
	[0.689]	[0.322]	[0.898]	[0.977]	[0.314]
Crash drops only, 10 days	−1.205	−0.703*	−0.818	−1.351	−0.610
	(−2.36)	(−2.20)	(−1.04)	(−2.39)	(−1.54)
	[0.159]	[0.064]	[0.478]	[0.142]	[0.293]
Crash drops	325	523	265	300	408
Trading dates with a crash drop	21	48	15	15	38
Shocks	4	4	4	2	7
Firm effects	yes	yes	yes	yes	yes

Notes. The forward return on the day-0 return among moves of 5% or more on closes inside a crash window, with firm effects. Column 1 uses the four crash windows. Column 2 adds five trading days before and after each. Column 3 keeps each window's five lowest market-return days. Column 4 tightens the weekly-return cut-off from −6% to −7% and the ratio's from −2.5 to −3.0, keeping the COVID-19 crash and the invasion. Column 5 relaxes them to −5% and −2.0, flagging seven windows, the week of 26 October 2020 among them. Parentheses hold date-clustered t-statistics; brackets, wild bootstrap p-values by date, which the stars use. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

pooling is a labeled row of Table IA.LXXIV.

Table IA.XXXIX shortens the list to its first 55 and its first 25 shares by traded value. The five-day slope stays indistinguishable from zero.

Over drops only, the ten-day slope on closes is negative in both shorter lists (p = 0.043 and 0.037). These are two of the twelve slopes of the table, and they are outside the headline tests.

Table IA.XL gives the crash slope on the fixed list of 55 shares, a comparison sample (Section II), and on the listed shares outside it. On closes the five-day slope of the fixed list is −0.023 (wild bootstrap p = 0.835), on 227 moves. Outside the list it is −0.168 (p = 0.037).

Table IA.XXXIX

Crash reversal on closes for shorter lists of the most-traded shares

	Most-traded shares	The 55 most traded	The 25 most traded
All crash moves, 5 days	−0.006	0.118	0.069
	(−0.08)	(0.83)	(0.29)
	[0.926]	[0.432]	[0.783]
All crash moves, 10 days	−0.479	−0.470	−0.501
	(−2.01)	(−1.38)	(−0.85)
	[0.192]	[0.287]	[0.504]
Crash moves	384	187	81
Trading dates	26	23	14
Crash drops only, 5 days	0.155	0.127	−0.273
	(0.39)	(0.35)	(−0.56)
	[0.689]	[0.725]	[0.639]
Crash drops only, 10 days	−1.205	−1.803**	−2.453**
	(−2.36)	(−3.06)	(−4.42)
	[0.159]	[0.043]	[0.037]
Crash drops	325	165	76
Securities	115	63	27
Firm effects	yes	yes	yes

Notes. Each regression is the forward return from the day-0 close on the day-0 return among moves of 5% or more inside the crash windows, with firm fixed effects. The three columns rank the listed shares by the traded value of Section II.E before each window and keep the first 100, 55, or 25. The second column is not the fixed list of 55 shares. Drops are moves with a negative day-0 return. Parentheses hold t-statistics clustered by trading date; brackets hold wild cluster bootstrap p-values by date; stars use the bootstrap p. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XLI asks whether a sector-wide move explains the slope in all listed shares. With sector-day effects the five-day slope is −0.289 (wild bootstrap p = 0.033), against −0.232 without them. Among the shares with a GICS code it is −0.263 (p = 0.098). At 5% no sector's five-day slope is distinguishable from zero when estimated alone; all eight estimated slopes are negative.

The point estimate is more negative in instruments that are not listed shares (−0.459); the table does not test the difference. Large moves on other days also have a negative slope at register prices, of −0.063 ($p < 0.001$), about a quarter of the crash slope.

Table IA.XL

Crash reversal on closes: the fixed list of 55 shares (comparison) and the listed shares outside it

	The fixed list of 55 shares	Listed shares outside the fixed list
Crash, 5 days	−0.023	−0.168**
[p, wild bootstrap]	[0.835]	[0.037]
Crash, 10 days	−0.323	−0.458**
[p, wild bootstrap]	[0.310]	[0.013]
Earnings, 5 days	0.296	0.174
(t, clustered by date)	(1.91)	(2.65)
Crash moves	227	483
Trading dates	28	29
Earnings moves	183	153
Securities, crash move	52	118
Securities, crash or earnings	55	154

Notes. The forward five-day and ten-day return on the day-0 return among crash-day moves of 5% or more on closes, with firm fixed effects. Brackets hold wild bootstrap p-values by trading date, which the stars use. The earnings row runs the same regression on earnings-day moves, with its t clustered by trading date. It carries no stars, because no bootstrap p is computed for it on closes. The securities rows count the shares with a crash-day move, and with a crash-day or an earnings-day move. The fixed list of 55 shares is the same in every year and is shown for comparison only. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XLI

Crash reversal within sectors and by instrument, register prices

Sample	5 days	10 days	Moves	Trading dates
All listed shares, firm effects	−0.232**	−0.446***	591	30
	(−3.26)	(−3.27)		
	[0.030]	[0.009]		
All listed shares, firm and sector-day effects	−0.289**	−0.377***	591	30
	(−2.56)	(−4.12)		
	[0.033]	[0.001]		
Listed shares with a GICS code, firm effects	−0.229**	−0.444**	535	30
	(−2.94)	(−2.96)		
	[0.042]	[0.022]		
Listed shares with a GICS code, firm and sector-day effects	−0.263*	−0.300***	535	30
	(−1.97)	(−3.06)		
	[0.098]	[0.003]		
Listed shares outside the fixed list of 55 (comparison), firm effects	−0.272***	−0.482***	397	30

Table IA.XLI (continued)

Sample	5 days	10 days	Moves	Trading dates
	(−4.06)	(−4.40)		
	[0.003]	[<0.001]		
Every instrument the register prices, firm effects	−0.453***	−0.610***	4,570	30
	(−4.15)	(−3.07)		
	[<0.001]	[0.007]		
Not listed shares (warrants, certificates, other), firm effects	−0.459***	−0.614***	3,979	30
	(−4.13)	(−3.04)		
	[<0.001]	[0.008]		
All listed shares, everyday large moves, firm effects	−0.063***		7,971	1,224
	(−3.40)			
	[<0.001]			
Industrials	−0.167	−0.494	122	26
	(−1.48)	(−2.06)		
	[0.164]	[0.102]		
Information Technology	−0.406*	−0.562*	122	27
	(−2.95)	(−2.55)		
	[0.092]	[0.093]		
Consumer Discretionary	−0.262	−0.494	51	23
	(−1.46)	(−1.58)		
	[0.122]	[0.154]		
Financials	−0.143	−0.735***	51	18
	(−1.30)	(−6.01)		
	[0.171]	[<0.001]		
Communication Services	−0.250	−0.348	49	20
	(−1.65)	(−1.99)		
	[0.242]	[0.155]		
Health Care	−0.193	−0.305*	45	19
	(−1.03)	(−2.94)		
	[0.307]	[0.064]		
Materials	−0.381	−1.109*	34	14
	(−1.48)	(−3.12)		
	[0.151]	[0.067]		
Consumer Staples	−0.125	−0.076	33	16
	(−0.73)	(−0.40)		
	[0.535]	[0.737]		
Real Estate	not estimated	not estimated	19	10
Energy	not estimated	not estimated	5	5
Utilities	not estimated	not estimated	4	4

No GICS code	−0.262	−0.466**	56	18
	(−1.90)	(−3.75)		
	[0.103]	[0.014]		

Notes. Slopes of the forward return on the day-0 return across crash-day moves of 5% or more at register prices. Parentheses hold t-statistics clustered by trading date; brackets hold wild bootstrap p-values by trading date, which the stars of every row use. The first row is the slope of Table III. Sector-day effects absorb the sector's mean move that day; a share with no GICS code gets a date effect. Sector rows use firm effects; a sector under 30 moves is not estimated. Everyday large moves lie outside the crash windows and off earnings days, the October 2020 fall among them. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XLII gives the returns after guidance changes, the second news benchmark of Section III.A. The slope of the ten-day abnormal return on the sign of the change is 1.82% (p = 0.006). The drift follows lowered guidance, at −3.67% (t = −3.65). After raised guidance the mean is −0.03% (t = −0.04) and cannot be told from zero.

Table IA.XLIII gives the mean return after a drop of 5% or more in the most-traded shares, from closes. The raw return over the next five days is −6.75%: the market kept falling. Net of the market treats every share as if its market beta were one, and the rows less beta times the market drop that assumption. Section III.D reports the five-day return; the later horizons are read here. In the October 2020 window the shares that dropped led the market instead, by 5.08% at 60 days (p = 0.039).

At ten days the return less beta times the market is −4.23%. It rejects at 5% by date (p = 0.030)

Table IA.XLII

Returns after guidance changes, all listed shares at register prices

	Announcement day	Days 1 to 10	t	p	Events
Raised guidance	4.63%	−0.03%	−0.04		92
Lowered guidance	−2.21%	−3.67%***	−3.65		52
Slope on the sign (headline)		1.82%***	2.77	0.006	144

Notes. Events are announcements of raised or lowered guidance, 2018 to 2022, from S&P Capital IQ's key developments file; events inside the crash windows are kept. The abnormal return is the share's return less the register market factor (Section II.C). The second column compounds it over days 1 to 10. Of 165 events, 144 have a ten-day return. The first two rows are event means with their t; their p is not printed. The last row regresses the ten-day abnormal return on the sign of the change, +1 for raised and −1 for lowered, its t clustered by announcement date. Stars use each row's p. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XLIII

Returns after drops of 5% or more inside the crash windows and in the October 2020 window, most-traded shares

	5 days	10 days	20 days	60 days	90 days	Drops	Dates
Panel A. The four crash windows							
Raw return	−6.75%*	−6.42%	−3.74%	5.44%	4.11%	325	21
	[0.055]	[0.123]	[0.520]	[0.540]	[0.815]		
[p, shocks as clusters]	[0.244]	[0.648]	[0.648]	[0.427]	[0.901]		
Return net of the market	0.00%	−1.97%	−2.14%*	−5.71%***	−7.31%***	325	21
	[>0.999]	[0.453]	[0.071]	[0.007]	[0.002]		
[p, shocks as clusters]	[0.998]	[0.610]	[0.532]	[0.100]	[0.085]		
Return less beta × market	−2.25%	−4.23%**	−3.52%	−1.84%	−2.36%	325	21
	[0.300]	[0.030]	[0.199]	[0.507]	[0.427]		
[p, shocks as clusters]	[0.782]	[0.579]	[0.512]	[0.094]	[0.111]		
Panel B. The four crash windows without 12 March 2020							
Raw return	−6.75%	−8.44%	−8.27%	−0.76%	−3.75%	234	20
	[0.105]	[0.192]	[0.230]	[0.858]	[0.400]		
[p, shocks as clusters]	[0.242]	[0.648]	[0.654]	[0.659]	[0.071]		
Return net of the market	0.92%	−0.13%	−2.09%	−5.12%**	−6.54%***	234	20
	[0.107]	[0.893]	[0.138]	[0.015]	[0.004]		
[p, shocks as clusters]	[0.139]	[0.818]	[0.534]	[0.080]	[0.074]		
Return less beta × market	−1.48%	−4.17%*	−5.68%**	−4.45%*	−5.21%***	234	20
	[0.607]	[0.058]	[0.024]	[0.068]	[0.003]		
[p, shocks as clusters]	[0.782]	[0.579]	[0.522]	[0.035]	[0.054]		
Panel C. October 2020 (robustness window)							
Raw return	2.45%**	8.46%*	11.39%	21.60%**	25.85%***	27	5
	[0.021]	[0.075]	[0.106]	[0.018]	[0.004]		
Return net of the market	−0.01%	0.48%	0.99%	5.08%**	7.12%*	27	5
	[0.989]	[0.748]	[0.752]	[0.039]	[0.069]		
Return less beta × market	0.32%	1.94%	2.91%	8.19%**	10.64%**	27	5
	[0.831]	[0.285]	[0.461]	[0.035]	[0.015]		

Notes. Mean compounded return after a drop of 5% or more inside a window, from closes. Net of the market subtracts the OMXH25 return, a price index, so such means are too high by the dividend yield (Section II.C). Less beta × market subtracts that return times the share's beta of the year before. Brackets hold wild bootstrap p-values by trading date; stars use them. The labeled rows cluster by shock, a guide only. One drop has no return beyond ten days, so later cells rest on 324 (Panel A) and 233 (Panel B). Panel A's five-day return net of the market is a headline test. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

and not with the four shocks as clusters (p = 0.579). At the other horizons of Panel A that return does not reject on either p.

Table IA.XLIV gives the returns after drops, net of the market, for each sample. In the other

Table IA.XLIV

Returns net of the market after drops of 5% or more inside the crash windows, by sample

	5 days	10 days	20 days	60 days	90 days	Drops	Dates
Most-traded shares	0.00%	−1.97%	−2.14%*	−5.71%***	−7.31%***	325	21
	[>0.999]	[0.453]	[0.071]	[0.007]	[0.002]		
[p, shocks as clusters]	[0.998]	[0.610]	[0.532]	[0.100]	[0.085]		
Other listed shares	1.98%**	−0.75%	−3.93%**	−7.21%***	−7.89%***	238	26
	[0.048]	[0.824]	[0.023]	[<0.001]	[<0.001]		
[p, shocks as clusters]	[0.144]	[0.073]	[0.082]	[0.019]	[0.114]		
All listed shares	0.84%	−1.46%	−2.90%**	−6.35%***	−7.56%***	563	28
	[0.373]	[0.687]	[0.017]	[<0.001]	[<0.001]		
[p, shocks as clusters]	[0.116]	[0.585]	[0.333]	[0.059]	[0.029]		
Fixed list of 55 shares	1.31%***	−0.08%	0.11%	−4.17%***	−6.32%***	187	22
	[0.003]	[0.978]	[0.887]	[0.004]	[0.002]		
[p, shocks as clusters]	[0.136]	[0.903]	[0.821]	[0.151]	[0.142]		

Notes. Mean compounded return less the OMXH25 return over the same days, after a drop of 5% or more on a day inside one of the four crash windows, from closes. The OMXH25 is a price index (Section II.C), so each mean is too high by the market's dividend yield. Brackets hold wild bootstrap p-values by trading date; stars use them. The labeled rows cluster by the four shocks and are a guide only. Drops and dates count the five-day cells; one drop fewer enters at 20 days and beyond in three of the four rows. The fixed list of 55 shares is shown for comparison. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

listed shares the five-day return is 1.98% (p = 0.048 by date, and 0.144 with the four shocks as clusters). By day 60 every sample trails the index. With the four shocks as clusters, two of the eight cells at 60 and 90 days have a p below 0.05.

Table IA.XLV turns each slope into the five-day gain it implies after a drop of 10%, beside what the drops returned at register prices. In the other listed shares the slope implies a gain of 3.53%. Raw, the drops near 10% returned −5.95%; net of the market they returned 2.13%, and all drops 2.31%. The implied gain is measured against a share's mean, so it is not a predicted level.

Table IA.XLVI gives the volume test of Section III.E for three samples, two measures of market volume, and two horizons. No interaction with market volume is distinguishable from zero at the 5% level. With the share's own volume the five-day interaction in all listed shares is 0.172 (unadjusted p = 0.014): there, high-volume moves reverse less. It is one of 18 cells and outside the headline tests. No other cell of Panels A and B rejects at 5%.

Llorente et al. (2002) relate the daily volume of a stock to the autocorrelation of its return, and

Table IA.XLV

The five-day gain a reversal slope implies after a drop of 10%, beside what the drops returned

	Most-traded shares	Other listed shares	All listed shares
Five-day slope	0.008	−0.353**	−0.232**
	[0.928]	[0.011]	[0.030]
Gain implied after a drop of 10%	−0.08%	3.53%	2.32%
All drops: raw return	−7.95%***	−4.85%*	−6.49%**
	[0.009]	[0.051]	[0.018]
All drops: return net of the market	0.24%	2.31%***	1.21%
	[0.867]	[<0.001]	[0.172]
Drops near 10%: raw return	−10.19%**	−5.95%*	−8.12%**
	[0.018]	[0.082]	[0.024]
Drops near 10%: return net of the market	−1.49%	2.13%***	0.26%
	[0.186]	[0.009]	[0.663]
Moves behind the slope	289	302	591
Trading dates of those moves	29	29	30
Drops	256	230	486
Trading dates of the drops	24	28	29
Drops near 10%	85	81	166
Trading dates of the drops near 10%	14	19	21

Notes. Crash-day moves of 5% or more at register prices. The slope is the five-day forward return on the day-0 return, with firm fixed effects. The implied gain is minus one tenth of the slope. The next rows are mean five-day returns after all drops and after drops of 7.5% to 12.5%, raw and net of the OMXH25. Brackets hold wild bootstrap p-values by date; stars use them. The slope rests on rises and drops together, the means on drops only; the last six rows count their moves and dates. Outside the most-traded shares one drop has no index return and leaves the net means. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

the interaction with the share's own volume follows that design. In the most-traded shares it is 0.065 on crash-window days (p = 0.331).

Panel D asks the same question across crash-day moves of 5% or more, and not across days. The product of the day-0 return with standardized log abnormal volume is positive in every sample. It rejects at 5% in all listed shares and on the fixed list. In the most-traded shares its bootstrap p is just above 0.05 and its p clustered by date is 0.006. A move on high volume reverses less there, which is against the volume explanation. At register prices in all listed shares the product is 0.120 (p = 0.004).

Table IA.XLVI

Coefficient on the day's return times volume in regressions of later returns, crash-window days and October 2020 window days

	Most-traded shares	All listed shares	Fixed list of 55 shares (comparison)
Panel A. Next-day return			
Own volume	0.065	0.017	0.005
	[0.331]	[0.674]	[0.947]
Market volume, closes	−0.201	−0.226	−0.057
	[0.475]	[0.308]	[0.809]
Market volume, register	−0.059	−0.079	0.198
	[0.906]	[0.845]	[0.681]
Stock-days, own volume	3,000	4,722	1,643
Stock-days, market volume	3,000	4,941	1,647
Trading dates	30	30	30
Panel B. Five-day return			
Own volume	0.188	0.172**	0.203
	[0.161]	[0.014]	[0.178]
Market volume, closes	0.774	0.710	0.496
	[0.227]	[0.203]	[0.525]
Market volume, register	0.508	0.422	−0.243
	[0.744]	[0.770]	[0.891]
Stock-days, own volume	3,000	4,722	1,643
Stock-days, market volume	3,000	4,941	1,647
Trading dates	30	30	30
Panel C. Next-day return, October 2020 (robustness window)			
Own volume	−0.091	−0.060	not estimated
	[0.395]	[0.147]	
Market volume, closes	−1.044	−1.204*	not estimated
	[0.141]	[0.055]	
Stock-days, own volume	500	790	
Stock-days, market volume	500	805	
Trading dates	5	5	
Panel D. Five-day return after crash-day moves of 5% or more			
Own abnormal volume	0.183*	0.186***	0.183**
	[0.050]	[<0.001]	[0.032]

[p, clustered by date]	[0.006]	[<0.001]	[0.006]
Moves	384	709	227
Trading dates	26	30	28

Notes. Each cell is the coefficient on the day's return times detrended log volume, in a regression of the next-day or next-five-day return on the day's return and that product, with firm effects. Volume is the share's own or the market's, less its mean of the previous year. Market volume is summed from closes and shares traded, or from register trades. The sample is the crash-window days, on closes. Panel D takes crash-day moves of 5% or more, with standardized log abnormal volume. Brackets hold wild bootstrap p-values by trading date; stars use them. In October 2020 the fixed list is not estimated. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XLVII gives the VIX test at every lag length. No book rejects at any lag length after the Benjamini-Hochberg adjustment over the three books.

Table IA.XLVIII adds the lagged market return and the market hedge of Nagel (2012) to the book formed two days back. The slope is between 0.035% and 0.045% per ten VIX points in every column. Hedged, the slope is 0.035% (t = 1.64 at five lags).

The t of the slope rises with the lag length. With the control it is 1.38 at no lags, 2.34 at three and 2.70 at five, the row that Section III.E reports. The result depends on that choice.

Table IA.XLIX gives the retail-buying test for both rankings, two tail sizes (top 2% and top 5%), and two samples. First-time buyers are counted from 2019, so the 2018 sell-off is out.

In all listed shares the top 5% by first-time buyers returns 1.13% less than the rest on crash-window days (wild bootstrap p = 0.404). The result of the most-traded shares is not detected there, and it is not detected in October 2020 (−0.44%, p = 0.903, on the five days of that window).

Ranked by net buying, the return of the top 5% less the rest in the most-traded shares is −0.69% on all days (t = −2.51) and 0.73% on crash-window days (p = 0.474).

Each sample has 36 crash-window cells: two rankings, a start at the day-0 or the next close, and tails of 2%, 5% and 10%. Each is taken over all shares and over either half by traded value. The table prints four of them for each sample.

Panel C splits the headline cell, the top 5% by first-time buyers in the most-traded shares, by shock. The mean is −5.90% in the COVID-19 crash, −1.92% in the 2021 scare and −1.99% in the invasion. The twenty-day returns of adjacent days overlap, and 15 of the 25 days are one window,

Table IA.XLVII

Reversal-book return on the previous month-end VIX, by lag length, most-traded shares

	Book formed on the previous five days	Book formed two days back	Book formed on the previous day	Rejections at 5%
Slope per 10 VIX points	−0.013%	0.040%	−0.054%	
t-statistic, 0 lags	(−0.84)	(1.34)	(−1.12)	0
	[0.400]	[0.393]	[0.393]	
t-statistic, 1 lag	(−0.75)	(1.50)	(−0.99)	0
	[0.451]	[0.403]	[0.451]	
t-statistic, 2 lags	(−0.69)	(1.64)	(−0.95)	0
	[0.489]	[0.304]	[0.489]	
t-statistic, 3 lags	(−0.66)	(1.78)	(−0.91)	0
	[0.507]	[0.226]	[0.507]	
t-statistic, 4 lags	(−0.64)	(1.81)	(−0.90)	0
	[0.519]	[0.212]	[0.519]	
t-statistic, 5 lags	(−0.63)	(1.82)	(−0.89)	0
	[0.530]	[0.207]	[0.530]	
t-statistic, 6 lags	(−0.62)	(1.87)	(−0.90)	0
	[0.534]	[0.183]	[0.534]	
Months	54	54	54	

Notes. Slope of the monthly mean of a reversal book's daily return on the previous month-end VIX, per ten VIX points, on closes. A book weights each share by minus its earlier return less the cross-sectional mean: over the previous five days, two days back, or the previous day. Parentheses hold t-statistics at each Newey-West lag length. Brackets hold p-values adjusted by Benjamini-Hochberg over the three books. The last column counts the books that reject at 5% after the adjustment. Table IV reports the row with five lags. No stars are printed, since the p depends on the lag length.

so the p-value of the pooled cell can overstate the evidence. No shock is tested alone.

Table IA.XLVIII

Reversal book formed two days back on the VIX, with a market control and a hedge, most-traded shares

	No control	Lagged market return	Hedged	Hedged, lagged market return
Slope per 10 VIX points	0.040%	0.045%	0.035%	0.041%
t-statistic, 0 lags	(1.34)	(1.38)	(1.16)	(1.22)
t-statistic, 1 lag	(1.50)	(1.74)	(1.32)	(1.54)
t-statistic, 2 lags	(1.64)	(2.01)	(1.46)	(1.79)
t-statistic, 3 lags	(1.78)	(2.34)	(1.58)	(2.08)
t-statistic, 4 lags	(1.81)	(2.52)	(1.62)	(2.24)
t-statistic, 5 lags	(1.82)	(2.70)	(1.64)	(2.42)
t-statistic, 6 lags	(1.87)	(2.95)	(1.70)	(2.69)
Months	54	54	54	54

Notes. Slope of the monthly mean of the book's daily return on the previous month-end VIX, per ten VIX points, on closes. The book formed two days back weights each share by minus its return two days before, less the cross-sectional mean. The control is the OMXH25 return over the four weeks to the previous month end. The hedge removes the book's OMXH25 beta, estimated apart after up and down market days. Parentheses hold t-statistics at each Newey-West lag length. These columns are outside the headline tests. No stars are printed, since the p depends on the lag length.

Table IA.XLIX

Twenty-day return after the heaviest household buying, from the day-0 close

	Most-traded shares: all days	Most-traded shares: window days	All listed shares: all days	All listed shares: window days
Panel A. All days and the days of the four crash windows				
Net buying, top 2%	−1.04%***	1.90%	0.25%	2.23%
	(−2.91)	[0.206]	(1.19)	[0.113]
[p, adjusted]		[0.437]		[0.583]
Days	1,113	30	1,220	30
Shares in the tail per day	2.00		3.17	
Net buying, top 5%	−0.69%**	0.73%	−0.01%	0.12%
	(−2.51)	[0.474]	(−0.06)	[0.895]
[p, adjusted]		[0.710]		[0.929]
Days	1,113	30	1,220	30
Shares in the tail per day	5.00		7.25	
First-time buyers, top 2%	−0.36%	−3.81%***	−0.58%	0.15%
	(−0.82)	[0.005]	(−1.46)	[0.890]
[p, adjusted]		[0.020]		[0.929]
Days	987	25	987	25
Shares in the tail per day	2.00		3.21	

Table IA.XLIX (continued)

	Most-traded shares: all days	Most-traded shares: window days	All listed shares: all days	All listed shares: window days
First-time buyers, top 5%	−0.07%	−4.32%***	0.03%	−1.13%
	(−0.23)	[<0.001]	(0.11)	[0.404]
[p, adjusted]		[0.004]		[0.910]
Days	987	25	987	25
Shares in the tail per day	5.00		7.37	
Panel B. The days of the October 2020 window (robustness)				
Net buying, top 2%		11.92%**		−0.96%
		[0.015]		[0.763]
Net buying, top 5%		5.45%**		0.98%
		[0.028]		[0.732]
First-time buyers, top 2%		1.11%		3.17%
		[0.737]		[0.507]
First-time buyers, top 5%		−0.44%		2.88%
		[0.903]		[0.674]
Days		5		5
Panel C. First-time buyers, top 5%, by shock (means, not tested alone)				
COVID-19 crash		−5.90%		−3.11%
Days		15		15
2021 scare		−1.92%		−2.61%
Days		5		5
Invasion		−1.99%		6.32%
Days		5		5

Notes. Mean twenty-day return of the tail less the rest, net of the day's mean, on closes, over stock-days with more than EUR 10,000 traded. Net buying ranks by household net purchases over all investors' gross trading. First-time buyers ranks by the household accounts whose first recorded leg in the share is an exchange buy that day, over those with an earlier leg. Counts run from 2019. Parentheses hold Newey-West t-statistics (20 lags), brackets wild bootstrap p-values; stars use the cell's p. The adjusted p is Benjamini-Hochberg within each sample over 36 crash-window cells. Panel C gives the mean of one cell by shock. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.L gives this paper's variant of the weekly contrarian test (Section III.E). On NYSE stocks a weekly contrarian strategy earns most after large market declines (Hameed, Kang, and Viswanathan (2010)). In the most-traded shares the return after a one-week decline is 0.31% above other weeks (permutation p = 0.727). After a four-week decline the return is 0.53% below other weeks (permutation p = 0.539).

