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THE ROLE OF SHORT SELLING IN EU CAPITAL MARKETS

Effects, evidence and regulatory implications

29 OCTOBER 2026

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PREFACE

Short selling is well documented in economic research as an important mechanism for price discovery and market efficiency. Yet short selling remains controversial in parts of the public debate – short sellers, after all, profit when prices fall.

A key regulatory instrument is mandatory public disclosure. Since 2012, the EU and UK have required investors to publicly disclose net short positions above 0.5 per cent of issued share capital. This rule introduces a second question for any investor considering a significant short position: whether public disclosure changes the trade's risk and return profile.

The two regimes have since diverged. The UK moved to anonymised aggregate disclosure in July 2026, while the EU's Short Selling Regulation still applies the individual disclosure rules introduced in 2012.

The Managed Funds Association (MFA) asked Copenhagen Economics to assess how public disclosure affects market quality under the EU regime, drawing on the disclosure data and research of the European Securities and Markets Authority (ESMA).

Specifically, we were asked to:

- Compare the major international disclosure regimes.
- Assess the EU evidence on the market quality effects of public disclosures.
- Quantify the cost to firms of restricting short selling, through the effect on their cost of capital.

We completed the study in September 2026, and the analysis reflects the evidence available at that date.

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EXECUTIVE SUMMARY

Short selling is well documented in economic research as an important mechanism for price discovery and market efficiency. In our research, we find that short selling contributes to market quality through two reinforcing channels:

First, short selling improves price discovery. Because short sellers tend to short stocks they believe are overvalued, their trading feeds genuine information into prices. Our econometric estimation in this study of disclosed short positions across seven European markets from 2015 to 2025 confirms that short sellers are informed: stocks with higher disclosed short interest go on to underperform over the following months, with the effect building steadily to around -0.7 per cent by 180 trading days. The effect concentrates in less-liquid stocks – where prices adjust slowly and an informational signal takes longest to surface. This suggests that, on average, short sellers correctly identify stocks the market has overvalued, and the gap we measure reflects the market catching up to that mispricing.

Second, short selling deepens market liquidity. Short sellers add to the supply of shares available in the market, and short selling is essential to the functioning of market makers, which account for around 16 per cent of daily short-selling activity in the US. Evidence from short-selling bans in both Europe and the United States confirms that restricting short selling widens bid-ask spreads and raises trading costs.

Crucially, these benefits are not confined to short sellers. More accurate prices and deeper liquidity accrue to all investors in the market – pension funds, households, and companies raising capital alike.

The EU is among the few that names individual short sellers publicly

Major markets all give their regulators information on short-selling activity so they can supervise the market. Where the markets differ is what is made available to the public. Here, the EU is among the few that publish both the size of a position and the name of the individual investor holding it once that position exceeds 0.5 per cent of a company's issued share capital. This report does not consider reporting positions to regulators; it focuses on what is made public.

Almost every peer that has reviewed this approach has moved away from it. The UK replaced named individual disclosure with anonymised aggregate data in July 2026. The United States provides public transparency through aggregate short-interest reporting rather than disclosure of individual short sellers. Japan and South Korea are the only other developed markets that still publicly name individual short sellers.

The stated rationale for the UK reform and US framework is consistent: named disclosure imposes costs on short sellers – through exposure to short squeezes, copycat trading, and reputational risk – that are disproportionate to the transparency benefits, and that ultimately harm the markets the disclosure is meant to serve.

The EU's named disclosure regime has adverse effects on market quality

Our empirical analysis and the wider economic research finds that the EU's public named disclosure regime has adverse effects on market quality through three reinforcing channels.

First, it deters short selling. Investors avoid crossing the 0.5 per cent public disclosure threshold: positions in the bin just below the threshold are significantly less likely to increase than positions elsewhere, a pattern documented in both German and EU-wide data. This deterrence reduces the flow of informed negative views into prices, slowing price discovery. As such, the benefits from short selling as discussed above are impaired by the disclosure requirement.

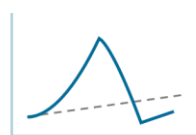
Second, it can lead to herding. Because a disclosed short position is a genuine signal (our analysis shows it predicts future price declines), other investors rationally follow. On European-wide data we find that a 1 percentage point rise in other investors' disclosed short interest leads a given investor to raise their own disclosed short interest in that stock by 0.07 percentage points over the following days, measured against other investors' disclosures only, with the investor's own position excluded. Danish data, which uniquely include non-publicly disclosed positions, allow a cleaner test: disclosed short interest has more than double the effect on subsequent short interest compared with non-disclosed short interest of the same size. The effect is driven by public observability, not by the underlying information.

Third, it is associated with increased volatility. We find that new short interest disclosure increases daily stock volatility by around 2.9 per cent. The most likely mechanism is the herding documented above: as investors pile in behind a disclosed position without conducting their own analysis, prices can be pushed beyond fundamental value, and the subsequent reassessment adds volatility.

Together, we find that these three channels together reduce market quality. Less informed short selling means prices adjust more slowly to negative information; herding can amplify price moves and, to the extent it pushes prices past fundamentals, feeds the higher volatility that raises the risk investors bear.

Figure 1

We find that public disclosure weakens market quality through three channels



1. By deterring short selling and thereby limiting the information flow to the market



2. By causing herding which can amplify price moves



3. By increasing volatility

Source: Copenhagen Economics

Better market liquidity from short selling reduces annual cost of capital for EU firms by EUR 11bn

Short selling benefits investors and firms not only through better market quality but also through lower cost of capital. When short selling deepens liquidity, bid-ask spreads narrow. Narrower spreads reduce the return investors require to hold equities, lowering the cost of equity capital for firms.

Concretely, we find that short-selling bans in Europe are associated with a 7.7 per cent widening of bid-ask spreads on average. Translating this into required returns, using the established relationship between trading costs and expected returns, and scaling to the STOXX Europe market capitalisation of EUR 13.9 trillion, the annual benefit of short selling on lower capital cost is approximately EUR 11 billion.

A second channel operates through risk. By helping prices reflect negative information earlier, short selling reduces the risk of large, sudden price corrections, which lower firm-specific risk premia and reduce the cost of capital further. The mechanism is well grounded, but the empirical evidence on how idiosyncratic volatility is priced is unclear, and we therefore do not attach a headline figure to this channel. The EUR 11 billion benefit therefore measures the liquidity channel alone, excluding the risk-premium channel.

CHAPTER 1

SHORT SELLING IS AN INTEGRAL PART OF WELL-FUNCTIONING CAPITAL MARKETS

Short selling is among the more contested practices in financial markets. Short sellers profit when prices fall, so their incentives run counter to those of other investors and of company management. This has fuelled a persistent claim that they harm the market and the investors in it. This chapter sets out what short selling is and examines its effects on the market.

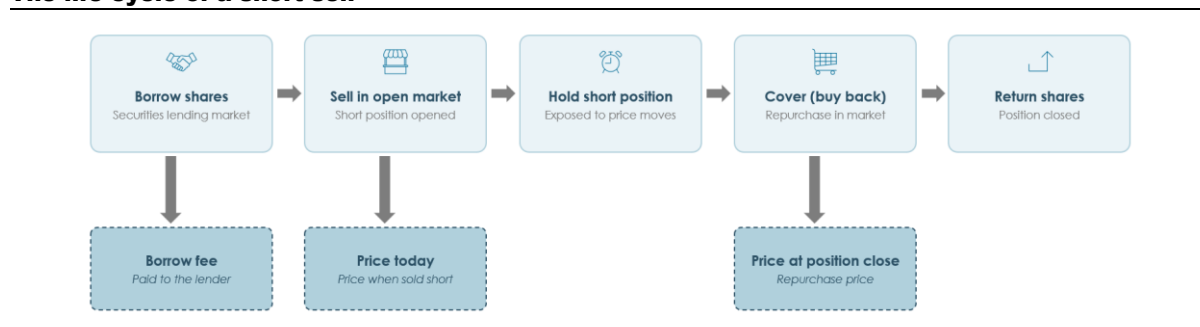
In *section 1.1* we explain the fundamental mechanisms of how short selling works. In *section 1.2*, based on a literature review and our own estimations, we demonstrate how short selling contributes to market quality for market participants through three reinforcing channels: Short sellers are informed traders whose positions carry information about future prices (*section 1.2.1*). That information supports price discovery, as short selling brings negative views into prices that optimists alone would leave out (*section 1.2.2*). Finally, short selling improves liquidity, as short sellers add trading activity to the market (*section 1.2.3*).

These channels matter because they shape how quickly prices reflect information and how easily investors can trade. When short sellers participate, prices adjust faster to negative information, markets grow deeper, and investors can better hedge the risk they already carry.

1.1 WHAT IS SHORT SELLING

Short selling is selling a stock that you do not already own. A short seller takes a short position by borrowing a share of a stock from another investor who is willing to lend it out for a fee.¹ The short seller then sells the borrowed share in the market at the current price. At a later point, the short seller can repurchase the share in the market and return it to the lender, see Figure 2.

Figure 2
The life cycle of a short sell²



Note: Illustrative
Source: Copenhagen Economics

If the share price has fallen in the interim, the difference between the two prices less the borrow fee is the short seller's profit. If the price has risen, the short seller incurs a loss, having repurchased shares at a price higher than that at which they were sold.

¹ In a short sale, the seller uses the securities lending market to borrow stock from a shareholder willing to lend their shares. For a full overview of the securities lending market, see Overdahl, J. A. (2025). *Short Selling: Essential to Strong Capital Markets*. Delta Strategy Group / Managed Funds Association, February 2025 ([link](#)).

² This describes a *covered* short sale, in which the seller has borrowed, or arranged to borrow, the shares before selling them. In a *naked* short sale, the seller sells shares without first locating a borrow, intending to acquire them before settlement falls due. Naked short selling is effectively prohibited in both EU and US, as Section 2.2 sets out in more detail. Throughout this report, 'short selling' refers to covered short selling.

The intent of a short

Investors take short positions for two broad investment reasons³:

- 1) **To express a view in pursuit of a return:** Typically driven by investors who believe a stock is overvalued compared to its fundamental value. This belief is typically reached through research into market dynamics and company financials. If the analysis is correct and the price falls, the short seller profits.
- 2) **To reduce the risk of an existing position** (also called hedging): An investor who owns a portfolio of securities may want to short specific securities to act as a counterweight to the risk in the portfolio. In this case, the short position is part of risk management and not a trade against the underlying company. As such, at times investors short stocks without a fundamental belief that the company is overvalued.

These two motives come together in the long-short strategies used by institutional investors such as hedge funds, pension funds, and insurers. These strategies pair long positions in expected outperformers with short positions in expected underperformers, selecting the stocks for the short leg through systematic screening on valuation and quality metrics that have historically predicted underperformance.⁴ The short leg therefore serves both purposes at once: it contributes to return by capturing the underperformance of the shorted stock, and it offsets broad market exposure, so that returns are driven by the relative performance of the two legs rather than by the direction of the market as a whole. In this case, shorting is a tool in a broader investment strategy.

The payoff and risk of a short

A short position's payoff reverses that of a long position. This reversal has implications for the risk of a short. A long position has a limited downside (the share price cannot fall below zero) and potentially unlimited upside. By contrast, a short position has a capped maximum upside (at most the initial sale price, if the price drops to zero) but potentially unlimited downside, as there is no upper bound on how high the share price can rise.

Profitability depends not only on the direction and magnitude of the price movement, but also on the cost of maintaining the position such as paying borrowing fees, margin interest, and any dividends or special payouts on the borrowed stock. To profit, a short seller must repurchase the stock at a price low enough to cover these carrying costs as well. The costs accrue throughout the life of the position and reduce net profits directly.

The principal ongoing cost is the borrow fee the short seller pays the lender for the duration of the trade. The fee reflects supply and demand for lendable shares and accrues continuously while the position remains open; for stocks that are hard to borrow because relatively few shares are available for lending, for example when a stock has relatively few shares available for trading or when many investors are already short, the fee can be substantial.

The short seller must also post collateral, typically cash or high-quality securities, to protect the lender against a failure to return the shares. The collateral is a requirement of the trade. It ordinarily earns interest or a rebate, which offsets part of the borrow fee, but it ties up capital for the life of the position. Because the collateral is valued at its current market price (i.e. marked to market), an adverse price move increases the amount the short seller must post: a rising share price triggers additional collateral calls, which must be met, or the position must be closed out.

A further risk is a lender recall as a second route to forced close out. The lender may demand the shares back before the short seller is ready to close the position, forcing a repurchase at short notice and potentially at an unfavourable price.

³ Not all short sellers take an investment view of their own on the stock. Financial intermediaries short for operational reasons. Market makers sell short to provide immediate liquidity to a buyer they cannot match with a seller, covering the position once they source the stock in the market; this allows them to quote continuous two-sided prices and is the function discussed in Section 1.3. Likewise, dealers in options and other derivatives short the underlying shares to hedge the exposures they take on from client trades.

⁴ Well documented risk factors, such as the value and size factors and the momentum effect, has been documented by Fama, E. F. and French, K. R. (1993). "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics*, Vol. 33, No. 1 ([link](#)); and Jegadeesh, N. and Titman, S. (1993). "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency", *The Journal of Finance*, Vol. 48, No. 1 ([link](#)).

1.2 SHORT SELLERS CONTRIBUTE TO GENERAL MARKET QUALITY BENEFITTING ALL INVESTORS

In line with existing literature on the topic, we have in our research identified two distinct channels through which short selling benefits market quality:

1. **Informed traders benefit price discovery:** Short sellers tend to be informed, as a short position usually reflects a belief that a stock is overvalued. By acting on information, short sellers allow prices to reflect the views of pessimists as well as optimists, supporting more accurate price discovery.
2. **Market liquidity:** Their participation deepens market liquidity, both directly and through market-making.

Crucially, these benefits extend to all market participants. All investors benefit from more accurate prices and deeper liquidity, whether they engage in short selling themselves.

In the following, we first document how short sellers trade on fundamental information about the company. We then explain how this activity improves price discovery and the informational efficiency of prices. Finally, we turn to the evidence on liquidity.

1.2.1 Short sellers are informed traders

The first step in our analysis is to establish whether short sellers are informed traders. As mentioned, this matters because the market quality benefits of short selling depend on it: a short seller who trades on genuine information about a company's fundamental value helps prices reflect that information. One who trades on noise does not.

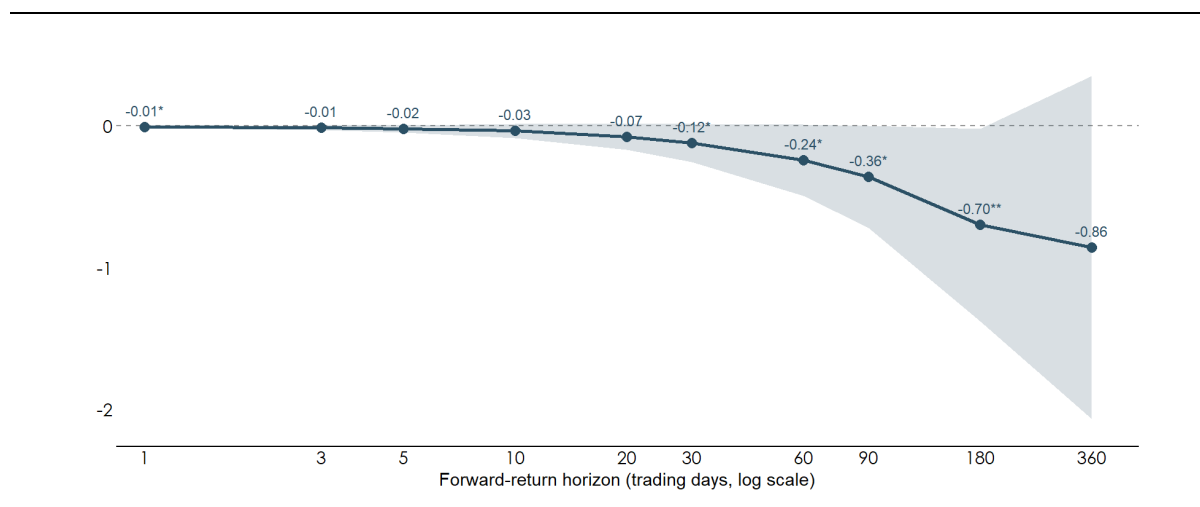
The test is straightforward. If short sellers act on real information about overvaluation, the stocks they short most heavily should go on to underperform as that information is gradually reflected in prices. If their trades contained no information, short interest today would tell us nothing about future returns. We therefore examine whether the level of disclosed short interest in a stock predicts its subsequent returns.

