

Geographic Proximity in Short Selling*

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Abstract

Micro-level geographic proximity is associated with significantly higher returns from short selling within London. Short trades by institutions near the target headquarters are followed by larger negative abnormal returns. Proximity matters more for stocks that are smaller, more volatile, and less actively covered by sellside analysts, and less for large trades and trades following more proximate institutions' trades. Short trades are correlated geographically, with proximate institutions more likely to short the same stocks. Geographically closer short trades predict more negative earnings. Covering of short positions by more proximate institutions is followed by more positive abnormal stock returns.

JEL classification: D82, G12, G14, G15, G23

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1 Introduction

Geographic proximity can be associated with informational advantage. Local equity analysts tend to be more accurate than distant or foreign ones, while households, professional traders and mutual funds generate higher returns from local holdings relative to nonlocal holdings.¹ However, in existing studies exploring local information advantage in financial markets, the distinction between local and non-local is usually based on domestic versus foreign market participants or large areas defined local, and within-country effects of proximity tend to be strongest in remote non-metropolitan areas. As a result, these studies cannot pinpoint the source of the information advantage, as their findings could be explained either by the importance of local knowledge and understanding the businesses' operating environments or by information gained from interactions with target firms' employees.

Short sellers are typically considered among the most sophisticated market participants and hence represent a highly interesting subject group for understanding the nature of local information. However, there is little existing evidence on the role of local information in short trades. Teo (2009) finds that Asia-focused hedge funds with an office in their investment region perform better than their non-present peers. But like most existing hedge fund studies, his study is based on fund-level returns. Studies of short sellers' information typically lack trade-level data and focus on the role of aggregate firm-level short interest in predicting stock returns.²

In this paper, we study institutional investors' short trades in London. We construct a comprehensive sample of large short positions during 2013 to 2019 using mandatory regu-

¹On equity analysts, see Malloy (2005) and Bae, Stulz, and Tan (2008). On households, see Ivković and Weisbenner (2005), on professional traders, Hau (2001), and on mutual funds, Coval and Moskowitz (1999, 2001).

²A few recent studies use trade-level data, including von Beschwitz, Lunghi, and Schmidt (2021), who study transaction data from long-short equity hedge funds and find that hedge funds exhibit skill in both long and short positions, and Choi, Park, Pearson, and Sandy (2020), who find that short trades covered within very short time windows are profitable but those kept open longer are not. Jones, Reed, and Waller (2016) use European short disclosure data and find that European short position disclosures are followed by negative abnormal returns.

latory disclosure data.³ This allows us to infer individual short trades directly and study trade-level returns. We match these data with institution data from Preqin and firm data from Compustat Global. For each short trade, we observe the office location of the investor (typically a hedge fund) and the target firm’s headquarters location. Given UK zip codes identify individual buildings, we use them and corresponding coordinate data that allow us to capture very precise locations of each office.

This setting allows us to study very small, micro-level differences in geographic proximity, in sharp contrast to the macro-level distance measures or definitions of local used in prior studies. We perform our analysis for London-based stocks only in our main analyses, as well as for the full UK sample in the appendixes. London is a dense metropolitan area, the main financial centre in Europe, and home to the vast majority of European hedge funds and many of the shorted UK stocks. This enables us to focus on micro-level differences in proximity within a small geographic area with high density of investors and target firms.⁴ Importantly, our setting allows for a cleaner interpretation of the results than prior studies of local information advantage. Within-London differences in information cannot be explained by better understanding of local business environment. Local knowledge and the target firms’ business operations are very unlikely to be *that* local. The most plausible channel for any differences we find are direct or indirect interactions with the target firm facilitating information dissemination.

Another important aspect of the setting is that we can compare the same investor’s short positions in more and less geographically proximate firms. Similarly, we can compare different investors in the same stock. This means that our results come from within-investor and within-stock differences in short returns, conditional on pairwise distance. In our regression analyses, we include fund and stock fixed effects, meaning that our findings are not affected by any given fund being better at short selling or any given stock being a better short target

³The European Union (EU) mandates disclosure of net short positions exceeding 0.5% of the firm’s share capital and at every increment of 0.1% above that.

⁴Jank and Smajlbegovic (2021) provide related macro-level evidence that European short trades perform better when the fund and the target stock are headquartered in the same country.

in general, as these would be captured by the fixed effects. This substantially mitigates potential endogeneity concerns related to unobserved fund or stock characteristics.

We begin our analysis by examining whether institutions in our sample exhibit a preference for short selling geographically close firms. We compute for each institution the share of short trades in firms within 2.5km or 5km radius, as well as the average distance between the institution and shorted firms. Comparing these measures to a location-neutral benchmark, we find no evidence of micro-level home bias in the number of trades. In other words, funds appear to be approximately as likely to short nearby stocks as further-away ones. This contrasts many prior studies documenting a (macro-level) home bias in investments (e.g., Coval and Moskowitz (1999, 2001)).