Table IA.LI splits the crash-day moves by whether the day is a flight-to-safety day. After a flight-to-safety spell, equity returns across 23 countries are indistinguishable from zero over five

Table IA.L

Weekly contrarian return after market declines and in other weeks

	After a decline	Other weeks	Difference	Permutation p	Decline weeks	Weeks
Panel A. After a one-week market decline						
Most-traded shares	0.66%	0.35%	0.31% (0.28)	0.727	9	233
All listed shares	0.78%	0.61%	0.18% (0.13)	0.852	9	238
Listed shares above the floor	0.32%	0.51%	−0.19% (−0.16)	0.830	9	238
Panel B. After a four-week market decline						
Most-traded shares	−0.14%	0.38%	−0.53% (−0.69)	0.539	10	233
All listed shares	−0.06%	0.64%	−0.70% (−0.54)	0.474	10	238
Listed shares above the floor	0.58%	0.50%	0.07% (0.07)	0.938	10	238

Notes. Weekly return of a contrarian book on closes, 2018 to 2022. Weights are minus the previous week's return less its mean, with one day skipped, on the half of shares with above-median turnover. A decline week follows an OMXH25 return, over one or four weeks, more than one and a half standard deviations below its mean over all weeks of the sample. Parentheses hold t-statistics from Newey-West standard errors at 4 lags. The permutation p reshuffles the decline weeks. The floor keeps a share whose median daily traded value over the 60 days before formation is at least EUR 25,000.

days (Baele et al. (2020)). Their regime-switching model puts a positive jump on the day a spell ends. In the most-traded shares the slope is 0.871 on flight-to-safety days and 0.027 on other crash-window days. Neither is distinguishable from zero, nor is their difference of 0.844 (p = 0.333).

The pooled interaction, from one regression with a flight-to-safety indicator, is 0.769 (p = 0.478). In all listed shares the slope on other crash-window days is negative, at −0.122 (p = 0.042) under the 3% rule. A difference between the two kinds of day is not detected in any column.

Table IA.LII asks whose trading on the day of a move goes with a reversal in the most-traded shares. A negative product means a larger reversal where the class bought more. Entered alone, the product for households is −1.101 (wild bootstrap p = 0.278). For foreign nominee accounts it is 1.214 (p = 0.019): moves continue more where these accounts bought more.

Table IA.LI

Crash reversal on flight-to-safety days and on other crash-window days

	Most-traded shares	All listed shares	All listed shares, index drop of 3%	All listed shares, Bund change in lowest 5%
Slope on flight-to-safety days	0.871	0.063	0.135	0.008
	[0.352]	[0.910]	[0.811]	[0.975]
Slope on other crash-window days	0.027	−0.110*	−0.122**	−0.173*
	[0.692]	[0.072]	[0.042]	[0.057]
Difference of the two slopes	0.844	0.173	0.257	0.182
	[0.333]	[0.777]	[0.630]	[0.694]
Pooled interaction, with a flight-to-safety indicator	0.769	0.201	0.169	0.176
	[0.478]	[0.767]	[0.787]	[0.698]
Flight-to-safety dates	7	7	6	4
Other crash-window dates	19	23	24	26
Moves on flight-to-safety days	178	301	282	180
Moves on other days	206	409	428	530

Notes. Slope of the five-day forward return on the day-0 return, with firm effects, across crash-day moves of 5% or more on closes. A flight-to-safety day has an OMXH25 return of −2% or lower and a ten-year Bund yield change at or below its tenth percentile of 2018 to 2022. The last two columns change one threshold; a Bund yield fall of 5 basis points selects the main rule's seven crash-window days. The pooled interaction is from one regression with firm effects and a flight-to-safety indicator. Brackets hold wild bootstrap p-values by trading date; stars use them. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

With the three classes together that product is 0.684 (p = 0.112) over all moves and 2.192 (p = 0.166) over drops only. For foreign nominee accounts alone over drops, the last column, it is 2.440 (p = 0.126). None of these is a headline test.

Other samples and the other price series do not all agree with the table. In all listed shares at register prices the product for foreign nominee accounts, with the three classes together, is 0.664 (p = 0.019). Over drops the product for domestic financial institutions is not detected in the table. On closes in the most-traded shares it is −10.249 (p = 0.036), and in all listed shares at register prices −4.225 (p = 0.032). There, a share that dropped earned more over the next five days where these institutions bought more of it.

Table IA.LIII compares each class's net share on the moves that reversed with its net share on the rest. Households sold on the moves that reversed (−1.90%) and bought on the rest (0.49%).

Table IA.LII

The crash reversal and each investor class's trading on the day of the move, most-traded shares at register prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Day-0 return	0.020	−0.020	−0.023	0.047	−0.024	0.087	−0.050
	(0.21)	(−0.20)	(−0.24)	(0.50)	(−0.08)	(0.28)	(−0.16)
Household net share	−0.063	−0.054			−0.060		
	(−1.50)	(−1.34)			(−1.13)		
Domestic financial net share	−0.177			−0.184	−0.133	−0.153	
	(−2.62)			(−2.32)	(−1.51)	(−1.57)	
Foreign nominee net share	0.022		0.044		0.014		0.032
	(0.85)		(1.95)		(0.53)		(1.20)
Return × household share	−0.872	−1.101			0.401		
	(−0.97)	(−1.36)			(0.29)		
	[0.407]	[0.278]			[0.770]		
Return × domestic financial share	−1.245			−0.533	−4.496	−6.035	
	(−1.44)			(−0.74)	(−0.99)	(−1.38)	
	[0.203]			[0.463]	[0.352]	[0.169]	
Return × foreign nominee share	0.684		1.214**		2.192		2.440
	(1.48)		(2.68)		(1.84)		(2.38)
	[0.112]		[0.019]		[0.166]		[0.126]
Moves	289	289	289	289	256	256	256
Trading dates	29	29	29	29	24	24	24
Securities	103	103	103	103	101	101	101
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes
Moves in the regression	All	All	All	All	Drops	Drops	Drops

Notes. Each column regresses the five-day forward return on the day-0 return and, for each class shown, the class's day-0 net share and their product. The last row says whether all crash-day moves of 5% or more enter, or drops only; columns 6 and 7 enter one class alone over drops. A net share is the class's net purchases on the exchange over the stock-day's traded value, half the register gross of the counted legs (Section II.B). The product uses the day-0 return less its mean. Parentheses hold date-clustered t-statistics; brackets, wild bootstrap p-values. Stars, on the product rows only, use the latter. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.LIII

Net share of each investor class on the moves that reversed and on the rest, most-traded shares at register prices

	Reversed	Not reversed	Difference	t
Households	−1.90%	0.49%	−2.38%	−1.77
Domestic financial institutions	0.89%	0.93%	−0.04%	−0.04
Foreign nominee accounts	1.61%	0.81%	0.80%	0.22
General government	−0.30%	−0.35%	0.06%	0.16
Non-financial corporations	1.63%	0.16%	1.47%	1.25
Non-profit institutions	−0.13%	−0.01%	−0.12%	−0.79
Foreign accounts held directly and unclassified	0.58%	0.73%	−0.14%	−0.14
Moves	83	206		

Notes. Crash-day moves of 5% or more in the most-traded shares at register prices. A move reversed when its five-day forward return has the opposite sign to its day-0 return. Each cell is the mean of the class's day-0 net share, defined in Table IA.LII. The t of the difference is clustered by trading date. No bootstrap p is computed for the difference, so the table carries no stars. The last class joins foreign accounts held directly with unclassified accounts. The rows do not sum to zero, because the other side of a counted leg can be a leg that the flow rules leave out (Section II.B).

The difference of −2.38% has a t of −1.77, with trading dates as clusters. It is not distinguishable from zero at 5%, and the test is outside the headline tests.

Table IA.LIV sorts the most-traded shares by household net buying in each crash window and follows them. Over 60 trading days the most bought trail the most sold by 11.4 basis points a day (t = −2.08). Over 20 days the spread is −13.6 (t = −1.27).

In all listed shares the 60-day spread is −5.4 (t = −1.03). It is not detected after the October 2020 window (t = −0.53) or in the fixed list of 55 shares (Panel C). The t takes pooled days as independent and the test is outside the headline tests, so we read the result as suggestive at most.

The factor sets are US: the CAPM, three factors (Fama and French (1993)), five factors (Fama and French (2015)), and five factors plus a momentum factor (Carhart (1997)). The US factor returns, the momentum factor among them, and the risk-free rate are the daily series of Kenneth French's data library (French (2026)).

Table IA.LIV

Returns after the crash windows by household net buying, most-traded shares

	Mean (bp/day)	CAPM alpha	Three-factor alpha	Five-factor alpha	Five-factor plus momentum alpha
Panel A. Held 20 trading days					
Most bought (quintile 5)	17.7	11.8	12.2	15.7	15.2
	(0.92)	(0.68)	(0.69)	(0.85)	(0.80)
R-squared		0.226	0.230	0.303	0.305
Most sold (quintile 1)	31.2	24.6	25.4	29.3	29.6
	(1.56)	(1.38)	(1.41)	(1.56)	(1.56)
R-squared		0.271	0.281	0.349	0.349
Most bought minus most sold	−13.6	−12.8	−13.2	−13.6	−14.4
	(−1.27)	(−1.19)	(−1.20)	(−1.26)	(−1.34)
R-squared		0.013	0.022	0.023	0.037
Trading days	80	80	80	80	80
Panel B. Held 60 trading days					
Most bought (quintile 5)	−2.4	−3.2	−3.3	−0.6	−1.5
	(−0.26)	(−0.39)	(−0.39)	(−0.07)	(−0.17)
R-squared		0.202	0.219	0.235	0.241
Most sold (quintile 1)	8.9	8.1	7.8	10.1	9.9
	(0.95)	(0.98)	(0.95)	(1.20)	(1.18)
R-squared		0.237	0.267	0.277	0.278
Most bought minus most sold	−11.4	−11.3	−11.1	−10.7	−11.4
	(−2.08)	(−2.06)	(−2.01)	(−1.89)	(−2.00)
R-squared		0.005	0.012	0.016	0.027
Trading days	235	235	235	235	235
Panel C. Most bought minus most sold, 60-day hold, other samples					
All listed shares	−5.4	−5.4	−5.2	−4.5	−4.7
	(−1.03)	(−1.03)	(−1.00)	(−0.85)	(−0.88)
Trading days	235	235	235	235	235
Most-traded, October 2020	−6.2	−7.8	−0.1	−0.2	1.4
	(−0.53)	(−0.59)	(−0.01)	(−0.02)	(0.10)
Trading days	58	58	58	58	58
Fixed list of 55 (comparison)	0.7	0.6	0.4	1.0	2.0
	(0.09)	(0.08)	(0.05)	(0.12)	(0.24)
Trading days	235	235	235	235	235

Notes. After each crash window the most-traded shares are sorted into quintiles by household net purchases over all investors' gross trading in the window (93 to 96 shares). Each quintile is held equal-weighted for 20 or 60 trading days, the four windows pooled. Returns are from closes, in euros, over the US risk-free rate, in basis points a day. Alphas use the market (CAPM), the Fama-French three and five factors, and the five plus momentum. The source is French's US daily five-factor, momentum and risk-free file dated 5 November 2026; its download date was not recorded. Days without US factors drop, leaving 235 of 240. Parentheses hold HC1 t-statistics. No stars are printed: the t takes pooled days as independent.

Table IA.LV repeats the sort against the developed-Europe factors of Kenneth French's data library (French (2026)), in dollars and in euros. The 60-day spread is −11.1 basis points a day unadjusted. Its alphas against the European factors lie between −9.1 and −11.4. Its mean is over five more days than in Table IA.LIV, which drops the days without US factors. With five factors and momentum its t is −1.79 in dollars and −1.74 in euros.

Table IA.LV

Returns after the crash windows by household net buying against European factors, most-traded shares

	Mean (bp/day)	CAPM alpha	Three-factor alpha	Five-factor alpha	Five-factor plus momentum alpha
Panel A. European factors in US dollars					
Most bought (quintile 5), held 20 days	17.7	2.3	4.2	3.6	4.3
	(0.92)	(0.17)	(0.34)	(0.29)	(0.34)
Most sold (quintile 1), held 20 days	31.2	14.7	18.1	17.0	15.8
	(1.56)	(1.02)	(1.46)	(1.36)	(1.27)
Most bought minus most sold, held 20 days	−13.6	−12.3	−13.9	−13.5	−11.5
	(−1.27)	(−1.13)	(−1.31)	(−1.32)	(−1.19)
Trading days, held 20 days	80	80	80	80	80
Most bought (quintile 5), held 60 days	−1.6	−6.8	−5.0	−3.8	−2.9
	(−0.18)	(−1.06)	(−0.80)	(−0.60)	(−0.46)
Most sold (quintile 1), held 60 days	9.5	4.1	6.4	6.9	6.6
	(1.03)	(0.63)	(1.07)	(1.16)	(1.09)
Most bought minus most sold, held 60 days	−11.1	−10.9	−11.4	−10.7	−9.5
	(−2.08)	(−2.02)	(−2.12)	(−1.97)	(−1.79)
Trading days, held 60 days	240	240	240	240	240
Panel B. European factors in euros					
Most bought (quintile 5), held 20 days	18.3	−1.5	−0.1	−0.8	0.1
	(0.95)	(−0.12)	(−0.01)	(−0.07)	(0.01)
Most sold (quintile 1), held 20 days	31.8	10.0	12.7	11.1	10.2
	(1.60)	(0.76)	(1.21)	(1.04)	(0.97)
Most bought minus most sold, held 20 days	−13.6	−11.5	−12.9	−11.9	−10.2
	(−1.27)	(−1.06)	(−1.22)	(−1.20)	(−1.06)
Trading days, held 20 days	80	80	80	80	80
Most bought (quintile 5), held 60 days	−1.1	−8.6	−6.7	−5.6	−4.5
	(−0.12)	(−1.37)	(−1.13)	(−0.94)	(−0.76)
Most sold (quintile 1), held 60 days	10.0	2.1	4.6	4.9	4.6
	(1.08)	(0.34)	(0.83)	(0.89)	(0.84)

Most bought minus most sold, held 60 days	−11.1	−10.7	−11.2	−10.5	−9.1
	(−2.08)	(−1.98)	(−2.09)	(−1.94)	(−1.74)
Trading days, held 60 days	240	240	240	240	240

Notes. The quintiles of Table IA.LIV, from closes, in basis points a day. Alphas use developed-Europe factors: the market (CAPM), the Fama-French three and five factors, and the five plus momentum. The files are 'Europe 5 Factors Daily', which carries the risk-free rate, and 'Europe MOM Factor Daily', downloaded 10 November 2026. Panel A uses the factors as published, in US dollars over the US Treasury bill rate; the portfolio returns stay in euros. Panel B converts the factors to euros and uses the euro overnight rate. The 60-day hold has 240 days here against 235 in Table IA.LIV, so its means differ. Parentheses hold HC1 t-statistics. No stars are printed: the t takes pooled days as independent.

Table IA.LVI gives the volume response of Section III.G for three samples at register prices, day by day and in one pooled panel. The test on closes that the family enters is in Table V and Table IA.XX. In the most-traded shares the pooled panel agrees with the day-by-day test. The product of the absolute return with a crash-window day is −3.567 (t = −3.34), and the product of its logarithm is 0.024 (t = 0.70).

The elasticity of Section III.G uses abnormal volume. Panel C of Table IA.LVI uses log volume itself, which leaves a share's usual volume in the slope. The elasticity then differs by 0.091 in the most-traded shares (permutation p = 0.084). In all listed shares it is higher on crash-window days by 0.139 (p = 0.011), against the sign of H4. In the other listed shares the difference is –0.138 (p = 0.068), and it rejects on Welch's t. The verdict reads abnormal volume in the most-traded shares, where neither form rejects.

Table IA.LVI

The volume response on crash-window days against other trading days, register prices

	Most-traded shares	Other listed shares	All listed shares
Panel A. One slope per day across shares			
Log abnormal volume on absolute return, crash-window days	9.395	7.773	8.487
Log abnormal volume on absolute return, other trading days	15.292	10.729	11.957
Log abnormal volume on absolute return, difference	−5.897**	−2.956	−3.470*
	(−4.45)	(−1.15)	(−2.65)
	[0.013]	[0.324]	[0.055]
Log abnormal volume on log absolute return, crash-window days	0.140	0.090	0.121
Log abnormal volume on log absolute return, other trading days	0.124	0.157	0.125
Log abnormal volume on log absolute return, difference	0.016	−0.067	−0.004
	(0.54)	(−1.27)	(−0.15)
	[0.494]	[0.220]	[0.883]
Crash-window days / other trading days	30 / 1,084	30 / 1,082	30 / 1,092
Panel B. Pooled panel of log abnormal volume			
Absolute return	15.036***	12.143***	13.425***
	(43.67)	(34.01)	(50.89)
Absolute return × crash-window day	−3.567***	−3.023*	−3.053***
	(−3.34)	(−1.95)	(−2.77)
Crash-window day	0.475***	0.510***	0.484***
	(7.02)	(5.68)	(7.11)
Absolute return × crash-window day, firm and date fixed effects	−4.706***	−6.216***	−5.142***
	(−4.33)	(−3.23)	(−4.37)
Log absolute return	0.141***	0.195***	0.157***
	(33.77)	(23.70)	(38.45)
Log absolute return × crash-window day	0.024	0.018	0.026
	(0.70)	(0.38)	(0.74)
Crash-window day, log absolute return model	0.562***	0.529***	0.561***
	(3.63)	(2.60)	(3.57)
Log absolute return × crash-window day, firm and date fixed effects	−0.028	−0.082*	−0.040
	(−0.99)	(−1.74)	(−1.63)
Stock-days	99,420	51,306	151,324
Trading dates	1,114	1,114	1,123
Securities	144	133	206
Dates left out, not trading days	0	0	41
Stock-days left out	0	0	3,977
Panel C. Log volume in place of log abnormal volume, one slope per day			

Log volume on log absolute return, difference	0.091*	−0.138*	0.139**
	(1.27)	(−2.06)	(1.76)
	[0.084]	[0.068]	[0.011]

Notes. Stock-days of listed shares at register prices, 2018 to 2022. Abnormal volume is the day's register shares traded on the exchange over the share's median of the previous year. Panels A and C fit one slope per day across shares, Panel C with log volume; parentheses hold the Welch t, brackets a permutation p the stars use. Panel B pools every stock-day, with firm effects and t-statistics clustered by date; stars use their p. Other trading days lie outside the four crash windows. All listed shares keep exchange trading days only (two rows count the rest); dates before July 2018 are in neither other sample. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.LVII gives the quantile skewness of Section III.G for each sample and price series. All listed shares and the fixed list have more other trading days, because they include the days before the first list of June 2018. In the four crash windows the value on crash-window days is below the value on other trading days in every sample. The permutation p is below 0.05 only for all listed shares. Welch's t for them is −1.86 on closes and −1.95 at register prices, and neither rejects. In the October 2020 window the value is above that of other trading days, and the difference is not distinguishable from zero (Panel C).

Panel D repeats the test on closes with two other measures: quartile skewness, built on the quartiles, and moment skewness, the third standardized moment. Neither sample rejects with either measure (all listed shares: p = 0.457 and 0.277). At register prices no sample rejects with either, with p-values from 0.087 to 0.329. Welch's t, which the rule of Section I.E does not read, disagrees for moment skewness at register prices. Its p is 0.018 in the most-traded shares and 0.041 in all listed shares.

Table IA.LVIII splits the quantile skewness by shock, in the most-traded shares on closes. The difference from other trading days is negative in three shocks and positive in the COVID-19 crash, the deepest shock, which holds 15 of the 30 days. None of the four differences is distinguishable from zero at 5% (permutation p from 0.090 to 0.649). These tests are outside the headline tests.

At register prices the invasion's difference is −0.062, with a Welch p of 0.028 and a permutation p of 0.458.

Tables for Section IV: who takes the other side. The tables follow the order of Section IV:

Table IA.LVII

Quantile skewness of daily returns across shares, crash-window days against other trading days

	Crash-window days	Other trading days	Difference	t	Permutation p	Crash-window days (N)	Other trading days (N)
Panel A. Closes							
Most-traded shares	−0.002	0.041	−0.043	−1.50	0.114	30	1,103
Other listed shares	−0.016	0.039	−0.055	−1.56	0.157	30	1,103
All listed shares	−0.016	0.041	−0.057**	−1.86	0.041	30	1,226
Fixed list of 55 (comparison)	−0.026	0.027	−0.054	−1.24	0.127	30	1,226
Panel B. Register prices, exchange trading days							
Most-traded shares	−0.034	0.031	−0.064*	−1.92	0.061	30	1,084
Other listed shares	−0.031	0.041	−0.072*	−1.94	0.073	30	1,082
All listed shares	−0.034	0.031	−0.065**	−1.95	0.039	30	1,208
Fixed list of 55 (comparison)	−0.049	0.026	−0.075*	−1.77	0.088	30	1,205
Panel C. October 2020 (robustness window), closes							
Most-traded shares	0.085	0.041	0.043	0.46	0.528	5	1,098
All listed shares	0.048	0.041	0.007	0.09	0.912	5	1,221
Panel D. Closes, two other measures of skewness							
Most-traded shares, quartile skewness	−0.004	0.027	−0.031	−1.15	0.314	30	1,103
Most-traded shares, moment skewness	0.324	0.465	−0.141	−0.59	0.647	30	1,103
All listed shares, quartile skewness	−0.002	0.026	−0.028	−0.97	0.457	30	1,226
All listed shares, moment skewness	0.360	0.807	−0.447	−1.65	0.277	30	1,226

Notes. Mean over days of the quantile skewness of the day's returns across shares: the 90th plus the 10th percentile less twice the median, over the 90th less the 10th. Other trading days are all others of 2018 to 2022. In Panel C the first column holds the five days of the October 2020 window, and other trading days leave them out. Panel B uses exchange trading days only, which drops 46 dates for all listed shares and the fixed list. Panel D uses the quartiles in place of those percentiles, or the third standardized moment. The permutation p reshuffles the crash-window days; stars use it. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.LVIII

Quantile skewness on the days of each crash window against other trading days, most-traded shares on closes

	Crash-window days	Other trading days	Difference	t	Permutation p	Crash-window days (N)	Other trading days (N)
2018 sell-off	−0.072	0.041	−0.114*	−1.09	0.090	5	1,103
COVID-19 crash	0.060	0.041	0.018	0.49	0.649	15	1,103
2021 scare	−0.070	0.041	−0.111*	−2.10	0.096	5	1,103
Invasion	−0.047	0.041	−0.088	−2.18	0.186	5	1,103

Notes. Quantile skewness of the day's returns across the most-traded shares, on closes, as defined in Table IA.LVII. Crash-window days are the trading days of one window; other trading days are the days outside the four crash windows, the October 2020 fall among them. The t is Welch's. The permutation p reshuffles the days; stars use it. It rests on the difference in means, so it need not rank the shocks as the t does. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

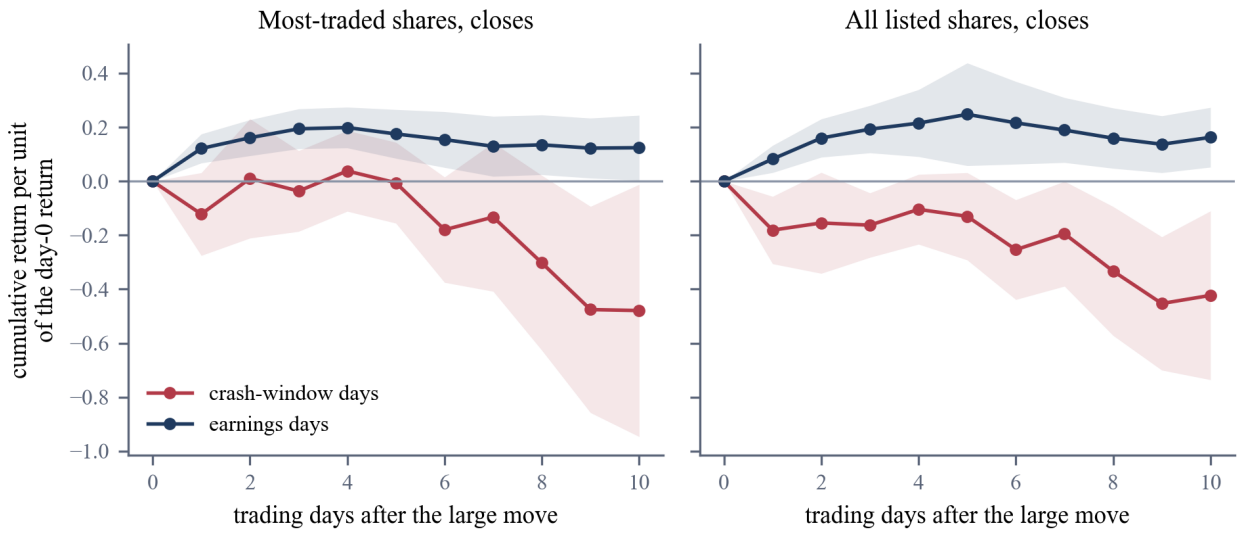

Figure IA.2. Slope of the cumulative return on the day-0 return, day by day: crash-window days against earnings days. Notes. Each point is the slope of the cumulative return from the day-0 close to the day-h close on the day-0 return, with firm fixed effects. Bands are 95% intervals from standard errors clustered by trading date. They are narrower than the wild bootstrap inference of the text: at day 10 the bootstrap p of the left panel's crash slope is 0.192. Left: the most-traded shares. Right: all listed shares. Both panels use closes. A path below zero is a reversal; a path above zero is a continuation.

the totals of the crash windows and the falls, down days, timing, what the buying followed, and how fast the gap closes. All start from the flow basis of Section II; Table IA.LIX, Table IA.LXII and Table IA.LXXII also show what each of its rules leaves out.