Concretely, we test this by regressing each stock's forward cumulative return on its lagged level of disclosed short interest, at horizons from one trading day to one year, based on EU data for 2015-2025. The specification is set out in Box 1.

Our results show that higher disclosed short interest indeed does predict lower future cumulative returns, meaning the stocks short sellers hold go on to underperform, see Figure 3.

Figure 3**Short interest predicts lower future returns**

Effect of +1 percentage point of short interest on future cumulative return (%)



Note: Each point is the coefficient from a separate regression of the forward cumulative return (over the horizon on the x-axis) on lagged total disclosed short interest, in per cent return per one-unit increase in short interest. The shaded band is the 95% confidence interval. Stars show the estimates' significance for the following: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on ISIN and date.

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK, and stock return, volume, and volatility from LSEG.

Each dot answers one question: how much lower are subsequent returns for stocks that carry more disclosed short interest today? A dot below the zero line means the more-shorter stocks went on to do worse, and the further below the line, the larger the gap. The dots sit lower the further ahead we look, so the gap widens as the horizon lengthens.

The shape of that pattern is informative in itself. A gap that opens slowly and keeps widening over 180 trading days resembles information reaching the market and thereby the price gradually, rather than a price adjustment caused by the short sellers. The estimates describe what short interest predicts about future returns, not what short selling does to them.

The grey band marks the uncertainty around the estimate: narrow where the effect is well pinned down, wider at the far right where it is not (so those points are more tentative). The relationship also holds only on average. Shorted stocks underperform others as a group, not individually, so any single short position still carries real risk.

The effect is modest, as expected in a market already close to efficient: a larger, more predictable pattern would attract shorting until it disappeared. It is also noisy, because not every short reflects a bet on falling prices. As *section 1.2* explains, investors short for different reasons and not all with the expectation of future negative returns. This mix of intentions likely explains both the modest average effect and the width of the uncertainty band.

Our results reveal two other characteristics worth noting:

- *First, the effect builds as the horizon lengthens.* The predicted underperformance grows steadily over the following months, reaching around -0.7 per cent by 180 trading days. It becomes statistically significant at the longer horizons. This gradual build up indicates information: profiting from a price move that soon unwinds points to a temporary effect, whereas profiting from one that lasts points to information correcting a mispricing. An effect that accumulates over months and never reverses reflects information entering prices. At the longest horizon, the estimate is larger still but is no longer statistically significant.
- *Second, the very short-horizon estimates carry little information.* The one-day effect is weakly significant and small, likely reflecting short-term reversal trading. This matters for how to read the result: informed short sellers are not solely short-term speculators betting on a drop tomorrow, but investors taking a

fundamental view that a stock is overvalued and waiting for prices to correct. That is why their signal builds over months rather than appearing within days.

Box 1 Returns prediction

When we investigate whether short sellers are informed across seven European markets, we test whether the level of disclosed short interest in a stock predicts its subsequent return. For each stock-day, we regress the cumulative return over the next N trading days on the lagged level of disclosed short interest plus standard controls, run at horizons $N \in \{1, 3, 5, 10, 20, 30, 60, 90, 180, 360\}$ trading days. The starting point of the analysis is a stock-level panel data regression of the following form:

$$r_{s,t}^{(N)} = \beta_N \cdot SI_{s,t-1} + \delta' X_{s,t-1} + \mu_s + \mu_t + \varepsilon_{s,t}.$$

Where the outcome variable, $r_{s,t}^{(N)}$ is the cumulative log return on stock s over the N trading days following day $t-1$, calculated as the sum of daily log returns. The main explanatory variable of interest is the level of total disclosed short interest in the stock at $t-1$, denoted $SI_{s,t-1}$, measured as the sum of all individual investor positions above the 0.5 per cent disclosure threshold for stock i on that day and expressed as a percentage of shares outstanding. We include trading volume, stock volatility and past returns, summed over the previous four days, in $X_{s,t-1}$ to control for market sentiment, and let δ be a vector of parameters that capture their effect. In addition, we include stock fixed effects μ_s and day fixed effects μ_t . Standard errors are clustered two-way, by stock and by date, which accommodates both the serial correlation induced by overlapping forward-return horizons and the cross-sectional correlation in returns across stocks on a given day. The coefficient of interest is β_N , which is expected to be negative under the informed shorts hypothesis since higher disclosed short interest should be followed by lower future returns.

Source: Copenhagen Economics. See Appendix A.2 for more details.

Our dataset for the analysis draws on two kinds of information. The first is the official record of short selling in European stock markets.⁵ We have gathered these disclosures across seven countries: the United Kingdom, Germany, France, Italy, the Netherlands, Finland and Denmark, recording who holds each position, in which company, how large it is, and how it changes from day to day. The second source is daily stock market data on share prices and returns, each company's market value, and trading volume. Matching the two lets us link short selling activity to how a stock performs. Together, the data cover the major European markets from 2015 to 2025.⁶

We have also examined whether the effect varies with the liquidity of the underlying stock. If short sellers are genuinely informed, their predictive power should be strongest in less-liquid stocks, where prices adjust slowly and information seeps in only gradually. Liquid stocks behave the opposite way, with prices absorbing information almost at once, competing away any informational edge before it can predict returns.

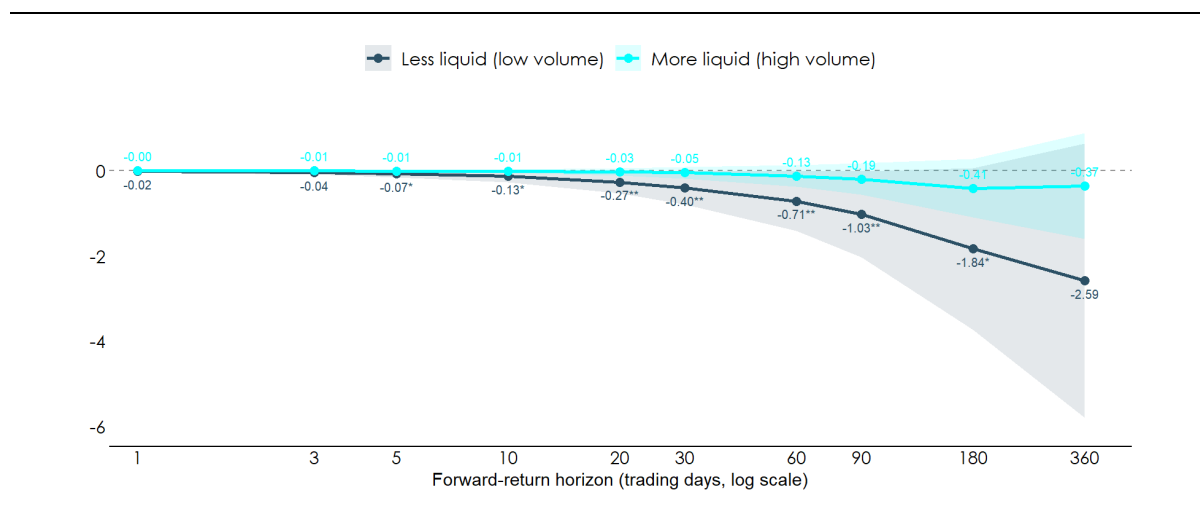
That is indeed the case in our estimation. In the less-liquid half of the sample, higher disclosed short interest predicts substantial underperformance: a more-shorter stock goes on to decline by around 1 per cent over the following 90 trading days. In the more-liquid half, the effect stays small and never reaches statistical significance at any horizon. The predictive power concentrates entirely in less-liquid stocks, which is exactly where prices adjust slowly and an informational signal should take longest to surface.

⁵ Under EU rules, an investor who builds a net short position worth at least 0.5% of a company's shares must report it publicly through the national financial regulator, see Section 2.1.

⁶ See Appendix A.1 for details

Figure 4**Return predictability concentrates in less-liquid stocks**

Effect of +1 percentage point of short interest on future cumulative return (%)



Note: Each point is the coefficient from a separate regression of the forward cumulative return (over the horizon on the x-axis) on lagged total disclosed short interest, in per cent return per one-unit increase in short interest. The shaded band is the 95% confidence interval. Stars show the estimates' significance for the following: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on ISIN and date.

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK, and stock return, volume, and volatility from LSEG.

We note one caution about the estimated effect and its uncertainty, or the payoff and the risk. The large effects in the less-liquid half come with uncertainty. The estimated effect keeps growing at longer horizons, but the confidence bands widen just as fast, and the longest-horizon estimate is no longer statistically significant. This is most likely a reflection of thin trading in less-liquid stocks, which limits the precision of estimates at longer horizons.

Our finding is consistent with an extensive body of research on short selling. Short selling has been studied extensively, and the weight of the evidence points the same way: short sellers tend to be informed investors whose trades anticipate falling prices and help move them towards fair value.

We highlight three studies that speak most directly to our analysis, each adding a different piece of evidence:

- The first study confirms that short sellers are informed and could predict future returns. It used the New York Stock Exchange's own internal records of every short sale placed electronically from 2000 to 2004 to examine which short sellers actually know something.⁷ Short sellers were right as a group: the stocks they sold most heavily fell by roughly 1.2 per cent over the next month (around 15 per cent a year) relative to the stocks they left alone. The magnitude came mostly from institutional trading, whose targets fell about 1.4 per cent over the next month (close to 20 per cent a year), whereas shorting by individuals did not have any predictive power. Because these price falls were permanent rather than temporary, the authors conclude that the short sellers were not driving prices down unfairly but helping push them towards fair value.
- The same conclusion holds on broader data. A study using an approach like ours examined daily short-selling data for all NYSE- and Nasdaq-listed US stocks in 2005⁸ and found that short sellers correctly anticipate negative future returns. The authors conclude that short sellers detect short-term deviations of prices from fundamental value and trade on them, which helps to correct overreaction in stock prices.
- A third study shows where that informational edge comes from: skill at processing public news. The negative relation between short selling and future returns roughly doubled on news days and quadrupled on negative news days. News fell on just 22 per cent of trading days but drove over 45 per cent of short sellers'

⁷ Boehmer, E., Jones, C. M. and Zhang, X. (2008). "Which Shorts Are Informed?", *The Journal of Finance*, Vol. 63, No. 2 ([link](#)).

⁸ Diether, K. B., Lee, K.-H. and Werner, I. M. (2009). "Short-Sale Strategies and Return Predictability", *Review of Financial Studies*, Vol. 22, No. 2 ([link](#)).

profits. The study is based on a comprehensive archive of US corporate news combined with daily short-selling data for NYSE-listed stocks from 2005 to 2007.⁹

1.2.2 How short selling supports price discovery

The section above showed that short sellers are informed, meaning their trading feeds real information into prices: A share price represents the market's collective estimate of what a company is worth. That estimate is only as accurate as the information investors bring to it when they trade. Buying expresses the view that a stock is worth more than its current price, while selling expresses the opposite. For a price to reflect both views, investors must be able to act on negative information as readily as on positive information.

Without short selling, only existing holders can act on negative information, and only to the extent of the shares they own. An investor who holds no shares in a company cannot express a negative view at all, however well-researched that view may be. The most informed sceptic is excluded from the price, while optimists face no equivalent constraint. Prices then drift above the level the available information would justify, see Box 2.

Short selling removes this asymmetry. By borrowing and selling shares they do not own, investors can act on negative information whether they already hold the stock. Prices come to reflect the views of pessimists and optimists alike and settle closer to the market's view of a company's fundamental value. The benefit is a more accurate price, not simply a lower one. A price that is too high inefficiently allocates capital just as a price that is too low does. An overvalued price is also more fragile, as it rests on optimists alone. A stock will therefore fall harder under an adverse shock than a stock whose price short sellers have already tempered.

⁹ Engelberg, J. E., Reed, A. V. and Ringgenberg, M. C. (2012). "How Are Shorts Informed? Short Sellers, News, and Information Processing", *Journal of Financial Economics*, Vol. 105, No. 2 ([link](#)).

Box 2 When only optimists set the price

A stock is cyclical. Over the next year a boom or recession is equally likely (50/50), and the outcome directly affects its value.

There are two different investor groups who disagree on its value in each future state. Yet the two groups agree on a valuation of 100 today given the 50/50 likelihood of boom or recession:

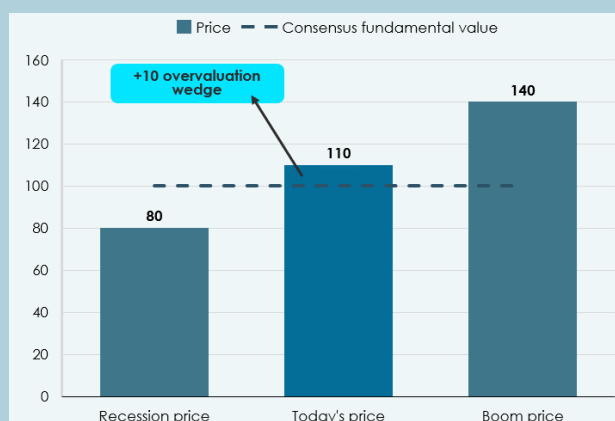
- **Type 1:** value 80 (recession) / 120 (boom) → mean 100
- **Type 2:** value 60 (recession) / 140 (boom) → mean 100

With short selling restricted, sceptics cannot act, so in each state the most optimistic group sets the price:

- Recession → Type 1 sets 80; Boom → Type 2 sets 140

Today's price = expected resale value = $0.5 \times 80 + 0.5 \times 140 = 110$

With the short side suppressed, prices diverge from their consensus fundamental value, see figure. This divergence can lead to inefficient capital allocation and asset bubbles.

The price is inflated without short sellers

Source: Example is from Pedersen (2015) pp. 119-120 based on Miller, E. M. (1977) and Harrison and Kreps (1978)

The economic research on the topic confirms, including through evidence that restricting short selling slows price discovery:¹⁰

- The first study linked short selling to more informative prices. Analysing daily US short data over six months in 2007, it showed that more active short selling gets information such as earnings releases into prices faster.¹¹ It found that this effect is most pronounced for negative information, which is consistent with the understanding that short selling supports downward price adjustments.
- Short selling bans provide causal evidence for the same effect. A 2013 study¹² examined short-selling bans imposed around the world during the 2007-2009 crisis. Since countries implemented bans on short selling to varying degrees and at different times, this study could identify how the bans affected the market.

¹⁰ See e.g. Dechow, P. M., Hutton, A. P., Meulbroek, L. and Sloan, R. G. (2001). "Short-Sellers, Fundamental Analysis, and Stock Returns", *Journal of Financial Economics*, Vol. 61, No. 1 ([link](#)); Boehmer, E., Jones, C. M. and Zhang, X. (2008). "Which Shorts Are Informed?", *The Journal of Finance*, Vol. 63, No. 2 ([link](#)); Diether, K. B., Lee, K.-H. and Werner, I. M. (2009). "Short-Sale Strategies and Return Predictability", *Review of Financial Studies*, Vol. 22, No. 2 ([link](#)); Saffi, P. A. C. and Sigurdsson, K. (2011). "Price Efficiency and Short Selling", *Review of Financial Studies*, Vol. 24, No. 3 ([link](#)).

¹¹ Boehmer, E., Jones, C. M. and Zhang, X. (2008). "Which Shorts Are Informed?", *The Journal of Finance*, Vol. 63, No. 2 ([link](#)). Note: This is assessed by measuring how closely transaction prices move relative to a random walk while incorporated at a daily frequency.

¹² Beber, A. and Pagano, M. (2013). "Short-selling Bans Around the World: Evidence from the 2007-09 Crisis", *The Journal of Finance*, Vol. 68, No. 1 ([link](#)). Note: The speed of incorporation is assessed by comparing autocorrelations during the short selling ban to autocorrelations outside of the ban period.

It found that where short selling was banned, negative information reached prices more slowly than in countries without a ban.

A related benefit is market discipline. Short selling lets the market signal disapproval of a firm's strategy, putting pressure on managers to change course. In more extreme cases, the prospect of informed short sellers scrutinising a firm deters managers from fraud and misreporting. By pushing down the prices of overvalued assets, short selling also reduces the risk that bubbles build up.