We next focus on short trade returns. We calculate cumulative abnormal stock returns (CAR) around each short trade and find that short trades tend to be followed by negative abnormal stock returns. This suggests that short sellers possess valuable information. The negative abnormal returns persist for relatively long periods but are largest in the first approximately 20 trading days following the short trade and start levelling out after that. This finding is consistent with a large literature suggesting that aggregate short interest predicts stock returns (see, e.g., Desai, Ramesh, Thiagarajan, and Balachandran (2002), Cohen, Diether, and Malloy (2007), Au, Doukas, and Onayev (2009), Rapach, Ringgenberg, and Zhou (2016)) and contrasts the findings of Chakrabarty, Moulton, and Trzcinka (2017), who find that the majority of short-term institutional (long) trades by mutual funds lose money. Our results are also consistent with those of Choi et al. (2020) and von Beschwitz et al. (2021) on hedge fund short trades in the U.S.

We find that the negative abnormal returns following short trades are significantly larger for investors that have an office near the target firm’s headquarters. Plotting the short trade returns for different geographic distances between the investor and the firm, it is clearly visible that for stocks less than 5 km away from the investor office, abnormal stock returns are substantially more negative in the days following the trade. Furthermore, the negative

abnormal returns persist longer for very proximate short trades. Our regression analysis for London-based trades suggests that the cumulative abnormal returns for the first 20 trading days following a short trade are approximately 1.7 percentage points more negative for investors that have an office less than 2.5km away from the shorted firm’s headquarters than for investors more than 5km away. The results are similar when using a continuous measure of geographic distance instead of distance dummies.

If the relationship between short returns and geographic distance is driven by information asymmetry, we might expect this effect to be larger for firms with more information asymmetry. To explore this, we divide all firms in our sample into two groups based on (1) market capitalization, (2) stock volatility, and (3) frequency of analyst estimate revisions. Intuitively, small and volatile stocks are likely to have more information asymmetry. The same is true of firms where analysts are less active in providing information. Hence, we might expect to find a stronger relationship between geographic distance and short returns in these subsamples.

Our results are consistent with these predictions. The estimated effect of distance is significantly larger for small, volatile and less frequently covered stocks. For small stocks in the London sample, short trades where the investor is less than 2.5km away from the target are followed by 3.5 percentage points more negative abnormal returns than trades where the distance is above 5km. This difference is both economically large and statistically significant. The same estimate decreases to 0.7 percentage points and is not statistically significant in the subsample of large stocks. The patterns are similar when dividing the sample based on stock volatility or analyst revision frequency. These findings suggest that geographic proximity is particularly important in information dissemination when the target firms are more opaque and there is less information available.

The relationship between short returns and geographic distance also varies across different institutional characteristics. We find that our results mainly come from institutions more focused on short selling geographically close firms and institutions exhibiting higher

idiosyncratic volatility in fund returns. These results are consistent with proximity being associated with firm-specific information advantage and certain institutions focusing more on exploiting such advantage.

Having explored the information advantage in trading geographically proximate stocks, we then explore whether such information advantage transmits across institutions. To test this, we examine whether geographically close institutions exhibit similar trading patterns. We construct a trade-by-institution-pair-level sample and study to what extent short trades are likely to be followed by the same trades by other institutions, and whether that likelihood is different depending on the distance between the two institutions. We find that geographically proximate institutions are significantly more likely to short the same stocks. This effect is strongest for institutions located within 0.5km from each and decreases as the distance between two institutions increases. This is consistent with information being transmitted between geographically proximate investors.

Motivated by the information transmission across institutions, we examine the role of locations in follow-on trades where the same stock has been shorted by others in the preceding 20 days. For each short trade, we compute the total GBP short volume in the prior 20 days for the stock and divide our sample of short trades into low and high prior short volume trades. We also calculate the percentage of prior short volume by institutions located near the target firm's headquarter. We find that in trades where there is little prior short volume, the short seller's own proximity to target is an important determinant of short returns. In contrast, for trades with higher preceding short volume, the location of the prior short sellers matters more than the current trader's location. This suggests that by following others' trades, short sellers can exploit other short sellers' proximity to the target firm.

Next, we examine the relationship between short trade returns and the size of the trade. We calculate the size of each short trade in GBP and find that there is a significant negative relationship between trade size and the abnormal stock return following the trade. This suggests that larger short trades are generally more profitable – possibly reflecting the insti-

tution’s confidence in the trade.⁵ Furthermore, geographic proximity matters substantially more for smaller trades. This could mean that short sellers tend to do large trades only when they are confident enough and avoid them in the absence of good-quality information, making distance less relevant.

To obtain more direct evidence of the information content in short trades by geographically proximate investors, we study company earnings surprises. We calculate earnings surprises as the difference in EPS between two consecutive fiscal years, divided by stock price, and find that short sales by geographically close institutions are followed by significantly more negative earnings surprises, even when controlling for general short selling in the stock. This finding provides further evidence that geographic proximity is associated with an information advantage.