Table IA.LIX repeats the window totals, the day counts, the return slopes and the down-day differences of Table VII with the tickets of EUR 25 million or more counted. Household net purchases and buying days are unchanged, and the household slopes move little. The foreign nominee flows change most. With no limit their sale on the exchange is EUR 770.1 million in the 2018 sell-off and EUR 2,454.1 million in the COVID-19 crash window. As counted it is EUR 170.5 million and EUR 914.8 million. In those two windows the limit thus leaves out most of their net sale on the exchange. Their purchase on the exchange in the invasion crash window falls to EUR 23.7 million.

In the 2018 sell-off the count of days on which they sell on the exchange and households buy then differs from regular days ($p = 0.019$). Two foreign nominee results change sign: the net purchases of October 2020 and the change in the return slope inside the crash windows.

The verdict on H2 does not change. With no limit the foreign nominee difference on down days is EUR −48.7 million a day on the first definition of a crash down day ($t = -1.11$, $p = 0.282$). On the second it is EUR −45.1 million ($t = -1.24$, $p = 0.219$). Neither is detected (Table IA.LXIX). The differences of households and of domestic financial institutions are unchanged.

Table IA.LIX

Headline flow results with and without tickets of EUR 25 million or more

result	as counted	no limit	sign changes
2018 sell-off: foreign nominee accounts, net purchases	−170.5	−770.1	no
	[0.107]	[0.073]	
2018 sell-off: households, net purchases	9.6	9.6	no
2018 sell-off: households, days as a net buyer	4 of 5	4 of 5	
2018 sell-off: days foreign nominee accounts sell on the exchange and households buy	3 of 5	4 of 5	no
	[0.125]	[0.019]	
COVID-19 crash: foreign nominee accounts, net purchases	−914.8	−2,454.1	no
	[0.000]	[0.024]	
COVID-19 crash: households, net purchases	162.6	162.6	no
COVID-19 crash: households, days as a net buyer	12 of 15	12 of 15	
COVID-19 crash: days foreign nominee accounts sell on the exchange and households buy	10 of 15	10 of 15	no
	[0.002]	[0.001]	
2021 scare: foreign nominee accounts, net purchases	148.2	75.5	no
	[0.798]	[0.625]	
2021 scare: households, net purchases	−34.3	−34.3	no
2021 scare: households, days as a net buyer	1 of 5	1 of 5	
2021 scare: days foreign nominee accounts sell on the exchange and households buy	1 of 5	1 of 5	no
	[1.000]	[1.000]	
invasion: foreign nominee accounts, net purchases	130.8	23.7	no
	[0.770]	[0.543]	
invasion: households, net purchases	70.5	70.5	no
invasion: households, days as a net buyer	5 of 5	5 of 5	
invasion: days foreign nominee accounts sell on the exchange and households buy	2 of 5	2 of 5	no
	[0.615]	[0.610]	
Households, net purchases on the market return of the same day	−3.15	−3.09	no
	(−7.57)	(−7.31)	
Households, change in the return slope in a crash window	6.61	5.91	no
	(1.29)	(1.20)	
Foreign nominee accounts, change in the return slope in a crash window	1.71	−6.34	yes
	(0.16)	(−0.96)	
Households, down days inside the crash windows less other down days	−1.8	−1.8	no
	(−0.39)	(−0.39)	
Foreign nominee accounts, down days inside the crash windows less other down days	−33.1	−48.7	no
	(−1.12)	(−1.11)	
Domestic financial institutions, down days inside the crash windows less other down days	6.4	6.4	no
	(1.77)	(1.77)	

Table IA.LIX (continued)

result	as counted	no limit	sign changes
Households, down days inside the four falls less other down days	−2.3	−2.3	no
	(−0.50)	(−0.50)	
Foreign nominee accounts, down days inside the four falls less other down days	−37.5	−45.1	no
	(−1.71)	(−1.24)	
Domestic financial institutions, down days inside the four falls less other down days	7.8	7.8	no
	(2.74)	(2.74)	
October 2020: foreign nominee accounts, net purchases (robustness window)	−16.2	357.1	yes
	[0.407]	[0.841]	
October 2020: households, net purchases (robustness window)	85.4	85.4	no
October 2020: households, days as a net buyer (robustness window)	5 of 5	5 of 5	
October 2020: days foreign nominee accounts sell on the exchange and households buy (robustness window)	3 of 5	3 of 5	no
	[0.125]	[0.116]	

Notes. Each result on tickets under EUR 25 million and with no limit, with net purchases in EUR million. Brackets beneath a net hold its position among runs of regular days of the same length, as in Table IA.LXIV; beneath the days on which both happen, the p-value of Fisher's exact test against regular days. The household return slope is in EUR million per percentage point; the two slope changes are in the units of Table IA.LXVIII. The down-day differences, EUR million a day, follow Table VII. Parentheses hold t-statistics: Newey-West with five lags for the slopes, Welch for the down-day differences. 'Sign changes' marks a sign that differs with no limit. October 2020 is a robustness window.

Table IA.LX splits each window's net purchases into legs with a register price (Panel A) and legs valued at closes (Panel B). The invasion crash window has 26,699 legs without a register price, 26,697 of them in Nordea (Section VI.D); no other window has more than 220. In that window foreign nominee accounts sold EUR 57.4 million on the exchange on priced legs, and the legs valued at closes add purchases of EUR 188.2 million. Over all classes those legs hold EUR 161.3 million more purchases than sales. The flow basis therefore does not hold all of their selling side, and the register does not record which class sold. The sign of the foreign nominee flow in that window is not identified.

Table IA.LXI counts foreign nominee accounts' net purchases of Nordea in the invasion crash window under each choice of legs (Section VI.D). Without the ticket limit their net purchases on the exchange are EUR 239.1 million. Register entries that are not exchange trades, such as stock loans, take 14.45 million shares back out of their position. Over every register entry in Nordea,

Table IA.LX

Net purchases by investor class: legs with a register price and legs valued at closes

	2018 sell-off	COVID-19 crash	2021 scare	invasion	October 2020 (robustness window)
Panel A. Legs with a register price					
Households	9.6	162.6	−34.3	60.7	85.4
Foreign nominee accounts	−170.5	−914.8	148.2	−57.4	−16.2
Domestic financial institutions	31.7	49.1	−15.5	57.0	15.9
General government	−3.7	123.8	−14.2	−44.0	−31.1
Non-financial corporations	14.6	74.4	−30.2	38.3	6.5
Non-profit institutions	−2.1	−25.2	−2.6	−23.9	−0.5
Foreign accounts held directly	62.8	22.0	−8.5	−8.2	−11.3
Accounts without a class	0.9	2.3	−0.5	2.9	0.1
All classes	−56.6	−505.8	42.3	25.4	48.7
Panel B. Legs valued at closes					
Households	0.0	0.0	0.0	9.8	0.0
Foreign nominee accounts	0.0	0.0	0.0	188.2	0.0
Domestic financial institutions	0.0	0.0	0.0	−13.5	0.0
General government	0.0	0.0	0.0	−16.4	0.0
Non-financial corporations	0.0	0.0	0.0	5.6	0.0
Non-profit institutions	0.0	0.0	0.0	−1.2	0.0
Foreign accounts held directly	0.0	0.0	0.0	−11.4	0.0
Accounts without a class	0.0	0.0	0.0	0.1	0.0
All classes	0.0	0.0	0.0	161.3	0.0
Gross, both sides	0.7	0.1	0.0	3,669.3	0.0
Number of legs	210	220	0	26,699	2
Of which legs in Nordea				26,697	

Notes. Net purchases of each investor class over each crash window, EUR million, split by how a leg is valued. Panel A sums legs at register prices. Panel B sums legs the register does not price, valued at closes of the trade day, with the gross of both sides and the number of such legs. The class rows of a panel add to 'All classes', and before rounding the two panels add to Panel A of Table VI. The last row counts the Nordea legs among those of the invasion crash window. Flow basis as in that table. October 2020 is a robustness window that the detection rule does not flag.

Table IA.LXI

Foreign nominee accounts' net purchases of Nordea in the invasion crash window by legs counted

Legs counted	Million shares	EUR million
Exchange trades under EUR 25 million	21.22	192.7
All exchange trades	26.65	239.1
Other register legs	−14.45	
Every register leg	12.21	107.2

Notes. Net purchases of Nordea shares by foreign nominee accounts in the invasion crash window, dated by trade day. The first two rows count exchange trades, with and without the EUR 25 million ticket limit. The row 'Other register legs' holds entries that are not exchange trades, such as stock loans; they carry no price, so only shares are shown. The row 'Every register leg' is the change in these accounts' Nordea position over all entries, the smallest figure for their buying. Euros value a leg without a register price at the exchange close of its trade day.

exchange trade or other, their position rose by 12.21 million shares, EUR 107.2 million at the close.

That figure counts every entry that is not an exchange trade against their purchases, so it is the smallest figure for their buying. The count of shares is positive under every choice. It covers one share, though, and the register does not hold all of the selling side, so the sign of the whole flow stays unidentified (Section IV.A).

Table IA.LXII adds each window's net purchases over every class and sets the sum, which differs from zero, against the legs the flow basis leaves out. With the legs off the exchange in the same shares and days added, the sum comes near zero in two windows. It moves from EUR −505.7 million to EUR 25.1 million in the COVID-19 crash window and from EUR 42.3 million to EUR 4.2 million in the 2021 scare. In the 2018 sell-off it grows to EUR −211.1 million, and in the invasion crash window EUR 142.3 million remains. The table does not identify which legs are missing in those two windows. Unmatched shares are a share count and the sums are euros, so the euro sum can grow while unmatched shares, as a percentage of gross shares, fall.

In the COVID-19 crash window foreign nominee accounts bought EUR 442.7 million net off the exchange, nearly half the size of their sale on the exchange. With trades on and off the exchange counted they remain net sellers. In the 2018 sell-off households sold EUR 47.4 million off the exchange, more than they bought on it.

Table IA.LXII

Net purchases summed over every class, and the legs the flow basis leaves out

	2018 sell-off	COVID-19 crash	2021 scare	invasion
Panel A. Net purchases on the flow basis, EUR million				
Households	9.6	162.6	−34.3	70.5
Foreign nominee accounts	−170.5	−914.8	148.2	130.8
Domestic financial institutions	31.7	49.1	−15.5	43.5
General government	−3.7	123.8	−14.2	−60.3
Non-financial corporations	14.6	74.4	−30.2	43.9
Non-profit institutions	−2.1	−25.2	−2.6	−25.1
Foreign accounts held directly	62.8	22.0	−8.5	−19.6
Accounts without a class	0.9	2.3	−0.5	3.0
Sum over every class	−56.6	−505.7	42.3	186.7
Gross euros, both sides	43,028.5	161,937.6	34,587.2	38,397.7
Sum as a share of gross	−0.13%	−0.31%	0.12%	0.49%
Register legs	304,749	1,472,428	313,900	541,211
Panel B. The conditions of the flow basis, EUR million				
Sum over every class, every valued leg	14.6	1,199.2	8.4	−196.8
Sum over every class, exchange legs	25.2	−663.8	18.4	−51.1
Sum over every class, exchange legs in listed shares	22.2	−758.7	22.0	−58.0
Gross removed, off-exchange legs	9,588.8	40,117.5	27,891.5	24,232.1
Gross removed, instruments that are not listed shares	241.7	1,579.8	219.7	7,587.9
Gross removed, tickets of EUR 25 million or more	9,335.1	23,192.1	5,754.8	3,163.5
Panel C. The residual on the flow basis, EUR million				
Unmatched shares at the register price of the share and day	−56.6	−534.4	44.5	188.4
Price difference between sides	0.0	28.6	−2.1	−1.8
Unmatched shares netted over the window	−56.7	−500.7	48.0	200.3
Sum with the legs off the exchange in the same shares and days	−211.1	25.1	4.2	142.3
Unmatched shares, % of gross shares	1.46%	1.96%	3.21%	3.50%
Same, with off-exchange legs	1.17%	0.27%	0.04%	0.44%
Panel D. Off the exchange, same shares and days, EUR million				
Households	−47.4	66.1	−18.6	63.6
Domestic financial institutions	−5.3	−4.4	−7.0	0.1
Foreign nominee accounts	−55.1	442.7	−32.9	109.8

Notes. Panel A gives each class's net purchases on the flow basis, their sum, the gross of both sides and the leg count. Panel B gives the class sum as each condition of the flow basis is added, and the gross each removes. Unmatched shares are, for each share and day, the shares bought less the shares sold over all classes on the flow basis. Panel C values them at register prices, beside the price difference between the sides; its third row first nets them over the window's days. Its last rows add off-exchange legs in listed shares under EUR 25 million. Panel D gives three classes' net purchases off the exchange in those shares and days.

Table IA.LXIII sets each class's net purchases against the net sale of foreign nominee accounts

Table IA.LXIII

Net purchases of each class against the foreign nominee sale on the exchange in the COVID-19 crash window

class	net purchases	share of the foreign nominee sale on the exchange	days a net buyer
Foreign nominee accounts	−914.8		4
Households	162.6	17.8%	12
General government	123.8	13.5%	10
Non-financial corporations	74.4	8.1%	12
Domestic financial institutions	49.1	5.4%	9
Foreign accounts held directly	22.0	2.4%	7
Non-profit institutions	−25.2	−2.7%	7
Accounts without a class	2.3	0.2%	12
All classes	−505.7		
Shortfall of the sum over every class, as a share of the foreign nominee sale on the exchange		55.3%	

Notes. Net purchases (purchases less sales) of each class over the trading days of the COVID-19 crash window, EUR million, and as a share of the net sale of foreign nominee accounts on the exchange. The shares set one class's net against another's and match no buyer to a seller. The last column counts the days of the window on which the class was a net buyer. The last row sets the sum over every class against that sale; the sum also holds the net sale of non-profit institutions. In this window trades off the exchange in the same shares and days account for most of it (Table IA.LXII). Flow basis as in Table VI.

on the exchange in the COVID-19 crash window. Household net purchases equal 17.8% of that sale and those of general government 13.5%. The table matches no buyer to a seller. With every ticket counted the sale on the exchange is larger and the household share of it smaller (Table IA.LIX).

Table IA.LXIV places each crash window among all runs of consecutive regular days of the same length. Regular days are those of Section II.D outside October 2020. None of the 983 runs of fifteen regular days has a foreign nominee net sale on the exchange as large as that of the COVID-19 crash window. With every ticket counted, a small share of those runs hold a larger sale. Because the runs overlap, 983 is not a count of independent comparisons, and a position describes and does not test.

By the foreign nominee net sale on the exchange the 2018 sell-off is at position 0.107. By household buying days the positions run from 0.182 to 0.953. The table compares foreign nominee net purchases and the share of household buying days. It makes no such comparison for household

Table IA.LXIV
Each crash window against runs of regular days of the same length

	2018 sell-off	COVID-19 crash	2021 scare	invasion	October 2020 (robustness window)
Days in the window	5	15	5	5	5
Runs of regular days	1,043	983	1,043	1,043	1,043
Foreign nominee net	−170.5	−914.8	148.2	130.8	−16.2
Foreign nominee net, median over the runs	21.7	37.9	21.7	21.7	21.7
Foreign nominee net, position of the window among the runs	0.107	0.000	0.798	0.770	0.407
Household buying days	80.0%	80.0%	20.0%	100.0%	100.0%
Household buying days, median over the runs	40.0%	46.7%	40.0%	40.0%	40.0%
Household buying days, position of the window among the runs	0.823	0.916	0.182	0.953	0.953

Notes. Foreign nominee net is the net purchases of foreign nominee accounts on the exchange over the crash window, EUR million. Household buying days is the share of the window's days on which households were net buyers. A run is any stretch of consecutive regular days as long as the crash window; the table gives their number. Every run is used, so runs overlap and a position is not a p-value. Position is the share of runs below the window's value plus half the share equal to it. Regular days are the regular days outside October 2020 of Section II.D, 1,067 days. Flow basis as in Table VI. October 2020 is a robustness window.

net purchases in euros.

Table IA.LXV counts the days on which foreign nominee accounts were net sellers on the exchange and households net buyers, and tests each window against regular days. On days the index closed lower, the lower-close days of the table, the COVID-19 share is 72.7%. On regular lower-close days it is 40.1% (p = 0.057). Each window other than the COVID-19 crash has five days, so the test has little power there.

Table IA.LXVI repeats the count over each fall, from the index peak to its trough. Over the COVID-19 fall the share of such days is 55.6% (p = 0.002), and over the invasion fall it is 46.5% (p = 0.008). Over the longer span the invasion thus differs from regular days, which its crash window does not. The 2018 fall does not differ at the 5% level. These tests are outside the family. On lower-close days no fall differs from regular days.

Table IA.LXVII compares household net purchases per week in each fall with the regular weeks before it. The rise is EUR 70.2 million a week in the COVID-19 fall (t = 1.68) and EUR 30.1

Table IA.LXV

Days on which foreign nominee accounts sell on the exchange and households buy

window	days	such days	share	lower-close days	such lower-close days	share of lower-close days
Regular days	1,065	286	26.9%	459	184	40.1%
2018 sell-off	5	3	60.0%	4	2	50.0%
			[0.125]			[1.000]
COVID-19 crash	15	10	66.7%***	11	8	72.7%*
			[0.002]			[0.057]
2021 scare	5	1	20.0%	5	1	20.0%
			[1.000]			[0.653]
invasion	5	2	40.0%	4	1	25.0%
			[0.615]			[1.000]
October 2020 (robustness window)	5	3	60.0%	4	2	50.0%
			[0.125]			[1.000]

Notes. A day counts when foreign nominee accounts were net sellers on the exchange and households net buyers. A lower-close day is a day the OMXH25 closed lower, a wider set than the down days of Table VII. Regular days are the regular days outside October 2020 of Section II.D. The last two of those 1,067 days have no trade dated to them and are not counted. Brackets hold two-sided p-values of Fisher's exact test against regular days or regular lower-close days; stars use them. Flow basis as in Table VI. October 2020 is a robustness window. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

million in the invasion fall (t = 1.96). Neither is detected at the 5% level. With the week's returns held fixed, the weeks of the 2021 fall are lower than other weeks (t = −3.32; Table IA.LXXVI).

Table IA.LXVIII gives each class's slope on the same-day market return and its change inside the crash windows. The slopes are in standard deviations of a class's daily net purchases, so they are not in the euros of Table IA.LXXII. The household slope is −19.72 outside the crash windows and 6.61 closer to zero inside them (t = 1.29). That change does not pass the family. For domestic financial institutions the slope changes by −15.49 inside the crash windows (t = −2.62), which means more buying the further the index falls. The test is outside the family and we report it as suggestive.

With the day of the largest household flow left out, the household change is 13.89 (t = 1.69). The test still cannot tell it from zero at the 5% level.

Table IA.LXIX repeats the down-day differences of Table VII under two other counts of legs

Table IA.LXVI

Days on which foreign nominee accounts sell on the exchange and households buy, over each fall

fall	days	such days	share	lower-close days	such lower-close days	share of lower-close days
Regular days	1,065	286	26.9%	459	184	40.1%
2018 sell-off	84	30	35.7%*	50	23	46.0%
			[0.098]			[0.450]
COVID-19 crash	27	15	55.6%***	20	12	60.0%
			[0.002]			[0.103]
2021 scare	22	6	27.3%	15	6	40.0%
			[1.000]			[1.000]
invasion	43	20	46.5%***	28	13	46.4%
			[0.008]			[0.554]
October 2020 (robustness window)	14	3	21.4%	9	2	22.2%
			[0.770]			[0.329]

Notes. The counts and tests of Table IA.LXV over each fall, from the OMXH25 peak to its trough, in place of each crash window. A day counts when foreign nominee accounts were net sellers on the exchange and households net buyers. Brackets hold two-sided p-values of Fisher's exact test against regular days or regular lower-close days; stars use them. The tests are outside the family. Flow basis as in Table VI. October 2020 is a robustness window. Stars as in Table IA.LXV.

Table IA.LXVII

Household net purchases per week: each fall against the regular weeks before it

shock	regular weeks, mean	fall weeks, mean	difference	regular weeks	fall weeks
2018 sell-off	−2.1	−1.7	0.5	23	18
			(0.06)		
COVID-19 crash	−15.6	54.6	70.2	23	6
			(1.68)		
2021 scare	0.4	−10.4	−10.7	23	5
			(−0.98)		
invasion	−1.9	28.2	30.1*	14	10
			(1.96)		

Notes. Household net purchases (purchases less sales) per week, EUR million. The first two columns are weekly means over the regular weeks among the 26 weeks before the shock's index peak and over the weeks of the fall. A fall week is a calendar week with at least one day of the fall. The weeks therefore hold some days before the peak and after the trough, and their sum differs from Panel B of Table VI. The difference is fall less regular, with a Welch t-statistic over the two weekly series in parentheses. The last two columns count the weeks in each mean. Flow basis of Section II. Stars use the p of the t-statistic.

Table IA.LXVIII

Daily net purchases and the market return of the same day, inside and outside the crash windows

class	market return	return × crash window	days	market return, one day left out	return × crash window, one day left out	days, one day left out
Households	−19.72***	6.61	1,258	−35.97***	13.89*	1,257
	(−6.66)	(1.29)		(−8.38)	(1.69)	
Foreign nominee accounts	7.71***	1.71	1,259	8.48***	1.24	1,258
	(2.78)	(0.16)		(2.98)	(0.11)	
Domestic financial institutions	6.26***	−15.49***	1,257	6.57***	−15.86***	1,256
	(2.70)	(−2.62)		(2.83)	(−2.67)	
General government	−2.57	−1.18	1,249	−2.62	−1.13	1,248
	(−1.03)	(−0.08)		(−1.05)	(−0.08)	
Non-financial corporations	6.12**	−14.47	1,258	6.10**	−14.45	1,257
	(2.20)	(−1.63)		(2.19)	(−1.63)	
Non-profit institutions	−1.11	−4.46	1,257	−1.26	−4.32	1,256
	(−0.50)	(−0.65)		(−0.56)	(−0.63)	
Foreign accounts held directly	3.68	−10.77	1,257	3.21	−10.66	1,256
	(1.26)	(−1.62)		(1.07)	(−1.53)	

Notes. OLS of each class's daily net purchases on the same-day OMXH25 return, an indicator for the four crash windows, and their interaction. The baseline is other trading days, the October 2020 fall among them. Net purchases are standardized over the sample; the return is a fraction. The unit is a day on which the class traded. Days of late December 2017 hold trades settled in January 2018, so a class can have more days than Table IA.LXXII. Newey-West standard errors, five lags; t-statistics in parentheses. The last three columns leave out 15 January 2021, the day of the largest household flow, and standardize without it. Flow basis as in Table VI. Stars use the p of the t-statistic.

and without the days of the invasion fall. The first column is the count of Section II, on which the rule of Section I is read.

Three of the 11 crash down days of that column lie in the invasion crash window. On those days 9,983 foreign nominee legs carry no register price, 10.2% of their gross trading (Table IA.LXX). Their net purchases on those legs are EUR 52.2 million a day. The foreign nominee difference of the first column thus rests in part on legs valued at closes.

Two counts disagree with the first column for foreign nominee accounts. On legs with a register price their difference is EUR −45.7 million a day on the first definition ($p = 0.077$). On the second it is EUR −45.3 million and is detected ($p = 0.028$). With no ticket limit neither difference is detected.

Without the days of the invasion fall the foreign nominee difference is detected on both definitions. It is EUR −73.1 million a day on the first (p = 0.013) and EUR −74.4 million on the second (p < 0.001). Without those days eight crash down days remain on the first definition. Both counts were chosen after the result and are outside the family, so we report them as suggestive. The rule of Section I is read on the first column, and the verdict on H2 does not change.

The household difference is not detected under any count; its p-values run from 0.333 to 0.790. The difference of domestic financial institutions is not detected on the first definition under any count, and is detected on the second under every count. Their mean net purchases on crash down days are a purchase under every count, so the verdict on the corollary does not change.

Table IA.LXXI repeats the down-day differences of Table VII and the change in the household return slope of Table IA.LXVIII on three counts of legs that preceded the flow basis. All three count only legs with a register price. Two count every security with no ticket limit, dated by settlement day or two weekdays before it. The third counts a narrower list of securities, without Nordea, under the ticket limit. None of them decides a verdict.

The household down-day difference is not detected on any of them. The change in the household return slope is detected on two, with opposite signs. It is −15.43 dated by settlement day (p = 0.025) and 16.30 on the narrower list (p = 0.044). Settlement dating places a trade two days late (Table IA.LXXII). On the flow basis the change is 6.61 and is not detected (p = 0.196).

For domestic financial institutions the down-day difference is detected on the narrower list (p = 0.029), and on no other count. The change in their return slope is detected on the flow basis and on the narrower list, and on neither count of every security. The foreign nominee difference is not detected on any of the three; its smallest p-value is 0.090.