These disciplinary effects have played out in some well-known cases. In the United States, short sellers uncovered Enron's questionable accounting practises ahead of its collapse in 2001. In Germany, short sellers played a similar role in exposing Wirecard's accounting fraud in 2020, see Box 3.

Box 3 Wirecard case: Short sellers identify an overvalued asset

In June 2020, Wirecard, a German payment processor and financial services provider, filed for insolvency after admitting that almost €2 billion in cash was "missing". The accounting fraud that eventually led to the €24 billion fintech's demise had been predicted by many investors who held short positions against the company years earlier, as early as 2015.

The investors who shorted Wirecard were frequently derided for their insistence that the company's financial statements and the value of its investments did not add up. Wirecard claimed that the decline in its stock price was unfounded and instead the result of a deliberate attack by investors and journalists. The German federal financial supervisory authority, BaFin, agreed. In February 2019, short sellers and journalists were criminally investigated, and BaFin issued a temporary ban on short selling of Wirecard stock after short positions contributed to a steep decline in the share price.

The Wirecard episode illustrates both ends of the spectrum of constraints on short selling. The ban represents the acute intervention by a direct prohibition on taking new short positions, while the individual public disclosure threshold operated as a friction to participating in short selling. Anecdotal evidence from interviews with hedge funds suggests that many funds shorting Wirecard were reluctant to cross the 0.5 per cent public disclosure threshold. This reluctance is consistent with the thesis that public disclosure suppresses price discovery and impedes market quality. By deterring informed investors from building the positions that would correct mispricing, it allows mispricing to persist.

It is clear from the company's bankruptcy that the hedge funds and other investors who were short Wirecard had accurately identified that the company was overvalued. Short selling was an important contributor to revealing the fraud, despite regulatory pressure to the contrary. In the case of Wirecard, policymakers' decision to constrain short sellers meant the fraud was permitted to continue longer and likely contributed to billions of euros of unnecessary losses for European investors.

In June 2025, BaFin itself conceded the point. In an interview with the Financial Times, its president, Mark Branson, acknowledged that, on Wirecard, "your institution got it right; ours got it wrong," that the regulator had sent mixed signals to the market, and that it had given ESMA selective and incomplete information when making the case for the short-selling ban.

Wirecard short interest, 2015 – 2021**Disclosed short interest, per cent of outstanding shares (%)**

Note: We assume that a position holder's position size is unchanged until we see a record in the data saying otherwise. The figure also reflects seven-day means.

Source: Copenhagen Economics based on data from German Bundesanzeiger

Source: Copenhagen Economics based on *The Economist* (2020), "Wirecard's Scandal Shows the Benefits of Short Sellers" ([link](#)); Reuters (2021), "The Ex-convict's Tale: Germany's Role in Wirecard Scandal Under Microscope" ([link](#)); Financial Times, Inside Wirecard ([link](#)); Financial Times (2025), "German Watchdog Says Wirecard Mistakes Have Made It More Willing to 'Step on Toes'" ([link](#))

1.2.3 Short selling improves market liquidity

Short selling also improves another dimension of market quality: it deepens liquidity.

Market liquidity is the ease with which an asset can be bought or sold quickly, in reasonable size, and without materially moving its price. A liquid market has many willing buyers and sellers at any moment, so a trade is easy and at a price close to the one last observed. An illiquid market has few: a buyer may have to pay well above the last price to find a seller, and a seller may have to accept well below it to find a buyer.¹³

Short sellers contribute to this directly. By borrowing and selling shares, they add to the supply of securities available in the market at any moment, making it easier for buyers to find a counterparty without moving the price.

Much of the day-to-day liquidity in equity markets is supplied by market makers. A market maker is a firm that holds itself out as continuously willing to buy and sell a security against its own capital. By quoting prices at which they will both buy and sell, and earning the spread between the two, they allow other investors to trade immediately rather than wait for a matching counterparty to appear.

Short selling is essential to the function of a market maker. When a market maker receives a buy order for a security it does not hold, it can sell the security short to fill the order at once and source the security in the market afterwards. Market makers account for about 16 per cent of daily short sales activities in the US, according to Nasdaq data.¹⁴

Liquidity matters for every participant in the market. A pension fund rebalancing its portfolio, a household buying an index fund, and a company issuing new shares all transact at costs set by the prevailing level of liquidity.

¹³ The most common measure of liquidity is the bid-ask spread, which is the difference between the highest price a buyer is currently willing to pay and the lowest price a seller is willing to accept. The spread is the cost of trading: what an investor gives up by buying and immediately selling. A narrow spread means trading is cheap; a wide spread means it is expensive.

¹⁴ Mackintosh, P. (2024). "A Deep Dive into How Short Selling Really Works", *Nasdaq*, 29 February 2024 ([link](#)).

Better liquidity (i.e. narrow spreads) and reliable execution lower the cost of investing for long-term and passive investors as much as for anyone else, and they ensure that an investor who needs to sell can do so without forcing the price down.

Short selling's contribution to market liquidity is supported by economic research:

- ESMA's review of the Short Selling Regulation, analysing the 2020 bans across the EEA30 states and the UK, found the bans worsened liquidity, measured by bid-ask spreads (and Amihud illiquidity indicator), with the deterioration most pronounced for large-cap stocks, highly fragmented stocks and stocks with listed derivatives.¹⁵
- A large cross-country study confirms the pattern. It investigated the short-selling bans that regulators imposed around the 2008 crisis, covering 16,491 stocks across 30 countries between January 2008 and June 2009, and used the staggered timing of each ban to isolate its effect.¹⁶ The bans damaged liquidity by widening bid-ask spreads for most stocks with small market capitalisation, high volatility and no listed options. The authors conclude that restricting short sellers raised trading costs without delivering the price stability regulators sought.
- A third study reveals the mechanism behind the damage. It examined the US Securities and Exchange Commission's September 2008 emergency ban on short sales in nearly 1,000 financial stocks, using proprietary order data from the NYSE, NASDAQ and BATS.¹⁷ Shorting in the affected large-cap stocks fell by an average of 77 per cent, and those stocks then suffered a severe degradation in market quality and liquidity, measured by quoted and effective spreads, price impacts and realised spreads. The authors trace this to a loss of competition in liquidity provision: with algorithmic traders no longer acting as informal market makers, the remaining market makers earned greater rents at the expense of those demanding liquidity.

¹⁵ European Securities and Markets Authority, "Final Report: Review of certain aspects of the Short Selling Regulation" (2022) ([link](#)).

¹⁶ Beber, A. and Pagano, M. (2013). "Short-selling Bans Around the World: Evidence from the 2007–09 Crisis", *The Journal of Finance*, Vol. 68, No. 1 ([link](#)).

¹⁷ Ekkehart Boehmer, Charles M. Jones and Xiaoyan Zhang, "Shackling Short Sellers: The 2008 Shorting Ban," *Review of Financial Studies*, 26(6) (2013), 1363 to 1400 ([link](#)).

CHAPTER 2

MAJOR MARKETS ARE SHIFTING REGULATION FROM NAMED TO ANONYMISED SHORT-SELLING DISCLOSURE

Chapter 1 showed that short selling improves market quality and that all investors benefit when short sellers participate. Short selling is nonetheless regulated, to safeguard market integrity and stability. This chapter examines how the EU regulates short selling and how its approach compares with other major markets.

In *section 2.1* we set out the EU framework, under which investors must cover every short sale, report significant positions privately to the regulator, and disclose the large short positions to the market. In *section 2.2* we compare that framework with its peers and find that the difference lies in whether the name of the position holder is disclosed. The EU publishes not only the size of a large position but also the name of the individual short seller. Almost every peer that has reviewed the naming of individual short sellers, among them the United Kingdom, has opted for or moved instead to anonymised disclosure.

2.1 HOW THE EU REGULATES SHORT SELLING

The EU framework rests on the Short Selling Regulation (SSR), which regulates short selling through three main mechanisms:

1. bans naked short selling by requiring every short sale to be covered;
2. gives regulators emergency powers to restrict or suspend short selling when markets come under stress;
3. requires investors to disclose significant net short positions.

1. Covered short selling

The SSR requires every short sale to be covered: at the point of shorting, the seller must already have borrowed the security or arranged to borrow it. This prohibits so-called naked short selling, where the seller has done neither¹⁸. This requirement reduces settlement failures, limits counterparty risk, and protects buyers.

2. Ban powers

At the market level, the SSR gives national competent authorities (NCAs) and ESMA emergency powers with the intention to address serious threats to financial stability and market confidence. They exist to stop short selling from amplifying downward price spirals in a crisis and can be used in two situations. First, they may impose a temporary ban when an instrument's price has fallen sharply¹⁹ during a single trading day. Second, they may impose longer restrictions when events pose a serious threat to financial stability or market confidence, as in the first wave of the COVID-19 pandemic in 2020²⁰.

The first two mechanisms constrain how short selling may be conducted. The third, which is the focus of this report, determines what regulators and the public can see.

3. Disclosure requirements

The SSR provides transparency for regulators and market participants about short-selling activity through rules

¹⁸ European Commission (2012). *Short Selling and certain aspects of Credit Default Swaps (CDS) – Frequently Asked Questions on Regulation (EU) No 236/2012*, MEMO/12/508, 5 July 2012 ([link](#)).

¹⁹ For liquid shares, a significant fall in value is defined as a price decline of 10% or more during a single trading day. European Parliament and Council (2012). Regulation (EU) No 236/2012 on short selling and certain aspects of credit default swaps, Article 23, *Power to restrict short selling of financial instruments temporarily in the case of a significant fall in price*, OJ L 86, 24 March 2012 ([link](#)).

²⁰ ESMA (2022), *The 2020 Short Selling Bans – Market Impact* ([link](#)).

on disclosure²¹. The rules implement a two-tier reporting framework based on investors' net short position. A net short position (NSP) is the difference between an investor's total short positions and total long positions in an issuer or company's shares and related financial instruments.

Disclosure follows two steps: positions above 0.1 per cent of share capital are reported privately to the regulator, and from 0.5 per cent the regulator makes the position and the holder's identity public, see Figure 5. The first reporting threshold is intended exclusively for regulators. It provides supervisory authorities with near-total visibility into significant short positions without making those positions public. At the 0.5 per cent threshold, the position and the holder's identity are made public by the regulator. This means that all market participants can observe that a specific investor holds a significant short position in each company. Additional public disclosures are required for each subsequent increase of 0.1 percentage points.

Figure 5
EU short-selling disclosure regulation for net short positions



Note: Net short positions are expressed as a percentage of the issuer's issued share capital.

Source: Regulation (EU) No 236/2012 of the European Parliament and of the Council of 14 March 2012 on short selling and certain aspects of credit default swaps ([link](#)).

The reporting requirements apply to investors holding NSPs above the regulatory thresholds. Certain activities are exempt. Market makers providing liquidity to financial markets and firms conducting stabilisation activities in connection with securities issuances may be exempt from certain reporting and short-selling requirements, subject to regulatory conditions and notification obligations²².

2.2 MARKETS DIFFER BY DISCLOSING SHORT INTEREST WITH AND WITHOUT NAMES

Major markets all give their regulators information on short-selling activity so they can supervise the market. Where the markets differ is what is made available to the public. On this point the EU is among the few markets that name the individual short seller, while most peers publish only anonymised, aggregate short interest. Recent reviews in peer markets have reshaped this public dimension. The United Kingdom has reviewed its regime and moved to anonymised disclosure, and the United States has endorsed the same aggregate approach though its rule has been remanded to the regulator and is not yet in force — while the EU has retained named disclosure of individual positions.

Only the EU, Japan, and South Korea publicly name the individual investors behind large short positions. By contrast, other major Western markets have adopted different disclosure models. The full comparison across major markets is shown in Table 1. Most markets have judged that anonymised disclosure gives the public the transparency it needs without naming individual investors.

²¹ The regime applies primarily to shares admitted to trading on EU trading venues, as well as to EU sovereign debt and related sovereign credit default swaps (CDS). European Commission (2010), Proposal for a Regulation on Short Selling and Certain Aspects of Credit Default Swaps, COM(2010) 482 final ([link](#)).

²² Regulation (EU) No 236/2012, Articles 17 and 18 ([link](#)).

Table 1
Comparison of public short-selling disclosure regulation

	EU	UK	US	JAPAN	AUS- TRALIA	CANADA	S. KOREA
Identity disclosed	Yes	No	No	Yes	No	No	Yes
Information to market	Individual positions	Aggregate	Aggregate	Individual positions	Aggregate	Aggregate	Individual positions
Public disclosure threshold	≥0.5%	N/A	N/A	≥0.5%	N/A	N/A	≥0.01%

Note: Public disclosure refers to information made available to market participants. Disclosure methodologies differ across jurisdictions, ranging from individual-position disclosure to anonymised issuer or market-level aggregation. Comparisons are focused on differences in disclosure regulation and may abstract certain details.

Source: Copenhagen Economics based on ESMA, FCA, SEC, ASIC, FSA Japan, CSA/IIROC and FSC/KRX regulatory disclosures and reporting frameworks.

Public disclosure in Japan and South Korea

Japan replaced the temporary public disclosure threshold of 0.25 per cent, introduced after the global financial crisis, with a permanent threshold of 0.5 per cent of issued share capital to facilitate fair short selling, strengthen the market function and avoid market declines caused by excessive restrictions. South Korea, by contrast, lowered its public disclosure threshold. In November 2023, the Financial Services Commission (FSC) imposed a temporary ban on short selling in domestic stock markets following investigations into repeated cases of illegal naked short selling. The authority lowered the public disclosure framework from 0.5 per cent to 0.01 per cent to prevent and regulate illegal activities and ensure protections for investors²³.

The UK switches from public disclosure

In the UK, the Financial Conduct Authority (FCA) has replaced the public disclosure of individual short positions with anonymised aggregate disclosures. The objective of the reform is “to maintain the orderly and effective functioning of UK markets, while removing disproportionate costs”²⁴ that restrict legitimate short-selling activity, including its role in “price formation,” “liquidity” provision and “risk management”²⁵.

Following its exit from the EU, the United Kingdom initially retained the EU SSR. However, after reviewing the regulatory framework, the FCA concluded that “the current regime should be modified to alleviate disproportionate burdens on firms”²⁶. HM Treasury’s Call for Evidence found that these “burdens may inhibit or discourage short selling and its associated benefits”²⁷. Respondents also “emphasised the negative effects of named disclosure enabling both short squeezing and copycat trading”²⁸. The Government concluded that the overall framework should be retained while being modified to support “the competitiveness of UK financial markets and contribute to the UK’s wider economic growth”²⁹.

The FCA’s reform implements this approach through a new UK-specific short-selling framework that has taken effect on 13 July 2026. The regime retains private notification of net short positions above 0.2 per cent of issued share capital, providing the regulator “with information that allows it to monitor the impact of short selling on the

²³ Financial Services Commission (2024). *Short Sale Reform Measures Introduced to Prevent Illegal Trading Activities and Protect Investors*, Press Release, 13 June 2024 ([link](#)); and Financial Services Commission (2024). *Short Sale Reform Measures*, Capital Market Reform, 1 August 2024 ([link](#)).

²⁴ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 1.4; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

²⁵ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 2.1; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

²⁶ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 1.4; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

²⁷ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 2.5, summarising the findings of HM Treasury’s Call for Evidence ([link](#)).

²⁸ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 2.10; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

²⁹ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 1.4; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

UK market”³⁰. However, public transparency shifts from individual disclosures to Aggregate Net Short Positions (ANSPs) published at issuer level³¹.

The US relies on aggregate short-interest reporting

The United States does not publicly disclose the identities of individual short sellers. Instead, public transparency is provided through aggregate short-interest data, currently published by FINRA. This approach provides information about overall short-selling activity in a security without revealing the identities or positions of individual investors.

The Securities and Exchange Commission (SEC) has likewise distinguished between information available to regulators and information available to the public. In adopting a 2023 reporting framework, the SEC explained that public disclosure of individual short positions could increase the costs of short selling in several ways, including by³²:

1. Increasing compliance costs, which may reduce short-selling activity and harm price efficiency;
2. Revealing information derived from fundamental research;
3. Revealing trading strategies and facilitating copycat trading;
4. Increasing the risk of retaliation against managers by other market participants, including the risk of short squeezes”³³.

Consistent with those concerns, the framework contemplated public dissemination of aggregated short-interest information rather than the disclosure of individual short sellers. That rule has not taken effect and is currently under review. In the meantime, U.S. public transparency continues to rest on aggregate short-interest data published by FINRA rather than named disclosure of individual investors.