Finally, if new short trades (i.e., new or increased short positions) are followed by negative abnormal returns, we might expect the opposite for closing of short positions. A weakness of our data is that we cannot see the time when a short position is exited completely, as full exit takes the position to a level that does not require regulatory reporting. However, we can see trades that reduce short interest while still keeping the position above the reporting threshold. We calculate 20-day cumulative abnormal returns following all such trades and perform a regression analysis similar to our main short trade returns analysis. The results mirror those on opening short positions. Covering of short positions by geographically proximate institutions is followed by significantly more positive abnormal stock returns. In the London sample, covering of a short position by an institution less than 2.5km away from the target firm is followed by 2.3 percentage points more positive abnormal stock returns than covering by an institution more than 5km away. This difference is statistically significant and economically even larger than the difference when opening short positions. This finding is also consistent with geographic proximity being associated with an information advantage.

The outbreak of COVID-19 in the Spring of 2020 in UK has completely reshaped how

⁵This finding is consistent with the results of Della Corte, Kosowski, and Rapanos (2021), who find that high-conviction short trades by hedge funds have more predictive power than smaller trades.

local information is transmitted, as country-wide lock downs, social distancing measures, and online meetings make geographical distance much less of an issue to obtain value-relevant information. Therefore, our previously documented relation between geographic proximity and short selling profits should disappear. Due to data availability, we can only extend our sample to 2020 at the moment. We find that the relation between geographic proximity and short selling profits are largely weakened. We also find some directionally consistent results showing that the number of new COVID-19 cases/deaths negatively impacts the relation between geographic proximity and short selling profits.

Our study makes several important contributions. First, we add to the evidence on short interest as a predictor of stock returns and the nature of information that short sellers may have (e.g., Aitken, Frino, McCorry, and Swan (1998), Desai et al. (2002), Christophe, Ferri, and Angel (2004), Cohen et al. (2007), Boehmer, Jones, and Zhang (2008), Karpoff and Lou (2010), Engelberg, Reed, and Ringgenberg (2012), Rapach et al. (2016), Boehmer, Duong, and Huszár (2018), von Beschwitz et al. (2021)). Our findings suggest that geographic proximity plays an important role in short sellers' information acquisition. Furthermore, there is a debate on whether short sellers possess private information (e.g., Christophe et al. (2004)), superior ability to analyze public information (e.g., Engelberg et al. (2012)), or both (e.g., Boehmer, Jones, Wu, and Zhang (2020)). Our results cannot be explained by superior ability to analyze public information and hence are likely related to short sellers acquiring private information via social interactions.

We also contribute to the understanding on the role of geography and distance in information dissemination in the financial markets (e.g., Malloy (2005), Choe, Kho, and Stulz (2005), Bae et al. (2008), Ivković and Weisbenner (2005), Hau (2001)). Related work shows the importance of geography in information dissemination related to R&D activity (Audretsch and Feldman (1996)), bank loan markets (Becker (2007)), and marketplace loans (Lin and Viswanathan (2016)). Our study provides the first evidence on the role of location in short selling and for hedge funds more generally. The closest existing studies are Teo

(2009), who finds that Asia-focused hedge funds with an office in their investment region perform better than their non-present peers, and Jank and Smajlbegovic (2021), who provide evidence that European short trades perform better when the fund and the target stock are headquartered in the same country.

An important distinction between the prior literature on the role of geography in investments and our study is that we focus on micro-level differences in location. For example, the results of Malloy (2005) on geographic distance and analyst accuracy are strongest for firms in small and remote locations. Similarly, the results of Coval and Moskowitz (2001) are strongest for small funds in remote areas. Teo (2009) measures proximity by having an office in the same continent. Our results, in sharp contrast, come from micro-level differences in proximity within one city, London, with very high density of both investors and target firms.

Our results should also be of interest to both regulators as well as practitioners, as they have the potential to shed light to some of the channels through which short sellers obtain firm-specific information. Cohen, Frazzini, and Malloy (2008) find that social connections, as proxied by alumni networks, can be an important mechanism of information acquisition. Our findings are consistent with this notion, as the micro-level differences in distance that we study are more likely to be a proxy for social connections rather than travel costs or other frictions for information acquisition.

Our findings also raise important questions for short sellers themselves. Our findings suggest that short sellers might be able to overcome some of the informational disadvantage when shorting further-away stocks by following the trades of other short sellers that are nearby the target firm. However, our results suggest that they are more likely to follow their nearby peers, instead of short sellers nearby the target firm.

A related question is why institutions do not focus more strongly on nearby stocks where they enjoy an information advantage. Cohen et al. (2008) explain the relatively low amounts that mutual funds invest in socially connected stocks by the small number of such stocks, and hence the resulting low diversification. This is, however, not likely the case in our

context. Given the large number and high concentration of both institutions and stocks in Central London, there would appear to be a large number of potential target firms nearby, substantially mitigating the diversification problem.