Table IA.LXXII regresses daily household net purchases on the OMXH25 return of the same day, the day before and the day after, under three datings of a trade. The dating decides whether returns appear to lead flows. Dated by settlement day, the same-day slope is 0.51 (t = 1.13) and lagged returns appear to lead household flows (p < 0.001). That lead is an effect of the two-day settlement lag. Once a trade is dated by its trade day the joint test no longer rejects. The slope on

Table IA.LXIX

Differences on crash down days under each count of legs and without the invasion fall

	as counted	no ticket limit	legs with a register price	without the invasion fall
Panel A. Crash down days inside a crash window				
Households, difference	−1.8	−1.8	−2.3	−5.9
t	(−0.39)	(−0.39)	(−0.49)	(−1.02)
p, unadjusted	[0.704]	[0.704]	[0.628]	[0.333]
Foreign nominee accounts, difference	−33.1	−48.7	−45.7	−73.1
t	(−1.12)	(−1.11)	(−1.89)	(−2.94)
p, unadjusted	[0.284]	[0.282]	[0.077]	[0.013]
Domestic financial institutions, difference	6.4	6.4	6.6	5.0
t	(1.77)	(1.77)	(1.82)	(1.11)
p, unadjusted	[0.097]	[0.097]	[0.089]	[0.295]
Domestic financial institutions, mean on crash down days	7.3	7.3	7.5	5.3
Crash down days	11	11	11	8
Other down days	46	46	46	42
Panel B. Crash down days inside one of the four falls				
Households, difference	−2.3	−2.3	−2.4	1.5
t	(−0.50)	(−0.50)	(−0.53)	(0.27)
p, unadjusted	[0.621]	[0.621]	[0.599]	[0.790]
Foreign nominee accounts, difference	−37.5	−45.1	−45.3	−74.4
t	(−1.71)	(−1.24)	(−2.27)	(−3.67)
p, unadjusted	[0.096]	[0.219]	[0.028]	[<0.001]
Domestic financial institutions, difference	7.8	7.8	7.9	6.6
t	(2.74)	(2.74)	(2.76)	(2.11)
p, unadjusted	[0.009]	[0.009]	[0.009]	[0.046]
Crash down days	20	20	20	13
Other down days	37	37	37	37

Notes. Mean daily net purchases on crash down days less other down days, EUR million, as in Table VII. Column 1 is the flow basis. Column 2 counts every ticket. Column 3 counts legs with a register price only. Column 4 leaves out every day from the OMXH25 peak of 5 January 2022 to its trough of 7 March 2022. Parentheses hold Welch t-statistics and brackets unadjusted two-sided p-values; both treat days as independent. The mean row decides the corollary of H2 by its sign. The last rows of each panel count the down days. All tests are outside the family.

Table IA.LXX

Legs valued at closes on the down days of the invasion crash window

	Households	Foreign nominee accounts	Domestic financial institutions
Down days	3	3	3
Legs valued at closes	6,084	9,983	249
Their share of gross euros traded	8.5%	10.2%	5.8%
Net purchases a day, legs valued at closes	2.4	52.2	−0.9
Net purchases a day, legs with a register price	12.9	23.9	13.5

Notes. The three down days (the OMXH25 returns −2% or less) of the invasion crash window, 28 February to 4 March 2022. Legs valued at closes are exchange legs in listed shares without a register price, tickets under EUR 25 million. Their share is of the class's gross euros traded on those days. Net purchases are means a day, EUR million; the two rows add to the class's mean net purchases on those days on the flow basis. The table holds no test.

the previous day's return alone is −1.20 (t = −2.20), which we report as suggestive.

In NYSE stocks individual investors' net buying predicts returns across stocks over the next month, but not the market's return (Kaniel, Saar, and Titman (2008)). Retail order imbalances at US brokers also predict the cross-section of returns at monthly horizons (Kelley and Tetlock (2013)). The table tests the market-level relation only, where Kaniel, Saar, and Titman do not detect one either; it does not test the cross-stock results.

Table IA.LXXIII repeats the joint tests on every OMXH25 trading day and with each household flow dated one trading day earlier or later. On every trading day, and with the flow one day earlier, neither test rejects. With the flow one day later, returns appear to lead household flows ($p < 0.001$). A flow dated a day late follows the return of its own day, so this is the same-day slope and not a lead. Under no dating do flows lead returns; the smallest p-value is 0.171.

Table IA.LXXIV regresses each class's daily net purchases during the falls on the accumulated loss of the shares it trades. For foreign nominee accounts the slope is −0.045 (t = −0.05), and the test detects no response to the loss on the days of the falls. One other regression disagrees. On every trading day, their net purchases over market volume fall with the lagged drawdown of the shares they trade (t = −2.39, p = 0.017; Table IA.LXXV). It uses another sample and another measure of loss, and it is outside the family.

Table IA.LXXI

The tests of H2 on earlier counts of legs

	flow basis	priced legs, every security, no limit, settlement day	the same, trade day	priced legs, named securities, trade day
Households, down-day difference	−1.8	1.3	−2.2	−1.6
t	(−0.39)	(0.20)	(−0.45)	(−0.42)
p, unadjusted	[0.704]	[0.844]	[0.661]	[0.681]
Households, change in the return slope	6.61	−15.43	5.20	16.30
t	(1.29)	(−2.23)	(1.05)	(2.02)
p, unadjusted	[0.196]	[0.025]	[0.294]	[0.044]
Foreign nominee accounts, down-day difference	−33.1	−27.6	−62.4	−44.1
t	(−1.12)	(−0.55)	(−1.50)	(−1.82)
p, unadjusted	[0.284]	[0.582]	[0.149]	[0.090]
Foreign nominee accounts, change in the return slope	1.71	1.60	−6.96	5.09
t	(0.16)	(0.46)	(−1.03)	(0.48)
p, unadjusted	[0.876]	[0.643]	[0.301]	[0.629]
Domestic financial institutions, down-day difference	6.4	7.2	5.3	6.5
t	(1.77)	(0.91)	(1.43)	(2.34)
p, unadjusted	[0.097]	[0.374]	[0.172]	[0.029]
Domestic financial institutions, change in the return slope	−15.49	−0.11	−0.52	−14.60
t	(−2.62)	(−0.03)	(−0.62)	(−2.10)
p, unadjusted	[0.009]	[0.974]	[0.533]	[0.036]

Notes. The down-day difference of Table VII, Panel A, in EUR million a day, and the change in the return slope inside the crash windows of Table IA.LXVIII. Column 1 is the flow basis. Columns 2 and 3 count legs with a register price in every security, with no ticket limit, dated by settlement day and by two weekdays before it. Column 4 counts such legs in the securities the register's security file names, without Nordea, under EUR 25 million a ticket. Parentheses hold t-statistics, Welch or Newey-West with five lags; brackets hold unadjusted two-sided p-values.

Table IA.LXXII

Household net purchases and the market return, by dating of a trade

dating	same day	day before	day after	returns lead flows, p	flows lead returns, p	days
Trade day (main)	−3.15***	−1.20**	−0.19	0.528	0.240	1,257
	(−7.57)	(−2.20)	(−0.44)			
Trade day (sensitivity)	−3.11***	−1.24**	−0.16	0.471	0.257	1,257
	(−7.50)	(−2.29)	(−0.39)			
Settlement day	0.51	−0.20	0.08	<0.001	0.408	1,257
	(1.13)	(−0.47)	(0.16)			

Notes. OLS slopes of daily household net purchases, EUR million, on the OMXH25 return, in percentage points, of the same day, the day before or the day after, one regression per cell. The unit is a trading day; a day without a trade counts as zero. The p-values test five daily lags of one series in the equation of the other, with five own lags, on days with a household trade (1,253 in the first row). The main row dates a leg by its recorded trade date or, without one, two settlement days before its settlement day (Section II.B). The sensitivity row uses settlement less two weekdays. Newey-West t-statistics, five lags, in parentheses. Stars use the p of the t-statistic.

Table IA.LXXIII

Do returns lead household flows? The joint tests with the flow dated one day earlier or later

days and dating	returns lead flows, p	flows lead returns, p	days
Days with a household trade (main)	0.528	0.240	1,253
Every OMXH25 trading day	0.531	0.243	1,252
Flow dated one day earlier	0.421	0.581	1,251
Flow dated one day later	<0.001	0.171	1,251

Notes. Each cell is the p-value of a joint Wald test of five daily lags of one series in the equation of the other, with five own lags. The series are daily household net purchases and the OMXH25 return, on the main dating of Table IA.LXXII. Row 1 is the test of that table. Row 2 counts a day without a household trade as zero. Rows 3 and 4 move every household flow one trading day earlier or later. Newey-West standard errors, five lags. The first cell of row 1 is a family test; the others are outside the family.

Table IA.LXXIV

Daily net purchases against the accumulated loss of the shares a class trades

sample	foreign nominee accounts	households	domestic financial institutions	days	falls
Four falls	−0.045	0.819***	0.474**	172	4
	(−0.05)	(2.85)	(2.29)		
Without the 2021 scare	0.060	0.824***	0.420*	151	3
	(0.06)	(2.93)	(1.92)		
Without COVID-19	1.338	−0.082	0.596*	146	3
	(1.09)	(−0.35)	(1.74)		
Crash windows only	−2.532	2.862***	0.033	30	4
	(−0.75)	(4.53)	(0.06)		
With October 2020 (robustness window)	−0.085	0.820***	0.471**	185	5
	(−0.09)	(2.89)	(2.28)		

Notes. Coefficient on the loss, lagged one day, in an OLS of daily net purchases in EUR million. Controls are the portfolio's return, its lag and a fixed effect for each fall. Days run from each index peak to its trough. The loss, in percent, is the fall since the index peak of a portfolio weighting each share by the class's gross trading in the 250 days before the peak. The register holds no positions, so it is not the class's own loss. Newey-West standard errors, five lags; t-statistics in parentheses. The last row adds October 2020, a robustness window. Stars use the p of the t-statistic.

Table IA.LXXV

Foreign nominee net purchases against the drawdown of the shares they trade, every trading day

	drawdown from the 250-day high, lagged one day	return of the shares they trade, same day
Coefficient	−0.024**	0.184***
	(−2.39)	(3.60)
p, unadjusted	[0.017]	[<0.001]
Days	1,233	1,233

Notes. OLS of daily foreign nominee net purchases on the exchange, in percent of market volume, on the lagged drawdown of the shares they trade, that portfolio's return and its lag. The drawdown, in percent, is the fall of the portfolio from its running 250-day high; its weights are the class's gross trading in 2018. Every trading day from February 2018, not only the days of the falls. Newey-West standard errors, five lags; t-statistics in parentheses and unadjusted two-sided p-values in brackets. The test is outside the family. Stars use the bracketed p.

Table IA.LXXVI regresses weekly household net purchases on market returns and on pandemic news. Household net purchases fall with the week's OMXH25 return: the slope is EUR −480.6 million per unit of return (t = −5.59). Returns enter as fractions, so one percentage point is a hundredth of a unit. In the pandemic weeks the test cannot tell their response to Finnish deaths from zero (t = −0.21), nor their response to district cases (t = −0.92).

The pandemic regression keeps the week of 11 January 2021, in which one security is over half of household gross trading, and is the regression the family uses. The column beside it leaves that week out. The slope on world deaths is then EUR 82.5 million (t = 3.35), against EUR 85.7 million (t = 3.21) with the week.

Table IA.LXXVII gives the gap between household and foreign nominee flows in week 0, in week 6 and in its largest week after each crash window. Table IA.LXXVIII gives every week from 0 to 8, and Figure IA.3 draws them against the weeks after an earnings day. After the 2018 sell-off and the COVID-19 crash the gap is largest in week 0. Its excess over the median first falls below half of that of week 0 in one week after the 2018 sell-off and in two after the COVID-19 crash. After the COVID-19 crash it then rises again. After the 2021 scare and the invasion it is largest in week 6 and week 8. Weeks 0 and 1 share one trading day, because each crash window ends on a Sunday.

Averaged over the four shocks the gap is 1.65 in week 1 and 1.71 in week 6, 0.77 below week 0. That change, week 6 less week 0, is the one the test of Section IV.D takes from the troughs.

The crash events of the test in Section IV.D are the four index troughs, the days the falls end. In the 2018 sell-off the trough comes about eleven weeks after the crash window. Table IA.LXXIX repeats the test of Section IV.D without the earnings days that are not trading days of the sample. Of the 625 earnings days, 12 are dated to a Saturday or Sunday and 4 to December 2017. For a weekend date week 0 starts on the next weekday.

Without those 16 the mean change after an earnings day is 0.057 and the difference, crash less earnings, is −0.215 (permutation p = 0.547). The test still cannot tell the difference from zero.

Table IA.LXXX repeats the test on legs with a register price. In the seven weeks from the

Table IA.LXXVI

What weekly household net purchases followed

	OMXH25 alone	markets and shock weeks	pandemic deaths	pandemic deaths, less one week	district cases
OMXH25 return	−480.6***	−504.7***	−320.5**	−379.1**	
	(−5.59)	(−3.96)	(−2.00)	(−2.43)	
S&P 500 return		−184.6			
		(−1.52)			
VIX change		−2.3**			
		(−2.42)			
2018 fall weeks		−7.2			
		(−0.95)			
COVID-19 fall weeks		30.1			
		(0.83)			
2021 scare fall weeks		−19.4***			
		(−3.32)			
Invasion fall weeks		18.6*			
		(1.71)			
World death innovation			85.7***	82.5***	
			(3.21)	(3.35)	
Finnish death innovation			−1.6	3.5	
			(−0.21)	(0.53)	
Signal week			20.9	10.7	
			(1.48)	(1.26)	
District cases					−42.6
					(−0.92)
Observations	261	261	74	73	2,016
R-squared	0.173	0.243	0.203	0.485	0.001
Standard errors	Newey-West, 4 lags	Newey-West, 4 lags	Newey-West, 4 lags	Newey-West, 4 lags	HC1
Week fixed effects	no	no	no	no	yes

Notes. One regression per column; t-statistics in parentheses. Columns 1 to 4 explain weekly household net purchases, EUR million, with Newey-West standard errors of four lags. Returns are weekly, as fractions. Columns 1 and 2 omit weeks in which one security is over half of household gross trading. Column 3 covers February 2020 to June 2021 and keeps the one such week; column 4 omits it. A death innovation is the weekly change in the logarithm of one plus new COVID-19 deaths; a signal week holds a dated pandemic event. Column 5 explains euros of net purchases per active account by the logarithm of one plus the hospital district's weekly cases. Stars use the p of the t-statistic.

Table IA.LXXVII

Gap between household and foreign nominee flows in the weeks after each crash window

shock	week 0	week 6	week 6 less week 0	largest week	week of the largest	weeks to halve
2018 sell-off	2.46	0.91	−1.55	2.46	0	1
COVID-19 crash	2.75	1.62	−1.12	2.75	0	2
2021 scare	1.93	2.77	0.84	2.77	6	
invasion	2.78	1.53	−1.25	2.87	8	
Four shocks, mean	2.48	1.71	−0.77			1
October 2020 (robustness window)	1.04	1.60	0.56	1.79	1	

Notes. The gap is the absolute difference between household and foreign nominee daily net purchases, averaged over five business days and divided by its median over all days of the sample. Each crash window ends on a Sunday, and week k starts 5k business days after it. Each week after week 0 thus starts on a Friday, and weeks 0 and 1 share one day. Weeks to halve is the first week whose excess over one is under half that of week 0, shown when week 0 is the largest; the gap can rise again afterwards. The mean row averages the four shocks by week. Flow basis as in Table VI. October 2020 is a robustness window.

Table IA.LXXVIII

Gap between household and foreign nominee flows in each of the nine weeks after each crash window

week	2018 sell-off	COVID-19 crash	2021 scare	invasion	Four shocks, mean	October 2020 (robustness window)
Week 0	2.46	2.75	1.93	2.78	2.48	1.04
Week 1	1.41	2.10	1.11	1.98	1.65	1.79
Week 2	1.32	1.04	1.48	2.83	1.67	0.83
Week 3	1.35	0.69	0.92	1.11	1.02	0.99
Week 4	0.66	1.63	2.68	2.63	1.90	1.52
Week 5	1.18	1.67	1.00	1.57	1.36	1.56
Week 6	0.91	1.62	2.77	1.53	1.71	1.60
Week 7	1.54	2.01	0.68	1.04	1.32	1.15
Week 8	0.90	0.89	0.99	2.87	1.41	0.35

Notes. The gap of Table IA.LXXVII in each week from 0 to 8 after the crash window. It is the absolute difference between household and foreign nominee daily net purchases, averaged over five business days and divided by its median over all days of the sample. Weeks are counted as in that table, so weeks 0 and 1 share one day. A value of one is the median day. The mean column averages the four shocks by week. The table holds no test. Flow basis as in Table VI. October 2020 is a robustness window.

Table IA.LXXIX

The test of H3 without earnings days dated to a weekend or before 2018

earnings days in the test	days	mean change	crash less earnings	permutation p	Welch t
Every earnings day	625	0.065	−0.224	[0.537]	(−0.49)
Earnings days on a weekday from January 2018	609	0.057	−0.215	[0.547]	(−0.48)
Left out: dated to a Saturday or Sunday	12				
Left out: dated before 2018	4				

Notes. The test of Table VIII on every earnings day and without those dated to a Saturday or Sunday or before 2018. The change is in the gap between household and foreign nominee net purchases, week 6 less week 0. The crash events are the four troughs in both rows. The two-sided permutation p-value is in brackets and the Welch t-statistic in parentheses; both treat events as independent. H3 predicts a positive difference.

invasion trough 64,223 foreign nominee legs and 33,811 household legs carry no register price. They are 10.7% and 10.9% of each class's gross trading in those weeks. After the other three troughs no more than 3,307 legs of either class carry none.

On priced legs the change at the invasion trough is −1.535, against −1.376 on every leg. The difference, crash less earnings, is −0.277 (permutation p = 0.447). The test still cannot tell it from zero, and its sign does not change. The size of the invasion gap is not identified on either count. Priced legs leave out part of both classes' trading, and legs valued at closes lack part of the selling side.

The gap of Table VIII is an absolute difference. Table IA.LXXXI keeps the sign of household net purchases minus foreign nominee net purchases, and divides by the median of that series.

The median is -EUR 2.95 million, so a positive change is a euro gap that fell. The difference, crash troughs less earnings days, is 13.712 (permutation p = 0.151; Table IA.LXXXI), and the test cannot tell it from zero. The verdict on H3 is read on the absolute gap, which Section I names.

Tables for Section V: which households buy. The tables follow the order of Section V: how many accounts buy, who buys, whether the buying was learned, and what the shares returned after the purchases. Positions are traced from exchange trades since January 2018 and are not holdings.

Table IA.LXXXII splits each crash window into its calendar weeks. Three of the four crash windows lie within one week, so their rows repeat Table IA.C. The COVID-19 crash window has

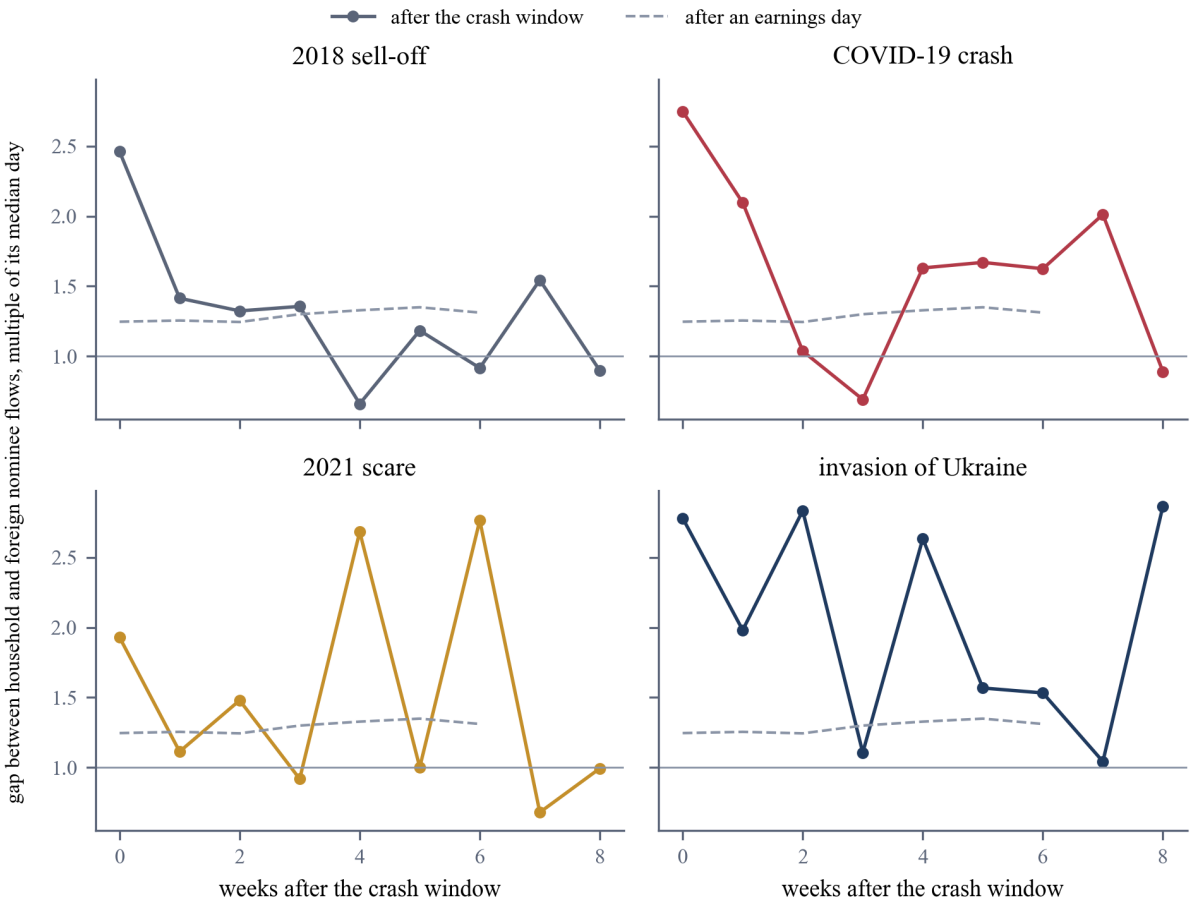

Figure IA.3. The gap between household and foreign nominee flows in the nine weeks after each crash window, against the weeks after an earnings day. Notes. Each panel is one shock. The solid line is the gap of Table IA.LXXVII, from week 0 to week 8 after the crash window. The dashed line is the same gap after an earnings day, drawn for weeks 0 to 6 from that day, the span of the test in Table VIII. The solid lines start after a crash window and not at the trough used in that test. The thin line marks one, the median day. A line that falls from week 0 is a gap that closes.

Table IA.LXXX
The test of H3 on legs with a register price

	every leg	legs with a register price	households	foreign nominee accounts
Panel A. The test				
Mean change, crash troughs	−0.158	−0.201		
Mean change, earnings days	0.065	0.076		
Crash less earnings	−0.224	−0.277		
p, permutation	[0.537]	[0.447]		
t, Welch	(−0.49)	(−0.57)		
Panel B. Each crash trough				
Change in the gap, trough of 27 December 2018	0.785	0.775		
Legs valued at closes			742	3,307
Their share of gross euros			0.0%	0.0%
Change in the gap, trough of 18 March 2020	−0.141	−0.144		
Legs valued at closes			4	9
Their share of gross euros			0.0%	0.0%
Change in the gap, trough of 6 October 2021	0.098	0.100		
Legs valued at closes			18	45
Their share of gross euros			0.0%	0.0%
Change in the gap, trough of 7 March 2022	−1.376	−1.535		
Legs valued at closes			33,811	64,223
Their share of gross euros			10.9%	10.7%

Notes. Panel A gives the test of Table VIII on every leg of the flow basis (column 1) and on legs with a register price only (column 2). Its rows are the mean changes in the gap, week 6 less week 0, their difference, its two-sided permutation p-value in brackets and its Welch t-statistic in parentheses. Panel B gives each trough's change on both counts. Its last two columns count the legs of households and of foreign nominee accounts valued at closes in the seven weeks from the trough, with their share of the class's gross euros. Both tests treat events as independent. H3 predicts a positive difference.

three weeks, and 6 and 2 regular weeks reach the shares of its second and third. In the 2018 sell-off and in the 2021 scare, more than half of the regular weeks have a share at least as high. The 95th percentile of the regular weeks is 77.3%, which is above the share of the COVID-19 crash window as a whole.

Table IA.LXXXIII measures how far the net buying rests on a few accounts. In every window the largest tenth of net buyers made between 65.7% and 73.3% of the net purchases of net buyers. In the 2018 sell-off the small net purchase of the household sector becomes a net sale once the 100 largest buyers are removed. The trim removes buyers only, so the fall is in part mechanical. In

Table IA.LXXXI

The H3 test on the signed gap between household and foreign nominee net purchases

	signed gap
Median of the signed series, EUR million	−2.95
Mean change, crash troughs	15.020
Mean change, earnings days	1.308
Crash less earnings	13.712
p, permutation	[0.151]
t, Welch	(1.24)
Change in the gap, trough of 27 December 2018	−1.640
Change in the gap, trough of 18 March 2020	6.155
Change in the gap, trough of 6 October 2021	8.017
Change in the gap, trough of 7 March 2022	47.547

Notes. Household net purchases minus foreign nominee net purchases, divided by the median of that signed series. The median is negative, so a positive change is a euro gap that fell. Week 6 less week 0, the same troughs and earnings days as the absolute test, and the same permutation. H3 predicts a positive difference. The absolute gap remains the test Section I names.

Table IA.LXXXII

Net-buyer share of household accounts week by week inside each crash window

window	week starting	accounts	net-buyer share	gap to the regular-week mean	regular weeks at or above
2018 sell-off	8 October 2018	16,509	67.5%	−0.1 pp	109
COVID-19 crash	24 February 2020	31,597	62.8%	−4.8 pp	156
COVID-19 crash	2 March 2020	27,275	81.1%	+13.4 pp	6
COVID-19 crash	9 March 2020	48,033	83.0%	+15.3 pp	2
2021 scare	13 September 2021	27,806	64.8%	−2.9 pp	138
invasion	28 February 2022	51,975	77.8%	+10.1 pp	9
October 2020 (robustness window)	26 October 2020	37,602	81.2%	+13.6 pp	6

Notes. Household accounts with an exchange trade in listed shares in the week, on the flow basis of Section II. An account is a net buyer when its euros bought exceed its euros sold within the week; the share is of the accounts that traded in that week. The gap is to the mean weekly share of the 201 regular weeks outside October 2020 (Section II.D), computed from unrounded shares. The last column counts the regular weeks whose share is at least as high. October 2020 is a robustness window that the detection rule does not flag.