The EU reaffirms public disclosure

The disclosure framework established by the SSR has remained largely unchanged since its entry into force in 2012. By contrast, the bulk of EU financial services regulation has undergone repeated reviews and amendments over the same period.³⁴

However, in its 2022 review of the SSR, ESMA supported the existing regulation to maintain the current disclosure regulation. ESMA recommended maintaining the 0.5 per cent public disclosure framework, despite proposals from respondents “to raise the threshold or to substitute the threshold by the publication of aggregated net short positions per issuer.” ESMA argued: “the current 0.5 per cent threshold provides a sufficient degree of transparency without compromising market efficiency”³⁵, including during periods of market stress such as the COVID-19 crisis.

ESMA recommended the periodic publication of aggregated and anonymised net short position data at issuer level, as well as “the introduction of a centralised system for publication and disclosure to the public of net short positions”³⁶. These measures “would lead to a more harmonised reporting mechanism and allow investors reporting to different NCAs to reduce their administrative burden, through a unique process of registration”³⁷.

³⁰ FCA, PS26/5: Changes to the UK Short Selling Regime, Annex 3; FCA, CP25/29: Reforming the UK Short Selling Regime ([link](#)).

³¹ FCA, PS26/5: Changes to the UK Short Selling Regime, para. 6.4 ([link](#)).

³² U.S. Securities and Exchange Commission (2023). *Short Position and Short Activity Reporting by Institutional Investment Managers*, Release No. 34-98738 ([link](#)).

³³ SEC, *Short Position and Short Activity Reporting by Institutional Investment Managers*, Release No. 34-98738, part C (October 2023) ([link](#)).

³⁴ See e.g. MiFID II and MiFIR (2018); EMIR Refit (2019); EMIR 2.2 (2020); AIFMD II (2024); and CSDR Refit (2024).

³⁵ ESMA (2022). *Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR)*, para. 282 ([link](#)).

³⁶ ESMA (2022). *Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR)*, ([link](#)).

³⁷ ESMA (2022). *Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR)*, para. 304 ([link](#)).

CHAPTER 3

THE EFFECTS OF EU PUBLIC DISCLOSURE ON MARKET QUALITY

Chapters 1 and 2 established two key points: short selling improves market quality, and the EU is among the few major western markets that publicly names the individual investors behind each short position.

This chapter examines what that public named disclosure does to short selling and to the very market it is meant to inform. We find that public disclosure harms market quality through three reinforcing channels: it reduces short-selling activity, therefore limiting the beneficial effects on price discovery and liquidity we documented above. Furthermore, the disclosure requirement causes herding and increases volatility.

In *section 3.1*, we examine how investors behave around the public disclosure threshold and find that public disclosure deters short selling. In *section 3.2*, we test whether public disclosure draws further short selling into the same stock and find that public disclosure can induce herding. Finally, in *section 3.3*, we test whether a stock's price vary more after a short position in the company has been disclosed and find that public disclosure is associated with raised stock volatility.

Each channel is examined below, drawing on both Europe-wide disclosure data and more detailed Danish data on positions held below the public threshold.

3.1 PUBLIC DISCLOSURE REQUIREMENT CAN DETER SHORT SELLING

The first channel is deterrence: public disclosure can reduce short selling. It does so by adding a consideration to every short-selling decision that would not otherwise arise:

- Without disclosure, an investor weighing a substantial short position asks a single question: is the stock overvalued?
- With disclosure, an investor also must consider: am I willing to reveal that belief to the rest of the market?

Investors may prefer to keep a negative view, and the short position behind it, private. Disclosure can therefore reduce short selling whenever an investor believes a stock is overvalued but is unwilling to say so publicly. Three reasons explain this reluctance:

- **Intellectual property:** A short position reveals an investor's view, just as a long position does. Disclosure lets rivals free ride on the research behind it: it can raise borrowing costs by tipping off the market and let others infer the underlying strategy.
- **Short squeezes:** Short positions carry theoretically unlimited losses. Disclosure exposes them to a short squeeze³⁸: other traders buy the stock to force the price up, pushing short sellers to post more margin or close their position, which can trigger a cascade among other short sellers, see Box 4.³⁹ Disclosure makes such squeezes easier to target.
- **Reputational risk:** A short position signals that an investor expects a company to lose value, something an investor may not want public, for instance where it also does business with that company, or because profiting from a decline in a company's share price is still viewed unfavourably in some quarters.

³⁸ Brunnermeier, M. K. and Pedersen, L. H. (2005). "Predatory Trading", *The Journal of Finance*, Vol. 60, No. 4 ([link](#)).

³⁹ Since short selling involves borrowing an asset and the risk associated with short selling is infinite, short selling requires investors to post a margin to ensure that the borrowed asset is eventually returned. In the US the initial margin is 150% of the value of the short sale. When the price of the borrowed asset increases, the investor is required to post additional margin.

Box 4 GameStop case

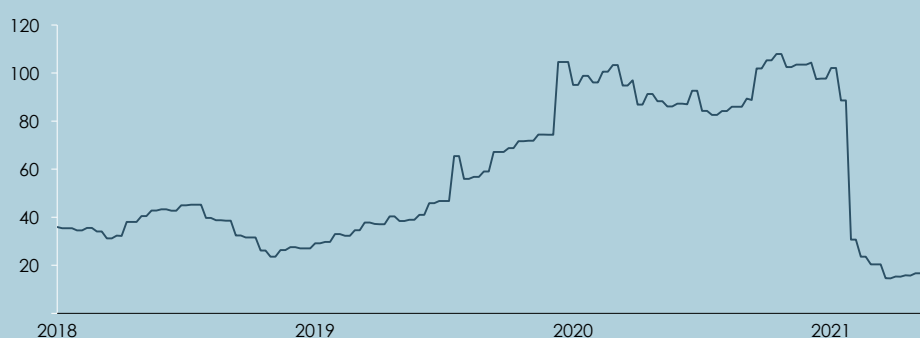
Many hedge funds regarded GameStop stock as being overvalued, believing that the company's brick-and-mortar retail strategy for video game and console sales was archaic, see Figure below.

When these short positions became known⁴⁰ to individual investors, particularly those who valued GameStop (perhaps for nostalgic reasons), they used social media to encourage purchases of GameStop shares to squeeze out the shorts.

The rush to invest in GameStop coupled with the rush by short sellers to close out their positions resulted in the price of GameStop increasing from under \$20 per share to almost \$350 per share over the course of just 15 days.

GameStop short interest, 2018-2021

Short interest, per cent of outstanding shares (%)



Source: Copenhagen Economics based on data on short interest for the stocks in S&P 500 from LSEG

3.1.1 Empirical research confirms that investors are reluctant to cross public disclosure thresholds

The empirical research confirms that public disclosure deters short selling. Two patterns stand out: investors avoid crossing the public disclosure threshold, and those who approach it stay below it for longer. The disclosure requirements thereby act as a constraint on investors' shorting activity, which has a negative effect on market quality:

- A 2016 study from the German central bank, Deutsche Bundesbank,⁴¹ found that those positions in the "bin" just below the disclosure threshold, i.e. short positions between 0.4 per cent and 0.5 per cent, had the lowest probability of increasing. Specifically, this bin was 34 per cent less likely to see positions increase than the positions in the bins above it. The researchers received access to unique data on the positions that were disclosed to regulators but not the broader public from Germany between 2012 and 2015⁴², allowing them to analyse whether investors avoided the threshold.
- Similarly, a 2018 study from ESMA⁴³ found that the positions within the bin just below the disclosure threshold were the least likely to increase; only 36 per cent of positions in this bin increased their net short position, which was the lowest of all bins, see Figure 6.

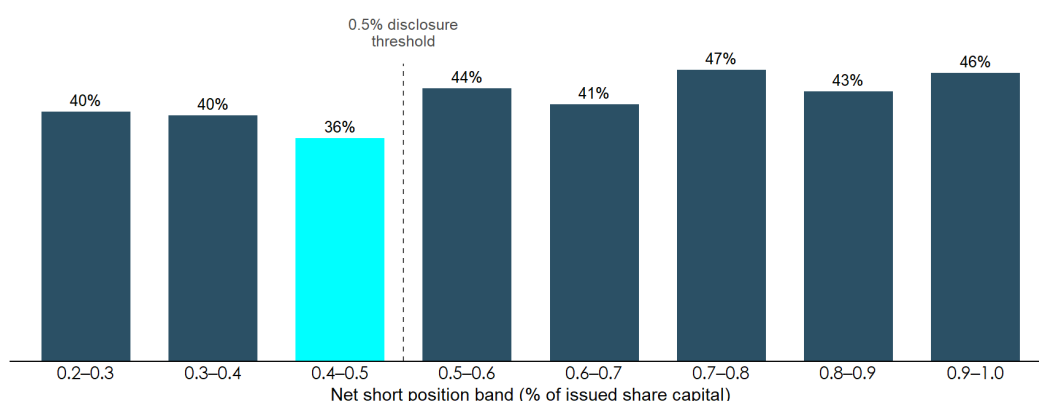
⁴⁰ Although the United States does not require individual investors to make public disclosures of short selling, some market participants were able to assume that a few hedge funds were holding large short positions against GameStop based on options market data reported in Form 13F.

⁴¹ Jank, S., Roling, C. and Smajlbegovic, E. (2021). "Flying under the Radar: The Effects of Short-Sale Disclosure Rules on Investor Behavior and Stock Prices", *Review of Financial Studies*, Vol. 34, No. 12 ([link](#)).

⁴² Positions between 0.2 per cent-0.49 per cent of issued share of capital.

⁴³ ESMA (2018). *ESMA Report on Trends, Risks and Vulnerabilities*, No. 2, 2018 ([link](#)).

Figure 6
Probability that investors will increase their position
 Frequency of net short position increases (%)



Note: The dotted line represents the public disclosure threshold. Frequency of net short position increases in EU shares from 01/01/2013 to 31/12/2016, grouped in 0.1 per cent increments (in per cent of issued share capital, based on the previous reporting bin).

Source: Copenhagen Economics based on ESMA (2018), ESMA Report on Trends, Risks and Vulnerabilities ([link](#)).

Both studies also find that positions just below the public disclosure threshold remain unchanged for significantly longer than other positions. That is, investors might move around between the different bins below the threshold, but once they reach the bin just below the 0.5 per cent public disclosure threshold, they tend to stay put to a larger degree than positions in other bins do.⁴⁴

The same pattern appears for public disclosure outside the EU. One study found that short selling decreased on the Tokyo Stock Exchange after the introduction of a disclosure requirement for net short positions of 0.25 per cent or more.⁴⁵

3.2 PUBLIC DISCLOSURE CAN CAUSE HERDING

Public disclosure can also cause herding. The mechanism follows directly from our earlier finding that short sellers are informed: because a disclosed short position predicts future price declines, it is a genuine signal to the market. Other investors, observing that signal, rationally follow by piling into the same stock without necessarily having conducted their own analysis.

This is where the problem arises. Even if the original position was justified, investors who follow it do not have access to the underlying analysis and may continue shorting beyond the point where the price has already corrected. Prices may then be pushed away from their fundamental value, and the subsequent reassessment drives volatility.

Our empirical analysis confirms that public disclosure causes herding. We find the effect in our analysis at two levels:

1. **Herding on a European level:** We find indications of herding in disclosed short positions across several major European markets. What we find suggests that one public disclosure draws further disclosures in the same stock.
2. **Herding based on granular data from Denmark:** We assess herding at a more granular level using short interest data from Denmark. Denmark uniquely publishes historical short positions below the public

⁴⁴ Concretely, the Deutsche Bundesbank study was able to split their sample into positions that were at their record maximum position, i.e. when an individual's short position was the largest, or below their record maximum. This allowed them to identify that the longer duration in the bin just below the threshold was driven by the positions that will never cross the threshold.

⁴⁵ Duong, T. X., Huszár, Z. R., Yamada, K. and Zhang, E. (2015). "The Costs and Benefits of Short Sale Disclosure", *Journal of Banking & Finance*, Vol. 53 ([link](#)).

disclosure threshold, releasing them to the market with a one-month delay rather than in real time. The data allow us to draw a stronger conclusion for what the other European markets indicated.

3.2.1 Herding on a European level

If short sellers follow each other, a disclosed short position should draw further short selling into the same stock, as investors read one disclosure as a signal and pile in behind it. If disclosure carried no such signal, one investor's position would tell us nothing about what others do next. This gives us a way to test for herding: we examine whether an increase in disclosed short interest in a stock prompts other investors to raise their own short interest in the same stock. If it does, investors are trading on each other's disclosures rather than on their own information alone.

We test this on publicly disclosed short interest on stocks over time, described in Box 6, combining public short-selling disclosures with daily stock market data on share prices, returns, market value and trading volume. This allows us to track short selling against how each stock performs. It covers seven countries from 2015 to 2025: Denmark, Finland, France, Germany, Italy, the Netherlands, and the United Kingdom.⁴⁶

We find that a short interest disclosure in a stock indeed tends to be followed by further disclosures in the same stock. Each additional day on which a stock carries a disclosure raises the probability of observing at least one further disclosure by 13.1 percentage points.⁴⁷ Investors appear to follow the short interest that others have already disclosed, which is an indication that short interest disclosures lead to herding.

Box 5 Herding analysis for Europe

When we investigate whether there is evidence of herding in seven European markets, we run two types of regressions. The starting point of the analysis is a stock-level panel data regression of the following form:

$$y_{st} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(y_{st}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{st}.$$

Where the outcome variable y_{st} is one if there was a short interest disclosure in stock s at time t and zero otherwise. The main explanatory variable of interest is the sum of this variable over the previous four days, denoted $\text{Lag}_{t-1,t-4}(y_{st})$. We include trading volume, stock volatility and returns in X_{st} to control for market sentiment and let δ be a vector of parameters that measures their effect. In addition, we include stock fixed effects μ_s and date fixed effects μ_t . We estimate that an additional past disclosure increases the probability of a new disclosure by 13.1 percentage points.

A key concern with this regression is that part of the herding effect stems from the same investor placing positions several days in a row in the same stock. To address this, we run the following more granular regression:

$$y_{ist} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(y_{ist}^{\text{others}}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_{is} + \mu_t + \varepsilon_{it}.$$

Where the outcome variable, y_{ist} , in the preferred specification is the change in short interest disclosure for investor i in stock s at time t . The primary explanatory variable of interest is the sum of the change in short interest for *all* investors *except* investor i in the same stock, summed over the past four days. In this regression, we remove the effect of investor i 's own past positions, and we find that when other investors increase their disclosed short interest by 1 percentage points it on average causes investor i to increase their short interest by 0.07 percentage points.

Source: Copenhagen Economics. See Appendix A.4 for more details.

⁴⁶ In 2018, these countries represented 73% of the EU 27 equity transactions value in EU stock exchanges. See the European Central Bank's statistical data warehouse.

⁴⁷ See Table 8 in the Appendix.

Our result matches the academic literature. One study, for example, finds that a short interest disclosure becomes 16 percentage points more likely once another disclosure has occurred in the same stock within the past six days.⁴⁸

One concern with this result is that it could be driven by a single investor adding to their own position day after day, which is not herding. To rule this out, we test whether an investor increases their short position specifically after other investors have increased theirs. Again, we find an effect that points to herding when adjusting for this. A 1 percentage point rise in total disclosed short interest is followed by a further 0.01 percentage point rise within four days.⁴⁹

A further concern with our result could be that short interest disclosures are correlated over time, largely because news about a stock arrives alongside market activity. We control for this by including volatility, volume and returns as control variables. We further control for so-called fixed effects, i.e. controls for anything common to a given day, stock, or investor, removing the daily news cycle and investor-specific effects.

Even so, no set of controls can capture every factor that might drive disclosures. However, data retrieved for Denmark, which include non-publicly disclosed positions, allow us to identify the effect of public disclosure more directly, as we show in the next section.

3.2.2 Herding based on granular data from Denmark

After establishing herding in the European disclosed data, we turn to richer data from Denmark, which records both publicly and non-publicly disclosed positions.

This lets us test herding directly. Herding requires observability in the market: investors can only follow others if they can see what those others are doing. Therefore, the market should react more strongly to a disclosed position, which it can see in real time, than to a non-disclosed position, which it cannot. We test this with a panel data regression, see Box 6.