2 Data and methodology

2.1 Short positions

To observe institutional investors' short positions, we use the WRDS European Short Data, encompassing all significant short positions reported by institutional investors under the EU236 Rule. The EU236 Rule is a regulation introduced by the European Securities and Markets Authority (ESMA) in the aftermath of the global financial crisis of 2008. Effective from November 2012, this EU-wide reporting regulation aims to improve the transparency of short selling activities conducted by institutional investors and to increase market stability through mandatory daily reporting by institutional investors. According to the regulation, significant net short positions in shares must be i) reported to the relevant competent authorities when they at least equal to 0.2% of company issued share capital and every 0.1% above that, and ii) disclosed to the public when they at least equal to 0.5% of company issued share capital and every 0.1% above that. The dataset covers 19 European markets.⁶

We focus on the short selling activities for London-based stocks only in the main analyses, as well as for the full UK sample in the appendixes. The reasons are as follows. First, London is the main financial centre in Europe, and home to the vast majority of European hedge funds and many of the shorted UK stocks. This enables us to focus on micro-level differences in proximity within a small geographic area with high density of investors and target firms. Second, UK postcodes have one-to-one mapping to geographic coordinates, enabling us to compute the precise distance between two addresses. Finally, short sales in the UK market

⁶The markets included in the data are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Spain, Sweden, and UK.

must be reported in a timely fashion. According to the UK Financial Conduct Authority, significant net short positions should be sent by 3.30 pm on the trading day after the day the position was reached.⁷ Hence, we are able to identify daily short selling activity through changes in the reported net short positions without a significant delay in time.

If an institution has more than one short position record for a stock in a day, we keep the last record as the end-of-the day position. If a short position is recorded on a non-trading day, we adjust the record date to the ensuing trading day. For each institution and each stock on a reporting day, we compare the short position reported with that on the previous reporting day. If the short position increases (decreases), we record a short selling (buy-back) transaction at the end of this reporting day.

2.2 Institution and firm locations

We obtain institutional investors' office locations from Preqin. We include all European investment-related offices based on institution types and manager job titles.⁸ The data include office addresses and zip codes. We match Preqin and WRDS European Short Data using institutions' names. To get locations of the shorted stocks, we identify the location of each listed firm based on its headquarter location from Compustat Global. Shorted stocks are identified across datasets using International Securities Identification Number (ISIN) codes.

Because each UK zip code uniquely identifies a specific geographic location (i.e., a building, instead of an area), we can get the precise coordinates of each office based on the zip code and use those to calculate the physical distance between two offices, as well as other geographic variables. We obtain coordinates for all UK zip codes from the National Statistics Postcode Lookup (NSPL).⁹

⁷<https://www.fca.org.uk/markets/short-selling/notification-and-disclosure-net-short-positions>

⁸Many fund management firms have purely administrative offices which are not involved in the actual investment decisions.

⁹This is an open database that can be accessed online: <https://opendata.camden.gov.uk/Maps/National-Statistics-Postcode-Lookup-UK-Coordinates/77ra-mbbn>.

Figure 1 shows the locations within central London. Short sellers are mostly concentrated in and around two areas of London, Mayfair and the City of London. Central London also includes the headquarters of a large number of shorted target firms in our sample. Figure IA.3 shows the institution office and target firm headquarter locations for the full UK sample. We see that the vast majority of institutions are located in London, while Manchester and Edinburgh also have some short sellers’ offices. The target firms are more evenly spread across the country.

2.3 Stock returns and accounting data

We obtain all stock-level data, including stock returns and accounting variables, from Compustat Global. We obtain Fama and French (1993) three factors and the Carhart (1997) momentum factor for the UK market from EUROFIDAI. We define daily abnormal return as the daily four-factor adjusted returns. More specifically, for daily returns from month t , we first run a regression using daily returns from month $t - 6$ to month $t - 1$. We compute daily four-factor adjusted returns in month t using the betas estimated from this regression, together with the daily four factors from month t . Robust results can be obtained if we adjust daily returns by market, or use the Fama-French three factor model (see Table IA.3).

3 Returns on short trades

3.1 Overview of the sample

To examine the role of geographic proximity on the returns from short selling, we construct a sample of all short trades for London-based stocks only for the main analyses, as well as for the full UK sample in the appendixes. For each short selling transaction, we define the record date or the ensuing trading day as the event day ($t = 0$), and track the targeted stock’s subsequent cumulative abnormal return (CAR) over the next 20-trading-day window. Daily abnormal returns are computed as the four-factor-adjusted returns using betas estimated

from the past six months. For each trade, we calculate the geographic distance between the short seller and the target firm based on their postcodes. Figure 2 shows the distribution of this variable. The average distance between the short seller and the target firm headquarters for the London sample is 3.24km, while the median is 2.81km . In the London sample, 43.5% of the short trades are within a distance of less than 2.5km and 42.1% are within 2.5km - 5km. To make our results easier to interpret intuitively, we use 2.5km and 5km as two thresholds when conducting our analyses. Our results remain robust with a continuous measure of distance.

Table 1 shows summary statistics for the London sample . The average 20-day cumulative abnormal return for the the short trades in the London sample is negative 0.39%. This suggests that the average short trade is “profitable” in that it generates a positive abnormal return for the short seller. The standard deviation of the abnormal returns for the London sample is 9.80%, which means that there is substantial variation among the profitability of short trades.