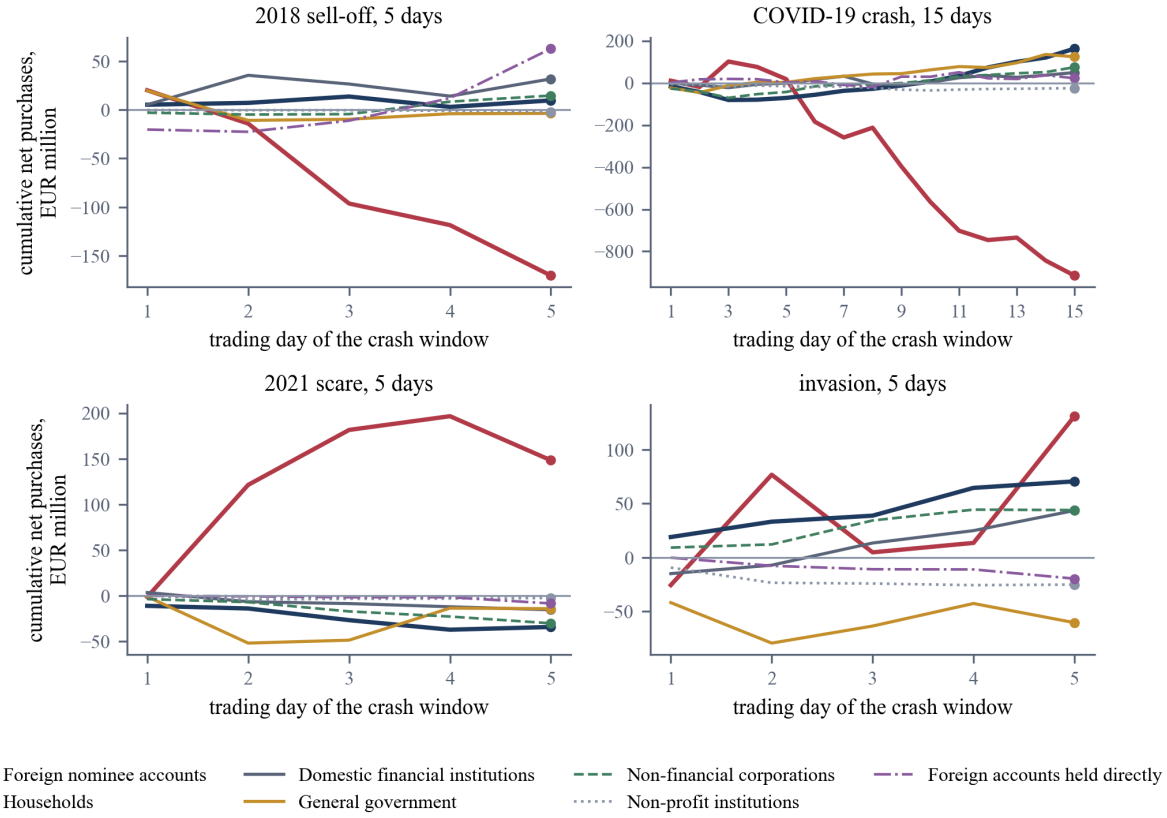

Figure IA.4. Cumulative net purchases by investor class through each crash window. Notes. Each panel is one crash window. Each line is the running sum of a class's net purchases (purchases less sales, EUR million) over the window's trading days. Its last point is the window total in Panel A of Table VI. Seven classes are drawn, every class of that panel except accounts without a class. A falling line is a class that sells on the exchange; a rising line is one that buys. In the invasion crash window the foreign nominee total rests on legs valued at closes and its sign is not identified (Table IA.LX). Exchange trades in listed shares on the flow basis of Section II.

the COVID-19 crash households still bought EUR 79.9 million net without those accounts, against EUR 162.6 million with them.

Table IA.LXXXIV repeats the four columns of Table IX without the same-day return slope, on the same accounts. The contrarian and the disposition measure keep their signs in every column and can be told from zero. The verdict on H5 therefore does not rest on the slope. Every cell is outside the family.

The linear age term depends on the model. In the COVID-19 crash it is −0.003 (t = −1.17) on

Table IA.LXXXIII
Concentration of household net buying in each crash window

window	net buyers	their net purchases, EUR million	largest 1% of net buyers, share	largest 10%, share	sector net, EUR million	sector net without the 100 largest buyers, EUR million	median net buyer, EUR
2018 sell-off	11,147	71.3	28.8%	65.7%	9.6	−10.0	1,676
COVID-19 crash	55,612	468.1	33.3%	69.5%	162.6	79.9	1,850
2021 scare	18,007	81.1	35.5%	73.3%	−34.3	−58.0	781
invasion	40,425	205.7	35.2%	72.3%	70.5	25.9	935
October 2020 (robustness window)	30,534	159.9	33.4%	68.7%	85.4	49.9	1,138

Notes. Household accounts; exchange trades in listed shares on the flow basis of Section II. Each account's euros bought less its euros sold are summed over the crash window, and a net buyer has a positive sum. Shares are of the summed net purchases of net buyers. Sector net is purchases less sales of every household account, as in Section IV. The next column removes the 100 accounts with the largest net purchases. October 2020 is a robustness window that the detection rule does not flag.

whole-sample traits and 0.014 (t = 2.90) on traits from before the crash. With the slope the two are −0.011 and 0.001. Pooled over the four windows the term is negative with the slope and without it.

Table IA.LXXXV puts every trait the register records into one regression for the COVID-19 crash, on the 71,339 accounts of owners aged 18 to 100 that traded in it. The linear age term is positive, 0.009 (t = 3.36).

On the accounts with every trait scored before the crash, the age term is 0.038 without the slope and 0.028 with it. Both columns hold the indicator for 70 or over. On those accounts the indicator is −0.025 and −0.024 and cannot be told from zero at the 5% level.

Column (3) of Table IX holds the slope and no indicator, and there the term cannot be told from zero. Without the slope it is positive (Table IA.LXXXIV). The sign of the linear age term in the COVID-19 crash therefore depends on the model, as Section V.B says.

Two of its rows record what the account did in the previous crash. The coefficient on having bought in the 2018 sell-off is 0.083, and on having sold in it −0.144. Both are against accounts

Table IA.LXXXIV

Which households are net buyers in a crash window, without the same-day return slope

trait	(1) every window	(2) COVID-19 crash	(3) COVID-19 crash, traits from before it	(4) October 2020 (robustness window)
Contrarian measure	−0.051***	−0.054***	−0.045***	−0.032***
	(−21.67)	(−20.44)	(−9.46)	(−11.39)
Disposition measure	0.042***	0.039***	0.073***	0.026***
	(19.03)	(16.61)	(16.05)	(10.43)
Age	−0.021***	−0.003	0.014***	−0.013***
	(−8.29)	(−1.17)	(2.90)	(−4.09)
Woman	0.008***	0.014***	0.010**	0.000
	(3.31)	(5.62)	(2.20)	(−0.08)
Years in the register	−0.013***	−0.020***	−0.003	0.003
	(−3.95)	(−7.27)	(−0.61)	(0.88)
Traded in early or late 2018 (flag)	−0.011***			
	(−3.30)			
Bought in the 2018 sell-off		0.022***	0.055***	0.013***
		(8.51)	(11.64)	(4.78)
Sold in the 2018 sell-off		−0.037***	−0.024***	−0.024***
		(−12.72)	(−4.76)	(−7.26)
Log postcode income	−0.003	0.001	0.011	−0.008*
	(−0.83)	(0.29)	(1.53)	(−1.89)
Postcode higher-education share	0.001	0.003	0.005	0.006
	(0.33)	(0.63)	(0.73)	(1.36)
Accounts in the model	39,314	28,737	10,029	20,323
R-squared	0.027	0.039	0.059	0.019

Notes. Linear probability models of net buying on the household accounts of Table IX, without the same-day return slope. Coefficients are per standard deviation; HC1 t-statistics in parentheses. A lower contrarian measure buys after falls. Traits are scored in regular weeks; column (3) scores them before 28 January 2020. Those weeks include the window of column (4), which is therefore no test. Column (1) nets the four windows and flags a trade in early or late 2018. Every cell is outside the family. The detection rule does not flag October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

with no net trade in the crash window of the 2018 sell-off. These two rows are outside the family of headline tests; their unadjusted p-values are below 0.001.

Table IA.LXXXV

Who bought in the COVID-19 crash: every account trait in one regression

trait	(1) all accounts	(2) every trait measured	(3) all accounts, with the slope	(4) every trait measured, with the slope
Contrarian measure	−0.017***	−0.042***	−0.015***	−0.030***
	(−9.55)	(−9.00)	(−8.81)	(−6.59)
Disposition measure	0.028***	0.072***	0.024***	0.048***
	(16.75)	(15.83)	(14.57)	(10.59)
Same-day return slope			−0.047***	−0.129***
			(−24.27)	(−27.76)
Age	0.009***	0.038***	0.008***	0.028***
	(3.36)	(5.16)	(2.97)	(3.82)
Aged 70 or over	−0.037***	−0.025*	−0.038***	−0.024*
	(−6.38)	(−1.66)	(−6.52)	(−1.67)
Woman	0.031***	0.024*	0.029***	0.016
	(8.31)	(1.84)	(7.75)	(1.28)
Swedish speaker	−0.035***	0.031	−0.033***	0.026
	(−3.95)	(1.25)	(−3.89)	(1.10)
Estate account	−0.179***	−0.059*	−0.175***	−0.043
	(−12.73)	(−1.75)	(−12.68)	(−1.39)
Years in the register	−0.012***	0.005	−0.011***	0.003
	(−5.56)	(0.75)	(−4.92)	(0.49)
In the register in January 2018	−0.007	−0.011	−0.006	0.001
	(−1.56)	(−0.78)	(−1.43)	(0.05)
Bought in the 2018 sell-off	0.083***	0.119***	0.075***	0.089***
	(13.69)	(11.41)	(12.61)	(8.70)
Sold in the 2018 sell-off	−0.144***	−0.073***	−0.134***	−0.054***
	(−13.08)	(−4.67)	(−12.34)	(−3.51)
Log exchange trades in the year before	0.007*	0.026***	0.014***	0.020***
	(1.76)	(4.19)	(3.23)	(3.33)
Log euros traded in the year before	−0.039***	−0.045***	−0.042***	−0.050***
	(−10.92)	(−6.08)	(−11.86)	(−6.83)
Log number of traced positions	0.004	−0.025***	0.016***	0.005
	(1.30)	(−3.79)	(4.79)	(0.79)
Log amount paid for traced positions	0.044***	−0.005	0.038***	−0.015**
	(12.00)	(−0.73)	(10.34)	(−2.19)
Log postcode income	0.004	0.011	0.004	0.007
	(1.34)	(1.42)	(1.49)	(0.96)
Postcode higher-education share	−0.008***	0.008	−0.008***	0.007
	(−2.95)	(1.03)	(−2.90)	(0.97)
Accounts	71,339	10,058	71,339	10,029

Table IA.LXXXV (continued)

trait	(1) all accounts	(2) every trait measured	(3) all accounts, with the slope	(4) every trait measured, with the slope
Postcode areas	850		850	
R-squared	0.048	0.066	0.060	0.131

Notes. Linear probability models of being a net buyer in the COVID-19 crash window, on trading household accounts of owners aged 18 to 100 in the window's year. Continuous traits are standardized; a missing trait is set to its mean and flagged. Traced positions cover shares bought on the exchange since January 2018 and are not wealth. The 2018 rows are against accounts with no net trade in that window. Columns (2) and (4) keep accounts with every trait measured. Traits are scored before 28 January 2020. Errors are clustered by postcode area in columns (1) and (3) and HC1 in the others; t-statistics in parentheses. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.LXXXVI enters owner age, an indicator for 70 or over, and years in the register together, window by window. The indicator in the COVID-19 crash column is the test in the family. The linear age term is positive in that column and negative in the other three crash windows. Without the indicator, on the accounts with traits, it is negative in the COVID-19 crash (column (2) of Table IX). The indicator is also negative in the 2021 scare and in the invasion crash window, and it cannot be told from zero in the 2018 sell-off. The coefficient on years in the register is negative in the 2021 scare and the invasion crash window and cannot be told from zero in the COVID-19 crash. In the 2018 sell-off it does not compare, as the note says. An owner's age is the year of the crash window less the year of birth, and every sample of owners keeps the ages 18 to 100.

Table IA.LXXXVII sets estate accounts against living owners, in levels and against each group's own regular weeks. The last column of the COVID-19 crash row is the test in the family. It counts account-weeks, 1,765 of estates in that window, and its z-statistic is clustered by account, because the same accounts recur from week to week. In the COVID-19 crash 55.1% of the estate accounts that traded were net buyers, against 75.5% of living owners. The difference of the last column is +5.1 points in the 2018 sell-off and −7.6 points in the 2021 scare ($z = -2.77$).

Table IA.LXXXVIII gives the bins of the left panel of Figure IA.5 for households, beside the same bins for domestic financial institutions. The household add rate peaks 2% to 10% below the price paid and falls on both sides. The institutions' add rate is higher in every bin and nearly flat.

Table IA.LXXXVI

Age and years in the register together: who was a net buyer in each crash window

term	2018 sell-off	COVID-19 crash	2021 scare	invasion	October 2020 (robustness window)
Age, per ten years	−0.021***	0.006***	−0.022***	−0.010***	0.000
	(−6.85)	(4.05)	(−8.56)	(−6.24)	(−0.27)
Aged 70 or over	−0.007	−0.045***	−0.044***	−0.083***	−0.042***
	(−0.57)	(−7.59)	(−4.00)	(−10.85)	(−5.40)
Years in the register	0.151***	−0.005*	−0.029***	−0.023***	−0.007**
	(5.75)	(−1.68)	(−10.02)	(−14.94)	(−2.36)
In the register in January 2018	−0.024**	−0.022***	0.017**	−0.013**	0.019***
	(−2.32)	(−5.26)	(2.18)	(−2.40)	(3.56)
Accounts	16,074	71,339	26,957	50,276	36,333
Correlation of age and years in the register	0.12	0.27	0.39	0.38	0.35

Notes. Linear probability models of being a net buyer in each crash window, on household accounts of owners aged 18 to 100 that traded in it. Years in the register run from the register's first record of the account to the window. The register starts in January 2018, so an indicator marks the accounts it already held. In the 2018 sell-off the years are under one and are nearly that indicator, so that coefficient does not compare with the others. Controls are woman, Swedish speaker, estate, and log trades and euros the year before. HC1 t-statistics in parentheses. The detection rule does not flag October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Its highest value is in the same bin, and seven of the nine bins lie between 18.14% and 22.12%. The deepest bin holds 230 position-weeks.

Table IA.LXXXIX gives the add rates near and far below the price paid window by window, for households and for domestic financial institutions. Near is 2% to 10% below the price paid, and far is more than 30% below it. Panels A and B place a position by the last register price before each week, which the account could see. Panel C is a second rule, which places a position by the lowest price of the window. The account had not seen that price when it traded, and the rule reverses the sign. It is shown for comparison only. For households the add rate is 2.25% far below the price paid, and 1.43% for the positions farthest above it (Table IA.LXXXVIII).

In the weeks of the four crash windows institutions add to 22.12% of positions near the price paid and to 17.49% of positions far below it. The two groups are those of the household rows. Inside each window the institutions' gap has an unadjusted p-value of 0.029, and it cannot be told

Table IA.LXXXVII

Estates against living owners: net buyers in a crash window and in regular weeks

window	estate accounts	estates: net buyers	living owners: net buyers	estates minus living owners	estates: window minus regular weeks	living owners: window minus regular weeks	difference of the two
2018 sell-off	500	50.0%	68.0%	−18.0***	+4.7**	−0.4	+5.1**
				(−7.95)	(2.10)	(−1.20)	(2.27)
COVID-19 crash	1,315	55.1%	75.5%	−20.4***	+14.7***	+8.3***	+6.3***
				(−14.77)	(11.76)	(57.68)	(5.05)
2021 scare	294	34.4%	65.1%	−30.7***	−11.0***	−3.4***	−7.6***
				(−11.03)	(−4.03)	(−11.91)	(−2.77)
invasion	396	55.1%	77.9%	−22.9***	+9.7***	+9.5***	+0.2
				(−9.13)	(3.90)	(51.15)	(0.09)
October 2020 (robustness window)	547	61.6%	81.5%	−19.9***	+16.3***	+13.0***	+3.3
				(−9.51)	(7.97)	(64.24)	(1.59)
Regular weeks, share of account-weeks		45.3%	68.5%				
Regular weeks, account-weeks		75,300	4,205,300				

Notes. Household accounts the register flags as an estate against all other household accounts. A net buyer bought more euros of listed shares on the exchange than it sold. Columns three to five use accounts over the whole window. The last three columns use the share of account-weeks with more euros bought, in the window less in the 201 regular weeks outside October 2020 (Section II.D). The last row counts the account-weeks of those weeks. Differences are in percentage points. z-statistics in parentheses: column five takes accounts as independent draws, and the last three columns cluster by account. The detection rule does not flag October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

from zero in the COVID-19 crash (+1.67 points, t = 0.65).

Table IA.LXXXVIII

The add rate by the gap between the last price and the price paid: households and domestic financial institutions

last price against the price paid	households: add rate	households: position-weeks	institutions: add rate	institutions: position-weeks
50% to 90% below	1.93%	129,739	3.48%	230
30% to 50% below	2.40%	283,029	21.57%	788
20% to 30% below	3.60%	357,796	18.14%	1,009
10% to 20% below	5.43%	602,907	20.41%	1,710
2% to 10% below	5.82%	730,337	22.12%	2,518
Within 2%	5.14%	383,914	21.43%	1,395
2% to 10% above	3.50%	562,874	20.81%	1,951
10% to 30% above	2.35%	908,510	18.83%	3,069
30% to 90% above	1.43%	866,155	14.35%	2,418
Every position	3.54%	4,825,300	19.20%	15,088
Accounts		335,247		467

Notes. Position-weeks of traced positions in the weeks of the four crash windows, by the last register price before the week against the price paid. A position is traced from the account's exchange trades since January 2018, and the price paid is the euros of those purchases divided by the shares bought. The add rate is the share of position-weeks with a purchase in the week. Institutions are the accounts of domestic financial institutions, on the same flow basis and the same rule. The household columns hold the bins of Figure IA.5. The bins stop at 90% from the price paid, and the household total also holds the few position-weeks more than 90% below it.

Table IA.LXXXIX

Add rates near and far below the price paid by window: households and domestic financial institutions

sample	add rate 2% to 10% below the price paid	N	add rate more than 30% below	N	near minus far (pp)	accounts
Panel A. Households, last price before the week						
Four crash windows	5.82%	730,337	2.25%	412,807	+3.57*** (73.01)	260,567
Same, inside each window					+3.98*** (76.96)	
2018 sell-off	3.58%	97,250	1.06%	19,198	+2.52*** (23.58)	75,382
COVID-19 crash	7.56%	337,817	1.99%	242,215	+5.57*** (74.50)	169,374
2021 scare	3.03%	108,041	0.68%	43,188	+2.35*** (31.65)	103,232
invasion	5.47%	187,229	3.69%	108,206	+1.78*** (20.22)	157,072

Table IA.LXXXIX (continued)

sample	add rate 2% to 10% below the price paid	N	add rate more than 30% below	N	near minus far (pp)	accounts
October 2020 (robustness window)	5.02%	117,201	1.19%	92,612	+3.82***	125,061
					(48.25)	
Panel B. Institutions, last price before the week						
Four crash windows	22.12%	2,518	17.49%	1,018	+4.64**	368
					(2.22)	
Same, inside each window					+4.23**	
					(2.18)	
2018 sell-off	27.87%	628	4.08%	49	+23.78***	183
					(4.64)	
COVID-19 crash	22.60%	1,177	20.93%	688	+1.67	249
					(0.65)	
2021 scare	9.95%	211	1.43%	70	+8.52***	129
					(2.66)	
invasion	18.92%	502	14.69%	211	+4.23	229
					(1.45)	
Panel C. Households, lowest price of the window (comparison)						
Four crash windows	4.20%	450,305	7.87%	618,676	−3.67***	268,763
					(−68.99)	
Same, inside each window					−0.70***	
					(−13.44)	

Notes. Traced positions of households and of domestic financial institutions, in the weeks of each crash window. Panels A and B place a position by the last register price before the week, and N counts position-weeks. Panel C places it by the lowest price of the window, and N counts positions. Near minus far is in percentage points, with t-statistics in parentheses clustered by account. The row inside each window adds window fixed effects. The institutions' rows are outside the family of headline tests. October 2020 is a robustness window that the detection rule does not flag, and it is not estimated for institutions. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XC reports the step in the add rate at the price paid for four widths of the fit, and at two placebo cut-offs. The family's test is the difference at a width of 10% in Panel A. One sample of regular weeks serves both panels. At a width of 10% its step is +0.08 points (unadjusted p = 0.038), small and of the opposite sign to the step in crash weeks.

The difference of Panel A shrinks from −3.28 points at the widest fit to −0.40 points at the narrowest. At the placebo cut-offs it is +0.76 and +0.34 points. For the four crash windows together (Panel B), the difference at the narrowest fit is −0.19 points and cannot be told from zero (t = −1.82). A smooth hump with its peak just below the price paid gives that pattern. The linear

Table IA.XC

The add rate at the price paid: crash weeks against regular weeks

sample	within 50% of the price paid	within 20%	within 10%	within 5%	cut-off 10% below the price paid	cut-off 10% above the price paid
Panel A. Weeks of the COVID-19 crash window						
Crash weeks	−3.47***	−2.19***	−0.72***	−0.42***	+0.88***	+0.46***
	(−55.46)	(−26.43)	(−6.56)	(−2.79)	(7.68)	(4.54)
Regular weeks	−0.19***	−0.10***	+0.08**	−0.02	+0.12***	+0.12***
	(−7.76)	(−3.50)	(2.07)	(−0.49)	(3.05)	(3.41)
Crash minus regular	−3.28***	−2.09***	−0.80***	−0.40**	+0.76***	+0.34***
	(−49.69)	(−24.12)	(−6.92)	(−2.51)	(6.26)	(3.19)
Position-weeks in the fit	9,112,982	5,733,879	3,386,413	1,843,865	2,980,998	2,752,881
Accounts in the fit	239,141	219,261	200,166	180,811	200,914	182,151
Panel B. Weeks of the four crash windows						
Crash weeks	−2.43***	−1.21***	−0.27***	−0.21**	+0.22***	+0.51***
	(−63.42)	(−24.27)	(−4.06)	(−2.34)	(2.93)	(8.50)
Regular weeks	−0.19***	−0.10***	+0.08**	−0.02	+0.12***	+0.12***
	(−7.76)	(−3.50)	(2.07)	(−0.49)	(3.05)	(3.41)
Crash minus regular	−2.24***	−1.11***	−0.34***	−0.19*	+0.09	+0.39***
	(−51.56)	(−19.74)	(−4.59)	(−1.82)	(1.12)	(5.62)
Position-weeks in the fit	11,531,258	7,285,322	4,330,667	2,370,192	3,768,155	3,517,167
Accounts in the fit	341,313	327,909	305,330	269,631	298,445	279,702

Notes. Position-weeks of household traced positions, by the last register price before the week against the price paid. Cells are steps in the add rate at a cut-off, in percentage points, from linear fits on each side. The first four columns narrow the fit around the price paid; the last two put the cut-off 10% below and above, where no step is predicted. Crash weeks are those of a crash window. Regular weeks are 48: every fourth regular week outside October 2020 from 5 March 2018 to 19 December 2022, for one account in five. Counts pool both; t-statistics in parentheses cluster by account. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

fits therefore do not separate a break at the price paid from the bend of the profile.

Table IA.XCI gives the yearly shares behind the test on December sales of Section V.B. The December share of sales below the price paid is above that of the other months in every year but 2020. The last row is the test in the family, and it does not pass. The mean yearly difference is 12.3 points (t = 1.92), and with five yearly differences the test has p = 0.127.

Table IA.XCII gives the raw shares behind the learning test. It sorts accounts by what they did in the 2018 sell-off and reports what they did in the COVID-19 crash window. The register had lost sight of more of the accounts that sold in 2018 than of those that bought. Attrition does not explain

Table IA.XCI

Household sales below the price paid, December against other months

year	sales in December	below the price paid, December	sales in other months	below the price paid, other months	December minus other months
2018	47,799	79.5%	392,517	49.0%	+30.5 pp
2019	62,098	58.8%	524,194	52.7%	+6.1 pp
2020	103,597	35.8%	1,030,562	42.0%	−6.2 pp
2021	89,949	41.9%	999,892	20.1%	+21.9 pp
2022	65,815	60.1%	831,013	51.0%	+9.1 pp
All years	369,258	51.2%	3,778,178	40.4%	+10.8 pp
Mean of the yearly differences					+12.3 pp (1.92)

Notes. Household exchange sales of listed shares in which the account had a traced position bought in the register. The price paid is the euros of the account's purchases of the share since January 2018 divided by the shares bought; shares held before 2018 are left out. A sale is below the price paid when the register price on the sale day is lower. In the row of all years the share of other months is the mean of eleven monthly shares. Differences are in percentage points. The t-statistic in parentheses is over the yearly differences.

the learning test: the register still saw 97.7% of the accounts that gained and 98.1% of those that lost. Of the accounts that sold in the 2018 sell-off and were still in the register, 54.4% traded in the COVID-19 crash window, against 63.4% of those that bought. The side an account took in 2018 therefore separates accounts by more than the outcome of its purchases does.

The models of Table X on every account that traded in 2018 agree with the raw shares. With heteroskedasticity-robust errors, the average marginal effect of a gain on trading is −0.024. That row is outside the family, with an unadjusted p-value of 0.009.

Among the accounts that traded, 78.3% of those that had gained and 79.9% of those that had lost were net buyers. The same model puts that gap at −0.025 (z = −2.09), outside the family, with an unadjusted p-value of 0.037. In the model on the 2018 buyers, with errors clustered by security, the gap cannot be told from zero (t = −1.17).