The Danish data confirm our expectation: the market reacts far more strongly to a disclosed position than to a non-disclosed one. Total short interest reacts roughly 2.4 times as strongly to a past **disclosed** change in short interest (0.059) as to a past **non-disclosed** change (0.025), see Figure 7. Because non-disclosed positions are not publicly visible in real time, the non-disclosed reaction captures primarily co-movement driven by shared information. We therefore interpret the 0.034 gap as the increment attributable to public disclosure itself, which is about 58 per cent of the reaction.

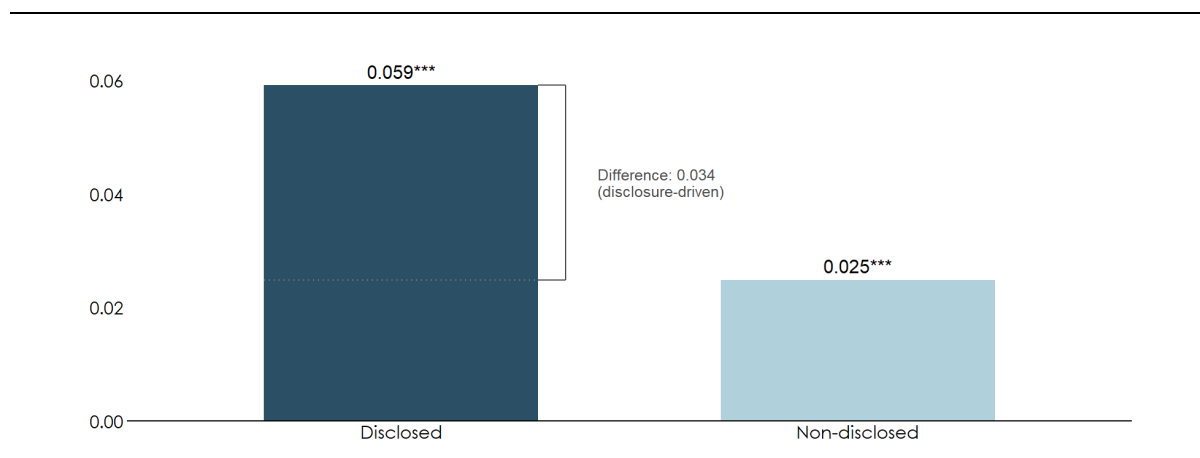
We do find some reaction of non-disclosed short interest to changes in non-disclosed short interest. This suggests our controls do not fully capture negative news in the Danish regression and therefore likely in the European too.

⁴⁸ Jones, C. M., Reed, A. V. and Waller, W. (2016). "Revealing Shorts: An Examination of Large Short Position Disclosures", *The Review of Financial Studies*, Vol. 29, No. 12 ([link](#)).

⁴⁹ At the individual investor level, a public disclosure that raises total disclosed short interest by 1 percentage point leads to a 0.007 percentage point increase in that investor's disclosed short interest four days later. See the Appendix, in particular Table 9.

Figure 7**The market has a stronger reaction to changes in disclosed short interest**

Percentage point change impact on total short interest



Note: The figure is based on data on short positions in Denmark between 2015 to 2025. See Table 10 in the Appendix for more details.

Source: Copenhagen Economics based on data from the Danish Financial Supervisory Authority (DFSA).

Box 6 Herding analysis for Denmark

In the Danish data we can study whether disclosed and non-disclosed short interest have different effects on future short interest.⁵⁰ We therefore run the regression below.

$$y_{st} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(\Delta \text{Total Disclosed SI}_{st}) + \beta_2 \text{Lag}_{t-1,t-4}(\Delta \text{Total NonDisclosed SI}_{st}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{it}.$$

Where the outcome of interest, y_{st} , is the change in either total short interest, total disclosed short interest, or total non-disclosed short interest in stock s at time t . The key explanatory variables of interest are the lagged change in disclosed and non-disclosed short interest. Since the non-disclosed short interest is not available to investors in real time, we can use the comparison of the effect of disclosed and non-disclosed short interest to find evidence of a causal effect of disclosure. We do indeed find that the effect of disclosed short interest is significantly larger than non-disclosed short interest.

Source: Copenhagen Economics. See Appendix A.3 for more details.

Empirical research backs up our findings. Public disclosure drives investors to trade on what others are doing rather than on their own beliefs, which can weaken price discovery and set up sharper corrections where positioning runs beyond what the underlying information supports. Several European studies find the same pattern:

- ESMA's study from 2018 found evidence that public disclosures were often followed by other public disclosures.⁵¹ Specifically, the study shows that the probability of a public disclosure is six times higher if another public disclosure on the same stock has taken place in the last week.
- An academic paper from 2016 also found that disclosures led to additional disclosures.⁵² The study found that the probability of disclosure increased from a baseline probability of 0.08 per cent to 0.24 per cent if there was a disclosure in the same stock in the last week.

⁵⁰ The non-disclosed short interest in the Danish data is computed by subtracting the disclosed short interest from the total short interest.

⁵¹ ESMA (2018). *ESMA Report on Trends, Risks and Vulnerabilities*, No. 2, 2018 ([link](#)).

⁵² Jones, C. M., Reed, A. V. and Waller, W. (2016). "Revealing Shorts: An Examination of Large Short Position Disclosures", *The Review of Financial Studies*, Vol. 29, No. 12 ([link](#)).

- A study investigating the effects of short-selling public disclosures on the Tokyo Stock Exchange found that short selling became more trend-chasing and prices became less informative.⁵³

3.3 PUBLIC DISCLOSURE IS ASSOCIATED WITH HIGHER VOLATILITY

Having shown that disclosure leads to herding, we would also expect disclosures to contribute to higher volatility. Volatility measures how much a stock's price changes from day to day. We test this on the data and find a stock's price varies more in the days after a disclosure, by a small but statistically significant amount.

If investors trade on the information in a short interest disclosure, their reaction can push the price further than the underlying news justifies, and that excess movement shows up as higher volatility. If disclosure carried no such signal, it would leave volatility unchanged. This gives us a way to test the link directly.

We should not expect a large effect. Many factors drive volatility, and disclosure is only one small input among them. The question is whether its effect is real and measurable, not whether it dominates.

We test whether disclosures affect volatility using a European dataset, see Box 7. To capture news arriving about a stock, we control for past volatility, trading volume and returns, as in our earlier estimations, and we include fixed effects at the stock and date level.

Box 7 Volatility analysis

We conduct several regression analyses to investigate the effect of short interest disclosures on stock volatility. We use daily stock returns and compute volatility using 1 plus the natural logarithm of the absolute value of the daily stock returns. For the volatility regression on European data, we use the following regression specification.

$$y_{st} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(I_{st}^{\text{disclosure}}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{st}$$

Where the outcome variable of interest is the daily volatility and the explanatory variable is the sum of the variable $I_{st}^{\text{disclosure}}$ over the past four days, indicating whether a disclosure took place at day t in stock s . We include the same control variables and fixed effects as for the herding regressions in Box 5.

We find that following a disclosure for a given stock there is an increase in daily volatility by 0.0005.

Source: Copenhagen Economics. See Appendix A.4 for more details.

We find a small but statistically significant effect. One additional disclosure over the previous four days raises a stock's daily volatility by 0.0005. To put it into perspective, it is a 2.9 per cent increase relative to the average volatility of a stock in the dataset. That means, the range of likely prices is 2.9 per cent wider in the days after a disclosure.

There is limited economic research into a direct effect of public short interest disclosure on volatility. Yet, one study investigating the effects of short-selling public disclosures on the Tokyo Stock Exchange found that short-term price volatility increased.⁵⁴ Alternatively, ESMA found that volatility decreased during the temporary bans on short selling during COVID-19. This result does not contradict our finding of increased volatility from disclosures, see Box 8.

⁵³ Duong, T. X., Huszár, Z. R., Yamada, K. and Zhang, E. (2015). "The Costs and Benefits of Short Sale Disclosure", *Journal of Banking & Finance*, Vol. 53 ([link](#)).

⁵⁴ Duong, T. X., Huszár, Z. R., Yamada, K. and Zhang, E. (2015). "The Costs and Benefits of Short Sale Disclosure", *Journal of Banking & Finance*, Vol. 53 ([link](#)).

Box 8 Reconciling ESMA's and our findings of public disclosure's effect on volatility

In ESMA's review of the SSR regulation, they found volatility decreased during the COVID-19 ban on short selling.

ESMA's evidence on the effect of bans on volatility does not necessarily contradict our finding that public disclosure raises volatility.

A ban and a disclosure requirement are different interventions. A ban also removes all disclosure, because no positions are taken and so none are named to the market. The disclosure channel we identify is therefore switched off for the duration of the ban, and the volatility it generates does not arise.

Read this way, the fall in volatility is consistent with our finding: it reflects the absence of disclosure under the ban rather than any stabilising effect of removing short sellers. Our analysis isolates the effect of disclosure while short selling continues, which is precisely the margin the SSR's public threshold governs and a ban removes.

Source: Copenhagen Economics. ESMA (2022). Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR), ([link](#)).

3.4 OUR RESULTS HOLD OVER A LONGER AND MORE TURBULENT PERIOD

Our study from 2021 established the herding and volatility effects on data from 1 January 2015 to 31 December 2020.⁵⁵ This report re-estimates them on an extended window, from 1 January 2015 to 31 December 2025, and reaches the same conclusions that public disclosure draws further short selling into a stock and raises its volatility.

That the results survive this extension matters because the additional years were far from calm. The window from 2020 to 2025 spanned the COVID-19 market shock in early 2020, the meme-stock short squeezes of 2021, and the monetary tightening and energy price shock that followed Russia's invasion of Ukraine in 2022.

The effects of public disclosure persist across all of them. This shows that disclosure-driven herding and volatility are general market phenomena, built into how markets respond to named short selling because of the SSR, rather than the product of any single event or market cycle.

⁵⁵ Copenhagen Economics (2021). *Market Impact of Short Sale Position Disclosures*, 15 July 2021 ([link](#)).

CHAPTER 4

INVESTORS AND FIRMS BENEFIT FROM SHORT SELLERS' PARTICIPATION

Having established the market benefits of short selling, how it is regulated, and how the EU's public disclosure requirement harms short selling and market quality, this chapter examines the benefits of short selling to investors and firms and quantifies them where possible.

We find that short selling benefits investors and firms directly, not only the market. In *section 4.1* we underline that all investors gain, whether they trade actively or hold passively. In *section 4.2* we set out two channels through which short selling can lower firms' cost of capital: a lower liquidity premium and, potentially, a lower risk premium, establishing the theoretical link before quantifying it. We quantify the liquidity channel and find it worth up to €11bn a year to European firms.

The quantification should add perspective to the EU SSR: if public disclosure suppresses short selling, it may also suppress the gains that flow from it to the market and thereby to other investors and firms.

4.1 SHORT-SELLING BENEFITS INVESTORS DIRECTLY, NOT ONLY THE MARKET

The benefits of short selling we established earlier in this report materialise to investors and the firms they invest in. More accurate prices protect investors from overpaying, deeper liquidity lowers what everyone pays to trade, and the fees short sellers pay to borrow shares are income for the long investors who lend them.

Investors therefore gain from short selling, whether they are active or passive, and whether they ever sell a share short themselves:

- **Short selling helps investors avoid mispriced assets.** We demonstrated that short sellers are informed traders whose activity moves prices closer to a company's fundamental value. The benefit to other investors is a more accurate price: when investors can act on negative information, an investor is less likely to buy into an overvalued stock and less exposed to the sharp correction that an overvalued price invites. The same discipline protects shareholders in a second way: the prospect of informed short sellers scrutinising a company disciplines managers and has been shown to reveal fraud in specific cases. Investors who hold these companies through pension funds and index funds capture this protection without doing any analysis themselves.
- **Short selling lowers the cost of trading for every investor.** Short selling deepens market liquidity and narrows bid-ask spreads, both directly and through the market-making process that depends on it. The spread is the cost of trading, so a narrower spread makes investing cheaper for everyone who transacts. A pension fund rebalancing its portfolio, a household buying an index fund, and a company issuing new shares all trade at costs set by the prevailing level of liquidity. Narrow spreads also mean an investor who needs to sell can do so without forcing the price down.
- **Short sellers pay long investors to borrow their shares.** Short selling also creates a direct income stream for long investors. To sell a share short, an investor must first borrow it, and pays a fee to the owner of the shares for as long as the position stays open. Borrowers paid lenders around USD 10 billion

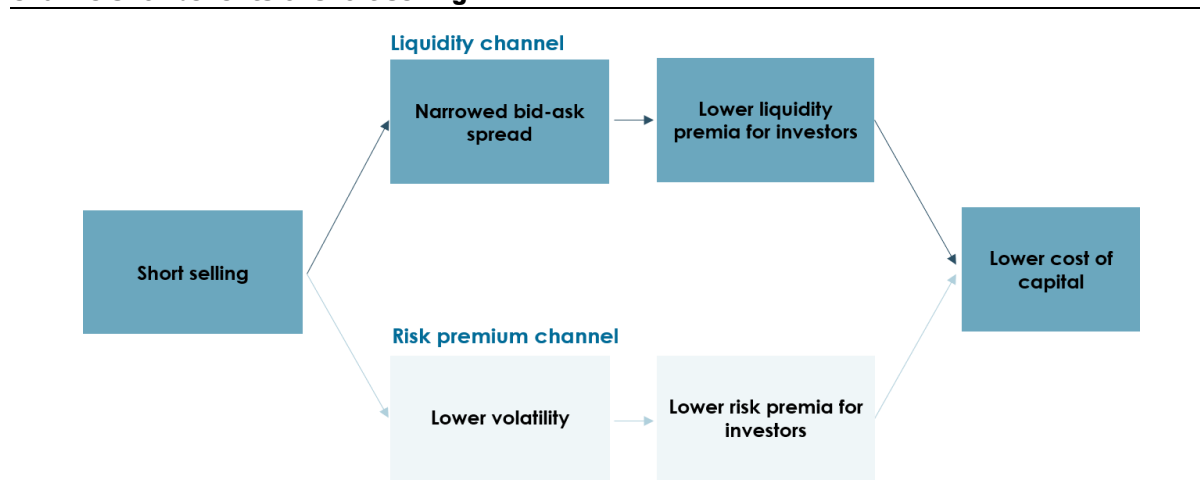
worldwide in 2024, with borrowing of equity shares accounting for the lion's share.⁵⁶ The income is distributed across the participants of the securities lending markets with intermediaries such as brokers and lending agents taking a fee, but the larger share accrues to the owners of the shares, such as investment funds and pension funds that hold shares for the long run. Because funds share these fees with their investors, the income reaches ordinary savers whether they invest actively or passively, and through index funds it returns to them as lower charges.

4.2 TWO POSSIBLE CHANNELS TO QUANTIFY HOW SHORT SELLING REDUCES COST OF CAPITAL

Section 4.1 showed that short selling benefits investors. It also benefits the firms they invest in, by lowering their cost of capital through two main channels, see Figure 8:

1. **Liquidity channel:** by providing additional sell-side participation, short sellers help narrow bid-ask⁵⁷ spreads and increase market depth. This enhances liquidity and reduces the premium investors require for trading in less-liquid markets.
2. **Risk premium channel:** short sellers play a role in incorporating negative information into prices more rapidly, which can improve price accuracy and reduce excessive volatility. More efficient pricing may, in turn, lower the risk premium demanded by investors.

Figure 8
Channels for benefits of short selling



Note: Illustrative. Channels should not be considered exhaustive.

Source: Copenhagen Economics.

4.2.1 Short selling lowers the cost of capital through a lower liquidity premium

The first channel operates through liquidity: short selling narrows bid-ask spreads, which lowers companies' cost of capital. Short selling increases the number of willing sellers in the market, which makes it easier to match buyers and sellers quickly and at closer prices. Tighter bid-ask spreads lower trading costs and, in turn, the liquidity premium that investors require.

⁵⁶ Two commercial data providers report broadly consistent global totals for 2024. DataLend (EquiLend) reports USD 9.64 billion in lending revenue. S&P Global Market Intelligence reports year-to-date revenue of USD 11.74 billion in 2024. Both series cover all asset classes, not equities alone. In December 2024, equities account for around 70 per cent of that total. Lender revenue approximates the gross cost borne by borrowers, which also includes the agent-lender spread. Sources: DataLend (2025), 2024 Securities Lending Revenue Down 10% YoY to \$9.64 Billion ([link](#)); S&P Global Market Intelligence (2025), Securities Finance December, Q4, H2 and Full Year Snapshot 2024. ([link](#))

⁵⁷ Bid-ask spread is the difference between the highest price buyers are willing to pay for a share (the bid) and the lowest price sellers are willing to accept (the ask). It effectively works as a built-in trading cost: the wider the bid-ask spread, the more expensive it is to buy or sell an investment.