3.2 Geographic home bias in short trades

Before conducting quantitative analysis on the relation between geographic distance and short returns, we first examine whether institutions in our sample exhibit any preference in short selling geographically close firms. In Table 1, we compute for each institution the share of short trades in firms within 2.5km or 5km radius, the mean value of distance between the institution and shorted firms (in km), and the mean value of the natural logarithm of such distances. We then compute the same measures for the short trades conducted by other institutions in our sample. The latter provides a location-neutral benchmark of what the ”expected” share of nearby trades would be, if the institution traded similarly to other institutions in the sample.

We then compare these two measures for each institution to get a proxy for location-based home bias in the short trades in our sample. If the institution itself is more likely to

short nearby firms than others are, that would suggest the existence of positive home bias. We find that, on average, institutions in our sample do not exhibit a significant home bias in short selling geographically proximate firms.

3.3 Returns analysis

We next focus on short trade returns. We calculate cumulative abnormal stock returns (CAR) around each short trade and plot the average CARs by geographic distance, shown in Figure 3.

Consistent with prior literature, we find that short trades tend to be followed by negative abnormal stock returns, suggesting that short sellers possess valuable information. The negative abnormal returns persist for relatively long periods but are largest in the first 20 trading days following the short trade and start levelling out after that. More interestingly, even though the firms being shorted have a negative subsequent stock performance on average, this varies substantially depending on geographic proximity. The negative abnormal returns following short trades are significantly larger for investors that have an office near the target firm's headquarters. For example, for stocks less than 2.5km away from the investor office, the cumulative abnormal return in the next 20 days following a short trade is about -1 percentage point, while this number is only about -0.25 percentage point for stocks with a distance between 2.5km and 5km away from the investor office. For stocks further than 5km from the investor office, the subsequent abnormal stock returns following a short trade are slightly positive on average. This suggests that the average short trades are profitable only for investors shorting nearby stocks. Furthermore, the negative abnormal returns persist longer for very proximate short trades. These patterns are similar within the UK sample as well (see Figure IA.5).

To further test these relationships, we conduct the following regression:

$$CAR[1, 20]_{i,f,t} = \alpha_{i,f,t} + \beta_1 \cdot \text{Distance below } 2.5km_{i,f} + \beta_2 \cdot \text{Distance } 2.5 - 5km_{i,f} + \gamma \cdot \text{Controls}_{i,t} + \sigma_i + \phi_f + \delta_t + \varepsilon_{i,f,t}. \quad (1)$$

The dependent variable is the cumulative abnormal return for stock i from day 1 to day 20, where day 0 is the day when the institution f shorts the stock. We define *Distance below 2.5km* as a dummy variable that equals one if the distance between the short-selling institution is within 2.5km from the headquarter of the firm, and zero otherwise. *Distance 2.5 - 5km* is defined in a similar fashion. We include the following control variables: (1) $\ln(\text{Market cap})$, the natural logarithm of the market capitalization; (2) *Market-to-book ratio*, the ratio of market value of equity to book value of equity; (3) *Past return (t-1)*, the return from the previous month; (4) *Past return (t-12, t-2)*, the return from the past 12 months, excluding the most recent month; (5) *Asset growth*, the annual growth rate of total assets; (6) *Volatility*, the standard deviation of daily stock returns in the previous month (in percentage). Depending on the specification, we include stock, fund, and time fixed effects to control for any stock- or fund-specific factors as well as market timing.

The results, shown in Table 2, are consistent with Figure 3. The post-short-selling abnormal stock return is more negative when the distance between the firm and the institution is closer. Columns (1)-(4) show this result using dummies indicating distances below 2.5 km and between 2.5 and 5 km, relative to trades with higher distances. Our regression analysis suggests that the cumulative abnormal returns for the first 20 trading days following a short trade are approximately 1.7 percentage points more negative for investors that have an office less than 2.5km away from the shorted firm's headquarters than for investors more than 5 km away. The results are similar when using the natural logarithm of the distance as a continuous variable instead of distance dummies, as shown in columns (5)-(8). It is worth noting that, we include fund and stock fixed affects in the regressions, meaning that our findings are not affected by any given fund being better at short selling or any given stock

being a better short target in general, as these would be captured by the fixed effects. This substantially mitigates potential endogeneity concerns related to unobserved fund or stock characteristics. Similar results are also obtained in the full UK sample (see Table IA.7). Robust results can be obtained if we adjust daily returns by market, or use the Fama-French three factor model (see Table IA.3).

To further explore the robust relationship between short returns and distance and to show that our results are not merely driven by the random selection of two distance dummies, we divide our London sample into quintile groups based on the distance between the short seller and the target firm. In Panel A of Figure 4, we first plot the average CAR from each quintile. The average CAR monotonically increases with distance, consistent with our earlier results showing that geographically proximate short trades are more profitable.

In Panel B, we perform a regression analysis including the same controls as in Table 2 with distance quintile dummies and plot the estimated coefficients. We exclude the dummy indicating quintile 5, so the estimated coefficients are relative to the furthest distant quintile. The pattern looks very similar to Panel A, showing that the monotonic relation between distance and CAR is robust to including the full set of control variables.