Table IA.XCIII repeats the family's test of Table X on each pair of consecutive crashes. Its first row is that test, and the other two rows are outside the family. From the COVID-19 crash to the 2021 scare the coefficient on a gain is 0.096 (t = 1.09), and from the 2021 scare to the invasion it

Table IA.XCII

Trading in the COVID-19 crash by what a household did in the 2018 sell-off

in the 2018 sell-off window	accounts	traded in the COVID-19 crash	still in the register	traded, of those still in the register	net buyers, of those that traded
Bought, purchases up three months later	3,326	59.7%	97.7%	61.1%	78.3%
Bought, purchases not up three months later	7,805	63.2%	98.1%	64.4%	79.9%
Bought, return not priced	16	50.0%	93.8%	53.3%	62.5%
Bought, every net buyer	11,147	62.2%	98.0%	63.4%	79.4%
Bought as much as sold	24	50.0%	91.7%	54.5%	75.0%
Sold	5,338	46.4%	85.3%	54.4%	53.0%

Notes. Household accounts with an exchange trade in listed shares in the crash window of the 2018 sell-off, by the sign of their net euros in it. A buyer's purchases are up when their euro-weighted total return from the end of the window to the close 84 to 91 days after it is positive; the row labels call that three months later. Still in the register means the register saw the account on or after the first day of the COVID-19 crash window. The last column is the share of net buyers among the accounts that traded in that window.

is −0.011 (t = −0.20). Neither can be told from zero, so learning is not detected in any pair.

The middle pair has little to compare. Of the accounts that bought in the COVID-19 crash window, the purchases of 54,852 gained and those of 748 did not.

Table IA.XCIV reports the models behind the family's test on marked losses, for all accounts and for accounts still trading. An account is still trading when it has an exchange trade from January 2021 to the invasion period. The loss is on traced positions only and is not the account's whole loss. It is marked at each share's lowest register price in the COVID-19 crash, and the test does not check that it was still open two years later. Accounts with a loss above 30% are 60.7% of the sample. The invasion period is the 12 trading days from the day of the invasion, and it is longer than the invasion crash window. Before netting, the marked accounts were more likely to trade in it (+0.026), but they also trade more in the benchmark period.

Panel A nets the benchmark period of the family's test, 10 trading days of November 2021. Before netting every coefficient is positive, and net of that benchmark every one is negative.

Panel B varies the benchmark by a rule: the first 12 trading days of each month of 2021, kept

Table IA.XCIII

Coming back after a gain: each pair of consecutive crashes

first crash to the next	gained: accounts	gained: traded in the next	not up: accounts	not up: traded in the next	logit coefficient on a gain	accounts in the model	securities
2018 sell-off to COVID-19 crash	3,326	59.7%	7,805	63.2%	−0.138*	11,129	153
					(−1.94)		
COVID-19 crash to 2021 scare	54,852	16.3%	748	14.6%	0.096	55,587	156
					(1.09)		
2021 scare to invasion	8,458	39.5%	9,549	40.5%	−0.011	18,004	164
					(−0.20)		

Notes. Household accounts that were net buyers in the first crash window of each pair. Purchases gained when their euro-weighted total return from the end of that window to 84 to 91 days later was positive, always before the next crash window. Traded is the share with a trade in the next crash window. The logit of that trade on the gain controls for log euros traded in the first window, log exchange trades before it, age and woman. Errors are clustered by the security of the account's largest first-window purchase; t-statistics in parentheses. The first row is the test in the family. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

when every week of the run is a regular week. The rule leaves out September and October, the months of the 2021 scare. The netted coefficient on trading is negative in five of the ten runs and positive in five, between −0.019 and 0.013. The run from 1 November gives −0.017, the coefficient of the test, so the two missing days are not the reason. The sign of the family's test is therefore that of its benchmark month, and we do not read it as an effect of a marked loss.

Table IA.XCIV

Trading in the invasion period by the marked loss on traced positions in the COVID-19 crash

in the invasion period	all accounts: loss above 30%	less own benchmark period	accounts	still trading: loss above 30%	less own benchmark period	accounts
Panel A. The test's benchmark period, 1 to 12 November 2021						
Traded	0.026***	−0.017***	192,816	0.024***	−0.034***	120,155
	(14.08)	(−8.03)		(8.92)	(−10.31)	
Net seller	0.006***	−0.005***	192,816	0.007***	−0.008***	120,155
	(5.67)	(−3.29)		(3.77)	(−3.60)	
Net buyer	0.019***	−0.013***	192,816	0.018***	−0.026***	120,155
	(11.48)	(−6.43)		(6.88)	(−8.61)	
Sold any share	0.011***	−0.004**	192,816	0.013***	−0.007***	120,155
	(8.92)	(−2.42)		(6.63)	(−3.06)	
Bought any share	0.027***	−0.012***	192,816	0.028***	−0.026***	120,155
	(15.30)	(−5.84)		(10.57)	(−8.24)	
Share of accounts with a loss above 30%	60.7%					
Panel B. Traded, less the first 12 trading days of a month						
4 to 20 January 2021		0.006***	192,816		0.006*	120,155
		(2.80)			(1.72)	
1 to 16 February 2021		−0.014***	192,816		−0.024***	120,155
		(−6.34)			(−6.76)	
1 to 16 March 2021		−0.001	192,816		−0.006*	120,155
		(−0.60)			(−1.85)	
1 to 20 April 2021		0.003	192,816		0.000	120,155
		(1.49)			(0.01)	
3 to 19 May 2021		−0.019***	192,816		−0.033***	120,155
		(−8.48)			(−9.61)	
1 to 16 June 2021		0.008***	192,816		0.004	120,155
		(3.94)			(1.32)	
1 to 16 July 2021		0.010***	192,816		0.008**	120,155
		(4.62)			(2.38)	
2 to 17 August 2021		−0.011***	192,816		−0.023***	120,155
		(−4.95)			(−6.61)	
1 to 16 November 2021		−0.017***	192,816		−0.033***	120,155

	(−8.13)			(−9.97)	
1 to 17 December 2021	0.013***	192,816		0.013***	120,155
	(6.01)			(4.08)	

Notes. Household accounts with a traced position before the COVID-19 crash window. The loss marks those positions at each share's lowest register price in the crash against the price paid since January 2018. Cells give the probability of the action in the invasion period, 24 February to 11 March 2022 (12 trading days), loss above 30% less the rest, given age, woman, years in the register, positions and 2019 trades. The second column of each pair nets the account's rate in a benchmark: 1 to 12 November 2021 (10 trading days) in Panel A, a regular run of 2021 in Panel B. HC1 t-statistics in parentheses. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XCVI gives the returns after household purchases and sales with no index subtracted, and the number of trades. Each return starts at the close of the trade day, because the price the register records on most legs is the day's close. A purchase in the fall of a shock need not lie in its crash window. Panel C of Table XI and Table IA.XCV give the same returns net of the index, and the family's test is in the first.

In the COVID-19 fall, purchases were followed over 90 days by +10.8% and sales by −0.7%, with no index subtracted. Section V.D reads the difference between them: it is the path of the index after the days of purchases and of sales, and not a test of timing skill.

The other shocks do not repeat it. At the same horizon the difference is −0.1 points in the 2018 sell-off, +1.1 in the 2021 scare and +1.5 in the fall of the invasion. None can be told from zero.

Over 20 trading days in the COVID-19 fall the difference is 8.7 points (t = 4.34). In the October 2020 fall, which is not one of the four shocks, the 90-day difference is 8.5 points (t = 2.03). The same caution applies to both.

Table IA.XCV gives the 5- and 20-trading-day returns of Table XI on every listed share.

Table IA.XCV

Returns 5 and 20 trading days after household purchases and sales in each fall, every listed share

	Purchases	Minus sales (pp)	Purchases, beta-adjusted	Minus sales, beta-adjusted (pp)	Accounts buying	Accounts selling	Securities
Panel A. Every listed share, 5 trading days							
2018 sell-off	−0.2%	−0.3*	−0.3%	−0.2	75,846	54,278	152
	(−0.96)	(−1.91)	(−1.58)	(−1.05)			
COVID-19 crash	−1.1%*	−1.0*	−1.5%*	−1.1*	80,053	34,220	152
	(−1.80)	(−1.67)	(−1.75)	(−1.78)			
2021 scare	0.0%	−0.1	+0.8%**	−0.1	54,568	30,299	163
	(−0.09)	(−0.34)	(2.24)	(−0.60)			
invasion	+0.1%	+1.3*	+0.3%	+1.2	114,317	55,174	175
	(0.73)	(1.67)	(1.30)	(1.48)			
October 2020 fall	+0.4%	+0.2	+0.1%	−0.3	45,302	20,080	152
	(1.63)	(0.67)	(0.38)	(−0.92)			
Panel B. Every listed share, 20 trading days							
2018 sell-off	+0.3%	0.0	+0.2%	+0.2	75,846	54,278	152
	(0.67)	(−0.03)	(0.27)	(0.58)			
COVID-19 crash	−1.6%	−1.4	−3.6%***	−1.8**	80,053	34,220	152
	(−1.24)	(−1.38)	(−2.74)	(−2.00)			
2021 scare	+2.1%***	+0.5	+3.1%***	+0.4	54,568	30,299	163
	(3.20)	(1.37)	(4.55)	(1.14)			
invasion	+0.4%	+1.9*	+1.9%**	+2.7**	114,317	55,174	175
	(0.50)	(1.73)	(2.00)	(2.20)			
October 2020 fall	+5.1%	+4.1	+4.0%	+3.5	45,302	20,080	152
	(1.49)	(1.53)	(1.08)	(1.20)			

Notes. The shorter horizons of Table XI, on the same trades, weights and errors. Returns run from the trade-day close to the close 5 or 20 trading days later. Purchases is the mean over accounts of the euro-weighted return less the OMXH25; minus sales is purchases less sales, in percentage points (pp). A beta-adjusted return subtracts the share's prior-year beta times the register market factor's return. t-statistics in parentheses are clustered by security. No cell is a test in the family. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XCVI

What the shares returned after household purchases and sales, with no index subtracted

	5 trading days	20 trading days	90 days	trades	securities
Panel A. Purchases					
2018 sell-off	−0.6%**	−1.0%***	0.0%	330,318	152
	(−2.39)	(−2.83)	(0.01)		
COVID-19 crash	−6.8%***	−7.5%***	+10.8%***	321,188	152
	(−13.21)	(−4.80)	(3.80)		
2021 scare	−1.2%***	+1.1%	+0.7%	168,807	163
	(−3.83)	(1.55)	(0.57)		
invasion	−1.5%***	−3.1%***	−5.0%**	524,153	175
	(−6.01)	(−3.06)	(−2.37)		
October 2020 fall	−0.1%	+10.5%***	+26.3%***	122,817	152
	(−0.12)	(3.20)	(5.68)		
Panel B. Sales					
2018 sell-off	−0.6%***	−0.9%*	+0.1%	175,401	152
	(−3.37)	(−1.78)	(0.06)		
COVID-19 crash	−5.8%***	−16.1%***	−0.7%	107,795	152
	(−11.63)	(−9.22)	(−0.29)		
2021 scare	−1.2%***	+0.5%	−0.4%	80,918	163
	(−4.01)	(0.57)	(−0.32)		
invasion	−3.2%***	−4.5%***	−6.5%***	188,192	175
	(−2.71)	(−4.46)	(−4.41)		
October 2020 fall	−1.3%***	+4.9%**	+17.8%***	45,454	152
	(−3.97)	(2.40)	(5.09)		
Panel C. Purchases minus sales (pp)					
2018 sell-off	0.0	−0.1	−0.1	505,743	152
	(−0.18)	(−0.29)	(−0.09)		
COVID-19 crash	−1.0*	+8.7***	+11.5***	428,983	152
	(−1.87)	(4.34)	(4.20)		
2021 scare	0.0	+0.6	+1.1*	249,876	163
	(0.24)	(1.43)	(1.78)		
invasion	+1.8	+1.4	+1.5	713,859	175
	(1.49)	(1.14)	(1.13)		
October 2020 fall	+1.3*	+5.7**	+8.5**	168,271	152
	(1.90)	(2.17)	(2.03)		

Notes. Household exchange trades of listed shares on trade days in each fall (Table II). Returns are total returns from the trade-day close to the close 5 or 20 trading days or 90 calendar days later, with no index subtracted. Means are over accounts of euro-weighted returns; Panel C is purchases less sales, in percentage points (pp). t-statistics in parentheses are clustered by security and take each fall's index path as given. Panels A and B count trades with a 90-day return, Panel C trades with a 5-day return. The detection rule does not flag the October 2020 fall, 12 to 29 October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XCVII repeats Table IA.XCV and Panel C of Table XI for the trades inside each crash window, the 5 or 15 trading days of Table IA.XIII. Every cell is outside the family. Over 90 days, purchases less sales cannot be told from zero in any of the four shocks, net of the index or beta-adjusted. Net of the index the difference is negative in the 2018 sell-off and the COVID-19 crash and positive in the other two.

Over 90 days the level of purchases net of the index cannot be told from zero in any of the four shocks either (Panel C of Table IA.XCVII). Beta-adjusted, it is −5.4% in the COVID-19 crash window (t = −2.03), against purchases.

At 5 and 20 trading days ten cells of Table IA.XCVII can be told from zero, in both directions. Six are in the COVID-19 crash window, and all six are against purchases. Four are for purchases: three in the invasion crash window at the shorter horizon, and one in the 2021 scare at the longer.

Purchases less sales can be told from zero at the shorter horizons in two shocks, with opposite signs. In the COVID-19 crash window, after 5 trading days purchases trailed sales by 1.6 points (t = −2.66), and after 20 by 2.4 points (t = −2.23).

In the invasion crash window, after 5 trading days purchases led sales by 2.0 points (t = 2.90). In the October 2020 window, which is not one of the four shocks, the 90-day difference is 9.1 points (t = 2.35).

Table IA.XCVII

Returns after household purchases and sales inside each crash window

	Purchases	Minus sales (pp)	Purchases, beta-adjusted	Minus sales, beta-adjusted (pp)	Accounts buying	Accounts selling	Securities
Panel A. 5 trading days							
2018 sell-off	+0.1%	−0.6	−0.1%	−0.4	11,427	5,835	148
	(0.11)	(−1.49)	(−0.18)	(−1.05)			
COVID-19 crash	−1.3%*	−1.6***	−1.7%	−1.4**	58,579	22,810	151
	(−1.95)	(−2.66)	(−1.63)	(−2.02)			
2021 scare	−0.3%	+0.2	+0.3%	0.0	19,534	10,988	160
	(−0.92)	(0.43)	(0.68)	(−0.13)			
invasion	+1.7%***	+2.0***	−0.5%	+1.9**	42,969	14,339	173
	(2.61)	(2.90)	(−0.88)	(2.54)			
October 2020 (robustness)	−0.7%	+0.7	−1.4%	+0.1	31,889	9,264	152
	(−1.10)	(0.94)	(−1.16)	(0.11)			
Panel B. 20 trading days							
2018 sell-off	−1.0%	−1.1	−1.6%	−1.1	11,427	5,835	148
	(−0.42)	(−0.98)	(−0.69)	(−1.02)			
COVID-19 crash	−2.9%**	−2.4**	−5.4%***	−2.4***	58,579	22,810	151
	(−2.04)	(−2.23)	(−3.71)	(−2.79)			
2021 scare	+1.2%	0.0	+2.6%***	−0.4	19,534	10,988	160
	(1.45)	(−0.02)	(2.67)	(−0.64)			
invasion	+2.8%	+1.9	+1.2%	+2.3	42,969	14,339	173
	(1.61)	(1.24)	(0.58)	(1.35)			
October 2020 (robustness)	+5.2%**	+4.5**	+3.1%	+3.4	31,889	9,264	152
	(2.12)	(2.50)	(1.01)	(1.38)			
Panel C. 90 days							
2018 sell-off	−0.4%	−2.0	−1.6%	−1.6	11,427	5,835	148
	(−0.15)	(−1.56)	(−0.58)	(−1.26)			
COVID-19 crash	−1.8%	−1.9	−5.4%**	−2.6	58,579	22,810	151
	(−0.75)	(−1.21)	(−2.03)	(−1.35)			
2021 scare	+0.2%	+0.2	+2.6%*	−0.2	19,534	10,988	160
	(0.12)	(0.25)	(1.90)	(−0.19)			
invasion	+0.7%	+0.7	+0.7%	+1.1	42,969	14,339	173

	(0.28)	(0.45)	(0.26)	(0.58)			
October 2020	+15.7%***	+9.1**	+10.5%***	+7.4**	31,889	9,264	152
(robustness)							
	(3.75)	(2.35)	(4.18)	(2.04)			

Notes. Household exchange trades of listed shares inside each crash window (Table IA.XIII). Returns run from the trade-day close to the close 5 or 20 trading days or 90 calendar days later. Purchases is the mean over accounts of the euro-weighted return less the OMXH25; minus sales is purchases less sales, in percentage points (pp). A beta-adjusted return subtracts the share's beta, estimated over the year before, times the register market factor's return. t-statistics in parentheses are clustered by security. Every cell is outside the family. The detection rule does not flag October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XCVIII gives the 90-day returns of Table XI weighted by euros, and split by the fixed list of 55 shares. Panels A to C weight every euro once, where Table XI averages over accounts. Panels D to G split the shares by the fixed list of 55 shares, as a comparison. That list does not change, while the list of most-traded shares is formed again at each month end. A share can therefore be in both groups of one fall in Table XI. Every cell is outside the family.

No level of purchases net of the index can be told from zero in any of the four shocks, in any panel. The first prediction of skill is therefore not detected on any weighting or split. Eight cells of the four shocks can be told from zero at the 5% level, and seven of them are for purchases.

In the 2021 scare, purchases weighted by euros returned +3.0% beta-adjusted (t = 2.37), and +3.1% among the most-traded shares. In the fall of the invasion, purchases less sales are positive beta-adjusted in Panels A, B and D, and on both measures in Panel E. The cell against purchases is in the COVID-19 fall: outside the fixed list, purchases weighted by euros returned −5.0% beta-adjusted (t = −2.16). In the October 2020 fall, which is not one of the four shocks, twelve cells can be told from zero, and all are for purchases.

Table IA.XCVIII

Returns 90 days after household purchases and sales in each fall, by weighting and by sample

	Purchases	Minus sales (pp)	Purchases, beta-adjusted	Minus sales, beta-adjusted (pp)	Securities
Panel A. Every listed share, weighted by euros					
2018 sell-off	−0.9%	−0.8	−1.0%	−0.7	152
	(−0.52)	(−1.54)	(−0.59)	(−1.47)	
COVID-19 crash	−0.4%	+0.1	−3.2%	−0.7	152
	(−0.21)	(0.09)	(−1.33)	(−0.43)	
2021 scare	+1.3%	+1.0*	+3.0%**	+0.8	163
	(1.06)	(1.94)	(2.37)	(1.62)	
invasion	+0.1%	+1.6*	+2.4%	+2.0**	175
	(0.04)	(1.85)	(0.96)	(2.09)	
October 2020 fall	+9.9%***	+3.6	+5.9%**	+3.4*	152
	(3.77)	(1.55)	(2.45)	(1.69)	
Panel B. Most-traded shares, weighted by euros					
2018 sell-off	−0.9%	−0.9	−1.0%	−0.7	98
	(−0.49)	(−1.61)	(−0.56)	(−1.44)	
COVID-19 crash	−0.4%	+0.1	−3.2%	−0.7	96
	(−0.23)	(0.11)	(−1.33)	(−0.42)	
2021 scare	+1.4%	+1.1*	+3.1%**	+0.9*	97
	(1.09)	(1.98)	(2.36)	(1.68)	
invasion	−0.1%	+1.5*	+2.3%	+1.9**	97
	(−0.04)	(1.74)	(0.89)	(1.99)	
October 2020 fall	+9.3%***	+4.3*	+5.2%**	+4.1**	95
	(3.40)	(1.74)	(2.10)	(2.00)	
Panel C. Other listed shares, weighted by euros					
2018 sell-off	−2.7%	+0.6	−3.1%*	−1.3	62
	(−1.36)	(0.32)	(−1.74)	(−0.94)	
COVID-19 crash	+2.8%	−0.1	+0.7%	+0.1	60
	(0.74)	(−0.15)	(0.19)	(0.12)	
2021 scare	−0.4%	0.0	+0.8%	−0.1	71
	(−0.19)	(−0.01)	(0.34)	(−0.14)	
invasion	+6.4%	+3.0*	+5.8%	+3.1*	81
	(1.10)	(1.72)	(0.99)	(1.78)	
October 2020 fall	+20.1%***	+1.0	+20.0%***	+0.9	59
	(6.09)	(1.36)	(8.73)	(1.34)	
Panel D. Fixed list of 55 shares (comparison), mean over accounts					
2018 sell-off	+0.8%	+0.6	+0.7%	+0.9	55
	(0.30)	(0.58)	(0.24)	(0.74)	
COVID-19 crash	+0.6%	−0.7	−1.9%	−1.0	53
	(0.20)	(−0.44)	(−0.50)	(−0.42)	
2021 scare	+1.4%	+0.8	+3.1%	+0.6	53

Table IA.XCVIII (continued)

	Purchases	Minus sales (pp)	Purchases, beta-adjusted	Minus sales, beta-adjusted (pp)	Securities
	(0.74)	(1.05)	(1.65)	(0.87)	
invasion	+1.4%	+2.8*	+3.6%	+3.6**	53
	(0.50)	(1.74)	(1.21)	(2.06)	
October 2020 fall	+16.1%***	+9.5*	+11.2%*	+9.6*	53
	(2.68)	(1.76)	(1.88)	(1.73)	
Panel E. Fixed list of 55 shares (comparison), weighted by euros					
2018 sell-off	−0.2%	−0.3	−0.4%	−0.2	55
	(−0.09)	(−0.44)	(−0.16)	(−0.30)	
COVID-19 crash	+0.4%	−1.2	−2.1%	−1.7	53
	(0.15)	(−1.00)	(−0.65)	(−0.84)	
2021 scare	+1.6%	+1.1*	+3.5%*	+1.0	53
	(0.92)	(1.86)	(1.87)	(1.52)	
invasion	+2.2%	+2.9**	+4.7%	+3.5***	53
	(0.70)	(2.62)	(1.51)	(2.87)	
October 2020 fall	+10.9%***	+5.4	+5.5%*	+5.1*	53
	(3.20)	(1.62)	(1.84)	(1.74)	
Panel F. Outside the fixed list (comparison), mean over accounts					
2018 sell-off	−2.1%	−1.8*	−1.8%	−1.3	97
	(−1.58)	(−1.80)	(−1.48)	(−1.33)	
COVID-19 crash	−0.9%	+1.8	−3.2%	+1.4	99
	(−0.43)	(1.05)	(−1.31)	(0.87)	
2021 scare	+0.1%	+1.1*	+1.4%	+0.9	110
	(0.04)	(1.75)	(0.91)	(1.40)	
invasion	−2.9%	0.0	−1.2%	+0.4	122
	(−1.00)	(0.02)	(−0.40)	(0.47)	
October 2020 fall	+10.0%***	+0.6	+9.5%**	+0.7	99
	(3.14)	(0.38)	(2.59)	(0.36)	
Panel G. Outside the fixed list (comparison), weighted by euros					
2018 sell-off	−1.7%	−1.4	−1.7%*	−1.3*	97
	(−1.51)	(−1.45)	(−1.85)	(−1.83)	
COVID-19 crash	−1.9%	+2.1	−5.0%**	+0.9	99
	(−0.94)	(1.45)	(−2.16)	(0.60)	
2021 scare	+0.9%	+0.9	+2.4%	+0.8	110
	(0.53)	(1.07)	(1.42)	(0.94)	
invasion	−3.0%	−0.1	−1.1%	+0.1	122

	(−0.87)	(−0.13)	(−0.33)	(0.17)	
October 2020 fall	+8.0%**	+0.5	+6.7%	+0.8	99
	(2.22)	(0.27)	(1.59)	(0.38)	

Notes. Household exchange trades of listed shares in each fall (Table II). Returns run from the trade-day close to the close 90 days later. Purchases is the return less the OMXH25; minus sales is purchases less sales, in percentage points (pp). A beta-adjusted return subtracts the share's prior-year beta times the register market factor's return. Panels A to C, E and G weight every euro once; Panels D and F average over accounts, as Table XI does. t-statistics in parentheses are clustered by security. Every cell is outside the family. The detection rule does not flag the October 2020 fall, 12 to 29 October 2020. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.XCIX compares the 90-day return on purchases by owners aged 70 or over with that of younger owners, weighted by euros. Panel A is on the price basis of the family's test: closes for the fixed list of 55 shares and register prices for the rest. Register prices carry no dividends or splits, so that basis mixes two kinds of return across shares. Panel B computes every row at closes, the prices of Table XI, outside the family. Its levels differ from Table XI because it weights by euros and Table XI averages over accounts. It holds fewer securities, those with a close. In the four shocks the difference lies between −0.3 and +0.6 points across the two panels.

We read every returns test on the t-statistic clustered by security, here and in Section V.D, as Section I.F does. Trade dates in one fall share most of the 90-day horizon, so they are not independent clusters, and a bootstrap by trade date can give too small a p-value. The family's test is the COVID-19 row of Panel A. On the t-statistic clustered by security, −0.34 (Table IA.XCIX), its p-value is 0.736 (Table IA.XX). The family carries that one (Table IA.XXI). On the wild bootstrap by trade date it is 0.415. The test passes on neither, and the difference is not detected. At closes the same difference is 0.0 points (t = −0.02).

In the fall of the invasion the two kinds of error disagree in Panel B. The difference is +0.6 points, with t = 1.43 and a bootstrap p-value of 0.004. On the rule above we read the t-statistic, which cannot be told from zero.

In the October 2020 fall they disagree in both panels: the bootstrap p-values are below 0.002 and the t-statistics are −1.40 and −1.38. This bootstrap draws 499 times.