Short selling narrows bid-ask spreads of stocks

As covered in *section 1.2.3*, short sellers contribute to market liquidity which makes the gap between the best buy price and the best sell price smaller, i.e. narrowing the bid-ask spread.⁵⁸

A substantial body of empirical literature finds that restricting short selling leads to wider spreads and poorer market quality, while lifting such restrictions is associated with tighter spreads and lower trading costs for investors. For example, both an academic study⁵⁹ and a study from ESMA⁶⁰ show that the short-selling bans introduced in several European markets during the COVID-19 crisis resulted in wider bid-ask spreads and lower liquidity. Similarly, academic studies⁶¹ find that the 2008 US ban on short selling in financial stocks led to significantly higher bid-ask spreads and a marked deterioration in market quality.⁶²

A narrower bid-ask spread lowers liquidity premia

A narrower bid-ask spread means that investors can buy and sell stock at lower transaction cost, because the gap between the buying and selling price is smaller. When trading is cheaper and easier, the stock is more liquid, and investors face less liquidity risk when they want to enter or exit their positions. With less liquidity risk, investors require less compensation for holding the stock; that is, they demand a lower liquidity premium.⁶³

Empirical literature supports the idea that investors demand higher returns to compensate for illiquidity. Academic studies from 2003 and 2005⁶⁴ show that both the level of market liquidity and the risk that liquidity will deteriorate are positively priced in expected stock returns, consistent with a liquidity premium that falls as trading becomes easier and cheaper.

Lower liquidity premia reduce the cost of capital

When the liquidity premium falls, the return investors require for providing equity capital to the company also decreases. This means that companies can raise equity financing at a lower expected rate of return, i.e. their cost of capital is lower.⁶⁵ Narrower bid-ask spreads resulting from short selling therefore lead to lower liquidity premia and, in turn, a lower cost of capital.

Translating this into monetary terms, we estimate the liquidity benefit of short selling at around EUR 11 billion a year for European listed firms. The estimate rests on three steps:

- 1) First a baseline for market liquidity. Across European equities, we estimate the average bid-ask spread at 23.4 basis points. Evidence from past short-selling bans shows that short-selling restrictions increase bid-ask spreads by around 7.7 per cent, equivalent to a widening of approximately 1.8 basis points in our scenario. This implies that allowing short selling can be expected to improve liquidity by reducing spreads by a similar magnitude.
- 2) We translate this change in liquidity into an impact on investor returns. Empirical evidence shows that higher trading costs require investors to be compensated through higher expected returns. Quantitatively, a 1 basis point increase in bid-ask spreads is associated with a 0.38 basis point increase in monthly

⁵⁸ Diamond, D. W. and Verrecchia, R. E. (1987). "Constraints on Short-Selling and Asset Price Adjustment to Private Information", *Journal of Financial Economics*, Vol. 18, No. 2 ([link](#)); and Beber, A. and Pagano, M. (2013). "Short-selling Bans Around the World: Evidence from the 2007–09 Crisis", *The Journal of Finance*, Vol. 68, No. 1 ([link](#)).

⁵⁹ Bessler, W. and Vendrasco, M. (2022). "Short-selling restrictions and financial stability in Europe: Evidence from the Covid-19 crisis", *Journal of International Financial Markets, Institutions and Money*, Vol. 80, Article 101612 ([link](#)).

⁶⁰ ESMA (2022). *Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR)*, ([link](#)).

⁶¹ Boehmer, E., Jones, C. M. and Zhang, X. (2013). "Shackling Short Sellers: The 2008 Shorting Ban", *The Review of Financial Studies*, Vol. 26, No. 6 ([link](#)); and Frino, A., Lecce, S. and Lepone, A. (2011). "Short-Sales Constraints and Market Quality: Evidence from the 2008 Short-Sales Bans", *International Review of Financial Analysis*, Vol. 20, No. 4 ([link](#)).

⁶² We note that evidence on short-selling bans in Europe and the US can only be observed during crisis periods (e.g. 2008 and COVID-19), so the estimated effects may partly reflect broader market stress.

⁶³ Amihud, Y. and Mendelson, H. (1986). "Liquidity and Stock Returns", *Financial Analysts Journal*, Vol. 42, No. 3 ([link](#)); Pástor, L. and Stambaugh, R. F. (2003). "Liquidity Risk and Expected Stock Returns", *Journal of Political Economy*, Vol. 111, No. 3 ([link](#)); and Acharya, V. V. and Pedersen, L. H. (2005). "Asset Pricing with Liquidity Risk", *Journal of Financial Economics*, Vol. 77, No. 2 ([link](#)).

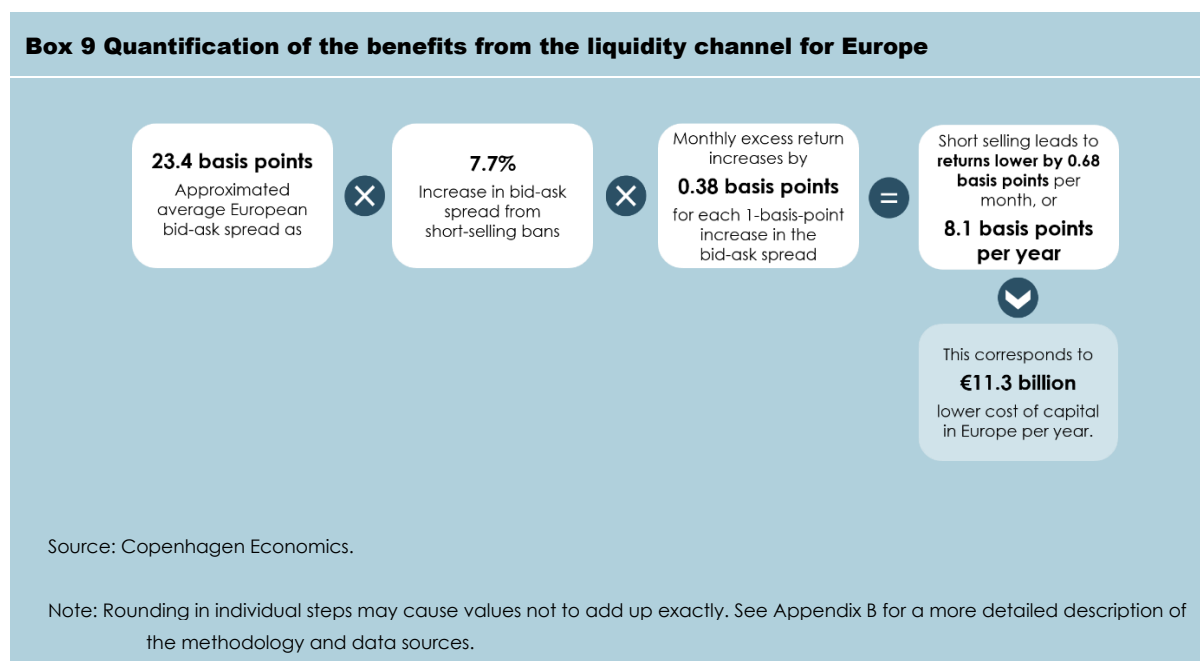
⁶⁴ Pástor, L. and Stambaugh, R. F. (2003). "Liquidity Risk and Expected Stock Returns", *Journal of Political Economy*, Vol. 111, No. 3 ([link](#)); and Acharya, V. V. and Pedersen, L. H. (2005). "Asset Pricing with Liquidity Risk", *Journal of Financial Economics*, Vol. 77, No. 2 ([link](#)).

⁶⁵ Saad, M. and Samet, A. (2017). "Liquidity and the Implied Cost of Equity Capital", *Journal of International Financial Markets, Institutions and Money*, Vol. 51 ([link](#)).

expected returns. Applying this relationship, the estimated reduction in spreads from allowing short selling lowers required returns by around 0.68 basis points per month, or 8.1 basis points on an annual basis.

- 3) We scale this effect to the size of the European stock market. Applying the reduction in required returns to a total market capitalisation of STOXX Europe of approximately EUR 13.9 trillion yields an estimated annual benefit of short selling of around EUR 11.3 billion.⁶⁶

See Box 9 for a summary of the total calculation.



4.2.2 Short selling possibly also lowers the cost of capital through a lower risk premium

The second channel works through risk. As described in *section 1.2.2*, short selling helps prices reflect negative information earlier, which can correct overpricing before it grows and reduce the risk of large, later corrections.

Lower volatility of this kind can feed through to lower idiosyncratic risk premia and, in turn, to a lower cost of capital for firms. The chain of logic is straightforward: if firm-specific risk is priced, investors require a higher return to hold more volatile stocks. Remove the source of excess volatility, and the premium they demand falls with it.

Lower stock volatility likely decreases idiosyncratic risk premia

When investors cannot fully diversify their portfolios due to, for example, market frictions and transaction costs, idiosyncratic risk⁶⁷ becomes priced. That means that in imperfect markets, investors require a positive premium to compensate them for exposure to higher idiosyncratic volatility. Conversely, when idiosyncratic volatility declines, the perceived risk tied to firm-specific uncertainty decreases, reducing the premium investors require to hold such assets. This relationship implies that reductions in volatility, including volatility reductions driven by short selling moving prices to fundamentals sooner, may contribute to lower risk premia.⁶⁸

⁶⁶ We estimate the monetary impacts of only one of the two channels; therefore, the total monetary benefits of short selling may be higher than what we report.

⁶⁷ Idiosyncratic risk refers to the firm-specific component of stock return volatility that cannot be diversified away and can therefore become priced when investors face market frictions or incomplete diversification (Merton, 1987).

⁶⁸ Merton, R. C. (1987). "A Simple Model of Capital Market Equilibrium with Incomplete Information", *The Journal of Finance*, Vol. 42, No. 3 ([link](#)); Malkiel, B. G. and Xu, Y. (2002). *Idiosyncratic Risk and Security Returns*. University of Texas at Dallas ([link](#)); Fu, F. (2009). "Idiosyncratic Risk and the Cross-Section of Expected Stock Returns", *Journal of Financial Economics*, Vol. 91, No. 1 ([link](#)); Spiegel, M. I. and Wang, X. (2005). *Cross-Sectional Variation in Stock Returns: Liquidity and Idiosyncratic Risk* ([link](#)); and Brockman, P., Guo, T., Vivero, M. G. and Yu, W. (2009). *Is Idiosyncratic Risk Priced? The International Evidence* ([link](#)).

Empirical evidence provides mixed support for this theoretical relationship. Several studies document a positive relationship between idiosyncratic volatility and expected returns, consistent with the idea that priced firm-specific risk commands a premium.⁶⁹ However, it is also important to note that a body of opposing evidence, known as the "idiosyncratic volatility puzzle", finds that stocks with higher idiosyncratic volatility earn *lower* average returns. This puzzling negative relation between idiosyncratic volatility and subsequent returns has been documented in US data and, to a more limited extent, in European markets.⁷⁰

Subsequent work questions whether the negative volatility-return relation reflects a genuine pricing effect or arises from empirical issues. Several studies show that the puzzle weakens or disappears once controlling for short-term return reversals, sample period choice, or omitted risk factors.⁷¹ However, these mixed findings suggest that our interpretation should be viewed with some caution, as the literature does not yet offer a firm consensus on the pricing of idiosyncratic volatility.

Lower idiosyncratic risk premia reduce the cost of capital

When idiosyncratic risk premia fall, the return investors require for providing equity capital to the company also decreases. This means that companies can raise equity financing at a lower expected rate of return, i.e. their cost of capital is lower. Lower volatility resulting from short selling therefore translates into lower idiosyncratic risk premia and, in turn, a lower cost of capital.

We are confident that this channel is real, but its size is genuinely uncertain. The mechanism is well grounded: by helping prices reflect information earlier, short selling lowers the risk of large, delayed corrections, and lower firm-specific risk should feed through to a lower risk premium and into a lower cost of capital.

The difficulty is empirical. As noted above, the evidence on how idiosyncratic risk is priced is mixed, and the idiosyncratic volatility puzzle pulls estimates in opposite directions. Depending on which studies one accepts, the benefit could range from zero to several times the liquidity effect quantified above.

We therefore do not attach a single headline figure to the risk premium channel and include only the liquidity channel in our main results. For an exploration of quantifying the risk premium channel, see Appendix B.

⁶⁹ Fu, F. (2009). "Idiosyncratic Risk and the Cross-Section of Expected Stock Returns", *Journal of Financial Economics*, Vol. 91, No. 1 ([link](#)); Spiegel, M. I. and Wang, X. (2005). *Cross-Sectional Variation in Stock Returns: Liquidity and Idiosyncratic Risk* ([link](#)); Xu, Y. and Malkiel, B. G. (2003). "Investigating the Behavior of Idiosyncratic Volatility", *The Journal of Business*, Vol. 76, No. 4 ([link](#)).

⁷⁰ Ang, A., Hodrick, R. J., Xing, Y. and Zhang, X. (2006). "The Cross-Section of Volatility and Expected Returns", *The Journal of Finance*, Vol. 61, No. 1 ([link](#)); Guo, H. and Savickas, R. (2006). "Idiosyncratic Volatility, Stock Market Volatility, and Expected Stock Returns", *Journal of Business & Economic Statistics*, Vol. 24, No.1 ([link](#)); and Bhootra, A. and Hur, J. (2015). "High Idiosyncratic Volatility and Low Returns: A Prospect Theory Explanation", *Financial Management*, Vol. 44, No. 2 ([link](#)).

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APPENDIX A

EMPIRICAL ANALYSIS ON PUBLIC DISCLOSURE

In this section we provide the technical details surrounding the empirical analysis.

A.1 DATA

We collect data on short interest and stock characteristics from a number of sources.

Disclosed short interest data for the European market is made public under Regulation (EU) No 236/2012. An investor must notify the relevant national competent authority once a net short position reaches 0.1 per cent⁷² of issued share capital (Article 5), and must disclose the position publicly, on a centralised website, once it reaches 0.5 per cent (Article 6). A further notification or disclosure is required at each 0.1 percentage point step above the threshold.

For the European market, we collect data on net short disclosures from the websites of the national financial regulatory authorities for the countries Denmark, Finland, France, Germany, Italy, the Netherlands, and the United Kingdom.

The dataset contains, for each observation, the date of disclosure, the identity of the investor, as well as an identifier for the stock. Further, it includes the short interest for a particular stock held by the investor on the day a disclosure threshold was crossed. That is, if an investor holds a short position amounting to 0.56 per cent of the issued share capital on a given day, the dataset records 0.56 per cent because the disclosed short position crossed the 0.5 per cent public disclosure threshold.

Uniquely, for the Danish market the Danish Financial Supervisory Authority (DFSA) also publishes daily information on the *total short interest* in each stock reported to the DFSA above the 0.1 per cent issued share capital threshold. Therefore, for the Danish market, in addition to the disclosed short interest, we also have access to total short interest at the stock level between 0.2 per cent and 0.5 per cent of issued share capital.

For the empirical analysis, we **transform the disclosed short interest data to panel data**, where the unit of observation is the investor, stock, and date. To do this, we need to make some assumptions about the level of short interest placed by an investor in a stock on days when there is no disclosure.

We therefore assume that if investor X has disclosed that threshold M has been crossed in stock A on date t, then:

- On date t+1: Without new disclosure, the investor's position is M
- On date t+1: With a new disclosure (crossing threshold N), we assume the investor's position is N

⁷² The private notification threshold was lowered from 0.2% to 0.1% by Commission Delegated Regulation (EU) 2022/27, which amended Article 5(2) and took effect on 31 January 2022. For most of our sample period the threshold was therefore 0.2%, except for a temporary reduction to 0.1% during the COVID-19 pandemic. The public disclosure threshold of 0.5% has remained unchanged.

Using this transformation, we obtain a panel dataset that contains the total disclosed short interest held by that investor in the given stock for each date, stock, and investor.

Daily market data come from LSEG. We collect data for both current and delisted stocks. Based on the data, we construct daily returns and volatility.

Variable definitions

Throughout the analysis we will work with similar variable definitions. We briefly present the definitions of the important explanatory and dependent variables that we use, see Table 2.