3.4 Stock characteristics and short returns

If the relationship between short returns and geographic distance is driven by information asymmetry, we might expect this effect to be larger for firms where the information asymmetry is likely to be larger. To explore this, we divide all firms in our sample into two groups based on: (1) market capitalization, (2) stock volatility, and (3) the frequency of analyst estimate revisions. Intuitively, small and volatile stocks are more like to have information asymmetry. The same is true for firms where analysts are less active in providing information. Hence, we might expect to find a stronger relationship between geographic distance and short returns in these subsamples. To test this, we repeat the main regression analysis shown in Table 2 using these subsamples.

The results are shown in Table 3. Consistent with our prediction, the estimated effect of distance is significantly larger for small, volatile and less frequently covered stocks. For small stocks, short trades where the institution is less than 2.5 km away from the target are followed by 3.5 percentage points more negative abnormal returns than trades where the distance is above 5 km. This difference is both economically large and statistically significant. The same estimate decreases to 0.7 percentage points and is not statistically significant in the subsample of large stocks. The patterns are similar when dividing the sample based on stock volatility or analyst revision frequency. These findings suggest that geographic distance is particularly important in information dissemination when the target firms are more opaque and there is generally less information available.

3.5 Institution characteristics and short returns

While we find no evidence of general micro-level home bias in short trades, it is possible that some institutions are particularly focused on geographically proximate trades. Motivated by this observation, we next study whether the relationship between short returns and geographic distance becomes stronger for short trades from institutions that are particularly focused on geographically proximate trades. To test this empirically, for each institution, we compute *Close ratio* as the percentage of the short trades within 2.5km radius from the past year. We divide our sample into two groups based on this ratio and examine our baseline results in these two subsamples.

In Table 4, we find that our main result mainly comes from institutions more focused on shortselling geographically close firms. The relationship between short returns and geographic distance within institutions with small *Close ratio* is neither statistically significant nor economically large.

If there is an informational advantage in at least some geographically proximate short trades, it seems likely to come from firm-specific information, rather than macro-economic information. This would imply that institutions focusing on more idiosyncratic rather than

macro investments should be the ones exhibiting stronger relationship between proximity and short returns.

To explore this conjecture, we compute idiosyncratic volatility (*IVOL*) for each institution using the Fama-French three-factor adjusted returns from the past twelve months. We divide our sample into two groups based on *IVOL* and examine our baseline results in these two subsamples. Consistent with the prediction, the relation between short returns and geographic distance is only significant within the subsample of high-*IVOL* institutions.

Overall, results presented in this subsection are consistent with proximity being associated with firm-specific information advantage and certain institutions focusing more on exploiting such advantage.

4 Additional analysis

4.1 Correlated short selling and stock returns

The analysis above studies whether institutions have information advantage in trading geographically proximate firms. In this section, we explore whether such information advantage transmits across institutions. To test this, we examine whether geographically proximate institutions exhibit similar trading patterns.

We construct a trade-by-institution-pair-level sample and study to what extent short trades are likely to be followed by the same trades by other institutions, and whether that likelihood is different depending on the distance between the two institutions. More specifically, for every short selling on a targeted stock conducted by an institution in our sample, we track all short trades from all other institutions reported in the next 20 trading days. We pair this institution with each of the institutions with short trades in this window, and define a dummy variable, *Same trade*, that equals one if the other institution in the pair also shorts the same stock. Since each institution can have multiple office locations, we compute the minimum distance between two institutions' office locations as the proxy for geographic

proximity between two institutions. Since many institutions are located very close to each other, we define an additional *Distance below 0.5km* dummy variable that equals one if the distance between two institutions is within 0.5km. Similarly, *Distance 0.5 - 2.5km* is a dummy variable that equals one if the distance between two institutions is between 0.5km and 2.5km, and zero otherwise. The 0.5km and 2.5km cutoffs roughly represents the 25th and 50th percentiles from the distribution of institutions' geographic proximity among each other. We then perform a regression analysis of *Same trade* on the distance dummies, together with stock controls and various fixed effects. Note that we define these dummy variables to make our results easier to interpret. Consistent results can be obtained using a continuous distance variable as well.

We report the results in Table 5. We find that geographically proximate institutions are significantly more likely to short the same stocks. This effect is strongest for institutions located within 0.5km from each and decreases as the distance between two institutions increases. For example, the likelihood of the same trade is nearly 20 percentage points higher for institutions located within 0.5km from each other than if the distance is more than 2.5km. This result is robust to including fund-stock-pair fixed effects, as well as year-month fixed effects to control for market timing. This is consistent with information being transmitted between geographically proximate investors.

A natural extension based on the information diffusion among institutions is to examine the role of locations in follow-on trades where the same stock has been shorted by others in the preceding 20 days. Therefore, for each short trade, we compute the total GBP short volume in the prior 20 days for the stock and divide our sample of short trades into low and high prior short volume trades. To explore the geographic proximity in the past trading records, we define *Volume below 2.5km* as the percentage of prior GBP short volume from institutions located within 2.5km from the target firm's headquarter. We re-run our baseline analysis in both low and high prior short trade subsamples.