Table IA.XCIX

What the shares returned after purchases in each fall: owners aged 70 or over against younger owners

fall	under 70	70 or over	difference	purchases	securities	trade dates
Panel A. Fixed-list closes, register prices for the rest						
2018 sell-off	−1.6%	−1.8%	−0.1 pp (−0.31) [0.559]	350,276	161	84
COVID-19 crash	+0.2%	−0.1%	−0.3 pp (−0.34) [0.415]	336,667	159	27
2021 scare	+1.0%	+0.9%	−0.2 pp (−0.48) [0.325]	171,296	169	22
invasion	−1.1%	−0.8%	+0.3 pp (0.62) [0.261]	499,306	181	43
October 2020 fall	+12.1%	+10.1%	−2.0 pp (−1.40) [<0.002]	124,768	159	14
Panel B. Closes						
2018 sell-off	−0.9%	−0.9%	−0.1 pp (−0.14) [0.790]	322,742	152	84
COVID-19 crash	−0.4%	−0.4%	0.0 pp (−0.02) [0.946]	313,708	152	27
2021 scare	+1.3%	+1.2%	−0.1 pp (−0.29) [0.661]	164,432	163	22
invasion	−0.1%	+0.6%	+0.6 pp (1.43) [0.004]	511,621	175	43
October 2020 fall	+10.4%	+8.5%	−1.9 pp (−1.38) [<0.002]	119,940	152	14

Notes. Household exchange purchases of listed shares on trade days in each fall, by owners aged 18 to 100. The return runs 90 days from the trade day, less the OMXH25, weighted by euros over purchases. Panel A, the family's basis, uses closes for the fixed list of 55 shares and register prices for the rest, at most seven days old and without dividends or splits. Panel B uses closes for every share and is outside the family. Beneath each difference are the t-statistic clustered by security, in parentheses, and in brackets the p-value of a wild bootstrap of 499 draws by trade date. The detection rule does not flag the October 2020 fall, 12 to 29 October 2020.

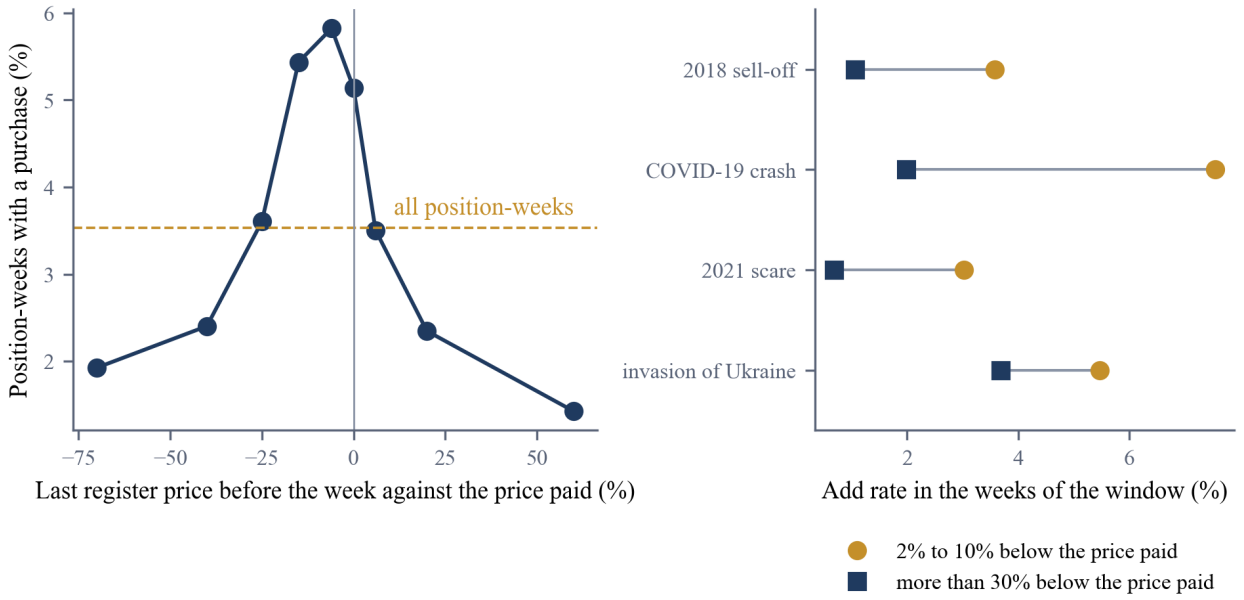

Figure IA.5. How often households add to a position, by the last register price against the price paid. Notes. Left: the add rate, the share of position-weeks with a purchase, of traced household positions in the weeks of the four crash windows, grouped by the last register price before the week against the price paid. The dashed line is the add rate over all position-weeks. Right: the add rate of positions 2% to 10% below the price paid (circles) and of positions more than 30% below it (squares), in the weeks of each crash window (Table IA.LXXXIX).

Table IA.C, the first table Section V.A cites, closes this part. It sets the net-buyer share of household accounts in each crash window against the 201 regular weeks outside October 2020 (Section V.A).

The invasion (Section VI). Table IA.CI sorts the 44 exposed shares by the kind of confirmation the source study found for their Russia exposure score (Section VI.A). The sorting is the source study's, and we did not check it. The source study states how the score was built in its section on the Finnish setting, in the words that Section VI.A quotes. For nine shares the source study sets the score beside a figure it took from the firm's own report. On the reports we read, two of those figures are not a Russia-only share of revenue (Section VI.A). Nokian's is Russia and Asia together, and Fortum states sales and no share. The two have a correlation of 0.99 and a median absolute gap of 0.22 points. The published figures are approximate, so this is agreement on nine shares and not a validation of the score.

Table IA.C

Net-buyer share of household accounts in each crash window against regular weeks

window	accounts	net-buyer share	gap to the regular-week mean	regular weeks at or above	share of regular weeks at or above	net-buyer share, owners aged 18 to 100
2018 sell-off	16,509	67.5%	−0.1 pp	109	54.2%	67.2%
COVID-19 crash	73,976	75.2%	+7.5 pp	19	9.5%	74.8%
2021 scare	27,806	64.8%	−2.9 pp	138	68.7%	64.2%
invasion	51,975	77.8%	+10.1 pp	9	4.5%	77.6%
Four crash windows pooled	122,147	72.5%	+4.9 pp	47	23.4%	72.1%
Regular weeks, mean of 201 weeks		67.6%				
Regular weeks, 95th percentile		77.3%				
October 2020 (robustness window)	37,602	81.2%	+13.6 pp	6	3.0%	80.9%

Notes. Household accounts with an exchange trade in listed shares in the window, on the flow basis of Section II. A net buyer bought more euros than it sold over the window; the share is of the accounts that traded. The benchmark is the 201 regular weeks outside October 2020 (Section II.D): weeks more than two weeks from the four falls and the October 2020 fall. The pooled row nets each account over the four windows and the COVID-19 row over three weeks, so their regular-week columns are not like for like. The gap is in percentage points (pp), from unrounded shares. The last column keeps owners aged 18 to 100. The detection rule does not flag October 2020.

Seven more scores are confirmed in kind only, by news of business in Russia or by an exit announcement, which does not bear on their level. The score out of date is Stockmann's, which describes a business that the firm had sold by January 2019. The unconfirmed shares have low scores: their mean is 4.17 points, against 13.03 for the nine, and their highest is 12.95. The highest score of all, 35.30, is confirmed in kind only.

Table IA.CII lists the 44 exposed shares with their scores and the kind of confirmation, so that a reader can check the regressor. The scores of the unexposed shares, all below two points, are not listed.

Table IA.CI

Check of the Russia exposure score of the exposed shares

Kind of confirmation	Exposed shares	Mean score	Lowest score	Highest score	Correlation with the published figure	Median absolute gap
Published revenue share	9	13.03	2.60	27.22	0.99	0.22
News of business in Russia	5	16.64	3.01	35.30		
An exit announcement	2	2.13	2.06	2.19		
Score out of date	1	15.94	15.94	15.94		
No confirmation	27	4.17	2.11	12.95		
All exposed shares	44	7.57	2.06	35.30		

Notes. Exposed shares have a Russia exposure score of two points of revenue or more. The score is the source study's estimate. That study, an unpublished manuscript of the same research project, states it as the share of revenue from Russia, from segment disclosures in annual reports, and records neither who compiled it nor its fiscal year. Each row holds the exposed shares with one kind of confirmation, and their mean, lowest and highest score. The kinds are the source study's, one per share. For the shares with a figure that the firm itself published, the last two columns give the correlation of the score with that figure and the median absolute gap in points. The published figures are approximate.

Table IA.CII

The Russia exposure score of each exposed share and its confirmation

Share	ISIN	Score	Kind of confirmation	Figure the source study took from the firm
Yleiselektroniik	FI0009900724	35.30	News of business in Russia	
Raute	FI0009004741	27.22	Published revenue share	27.0
Tikkurila Oyj	FI4000008719	24.67	Published revenue share	25.0
Aspo	FI0009008072	24.21	News of business in Russia	
Fortum	FI0009007132	21.48	Published revenue share	20.0
Nokian Renkaat	FI0009005318	19.61	Published revenue share	20.0
Stockmann	FI0009000251	15.94	Score out of date	0.0
Nurminen Logisti	FI0009900187	14.70	News of business in Russia	
Honkarakenne	FI0009900104	12.95	No confirmation	
YIT	FI0009800643	10.19	Published revenue share	7.0
HARVIA OYJ	FI4000306873	8.76	No confirmation	
Neste Oil	FI0009013296	6.01	News of business in Russia	
ROBIT OYJ	FI4000150016	5.99	No confirmation	
Teleste	FI0009007728	5.64	No confirmation	
Neomarkka	FI0009800296	5.49	No confirmation	
Atria	FI0009006548	5.33	Published revenue share	5.5
Rapala	FI0009007355	4.79	No confirmation	
QPR Software Plc	FI0009008668	4.76	No confirmation	
Aspocomp Group	FI0009008080	4.47	No confirmation	
Metsa Board B	FI0009000665	4.35	No confirmation	

Table IA.CII (continued)

Share	ISIN	Score	Kind of confirmation	Figure the source study took from the firm
NEXSTIM OYJ	FI4000506811	4.25	No confirmation	
Vaahto Group Plc	FI0009900708	4.25	No confirmation	
Elecster	FI0009900658	4.24	No confirmation	
Incap	FI0009006407	4.01	No confirmation	
Turkistuottajat	FI0009800551	3.74	No confirmation	
(no name in the file)	FI4000415252	3.67	No confirmation	
Pohjois-Karjalan	FI0009900468	3.31	No confirmation	
Huhtamäki	FI0009000459	3.19	Published revenue share	3.0
Biohit	FI0009005482	3.01	News of business in Russia	
Stora Enso	FI0009005961	2.96	Published revenue share	3.0
Fiskars	FI0009000400	2.93	No confirmation	
Basware	FI0009008403	2.85	No confirmation	
Outotec	FI0009014575	2.84	No confirmation	
QT GROUP OYJ	FI4000198031	2.83	No confirmation	
Suominen Yhtymä	FI0009010862	2.82	No confirmation	
Orion	FI0009014377	2.60	Published revenue share	2.5
VALMET OYJ	FI4000074984	2.44	No confirmation	
Scanfil	FI4000029905	2.34	No confirmation	
Westend ITC	FI0009007637	2.30	No confirmation	
Tulikivi	FI0009900583	2.21	No confirmation	
Raisio	FI0009002943	2.19	An exit announcement	
COMPONENTA OYJ	FI4000476783	2.14	No confirmation	
Wärtsilä	FI0009003727	2.11	No confirmation	
UPM-Kymmene	FI0009005987	2.06	An exit announcement	

Notes. One row per exposed share, by falling score. The score is the source study's estimate of the share of the firm's revenue that comes from Russia, in percentage points. Names are the data vendor's short names as the source study's file gives them, some of them older than 2022; one share has none. The kind of confirmation is the source study's. The last column is the figure the source study took from the firm's own report, where it found one; it describes these figures as approximate. The register holds no price in the invasion weeks for two of the 44 shares, which are in no regression at register prices.

The source study scores 150 listed shares and does not record the rule by which it chose them. Table IA.CIII counts what that leaves out. In the invasion weeks 182 listed shares traded on the exchange, and 34 of them have no score. Those 34 make up 19.0% of gross trading, and Nordea alone 10.7%. We hold shares outstanding for too few listed shares to give their part of market value.

The cut at two points is also the source study's. The price regressions use the score itself and not the cut. The flow sums and the sale-rate tests use the cut, and Table IA.CXI repeats the test of

Table IA.CIII

Listed shares with and without a Russia exposure score in the invasion weeks

	Count or share
Shares with an exposure score	150
Of which exposed	44
Of which without a register price	2
Listed shares traded in the invasion weeks	182
With an exposure score	148
Without an exposure score	34
Gross value in shares without a score	19.0%
Of which Nordea	10.7%

Notes. The first three rows count the shares that have a Russia exposure score. The two without a register price are exposed and have none after October 2021. The rows below count listed shares with at least one counted exchange trade from 21 February to 15 March 2022. Gross value is buys plus sells over all accounts. Legs are exchange trades of listed shares dated by trade day, in tickets under EUR 25 million.

the third part of H6 with the cut at five points.

Table IA.CIV sets every error estimate on file beside the slopes of the main tables (Section VI.B). H6 is read on the HC3 p and on the wild bootstrap of the HC1 t with six-point weights. At register prices the slope in the invasion weeks rejects on all five p-values. The two other bootstrap forms, with two-point weights and on the HC3 t, give 0.030 and 0.028.

For the difference of the second part the estimates disagree. With the controls, HC1 and HC3 errors reject and no bootstrap form does, and the p that enters each share twice is 0.070. Without the controls only the HC1 p rejects (0.037). At closes the slope in the invasion weeks rejects on HC1 and HC3 errors and on no bootstrap form. The difference at closes rejects on its HC1 p alone (0.027).

One estimate of the first slope is not ours. The source study's results file holds a regression across the 148 shares at register prices. It regresses the invasion-weeks return on the score and on a count of Russia news before the invasion. Its slope on the score is −0.43% with an HC1 t of −1.93, short of rejection at the 5% level, and the file holds no p for it. The coefficient on the news count is −1.90% (t = −1.52). We did not rerun that regression, so it has no HC3 p and no bootstrap p.

Table IA.CIV

Return on Russia exposure under every error estimate on file

	Register prices, before	Register prices, invasion weeks	Register prices, after	Register prices, before less invasion weeks	Register prices, same without controls	Closes, invasion weeks	Closes, before less invasion weeks
Return per exposure point	−0.10%	−0.52%	−0.23%	0.46%	0.42%	−0.76%	0.54%
	(−0.44)	(−2.16)	(−0.75)	(2.33)	(1.88)	(−2.75)	(1.84)
p, HC1 errors	0.589	0.008	0.412	0.008	0.037	0.001	0.027
p, HC3 errors	0.663	0.031	0.452	0.020	0.061	0.006	0.066
p, bootstrap, HC1 t, six-point	[0.625]	[0.022]	[0.440]	[0.067]	[0.116]	[0.137]	[0.145]
p, bootstrap, HC1 t, two-point	[0.626]	[0.030]	[0.437]	[0.075]	[0.120]	[0.167]	[0.152]
p, bootstrap, HC3 t, two-point	[0.641]	[0.028]	[0.422]	[0.075]	[0.120]	[0.167]	[0.153]
p, each share entered twice				0.070			0.061
Largest hat value	0.28	0.28	0.28	0.33	0.28	0.29	0.31
Shares	148	148	148	148	148	86	86

Notes. Each column is one regression of the main tables, one row per share. Slopes are returns per exposure point. The differences regress the return before the invasion less that of the invasion weeks on exposure, with or without the main tables' controls. Parentheses hold HC3 t-statistics. A bracketed p is a wild bootstrap p: it imposes the null and redraws the t named 9,999 times, with six-point or two-point weights. The row 'p, each share entered twice' pools the two windows as if a share's two returns were independent, for comparison only. A hat value is a share's weight in its own fitted value. H6 is read on the HC3 p and the first bootstrap p.

The families differ as well. In the source study's own family of 24 tests the slope enters on its HC1 p and passes (q = 0.013). In the family of this paper it enters on the larger of the HC3 p and the wild bootstrap p and does not pass (q = 0.063; Table IA.XX).

Table IA.CV repeats the register-price regressions of Section VI.B on other samples of shares and days. The first column is the result of the main tables, and the score out of date is Stockmann's. Without Stockmann the slope in the invasion weeks is −0.56% and rejects on both p-values (HC3 0.031; wild bootstrap 0.014).

The third column omits the 27 exposed shares in the sample whose score is unconfirmed or out of date. The source study counts 28 such shares, and one of them has no register price; one confirmed exposed share has none either. So 15 of the 16 confirmed exposed shares remain.

Every unexposed share stays in, and its score is likewise unconfirmed. Some of the 15 exposed

shares kept are confirmed in kind only, the highest score of the sample among them. The column therefore tests only whether the result rests on those 27 scores. The slope is −0.62% and rejects on both p-values (HC3 0.045; wild bootstrap 0.006).

On the same sample the slope before the invasion less the slope in the invasion weeks is 0.60%. It rejects on both p-values with the controls (0.005 and 0.028) and without them (0.006 and 0.039). That test is outside the family, and it uses the source study's windows.

On the most-traded shares alone the register-price slope is −0.73%. It rejects on HC3 errors (p = 0.009) and not on the wild bootstrap (p = 0.150). Under the wild bootstrap the slope rejects only when the other listed shares that have a score are added. The difference of the second part rejects on neither p on those shares, with or without the controls.

The last column checks the dating of the register price series. The series dates a leg two weekdays before settlement, and the flows date it two settlement days before (Sections II.B and II.C). The two counts date some legs differently, all on days beside an exchange holiday. No price between the first and the last of a window enters its return. No window starts or ends on such a day, and no share takes either price from one.

The controls do use such days. They come from the quarter before the first window, and all but one of the 148 shares take their last price of that quarter from one. Without the prices of those days the slope in each of the three windows is unchanged. The difference between the slopes is then 0.45% (HC3 p = 0.027; wild bootstrap p = 0.086), against 0.46% in the main column.

Table IA.CVI changes the window dates instead. A window return is a share's last price in the window over its first. The main windows therefore leave out the move from the price of 18 February to that of 21 February, the day to which H6 dates the news.

The second column starts the invasion weeks from the last price of 18 February. Their slope is then −0.59% and rejects on both p-values (HC3 0.005; wild bootstrap 0.013).

The slope before less the slope in the invasion weeks is then 0.53% with the controls and rejects on both (0.003 and 0.048). The two other bootstrap forms give 0.053 and 0.054 for that difference, so it does not reject on every form.

Table IA.CV

Return on Russia exposure at register prices on other samples of shares and days

	Main windows, scored shares	Without the stale score	Without unconfirmed scores	Most-traded shares	Without days beside holidays
Panel A. One regression per window					
Before the invasion	−0.10%	−0.09%	−0.02%	−0.27%	−0.10%
	(−0.44)	(−0.37)	(−0.09)	(−1.57)	(−0.44)
p, HC3 errors	0.663	0.713	0.925	0.117	0.663
p, wild bootstrap	[0.625]	[0.675]	[0.912]	[0.107]	[0.625]
The invasion weeks	−0.52%	−0.56%	−0.62%	−0.73%	−0.52%
	(−2.16)	(−2.16)	(−2.01)	(−2.60)	(−2.16)
p, HC3 errors	0.031	0.031	0.045	0.009	0.031
p, wild bootstrap	[0.022]	[0.014]	[0.006]	[0.150]	[0.022]
After	−0.23%	−0.38%	−0.31%	0.34%	−0.23%
	(−0.75)	(−1.39)	(−1.04)	(0.51)	(−0.75)
p, HC3 errors	0.452	0.165	0.297	0.609	0.452
p, wild bootstrap	[0.440]	[0.179]	[0.292]	[0.579]	[0.440]
Shares	148	147	121	86	148
Exposed shares	42	41	15	26	42
Panel B. Before less invasion weeks, one sample of shares					
With momentum and volatility	0.46%	0.49%	0.60%	0.42%	0.45%
	(2.33)	(2.43)	(2.82)	(1.09)	(2.21)
p, HC3 errors	0.020	0.015	0.005	0.274	0.027
p, wild bootstrap	[0.067]	[0.059]	[0.028]	[0.312]	[0.086]
Without controls	0.42%	0.47%	0.60%	0.46%	0.42%
	(1.88)	(2.13)	(2.76)	(1.48)	(1.88)
p, HC3 errors	0.061	0.033	0.006	0.139	0.061
p, wild bootstrap	[0.116]	[0.090]	[0.039]	[0.208]	[0.116]
Shares	148	147	121	86	148

Notes. Slopes are returns per exposure point at register prices. Parentheses hold HC3 t-statistics and brackets the wild bootstrap p of the main tables. The first column is the main result. Panel B regresses the return before the invasion less the return in the invasion weeks on exposure, with the controls of the main tables and without them. The third column omits the 27 exposed shares in the sample whose score is unconfirmed or out of date; unexposed shares stay in, their scores likewise unconfirmed. The fourth keeps the shares of the closes columns of the main tables. The last column drops prices of days on which the weekday and settlement-day counts date legs differently (Section VI.B).

Without the controls that difference is 0.50% and rejects on HC3 errors only (0.015, against 0.083 on the wild bootstrap). So on the window that starts where H6 dates the news, the second part would hold with the controls and fail without them. The verdict is read on the main windows, which Section I names.

The split column ends the first window on 23 February and starts the second from that day's price. It thus puts the first three days of the invasion weeks in the first window. We do not test those days on their own.

That window's slope of −0.33% rejects on the wild bootstrap (p = 0.046) and on its two-point form (0.048). It does not reject on HC3 errors (p = 0.114) or on the bootstrap of the HC3 t (0.058).

When the invasion weeks instead end at the index trough of 7 March, their slope is −0.71% and rejects on both p-values (wild bootstrap p = 0.005). The window after then starts on 8 March. The difference rejects on both there as well, with the controls and without them. In the columns of the two tables the bootstrap forms fall on different sides of 5% in two cells only, both named above.

Table IA.CVII repeats the window regressions at closes on the scored shares of the fixed list of 55 shares (Section II.E). That list is the sample the source study priced at closes. Of its shares 40 have a score, and 21 of them are exposed. On H6's own dates no other sample rejects on the wild bootstrap p before the invasion and not in the invasion weeks.

Before the invasion the slope is −0.83%. It rejects on the wild bootstrap p (0.023) and on the HC1 p (0.017), and not on the HC3 p (0.129). The largest weight of one share in its own fitted value is 0.49, against 0.28 in the main register-price sample. HC3 errors give the residual of such a share more weight than HC1 errors do.

No one share turns the sign: with one share left out at a time, that slope runs from −1.31% to −0.63%. The slope in the invasion weeks is −0.25%, with a wild bootstrap p of 0.788 and an HC3 p of 0.690.

With the controls of the main tables, the slope before less the slope in the invasion weeks is −0.16% (wild bootstrap p = 0.732). Without them it is −0.59% (wild bootstrap p = 0.481). Neither rejects on its HC3 p either, and no test of this table is in the family.

Table IA.CVI

Return on Russia exposure at register prices with other window dates

	Main windows, scored shares	From 18 February	Split at the invasion	Ending at the trough
Panel A. One regression per window				
Before the invasion	−0.10%	−0.10%	−0.33%	−0.10%
	(−0.44)	(−0.44)	(−1.58)	(−0.44)
p, HC3 errors	0.663	0.663	0.114	0.663
p, wild bootstrap	[0.625]	[0.625]	[0.046]	[0.625]
The invasion weeks	−0.52%	−0.59%	−0.38%	−0.71%
	(−2.16)	(−2.81)	(−1.50)	(−6.47)
p, HC3 errors	0.031	0.005	0.135	<0.001
p, wild bootstrap	[0.022]	[0.013]	[0.135]	[0.005]
After	−0.23%	−0.23%	−0.23%	0.10%
	(−0.75)	(−0.75)	(−0.75)	(0.36)
p, HC3 errors	0.452	0.452	0.452	0.717
p, wild bootstrap	[0.440]	[0.440]	[0.440]	[0.721]
Shares	148	148	148	148
Exposed shares	42	42	42	42
Panel B. Before less invasion weeks, one sample of shares				
With momentum and volatility	0.46%	0.53%	0.07%	0.63%
	(2.33)	(2.97)	(0.31)	(3.42)
p, HC3 errors	0.020	0.003	0.760	<0.001
p, wild bootstrap	[0.067]	[0.048]	[0.766]	[0.029]
Without controls	0.42%	0.50%	0.04%	0.61%
	(1.88)	(2.43)	(0.17)	(3.21)
p, HC3 errors	0.061	0.015	0.862	0.001
p, wild bootstrap	[0.116]	[0.083]	[0.864]	[0.030]
Shares	148	148	148	148

Notes. Slopes are returns per exposure point at register prices. Parentheses hold HC3 t-statistics and brackets the wild bootstrap p of the main tables. The first column is the main result. Panel B regresses the return before the invasion less the return in the invasion weeks on exposure, with the controls of the main tables and without them. The second column starts the invasion weeks from the last price of 18 February 2022. The split column ends the first window on 23 February 2022 and starts the second from that day's price. The last column ends the invasion weeks on 7 March 2022 and starts the window after on 8 March.

Table IA.CVII

Return on Russia exposure at closes of the scored shares on the fixed list of 55 shares

	Before the invasion	The invasion weeks	After	Before less invasion weeks	Same, without controls
Return per exposure point	−0.83%	−0.25%	−0.84%	−0.16%	−0.59%
	(−1.52)	(−0.40)	(−1.26)	(−0.20)	(−0.51)
p, HC1 errors	0.017	0.496	0.078	0.713	0.377
p, HC3 errors	0.129	0.690	0.209	0.838	0.607
p, wild bootstrap	[0.023]	[0.788]	[0.077]	[0.732]	[0.481]
Largest weight of one share in its own fitted value	0.49	0.49	0.49	0.59	0.49
Lowest slope without one share	−1.31%	−0.41%	−1.30%	−0.84%	−1.64%
Highest slope without one share	−0.63%	0.33%	−0.40%	−0.04%	−0.21%
Shares	40	40	40	40	40
Shares with exposure of two points or more	21	21	21		

Notes. The first three columns regress window returns at closes on the Russia exposure score, across the shares of the fixed list of 55 shares that have a score. The windows are 3 January to 18 February 2022, 21 February to 15 March, and 16 March to 30 June. The last two columns regress the return before the invasion less the return in the invasion weeks on the score, with momentum and volatility of late 2021 as controls and without them. Parentheses hold HC3 t-statistics, and brackets the wild bootstrap p. The largest weight is the largest hat value. Two rows give the lowest and the highest slope when one share is left out. No test here is in the family.