Table 2
Variable definitions

VARIABLE	DEFINITION
Short interest	Shares shorted as a fraction of total outstanding shares in a company.
Total short interest	(Denmark) Sum of short interest above the 0.1% issued-share-capital disclosure threshold, where investors disclose to the authority but not the public.
Non-disclosed short interest	(Denmark) Total short interest minus total disclosed short interest in a stock.
Disclosure	A public notification (via the supervisory authority) that an investor's short position has crossed a disclosure threshold.
Total and non-disclosed short interest adjustment	Dummy equal to one if the stock-level total or non-disclosed short interest changed, zero otherwise.
Lags	Throughout the analysis, we will use lagged variables as explanatory variables in the regressions. Given a variable X_{it} we define $\text{Lag}_{[t-4, t-1]}(X_{it}) = \sum_{k \in [t-4, t-1]} X_{ik}$ to be the sum of the relevant variable over the past four days. By doing this, we are including a four-period lag structure in our regression but restricting the regression parameter of all lagged variables to be the same. In this way we ensure that more than one period of information is included in the lagged variable while maintaining parsimony and interpretability in the lagged variables.
Returns	The daily change in log market capitalisation.
Volatility	The logarithm of the absolute value of the daily returns. We add one to avoid infinite values on days with zero returns.
Volume	The logarithm of the absolute value of the daily volume. We add one to avoid infinite values on days with no volume.
Threshold position	We define a threshold position as a disclosed position that is right at the threshold, for instance a position equal to 0.5 per cent, 0.6 per cent, 0.7 per cent etc. of issued share capital.

Source: Copenhagen Economics

Sample

Table 3 describes the sample selection for the European short interest disclosure data and the Danish dataset. In both samples, we restrict the period to 1 January 2015 to 31 December 2025. To the extent that stock data are available in LSEG, we merge stock information with the disclosed short interest dataset. Stocks that never appear in the shorting interest dataset from the regulators are assumed to have no shorting activity over the period. This ensures our dataset has full coverage of the stock market.

Descriptive statistics

In this section we present summary statistics for the datasets that we use in our regression analysis, that is, summary statistics for the Danish short interest data, the European disclosed short interest data as well as the stock information from LSEG.

Table 3
Descriptive statistics: Stock data

	DK	FI	FR	DE	IT	NL	UK
No. of stocks shorted at any point	59	79	261	922	230	87	905
Market cap (billion), mean	23.6	1.6	3.1	1.6	1.7	5.8	1.5
Market cap (billion), median	0.7	0.1	0.1	0.0	0.1	0.4	0.1
Market cap (billion), std	117.0	5.1	15.6	8.5	6.8	20.8	8.4
Daily return (bp), mean	2.4	-2.3	1.7	2.4	10.0	4.6	2.1
Volatility, mean	0.0161	0.0168	0.0155	0.0179	0.0291	0.0138	0.0136
Volatility, std	0.0256	0.0463	0.0357	0.0454	0.1135	0.0260	0.0311

Note: Market cap measured in national currency.

Source: Copenhagen Economics based on data from LSEG

Table 4
Descriptive statistics: Danish short interest data

	MEAN	MEDIAN	STD	COUNT
Total short interest	0.84	0.00	1.83	344,720
Disclosed short interest	0.19	0.00	0.84	465,310
Non-disclosed short interest	0.61	0.00	1.28	344,720

Source: Copenhagen Economics based on data on disclosed and total short interest from the Danish Financial Supervisory Authority (DFSA)

Table 5
Descriptive Statistics: European short interest data

	DK	FI	FR	DE	IT	NL	UK
No. of disclosures	8,665	10,412	38,190	57,892	23,687	20,571	104,049
No. of investors	210	235	374	482	286	247	591
No. of stocks	59	79	261	922	230	87	905
No. of positions	581	706	2,160	3,928	1,518	911	6,925
Disclosures per investor	41.26	44.31	102.11	120.11	82.82	83.28	176.06
Disclosures per stock	146.86	131.80	146.32	62.79	102.99	236.45	114.97
Disclosures per position	14.91	14.75	17.68	14.74	15.60	22.58	15.03
Positions per investor	2.77	3.00	5.78	8.15	5.31	3.69	11.72
Positions per stock	9.85	8.94	8.28	4.26	6.60	10.47	7.65
Short interest increases, mean	0.092	0.095	0.098	0.108	0.124	0.093	0.102
Short interest increases, std	0.077	0.086	0.100	0.627	0.799	0.083	0.183
Short interest increases, count	3,932	4,700	18,201	26,584	10,998	9,602	48,423
Short interest decreases, mean	-0.110	-0.114	-0.122	-0.130	-0.161	-0.105	-0.132
Short interest decreases, std	0.190	0.188	0.696	0.645	1.511	0.150	0.368
Short interest decreases, count	4,147	4,988	17,814	27,267	11,169	10,056	48,594

Note: This table provides descriptive statistics on key variables in the disclosed short interest data that we gather for European countries. We distinguish between disclosures and positions. A disclosure occurs every time an investor adjusts a position so that it crosses a disclosure threshold. A position is a series of disclosures from an investor in a stock where the investor does not go below the 0.5 per cent disclosure requirement. Once an investor goes back below the 0.5 per cent reporting threshold, the position ends.

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, and the United Kingdom

A.2 RETURNS PREDICTION IN EUROPE

We investigate the hypothesis that short sellers are informed traders. If short sellers act on genuine information about overvaluation, the stocks they short most heavily should subsequently underperform as that information is gradually reflected in prices. If their trades carried no information, short interest would have no predictive power over future returns. We therefore test whether the level of disclosed short interest in a stock today predicts its return over subsequent horizons on the European dataset.

For each stock-day, we regress the cumulative log return over the next N trading days on the lagged level of disclosed short interest. We estimate the regression separately at horizons $N \in \{1, 3, 5, 10, 20, 30, 60, 90, 180, 360\}$ trading days. The specification is a stock-level panel regression of the following form:

$$r_{s,t}^{(N)} = \beta_N \cdot SI_{s,t-1} + \delta' X_{s,t-1} + \mu_s + \mu_t + \varepsilon_{s,t}$$

Where the outcome variable $r_{s,t}^{(N)}$ the cumulative log return on stock s over the N trading days following day $t-1$, calculated as the sum of daily log returns. The main explanatory variable of interest is the level of total disclosed short interest in the stock at $t-1$, denoted $SI_{s,t-1}$, measured as the sum of all individual investor positions above the 0.5 per cent disclosure threshold for stock i on that day and expressed as a percentage of shares outstanding. We include trading volume, stock volatility and past returns, summed over the previous four days, $X_{s,t-1}$ to control for market sentiment, and let δ be a vector of parameters that capture their effect. In addition, we include stock fixed effects μ_s and day fixed effects μ_t . Standard errors are clustered two-way, by stock and by date, which accommodates both the serial correlation induced by overlapping forward-return horizons and the cross-sectional correlation in returns across stocks on a given day. The coefficient of interest is β_N , which is expected to be negative under the informed shorts hypothesis since higher disclosed short interest should be followed by lower future returns.

The results are presented in Table 6. It shows the β coefficient for the effect for each regression for a specific horizon. The remaining parameters of each regression are omitted for brevity. We find that higher disclosed short interest predicts lower future cumulative returns, meaning the stocks short sellers hold go on to underperform. The estimates are economically small, as expected in a market that is already close to efficient.

Table 6
Short interest as return predictor

HORIZON	β
1d	-0.00006*
3d	-0.00013
5d	-0.00020
10d	-0.00034
20d	-0.00074
30d	-0.00118*
60d	-0.00240*
90d	-0.00358*
180d	-0.00699**
360d	-0.00858

Note: β = coefficient on lag total disclosed SI each from a separate regression; SE two-way clustered by ISIN and date. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The remaining parameters such as trading volume, stock volatility, past returns, and fixed effects of each regression are omitted for brevity.

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK. Stock return, volume, and volatility from LSEG.

We test the informed-trading hypothesis further by exploiting cross-sectional variation in liquidity. If short sellers trade on information the wider market has not yet priced in, their predictive power should be concentrated in less-liquid stocks, where prices adjust slowly and an informational signal takes longest to surface. In liquid stocks, by contrast, prices absorb information almost immediately, competing away any informational edge before it can predict returns.

To test this, we split the universe at the median stock by trading volume and re-estimate the same fixed-effects specification within each half. We rank every stock by how actively it trades and split the market down the middle into a less-traded half and a more-traded half. The results are presented in Table 7. In the less-liquid half, higher disclosed short interest predicts substantial underperformance, reaching -0.402 per cent at 30 trading days and -1.027 per cent at 90, both significant at the 5 per cent level. In the more-liquid half, the effect stays small and never reaches significance at any horizon. The predictive relationship therefore lives entirely in the less-liquid stocks, exactly where an informational signal should take longest to be incorporated into prices.

Two caveats apply. First, we do not control for liquidity risk, so part of the stronger effect in less-liquid stocks could reflect compensation for that risk rather than information. Second, the larger point estimates in the less-liquid half come with correspondingly wider confidence bands, and the longest-horizon estimates lose significance, reflecting the thinner trading in these stocks.

Table 7
Short interest as return predictor by volume

HORIZON	$\beta_{low\ volume}$	$\beta_{high\ volume}$
1d	-0.00015	-0.00003
3d	-0.00042	-0.00006
5d	-0.00072*	-0.00007
10d	-0.00128*	-0.00012
20d	-0.00268**	-0.00026
30d	-0.00402**	-0.00048
60d	-0.00714**	-0.00126
90d	-0.01027**	-0.00195
180d	-0.01838*	-0.00412
360d	-0.02589	-0.00365

Note: β = coefficient on lag total disclosed SI each from a separate regression; SE two-way clustered by ISIN and date. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Stocks are classified as high or low volume by whether their median log volume, taken across all trading days, is at or above the cross-sectional median of those per-stock medians. The remaining parameters such as trading volume, stock volatility, past returns, and fixed effects of each regression are omitted for brevity. Observations per regression span from 3,405,997 for 1d horizon to 3,028,772 for 360d horizon for low volume stocks and 5,440,550 to 4,779,060 for high volume stocks.

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK. Stock return, volume, and volatility from LSEG.

A.3 HERDING REGRESSION ANALYSIS

In this section, we present our herding regression analysis on the European and Danish data.

Herding in the European data

Using a dataset of short interest disclosures for seven European countries (Denmark, Finland, France, Germany, Italy, the Netherlands, and the United Kingdom) we investigate the hypothesis that short interest disclosures generate herding. The data are large and cover a wide geographic scope of stocks. The main drawback compared to the Danish data is that all other NCAs do not publicise the non-disclosed short interest. The European analysis is therefore constrained by the available data and therefore it is not possible to compare the effect of disclosed short interest to the effect of non-disclosed short interest. We do study this relationship using the Danish data in detail in the next section.

We first investigate to what extent previous short interest disclosures lead to additional short interest disclosures in the stock. To do this, we consider the following regression:

$$I_{st}^{disclosure} = \beta_0 + \beta_1 Lag_{t-1,t-4}(I_{st}^{disclosure}) + \delta' Lag_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{st}$$

Where the outcome of interest $I_{st}^{disclosure}$ indicates whether a short interest disclosure took place in stock s at time t . And the main explanatory variable $Lag_{t-1,t-4}(I_{st}^{disclosure})$ sums the same variable over the past four days. We find that there is clear evidence of herding, see Table 8. We find that the autocorrelation between lagged and current disclosures in a stock is 0.131, meaning that an additional disclosure over the past four days on average increases the probability of a new disclosure by 13.1 percentage points.

Table 8
Herding regression: Europe

	I(CHANGE DISCLOSED)
I(Change in Disclosed)[t-1,t-4]	0.1315*** (0.0014)
Returns t	-0.0079*** (0.0013)
Returns[t-1,t-4]	-0.0094*** (0.0008)
Volatility t	0.0796*** (0.0049)
Volatility [t-1,t-4]	0.0018** (0.0009)
Volume	0.0024*** (0.0001)
Volume[t-1,t-4]	0.0001*** (0.0000)
Stock FE	✓
Date FE	✓
N	8,603,911

Note: This table presents a regression where the outcome variable I(Change in Disclosed)[t] is one if there was a disclosure in a stock on date t and zero otherwise. All lagged variables are constructed by summing the value of the variable over the past four days. We include fixed effects at the stock and date level. Standard error values in parentheses. Standard errors are clustered at the stock level. *: p<0.05, **: p<0.01, ***: p<0.001

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK. Stock return, volume, and volatility from LSEG.

An important issue with the above regression is that when we study autocorrelation in disclosures in a stock over time, we cannot rule out that parts of the autocorrelation stem from the same investor placing short positions in the same stock over several days in a row. If this is the case, the coefficient from regressing disclosures in a stock on past disclosures will not reflect herding, but merely the fact that investors are often smoothing their investments over time.

To address this issue, we consider an alternative regression where we zoom in on the individual investor and model how the disclosure decisions of *individual investors* react when *other investors* place short interest positions. To do this, we construct a measure of the disclosure activity of other investors than the one in question, defined below:

$$\Delta Total\ Disclosed\ SI\ Others_{ist} = \Delta Total\ Disclosed\ SI_{st} - \Delta Disclosed\ SI_{ist}$$

This measure takes the *change* in total disclosed short interest for stock s at time t and subtracts the change in disclosed short interest of investor i in stock s at time t . In this way, we obtain a measure of the change in total disclosed short interest for all investors in stock s at time t *except* for investor i . We then run the following regression:

$$y_{ist} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(\Delta \text{Total Disclosed SI Others}_{ist}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_{is} + \mu_t + \varepsilon_{it}$$

Where y_{ist} is an outcome of interest for investor i in stock s at time t . We will focus on the change in disclosed short interest $\Delta \text{Disclosed SI}_{ist}$. The main explanatory variable is the sum of $\Delta \text{Total Disclosed SI Others}_{ist}$ over the past four days. In addition, we again control for stock characteristics in X_{st} such as lagged trading volume, lagged volatility and lagged returns. The results are presented in Table 9 below.

The table presents results for the regression in which three different fixed-effects structures are used. The regressions include, in addition to date fixed effects, fixed effects at the investor, stock, or investor-stock level. We see that the results are quite robust to the fixed-effects structure, indicating that the regressions are not subject to bias from unobserved fixed effects. We find that the main variable of interest $\text{Lag}_{t-1,t-4}(\Delta \text{Total Disclosed SI Others}_{ist})$ has a significant and positive effect of 0.0007 in all specifications. This means that when the total disclosed SI of other investors increases by 1 percentage point, the disclosed short interest of investor i in stock s is likely to increase by 0.07 percentage points.

Table 9
Herding regression: Europe (disclosure: total investor)

	(I) Δ DISCLOSED SI	(II) Δ DISCLOSED SI	(III) Δ DISCLOSED SI
Δ Total disclosed [t-1,t-4] others	0.0007*** (0.0001)	0.0007*** (0.0001)	0.0007*** (0.0001)
Returns t	-0.0110*** (0.0018)	-0.0110*** (0.0018)	-0.0110*** (0.0018)
Returns [t-1,t-4]	-0.0018*** (0.0004)	-0.0018*** (0.0004)	-0.0018*** (0.0004)
Volatility t	-0.0060*** (0.0022)	-0.0054** (0.0021)	-0.0060*** (0.0022)
Volatility [t-1,t-4]	0.0001 (0.0005)	0.0007 (0.0005)	0.0001 (0.0005)
Volume	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
Volume [t-1,t-4]	0.0000*** (0.0000)	0.0000 (0.0000)	0.0000*** (0.0000)
Stock FE	✓		
Investor FE		✓	
Stock-Investor FE			✓
Date FE	✓	✓	✓
N	30,292,491	30,292,491	30,292,491

Note: This table presents a regression where the outcome variable Δ Disclosed SI[t] is the change in disclosed short interest of investor i in stock s at time t, and the main explanatory variable is the lagged change in total disclosed short interest of all other investors in the stock. All lagged variables are constructed by summing the value of the variable over the past four days. Columns (I)–(III) include date fixed effects together with fixed effects at the investor, stock, and investor-stock level, respectively. Standard errors in parentheses. Standard errors are clustered at the stock level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK. Stock return, volume, and volatility from LSEG.