The results, shown in Table 6, include two patterns. First, in addition to the relation

between geographic proximity and the subsequent stock return, previous short selling intensity from geographically proximate institutions also significantly and negatively predicts the subsequent stock return of a short trade. Second, the relation between geographic proximity and the subsequent stock return following a short trade is conditional on previous short selling intensity. In trades where there is little prior short volume, the short seller’s own proximity to target is an important determinant of short returns. In contrast, for trades with higher preceding short volume, the location of the prior short sellers matters more than the current trader’s location. This suggests that by following others’ trades, short sellers can exploit other short sellers’ proximity to the target firm.

4.2 Trade size and stock returns

In this section, we examine the relationship between short trade returns and the size of the trade. We calculate trade size in GBP and add it to our baseline return regression. We also further divide our samples into large and small trades based on the median value.

The results are shown in Table 7. In addition to the relation between geographic proximity and the subsequent stock return, there is also a significant negative relationship between trade size and the abnormal stock return following the trade. This suggests that larger short trades are generally more profitable – possibly reflecting the short seller’s confidence in the trade. Furthermore, the subsample analysis shows that geographic proximity matters substantially more for smaller trades. This could mean that short sellers tend to do large trades only when they are confident enough, and avoid them in the absence of good-quality information, making distance less relevant.

4.3 Earnings surprises and short selling

To study the relationship between geographic distance and information content more directly, we examine whether short trades by geographically proximate institutions are better at predicting negative earnings announcements. We compute earnings surprises as the difference

in EPS between two consecutive fiscal years, divided by the stock price. We define *Short (Distance below 2.5km)* as a dummy variable that equals one if the stock has been shorted by any institutions within 2.5km radius of its headquarter in the 30-trading day window before the earnings announcement. To control for the aggregate short selling from the market, we also define *Short* as a dummy variable that equals one if the stock has been shorted in the 30-trading day window before the earnings announcement. We run panel regressions of earnings surprises on these two dummy variables, together with other stock controls, stock, and time fixed effects, and report the results in Table 8.

Table 8 suggests that short sales from geographically proximate institutions right before earnings announcements negatively predict earnings outcomes. For example, column (2) reports a coefficient of -0.010 (t-value=-2.50) on *Short (Distance below 2.5km)*. For reference, the average earnings surprise in the London sample is about -0.005. Therefore, geographically proximate institutions' short selling is associated with doubled negative earnings surprise relative to the mean, even when controlling for general short selling in the stock. Similar results are also obtained in the UK sample (see Table IA.13). This result provides further evidence that geographic proximity is associated with an information advantage.

In the Internet Appendix, we provide some robustness results based on different event windows (Table IA.4). We examine short sales from a 15-day window and a 60-day window before earnings announcements, and find results consistent with Table 8.

4.4 Returns following covering of short positions

Finally, if new short trades (i.e., new or increased short positions) are followed by negative abnormal returns, we might expect the opposite for closing of short positions. A weakness of our data is that we cannot see the time when a short position is exited completely, as full exit takes the position to a level that does not require regulatory reporting. However, we can see trades that reduce short interest while still keeping the position above the reporting threshold. We calculate 20-day cumulative abnormal returns following all such trades and

perform a regression analysis similar to our main short trade returns analysis.

The results, shown in Table 9, mirror those on opening short positions. Covering of short positions by geographically proximate institutions is followed by significantly more positive abnormal stock returns. Column (2) suggests, covering of a short position by an institution less than 2.5 km away from the target firm is followed by 2.3 percentage points more positive abnormal stock returns than covering by an institution more than 5 km away. This difference is statistically significant and economically even larger than the difference when opening short positions. This finding is also consistent with geographic proximity being associated with an information advantage.

4.5 Geographic Proximity during COVID-19 Pandemic

The outbreak of COVID-19 in the Spring of 2020 in UK has completely reshaped how local information is transmitted, as country-wide lock downs, social distancing measures, and online meetings make geographical distance much less of an issue to obtain value-relevant information. Therefore, our previously documented relation between geographic proximity and short selling profits should disappear.

Due to data availability, we can only extend our sample to 2020 at the moment. We use three different ways to define the time period affected by COVID-19: (1) a dummy variable for all short trades in 2020; (2) a dummy variable for all short trades during country-wide lock down periods (March 25th, 2020 to July 19th, 2020; November 5th, 2020 to December 2nd, 2020); (3) a dummy variable for the last three quarters in 2020. Table 10 shows that, in all specifications, the relation between geographic proximity and short selling profits are largely weakened. For example, column (1) suggests that, even though short selling from institutions within the 2.5km radius comes with almost 2% lower CAR, this effect reduces to only 0.36% in during the COVID-19 pandemic. We also find some directionally consistent results showing that the number of new COVID-19 cases/deaths negatively impacts the relation between geographic proximity and short selling profits. These results are reported

in Table 11.

5 Conclusion

We find evidence of geography playing an important role in short selling. Geographic proximity between the short selling fund and the target firm is associated with significantly more negative abnormal stock returns following a short trade – translating into higher returns for the short seller. Correspondingly, covering of short positions by geographically more proximate funds is associated with more positive subsequent abnormal stock returns. These results suggest that hedge funds are generally better at shorting geographically proximate stocks, which in turn implies that geographic proximity may provide an important information advantage. As one might expect, geographic proximity appears more important when the shorted stocks are more opaque.