Evidence from other markets is on countries, not on firm exposure. Across 94 country indexes the relation between the index and war-related search intensity is not detectable before 24 February and is negative after (Boungou and Yatié (2022)).

Table IA.CVIII regresses the day's slope of returns on the exposure score on the changes in the geopolitical threats and acts indexes of Caldara and Iacoviello (2022) (Section VI.B). The test covers 55 trading days between 1 December 2021 and 23 February 2022, the last three of them in the invasion weeks.

The article's sample ends in 2020. The daily threats and acts indexes used here come from the authors' updated daily file, as of November 2026.

On register prices none of the twelve threats coefficients has a p below 5%, and on closes one does. That one is on closes with the index dated one day later, and its sign is positive. It is below 5% on its Newey-West p alone: on the HC3 p and on the wild bootstrap p none of the twelve is.

One rejection in 24 at 5% is what chance gives.

The scored shares of the fixed list of 55 shares have no column in the table. There one of the twelve threats coefficients is below 5%, on all three p-values, and its sign is positive as well. None of the twelve acts coefficients is below 5% on that list.

Each regression also holds the acts index. On closes two of its twelve coefficients have a p below 5%, both negative, and they are below 5% on all three p-values. On register prices none is. The two come from the same-day regressions of one outcome, with the index change in points and in logs.

Table IA.CVIII

Daily pricing of Russia exposure on the geopolitical threats and acts indexes, 1 December 2021 to 23 February 2022

	Threats, closes	Threats, register prices	Acts, closes	Acts, register prices
Exposure slope, same day, index change	+0.003	−0.002	−0.030**	−0.015*
	(0.44)	(−0.32)	(−2.45)	(−1.68)
Exposure slope, same day, index change, market return added	0.000	−0.005	−0.024*	−0.012*
	(−0.06)	(−0.90)	(−1.85)	(−1.78)
Exposure slope, same day, log index change	+0.012	+0.003	−0.014**	−0.007
	(0.99)	(0.36)	(−2.12)	(−1.49)
Exposure slope, next day, index change	+0.007	−0.002	+0.026	−0.006
	(1.52)	(−0.44)	(1.55)	(−0.63)
Exposure slope, next day, index change, market return added	+0.006	−0.004	+0.024	−0.004
	(1.40)	(−0.80)	(1.38)	(−0.38)
Exposure slope, next day, log index change	+0.021**	+0.003	+0.008*	+0.001
	(2.27)	(0.35)	(1.82)	(0.28)
Exposed less zero-score return, same day, index change	−0.021	−0.085	−0.012	+0.047
	(−0.19)	(−1.11)	(−0.05)	(0.39)
Exposed less zero-score return, same day, index change, market return added	−0.056	−0.096	+0.053	+0.056
	(−0.54)	(−1.26)	(0.25)	(0.46)
Exposed less zero-score return, same day, log index change	+0.067	−0.051	−0.023	+0.050
	(0.34)	(−0.32)	(−0.23)	(0.75)
Exposed less zero-score return, next day, index change	+0.091	−0.071	+0.234	+0.045
	(0.85)	(−0.76)	(0.87)	(0.26)
Exposed less zero-score return, next day, index change, market return added	+0.084	−0.074	+0.214	+0.050
	(0.87)	(−0.82)	(0.77)	(0.29)
Exposed less zero-score return, next day, log index change	+0.319*	+0.078	+0.064	−0.054

Table IA.CVIII (continued)

	Threats, closes	Threats, register prices	Acts, closes	Acts, register prices
	(1.74)	(0.59)	(0.93)	(–0.75)
Coefficients with p below 5%	1 of 12	0 of 12	2 of 12	0 of 12
The same on the HC3 p	0 of 12	0 of 12	2 of 12	0 of 12
The same on the wild bootstrap p	0 of 12	0 of 12	2 of 12	0 of 12
Trading days	55	55	55	55

Notes. Each row is one regression over the trading days from 1 December 2021 to 23 February 2022. The outcome is the day's slope of returns on Russia exposure across shares, or the return of exposed shares less shares with a score of zero, in percent. The columns give the coefficients on the changes in the threats and acts indexes per 100 points, or on their log changes. 'Next day' dates the indexes one day later, since a newspaper prints news the day after. Newey-West t-statistics with three lags in parentheses, and stars by the Newey-West p at the 10%, 5%, and 1% levels (two-sided). Three rows count coefficients below 5% on that, the HC3 and the wild bootstrap p.

Table IA.CIX gives the daily sums behind Section VI.C. The main net buyers of exposed shares in the invasion weeks were general government, EUR 5.9 million a day, and non-financial corporations, EUR 4.2 million. Domestic financial institutions bought unexposed shares, EUR 5.3 million a day, and little of the exposed. On either side of the invasion weeks households were net buyers of exposed shares, EUR 0.2 million a day in the first span and EUR 0.7 million in the last.

Table IA.CX gives each class's net purchases of exposed shares by calendar week around the invasion (Section VI.C). Households sold EUR 23.8 million net in the week of 14 February and EUR 62.4 million net in the week of 21 February, in which the invasion began. In the week of 7 March they were net buyers again. General government was a net buyer in every whole week shown, and most in the week the invasion began.

For foreign nominee accounts the sign in exposed shares rests on the last two days of the invasion weeks. They bought EUR 128.9 million net of exposed shares on the exchange in the first of those weeks and sold EUR 120.5 million net in the third. Over the three whole weeks they were still net buyers under the ticket limit. On the last two days, 14 and 15 March, they sold EUR 97.1 million net on the exchange. That brings their sum over the invasion weeks to net sales on the exchange of EUR 73.6 million. Table IA.CXIII adds the tickets over the limit.

Table IA.CXI compares household sale rates in exposed and unexposed shares (Sections VI.C

Table IA.CIX

Net purchases per trading day by investor class in exposed and unexposed shares around the invasion

Investor class	Exposed, 27 December to 18 February	Exposed, invasion weeks	Exposed, 16 March to 30 June	Unexposed, 27 December to 18 February	Unexposed, invasion weeks	Unexposed, 16 March to 30 June
Households	0.2	−1.7	0.7	2.0	3.1	1.4
Domestic financial institutions	−1.8	0.3	−2.0	1.1	5.3	−2.3
Foreign nominee accounts	5.8	−4.3	4.5	−7.5	−22.9	1.4
Of which valued at the close	0.5	0.0	0.0	−0.3	0.0	0.0
General government	0.8	5.9	−1.4	1.3	−0.9	−1.0
Non-financial corporations	−0.5	4.2	0.0	1.1	3.8	1.7
Non-profit institutions	−0.2	−0.9	−0.5	−0.9	−1.5	−0.1
Trading days	38	17	73	38	17	73

Notes. Net purchases in EUR million per trading day of the span. The first span is the eight weeks from 27 December 2021 to 18 February 2022; the invasion weeks are 21 February to 15 March. Exposed shares have a score of two points of revenue or more; unexposed shares have a lower score. Legs are exchange trades of listed shares by trade day, in tickets under EUR 25 million. A leg with no register price is valued at the exchange close. That part is shown for foreign nominee accounts and rounds to zero in every cell of the other classes. Nordea has no score and is in neither group. Foreign accounts held directly are not shown.

Table IA.CX

Net purchases of exposed shares by investor class in the weeks around the invasion

Investor class	27 December to 20 February	Week of 14 February	Week of 21 February	Week of 28 February	Week of 7 March	14 and 15 March	21 February to 15 March
Households	6.3	−23.8	−62.4	−3.2	22.1	15.3	−28.2
Domestic financial institutions	−69.5	0.3	−37.3	12.1	41.9	−12.1	4.6
Foreign nominee accounts	220.5	108.7	128.9	15.0	−120.5	−97.1	−73.6
General government	28.6	37.8	74.9	28.2	4.8	−8.1	99.8
Non-financial corporations	−20.2	0.9	14.9	13.9	41.9	1.0	71.7
Non-profit institutions	−6.5	−2.9	−4.8	−14.8	4.3	−0.1	−15.5

Notes. Net purchases in EUR million of exposed shares, those with a score of two points or more. Weeks start on the Monday in the column head. The first column sums the eight weeks to 20 February 2022 and so includes the second column. The last two columns show 14 and 15 March and the sum over the invasion weeks. Legs are exchange trades of listed shares by trade day, in tickets under EUR 25 million; one with no register price is valued at the close. The classes need not sum to zero: the other side of a counted leg can be a leg that the rules leave out (Section II.B). Foreign accounts held directly are not shown.

and VI.E). Its windows are the four weeks to 23 February 2022 and the four weeks from the invasion. The z in the table treats every position as independent and rejects in every column. An error clustered by account, on file for the first column, rejects as well (t = 17.71). Positions in one share have that share's news in common, which is what clustering by share allows for. With errors clustered by share the gap cannot be told from zero at the 5% level in any column but the fourth.

The third column is the test of the third part of H6, on the window that Section I names. No column of the table is in the family; the last two are checks. The fourth cuts the exposed group at five points instead of two, which leaves 15 exposed shares. Its gap of 0.662 percentage points rejects on the clustered p (0.024) and on the wild bootstrap (p = 0.0496). Three shares hold 78.7% of the exposed sales of that column. Without the exposed share with most sales its gap does not reject (p = 0.138), and no gap of the table does.

The fifth counts four weeks from 21 February, the day the invasion weeks open, and its gap is 0.376 percentage points (wild bootstrap p = 0.075; clustered p = 0.074). The test counts a position once in every week it is held. About two million distinct positions stand behind the eight million position-weeks of each weekly column.

The rows on one rate per share weigh every share alike instead of every position. The mean of the exposed shares' own sale rates is above that of the unexposed shares in every column, and both p-values are below 5% in every column. That holds before the invasion as well as after it, so the comparison does not date the selling to the invasion. In the four weeks before those of the first column the Welch p is 0.115 and the rank-sum p 0.044. The change in each share's rate between those two spans does not differ between the groups (p = 0.549).

Other estimates on file do not reject. By day, in the second column, the gap has a p of 0.060 clustered by day and of 0.230 clustered by share and day. The source study also prepared a weekly panel of sale rates. On it the comparison of one rate per share rejects in neither span (Welch p = 0.224 before the invasion and 0.538 from it).

Table IA.CXII sets general government's net purchases of exposed shares in the eight weeks from 27 December 2021 to 20 February 2022 beside every earlier eight-week window (Section

Table IA.CXI

Household sales of exposed shares in the four weeks to 23 February 2022 and the four weeks from the invasion

	27 January to 23 February, by week	27 January to 23 February, by day	From 24 February	From 24 February, cut at five points	From 21 February
Sale rate, exposed shares	0.591%	0.135%	0.868%	1.221%	0.973%
Sale rate, unexposed shares	0.486%	0.110%	0.546%	0.558%	0.596%
Gap, percentage points	0.105	0.025	0.322	0.662	0.376
	(1.13)	(1.25)	(1.93)	(2.28)	(1.80)
p, clustered by share	0.261	0.212	0.056	0.024	0.074
p, wild bootstrap by share	[0.332]		[0.074]	[0.0496]	[0.075]
p, clustered by day		0.060			
p, clustered by share and day		0.230			
Mean sale rate per share, exposed	0.690%	0.159%	0.819%	1.096%	0.881%
Mean sale rate per share, unexposed	0.523%	0.117%	0.611%	0.622%	0.650%
p, one rate per share, Welch t	0.032	0.024	0.019	0.016	0.010
p, one rate per share, rank-sum	0.025	0.008	0.004	<0.001	0.004
Gap without the exposed share with most sales	0.037	0.012	0.177	0.411	0.172
p of that gap, clustered by share	0.616	0.480	0.116	0.138	0.092
Part of exposed sales in three shares	40.3%	38.7%	49.0%	78.7%	49.9%
z, every position independent	20.06	22.13	54.56	88.98	60.59
Shares	148	148	148	148	148
Of which exposed	42	42	42	15	42
Position-weeks	7,855,522		7,983,278	7,983,278	7,956,631
Position-days		39,371,083			
Distinct positions	2,013,708	2,031,440	2,080,750	2,080,750	2,076,638
Sell legs counted	87,405	87,405	109,522	109,522	119,336
Sell legs valued at the close	0	0	0	0	0

Notes. A position is a household account's holding in one share at the start of a period. The first two columns cover 27 January to 23 February 2022, the next two 24 February to 23 March, and the last 21 February to 20 March. The second column counts days. The sale rate is the fraction of position-weeks, or position-days, with a sale on the exchange. The gap is exposed less unexposed. Exposed shares score two points or more; the fourth column cuts at five. t-statistics in parentheses are clustered by share; the wild bootstrap p is in brackets. Rows on one rate per share compare means of the shares' own rates. The z treats every position as independent.

Table IA.CXII

General government net purchases of exposed shares in the eight weeks to 20 February 2022 against earlier windows

	General government
Eight weeks to 20 February 2022, EUR million	28.6
Of which legs valued at the close, EUR million	0.0
Earlier eight-week windows	152
Mean of the earlier windows, EUR million	−37.7
5th percentile of the earlier windows, EUR million	−321.6
Share of earlier windows below the eight weeks to 20 February 2022	71.7%
Two-sided p	0.566

Notes. Net purchases, buys less sells in EUR million, by general government in shares with a Russia exposure score of two points of revenue or more. The first row sums the eight weeks from 27 December 2021 to 20 February 2022. The earlier windows are every eight-week sum ending in a week from January 2019 to November 2021; a week with no leg counts as zero. The sixth row is the share of those windows with lower net purchases, and the two-sided p is twice the smaller of that share and one less it. Legs are exchange trades of listed shares by trade day, in tickets under EUR 25 million; one with no register price is valued at the close.

VI.E). The earlier windows average net sales, so its buying in those eight weeks is above the usual level without being unusual. The two-sided p of the last row is the p of the test in the family. Every window counts tickets under EUR 25 million only. The sum with the one larger ticket is not set beside the earlier windows (Table IA.CXIII).

The share of earlier windows below is close on the two other leg counts on file. Counted on the source study's legs, priced exchange legs dated by settlement, the eight weeks sum to EUR 44.4 million, above 71.7% of the earlier windows. With priced legs only the share is 71.1%.

Table IA.CXIII shows what the ticket limit does to each class's net purchases of exposed shares (Sections VI.C and VI.E). Its panels are the eight weeks from 27 December 2021 to 20 February 2022 and the invasion weeks. In the eight weeks the limit changes the sign for foreign nominee accounts and for non-financial corporations, and it halves the sum for general government.

For general government the limit leaves out one purchase of EUR 28.5 million. With every ticket counted its net purchases of exposed shares in the eight weeks are EUR 57.1 million.

Under the limit foreign nominee accounts bought EUR 220.5 million net of exposed shares in

Table IA.CXIII

Net purchases of exposed shares in the eight weeks to 20 February 2022 and in the invasion weeks, by legs counted

Investor class	Legs the register prices	Legs valued at the close	All counted legs	Tickets of EUR 25 million or more, EUR million	Tickets of EUR 25 million or more, number	Every ticket counted
Panel A. Eight weeks to 20 February 2022						
Households	6.3	0.0	6.3	0.0	0	6.3
Domestic financial institutions	−69.5	0.0	−69.5	0.0	0	−69.5
Foreign nominee accounts	200.3	20.3	220.5	−290.2	89	−69.6
General government	28.6	0.0	28.6	28.5	1	57.1
Non-financial corporations	−20.2	0.0	−20.2	138.0	1	117.8
Non-profit institutions	−6.5	0.0	−6.5	0.0	0	−6.5
Panel B. Invasion weeks, 21 February to 15 March 2022						
Households	−28.2	0.0	−28.2	0.0	0	−28.2
Domestic financial institutions	4.6	0.0	4.6	0.0	0	4.6
Foreign nominee accounts	−73.6	0.0	−73.6	−102.6	99	−176.3
General government	99.8	0.0	99.8	0.0	0	99.8
Non-financial corporations	71.7	0.0	71.7	0.0	0	71.7
Non-profit institutions	−15.5	0.0	−15.5	0.0	0	−15.5

Notes. Net purchases, buys less sells in EUR million, of exposed shares, which have a Russia exposure score of two points of revenue or more. Panel B covers 21 February to 15 March 2022. The first three columns count exchange trades of listed shares by trade day, in tickets under EUR 25 million; a leg with no register price is valued at the exchange close of its trade day. The next two columns show the tickets of EUR 25 million or more in the same shares and weeks, which the flow basis leaves out. The last column counts every ticket. A class with large tickets on one side moves when they are left out. Foreign accounts held directly are not shown.

the eight weeks. The limit leaves out 89 larger tickets, which sum to net sales on the exchange of EUR 290.2 million. With every ticket counted they were net sellers on the exchange, EUR 69.6 million.

In the invasion weeks only foreign nominee accounts have tickets over the limit in exposed shares on the exchange: 99 tickets with net sales of EUR 102.6 million. With every ticket counted their net sales of exposed shares on the exchange are EUR 176.3 million, against EUR 73.6 million under the limit. The larger tickets are not split by week, so the net buying of the first three weeks is shown under the limit only.

Table IA.CXIV is the regression over share-weeks behind the second general government test

Table IA.CXIV

General government net purchases over gross trading from 1 December 2021 to 20 February 2022, exposed against unexposed

	No controls	With momentum and market beta
Exposed (score of two points or more)	−0.047	−0.022
	(−0.22)	(−0.11)
Momentum over 12 weeks		−1.195
		(−1.37)
Market beta		+0.007
		(0.02)
p for exposed	0.824	0.916
p for exposed, wild bootstrap		[0.921]
Share-weeks	228	228
Shares	46	46
Exposed shares	18	18
Weeks	12	12

Notes. Each column is one regression over share-weeks from 1 December 2021 to 20 February 2022. The dependent variable is general government's net purchases of the share in the week over its gross trading in it. A share-week enters when general government traded the share in that week. The regressor 'Exposed' is one for a Russia exposure score of two points or more. Momentum is the register price over its level 12 weeks earlier; market beta uses weekly returns of 2020 and 2021. Every variable is demeaned by week. t-statistics in parentheses cluster by share; the bracketed p is a wild cluster bootstrap by share. Legs are exchange trades of listed shares by trade day, in tickets under EUR 25 million.

(Section VI.E). It runs from 1 December 2021 to 20 February 2022. General government's net purchases over its gross trading are 0.022 lower in exposed shares than in unexposed shares, with momentum and market beta as controls. The wild bootstrap p for exposed shares is 0.921, and momentum and market beta cannot be told from zero either.

On the source study's legs the coefficient on exposed shares has the other sign, 0.106, and does not reject either (t = 0.52).

Table IA.CXV gives the household sale rate of Section VI.F under two ways of tracing positions. On positions traced from exchange trades only, the rate is 8.0% of 436,926 positions. Men's positions had a sale more often than women's under both tracings.

Table IA.CXVI regresses the sale on six account traits (Section VI.F). Each trait enters in standard deviations, the two indicators included, so a coefficient is not the gap between two groups.

Table IA.CXV

Household positions in exposed shares with a sale from 21 February to 22 April 2022

	Positions from every register entry	Positions from exchange trades
Positions with a sale	4.7%	8.0%
Men	5.4%	9.0%
Women	3.2%	5.8%
Positions	806,771	436,926
Exposed shares held	42	44

Notes. A position is a household account, aged 18 to 100, holding an exposed share at the start of 21 February 2022. The first column traces positions from every register entry since January 2018, the second from exchange trades only. A sale is at least one sell leg on the exchange in that share with a trade day from 21 February to 22 April 2022. Holdings from before 2018 are not in the register and are not counted. An exposed share that left the exchange before the invasion has no holder once every register entry is counted. Tracing from exchange trades alone still counts its former holders, because a tender offer is not an exchange trade.

Errors are clustered by postcode area and by share. The six tests are in the family; they belong to none of the six hypotheses (Table IA.XXI), and Table IA.XX gives their q-values. The register holds no holdings values, so portfolio size is not among the traits.

Four traits pass the family. Older account holders sold more: the probability of a sale is 0.81 percentage points higher per standard deviation of age (t = 2.88). Accounts in postcodes with more higher education sold less, by 0.37 percentage points per standard deviation (t = −6.61).

The coefficient on the indicator for women is −0.95 percentage points per standard deviation of the indicator (t = −11.35). The gap between the two groups is larger: a sale is recorded on 5.4% of men's positions and 3.2% of women's (Table IA.CXV). The coefficient on the indicator for Swedish speakers is −0.21 percentage points per standard deviation (t = −2.59).

Two traits do not pass. Accounts first seen longer ago sold more, 0.42 percentage points per standard deviation (t = 2.16; Table IA.CXVI). With a q of 0.063 (Table IA.XX) this is suggestive only. The coefficient on postcode income is 0.01 percentage points (t = 0.41), and the test cannot tell it from zero.

Table IA.CXVII sets the main model beside four others on file. The sign on age is not the same in all of them. On the source study's positions with its own traits the coefficient on age is −0.28

Table IA.CXVI

Which households sold an exposed share from 21 February to 22 April 2022: linear probability model

	Clustered by area	Clustered by share	Clustered by area and share
Age	0.81%***	0.81%***	0.81%***
	(18.82)	(2.90)	(2.88)
Woman	−0.95%***	−0.95%***	−0.95%***
	(−27.96)	(−11.94)	(−11.35)
Swedish speaker	−0.21%***	−0.21%***	−0.21%***
	(−6.34)	(−2.60)	(−2.59)
Years since the account was first seen	0.42%***	0.42%**	0.42%**
	(11.43)	(2.18)	(2.16)
Log median income of the postcode	0.01%	0.01%	0.01%
	(0.14)	(0.30)	(0.41)
Share with higher education in the postcode	−0.37%***	−0.37%***	−0.37%***
	(−5.19)	(−5.88)	(−6.61)
Positions	805,998	805,998	805,998
Postcode areas	856		856
Shares		42	42

Notes. The columns are one linear probability model under three clusterings of the errors. The dependent variable is one if the household sold the exposed share on the exchange from 21 February to 22 April 2022. One row is a position of a household account aged 18 to 100, held at the start of 21 February and traced from every register entry since January 2018, with no trait missing. A coefficient is the change in the probability of a sale per standard deviation of the trait. Area is the first three digits of the postcode. t-statistics in parentheses. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided), from the normal p of the t shown.

percentage points and rejects (t = −2.71). With register traits on those positions it is 0.19 and does not reject (t = 1.25). The source study's traits add the value and the concentration of an account's holdings, which the register does not hold.

The coefficients on women and on Swedish speakers are negative and reject in every column. The coefficient on postcode education is negative in every column and rejects at the 5% level in all but one. Postcode income rejects in none.

Table IA.CXVII

Which households sold an exposed share from 21 February to 22 April 2022: other positions and traits

	Main model	Positions from exchange trades	Years of activity for years since first seen	Source study's positions, register traits	Source study's positions and traits
Age	0.81%***	0.75%***	0.56%***	0.19%	−0.28%***
	(2.88)	(10.84)	(14.13)	(1.25)	(−2.71)
Woman	−0.95%***	−1.43%***	−0.75%***	−1.22%***	−0.98%***
	(−11.35)	(−26.31)	(−22.15)	(−12.42)	(−12.36)
Swedish speaker	−0.21%***	−0.40%***	−0.19%***	−0.36%***	−0.36%***
	(−2.59)	(−8.80)	(−6.00)	(−3.40)	(−3.04)
Years since the account was first seen	0.42%**	0.25%***			
	(2.16)	(4.09)			
Years between the account's first and last entry			1.50%***	1.60%***	0.48%
			(41.99)	(3.82)	(1.42)
Log median income of the postcode	0.01%	−0.06%	−0.01%	−0.05%	−0.01%
	(0.41)	(−0.49)	(−0.10)	(−0.96)	(−0.26)
Share with higher education in the postcode	−0.37%***	−0.25%**	−0.43%***	−0.21%*	−0.40%***
	(−6.61)	(−2.30)	(−6.01)	(−1.71)	(−4.16)
Log value of the account's holdings					1.69%***
					(5.15)
Concentration of the account's holdings					−1.95%***
					(−10.28)
Positions	805,998	436,619	805,998	437,101	435,287
Errors clustered by	Postcode area and share	Postcode area	Postcode area	Share	Share

Notes. Each column is one linear probability model of a sale on the exchange from 21 February to 22 April 2022, one row per household position in an exposed share. A coefficient is the change in the probability per standard deviation of the trait. The first column is the model of the family. The source study's positions sum priced exchange legs dated by settlement. Its own traits add the value and the concentration of the account's holdings, which we do not build because the register holds no holdings values. Years of activity end at the account's last entry, after the window. t-statistics in parentheses. One, two, and three stars mark significance at the 10%, 5%, and 1% levels (two-sided).

Table IA.CXVIII gives the abnormal returns after the twelve exit announcements at three horizons (Section VI.G). At ten and twenty trading days the 90% intervals also span zero. The an-

Table IA.CXVIII

Cumulative abnormal returns after announcements of an exit from Russia

Horizon	Mean cumulative abnormal return	90% interval, low	90% interval, high	Bootstrap p	Events
5 days	−0.58%	−2.56%	1.46%	0.655	12
10 days	0.70%	−2.72%	4.54%	0.758	12
20 days	−0.01%	−7.01%	5.88%	0.913	12

Notes. Mean cumulative abnormal return against the OMXH25 over 5, 10, and 20 trading days from each firm's own announcement, at register prices. The events are 12 usable ones among 16 candidates. Keyword rules found the candidates in Capital IQ headlines and event descriptions of Finnish issuers naming Russia or Belarus from 20 February to 31 December 2022. We excluded by hand the events unrelated to an exit, and a firm's first announcement is its event. The 90% interval and the two-sided p come from a bootstrap over firms.

nouncements are first announcements found by keyword rules in company news that can be dated and priced at register prices. The source study's eight dated exits, priced at closes of the fixed list, do not reject at any of the three horizons either (p = 0.784 at five days).