Herding in the Danish data

The Danish data are unique in the European context because in addition to the dataset on disclosed short interest, the Danish Financial Supervisory Authority (DFSA) also publishes data on total short interest at the stock level. These data include all short interest positions between 0.1 per cent and 0.5 per cent of issued share capital which are disclosed to the DFSA but not to the public. While this non-disclosed short interest is available on the website of the DFSA, it is published with a lag of more than a month. It is therefore not possible for traders to react to these data. We use these data to test several hypotheses regarding the effect of real-time publication of short interest disclosures.

If short interest disclosures contain information that is relevant to the market, a key concern is that disclosures may lead to herding or copycat investing. This may harm the efficiency of price discovery to the extent that some investors simply copy the investment decisions of others without conducting a proper analysis.

An important implication of this argument is that movements in *disclosed* short interest (SI) should have a larger effect on future investment decisions than movements in *non-disclosed* short interest.

We therefore run a variation of the following regression:

$$y_{st} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(\Delta \text{Total Disclosed SI}_{st}) + \beta_2 \text{Lag}_{t-1,t-4}(\Delta \text{Total NonDisclosed SI}_{st}) \\ + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{st}$$

where s indexes a stock and t is a calendar day and y_{st} is the outcome of interest. We will study changes in total SI, disclosed SI, and non-disclosed SI. The main explanatory variables of interest are lagged changes in disclosed and non-disclosed short interest. If disclosures have an effect, we expect the coefficient on disclosed short interest to be larger than on non-disclosed short interest.

A key threat to our identification strategy is that trading behaviour in a stock can be correlated over time simply because the arrival of news is correlated over time. Since information is fundamentally unobserved, we address this issue by including controls in the vector X_{st} . These controls include lagged stock characteristics such as return, stock volatility and trading volume.

On top of this, since we have a panel dataset, we can include fixed effects at both the stock and date level, contained in μ_s and μ_t . Including stock level fixed effects is important because if there is a lot of variation in the cross section between different stocks in how much they are shorted, this will generate an upward bias in the autocorrelation in short interest. For example, if one stock experiences high growth in shorting, both leads and lags of the change in short interest will be positive, even when there is no causal link between the two.

Table 10 presents the main results on herding of disclosed short interest. Column 1 presents the results for the main outcome of interest. Here, we regress the change in total short interest in a stock on the lagged changes in total disclosed and non-disclosed short interest. We find that both disclosed and non-disclosed short interest have a significant effect on the change in total short interest. Specifically, the effect of total disclosed short interest is 0.059, which is significant at the 0.1 per cent level, while the effect of total non-disclosed short interest is 0.025, which is also significant. We see that the effect of disclosed short interest is more than double the effect of non-disclosed short interest. This supports the hypothesis that short interest disclosures have a causal effect on future investment decisions, indicating that significant herding is taking place.

In columns 2 and 3 we change the outcome variable to be changes in total disclosed short interest and changes in total non-disclosed short interest. Here we see that the herding effect takes place below the public disclosure threshold in the non-disclosed short interest. While disclosed short interest reacts only slightly more to changes in disclosed than to changes in non-disclosed short interest, we find that non-disclosed short interest reacts much more strongly to disclosed short interest than to non-disclosed short interest.

Table 10
Herding regression: Denmark

	(I) Δ TOTAL SI	(II) Δ TOTAL DISCLOSED SI	(III) Δ TOTAL NON-DIS- CLOSED SI
Δ Total disclosed [t-1,t-4]	0.059*** (0.009)	0.038*** (0.008)	0.022*** (0.005)
Δ Total non-disclosed [t-1,t-4]	0.025*** (0.005)	0.040*** (0.005)	-0.015*** (0.004)
Volatility [t-1,t-4]	0.009*** (0.003)	0.001 (0.003)	0.008*** (0.003)
Returns [t-1,t-4]	-0.012*** (0.004)	-0.010** (0.005)	-0.002 (0.003)
Volume [t-1,t-4]	0.000*** (0.000)	0.000** (0.000)	0.000*** (0.000)
Stock FE	✓	✓	✓
Date FE	✓	✓	✓
N	290,264	290,264	290,264

Note: This table presents regression output from regressions of disclosed, non-disclosed and total short interest on key explanatory variables. All lagged variables are constructed by summing the value of the variable over the past four days. We include fixed effects at the stock and date level. Standard errors in parentheses. Standard errors are clustered at the stock level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Source: Copenhagen Economics based on data on total and disclosed short interest from DFSA. Stock return, volume, and volatility from LSEG.

A.4 VOLATILITY REGRESSION ANALYSIS

In this section, we present our volatility and returns regression analysis on the European and Danish data.

Volatility in Europe

We also investigate whether volatility is affected by past changes in disclosed and non-disclosed short interest in the European data on disclosed short interest.

We first run the following regression:

$$y_{st} = \beta_0 + \beta_1 \text{Lag}_{t-1,t-4}(I_{st}^{\text{disclosure}}) + \delta' \text{Lag}_{t-1,t-4}(X_{st}) + \mu_s + \mu_t + \varepsilon_{st}$$

where the outcome of interest is the daily stock volatility. We find that an additional short interest disclosure over the past four days increases volatility by 0.0005, see Table 11. Expressed relative to mean volatility it is a 2.9 per cent increase in daily volatility.

Note the effects are smaller compared to CE's 2021 analysis. We have changed the volatility measure to $\log(|\text{returns}| + 1)$ from $\log(|\text{returns}|)$. We implemented this change to avoid erroneous observations on trading days with no change in returns. This causes volatility to be measured on a different scale and therefore the differences in magnitude.

Table 11
Volatility: Europe

	(II) VOLATILITY (FE)
Δ Total disclosed [t-1,t-4]	0.0005*** (0.0001)
Volatility [t-1,t-4]	0.0905*** (0.0021)
Returns[t-1,t-4]	-0.0071** (0.0032)
Volume [t-1,t-4]	0.0003*** (0.0000)
Investor-stock FE	✓
Date FE	✓
N	8,789,736

Note: This table presents regression output from regressions of volatility on key explanatory variables. All lagged variables are constructed by summing the value of the variable over the past four days. We include fixed effects at the stock and date level. Standard errors in parenthesis. Standard errors are clustered at the stock level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Source: Copenhagen Economics based on data on disclosed short interest from financial supervisory authorities in the following countries: Denmark, Finland, France, Germany, Italy, Netherlands, UK. Stock return, volume, and volatility from LSEG.

APPENDIX B

QUANTIFICATION OF BENEFITS OF SHORT SELLING

In what follows, we describe in detail the methodology used to quantify the benefits of short selling. We provide calculations for both channels but include only the liquidity channel in our main results because the volatility-related benefits remain an area of ongoing research. Accordingly, the risk premium channel should be interpreted with appropriate caution. We also explore how the identified relationships would differ in the US, where the literature allows.

QUANTIFICATION OF THE BENEFITS OF THE LIQUIDITY CHANNEL

We approximate the average European bid-ask spread as around 23 basis points. One academic study reports an effective bid-ask spread of 39.6 basis points, calculated as the simple average for all European common stocks across 15 exchanges over 2010–2024.⁷³ This estimate likely represents an upper bound, due to the long sample period including years with generally wider spreads and an equal-weighting scheme which gives more weight to smaller stocks with typically wider spreads. An EU-commissioned study reports an average quoted bid-ask spread of 7.1 basis points across EU equity markets in 2019, based on an order-weighted aggregation across countries.⁷⁴ A recent publication also reports a median quoted bid-ask spread of around 8–9 basis points for STOXX Europe Large 200 constituents in 2024; given that large-cap stocks generally have tighter spreads than small-caps, this should be interpreted as a lower-bound estimate.⁷⁵ Taking the midpoint between the lower-bound estimate of 7.1 basis points and the upper-bound estimate of 39.6 basis points yields our estimate of approximately 23 basis points.

Recent academic evidence shows that US equities generally trade at lower bid-ask spreads than European equities, particularly for large-capitalisation stocks. An academic study using data for US and European stocks over 2010–2024 documents that effective spreads are systematically narrower in the US, with the difference most pronounced outside the very largest European names.⁷⁶ Thus, we expect the average US bid-ask spread to be similar to, or lower than, our average estimate for European equities.

Short-selling bans in Europe increase the quoted bid-ask spreads by approximately 7.7 per cent on average. Short-selling bans in Europe are associated with a deterioration in market liquidity, as reflected in wider quoted bid-ask spreads. One ESMA study finds that short-selling bans increased bid-ask spreads by about 7.5 per cent for stocks in banned jurisdictions during the

⁷³ Brogaard, J., Hagströmer, B. and Zareei, A. (2025). *The European Liquidity Gap* ([link](#)).

⁷⁴ European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union and Oxera Consulting LLP (2020). *Primary and Secondary Equity Markets in the EU: Final Report* ([link](#)).

⁷⁵ ESMA (2025). *TRV Statistical Annex: ESMA Report on Trends, Risks and Vulnerabilities, No. 1, 2025* ([link](#)).

⁷⁶ Brogaard, J., Hagströmer, B. and Zareei, A. (2025). *The European Liquidity Gap* ([link](#)).

restriction period, relative to a control group.⁷⁷ A separate ESMA analysis of the 2020 European short-selling bans reports a similar effect, with bid-ask spreads rising by around 8 per cent for affected stocks compared with a control group over the same period.⁷⁸ Taking the simple average of these two estimates, and giving equal weight to the different methodologies, we approximate the impact of short-selling bans on quoted bid-ask spreads in Europe at 7.7 per cent.

For the United States, there is no direct comparison to the recent ESMA studies, but available evidence suggests that the impact of short-selling bans on the bid-ask spread may be even larger. One academic study reports that during the 2008 US short-selling ban, median effective spreads in the US widened from 33 to 52 basis points for control stocks, whereas median effective spreads for stocks on the short-selling ban list more than tripled, from 42 to 145 basis points. This implies an increase of roughly 58 per cent for the control group, compared with about 245 per cent for the banned stocks, indicating a markedly stronger deterioration in liquidity for securities directly subject to the ban.⁷⁹

The monthly excess return of a stock with a 1-percentage-point higher bid-ask spread is estimated to be 0.38 percentage points higher. We base this estimate on two US studies, and we apply them to Europe in the absence of a comparable European analysis. The first academic paper concludes that the excess return of a stock with a 1.5 percentage point spread is 0.45 percentage point greater than that of a stock with a 0.5 percentage point spread.⁸⁰ The relationship between bid-ask spreads and expected returns is nonlinear, and because we focus on relatively small changes in spreads, we use the local slope at the lower end of the curve. A second paper by the same authors reports that the excess return differential is 0.3 percentage point per month for a stock with a 1.5 percentage point spread compared with a same-risk stock with a 0.5 percentage point spread.⁸¹ We use the midpoint between the two identified values to arrive at our estimate.

We estimate that, through the liquidity channel, allowing short selling in Europe yields an annual benefit of approximately EUR 11.3 billion. We first multiply the average European bid-ask spread (23 basis points) by the expected percentage increase resulting from a short-selling ban (7.7 per cent) to obtain the expected increase in the European bid-ask spread. We then multiply this increase by the estimated effect of a one basis-point rise in the bid-ask spread on monthly excess returns (0.38 basis points), which yields an implied monthly increase in excess return of about 0.68 basis points. This corresponds to an increase of around 8 basis points per year. Finally, applying this annual return change to the STOXX Europe Total Market, with an aggregate free float market cap of EUR 13.9 trillion in 2026⁸², gives an estimated potential increase in returns of approximately EUR 11.3 billion.

Allowing short selling is therefore assumed to have the opposite effect on bid-ask spreads, i.e. to narrow them by the same magnitude as the estimated widening under a ban. We adopt this symmetry

⁷⁷ ESMA (2022). *Final Report: Review of Regulation (EU) No 236/2012 on Short Selling and Certain Aspects of Credit Default Swaps (SSR)*, ([link](#)).

⁷⁸ ESMA (2025). *2024 Annual Report* ([link](#)).

⁷⁹ Boehmer, E., Jones, C. M. and Zhang, X. (2013). "Shackling Short Sellers: The 2008 Shorting Ban", *The Review of Financial Studies*, Vol. 26, No. 6 ([link](#)).

⁸⁰ Amihud, Y. and Mendelson, H. (1986). "Liquidity and Stock Returns", *Financial Analysts Journal*, Vol. 42, No. 3 ([link](#)).

⁸¹ Amihud, Y., Mendelson, H. and Pedersen, L. H. (2005). "Liquidity and Asset Prices", *Foundations and Trends in Finance*, Vol. 1, No. 4 ([link](#)). We take a conservative approach by not relying on the most extreme values of the curve, to allow for the possibility that the effect has weakened since publication.

⁸² STOXX Ltd. (2025). *STOXX Europe Factsheet* ([link](#)).

assumption in the absence of more precise empirical estimates for the liquidity impact of lifting short-selling restrictions.

The absolute monetary benefits of short selling in the United States would likely be larger than what we identify in Europe, reflecting higher trading volumes. The relative magnitude is more difficult to quantify, but available evidence suggests that the impact on bid-ask spreads could be at least as pronounced as in European markets, despite lower average spreads, potentially reflecting a stronger effect of short-selling constraints on volatility. The overall effect in the US would therefore be substantial, even if its precise magnitude remains uncertain.

QUANTIFICATION OF THE RISK PREMIUM CHANNEL

Short selling bans in Europe increase the return volatility by 0.018 standard deviations. An academic study examining short-selling bans in Europe during COVID-19 finds that these bans harmed overall market quality. Using linear regression, the study identifies a statistically significant effect of short-selling bans on stock return volatility of 0.018 standard deviations of returns.⁸³ In the absence of more targeted evidence, this result for overall return volatility is extended to idiosyncratic volatility in the following calculation. This value can only be interpreted as a rough approximation.

For the United States, no directly comparable estimates expressed in standard-deviation units are available. However, existing empirical studies of broad, market-wide short-selling bans in US equities similarly find that such bans tend to increase stock return volatility.⁸⁴

An increase in volatility by one standard deviation is associated with an increase in returns of approximately 1.6 percentage points. One academic study finds that a one-standard-deviation change in idiosyncratic volatility is 0.098 and that the average impact of an increase in volatility on stock returns is 0.19. The overall effect in that study is obtained by multiplying these two values.⁸⁵ An alternative study finds that a one standard deviation change in idiosyncratic volatility is 0.099, and the average impact of an increase in volatility on stock returns is between 0.11 and 0.15.⁸⁶ Taking the simple averages of the respective parameters across the two studies gives 0.099 and 0.16, yielding an estimated effect of about 1.6 percentage points. In this step, US evidence is applied to the European market in the absence of comparable European analyses.

Used mechanically, this approach would imply that, through the risk premium channel, allowing short selling in Europe could yield an annual benefit of up to 35 basis points per year. The figure is obtained by multiplying the estimated increase in volatility resulting

⁸³ Bessler, W. and Vendrasco, M. (2022). "Short-selling Restrictions and Financial Stability in Europe: Evidence from the Covid-19 Crisis", *Journal of International Financial Markets, Institutions and Money*, Vol. 80 ([link](#)).

⁸⁴ Boehmer, E., Jones, C. M. and Zhang, X. (2013). "Shackling Short Sellers: The 2008 Shorting Ban", *The Review of Financial Studies*, Vol. 26, No. 6 ([link](#)).

⁸⁵ Fu, F. (2009). "Idiosyncratic Risk and the Cross-Section of Expected Stock Returns", *Journal of Financial Economics*, Vol. 91, No. 1 ([link](#)).

⁸⁶ Spiegel, M. I. and Wang, X. (2005). *Cross-Sectional Variation in Stock Returns: Liquidity and Idiosyncratic Risk*. SSRN Working Paper ([link](#)).

from a short-selling ban with the corresponding estimated impact on returns. The lower bound should be set to zero to allow for a conservative scenario in which the channel has no effect.

Applied mechanically, this implies that banning short selling reduces returns by 0 to 2.9 basis points per month, corresponding to an annual effect of 0 to 35 basis points.

Thus, as the economic research does not yet provide a firm consensus on the pricing of idiosyncratic volatility, we do not provide a headline EUR estimate for the risk premium channel.

The available economic evidence on market-wide short-selling bans suggests that similar mechanisms may operate in US equities, and that the magnitude of the effect could be of a comparable order. This extrapolation should, however, be interpreted with caution, as there is currently no directly comparable US literature that would allow the effect on return volatility to be quantified in an equivalent manner.

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