Our findings on the clustering of short trades between institutions located near each other suggests that information is also disseminated between different institutions. In other words, the proximity to both target firms as well as to other institutions can be an important determinant of success for a short seller.

Our study has limitations that should be kept in mind when interpreting our findings. Most importantly, we only observe short trades. The funds doing these trades are very likely to hold simultaneous long positions, some of which might be designed to offset or match the short exposures. Our results allow comparing the profitability of the short positions. Hence, it is possible that the returns from the long positions might offset the differences in observed short trade profitability. Nevertheless, our results provide important evidence of the value that the funds create on the short legs of their long-short strategies and how that depends on physical proximity.

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Figure 1: Short seller and target firm locations

This figure provides the locations of short sellers' offices (red dots) and target firm headquarters (blue dots).



Figure 2: The distribution of distance

This figure shows the distribution of the distance between the short seller office and the target firm headquarters for the London sample. We obtain geographic coordinates based on the zip codes from the addresses of the short seller's office and the target firm's headquarter. We filter institutions' offices based on institution types and manager job titles, since many fund management firms have purely administrative offices which are not involved in the actual investment decisions. We compute geographic distance based on these coordinates. If a short seller has multiple offices, we use the most proximate office.

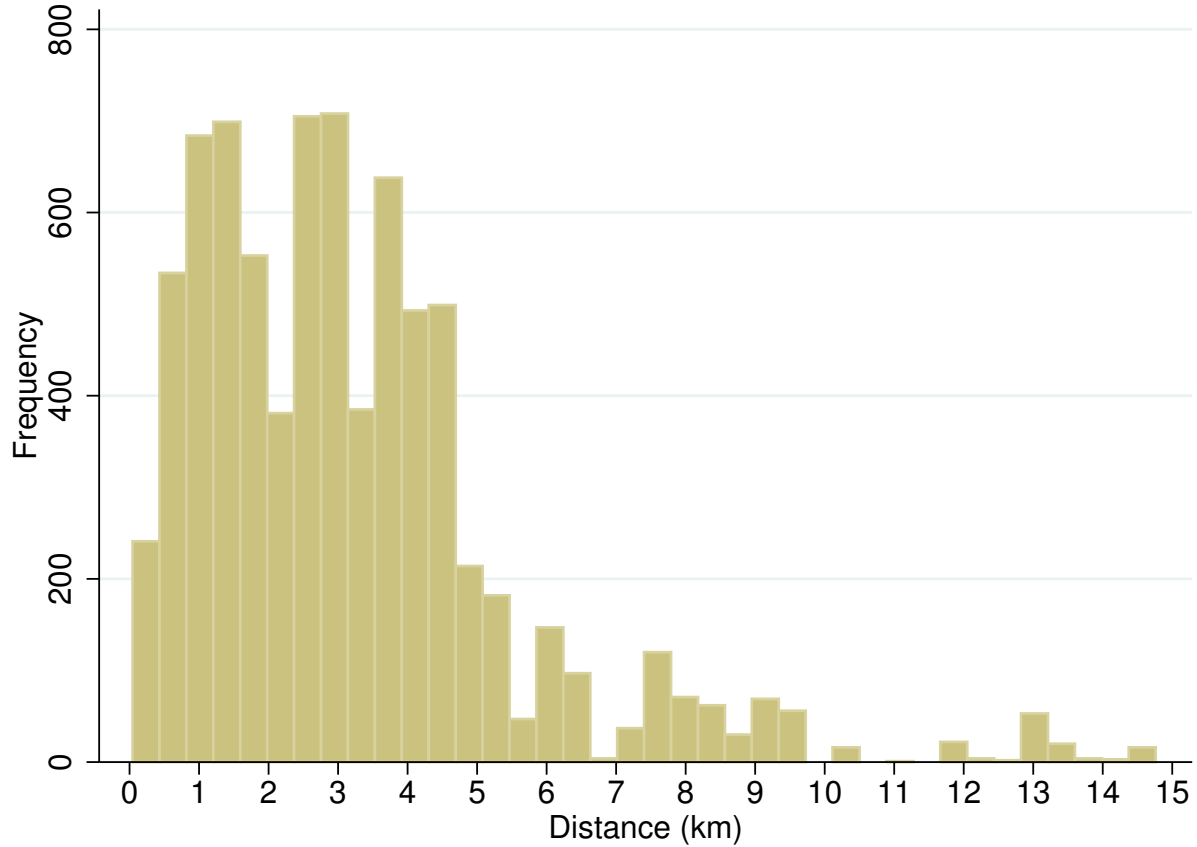


Figure 3: Cumulative abnormal return of stocks following short trades

This figure shows the average cumulative abnormal stock return following a short trade for the London sample. We divide our samples into three groups based on the distance between the short seller and the target firm: (1) distance below 2.5km (the red line); (2) distance between 2.5km and 5km (green line); (3) distance over 5km. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.

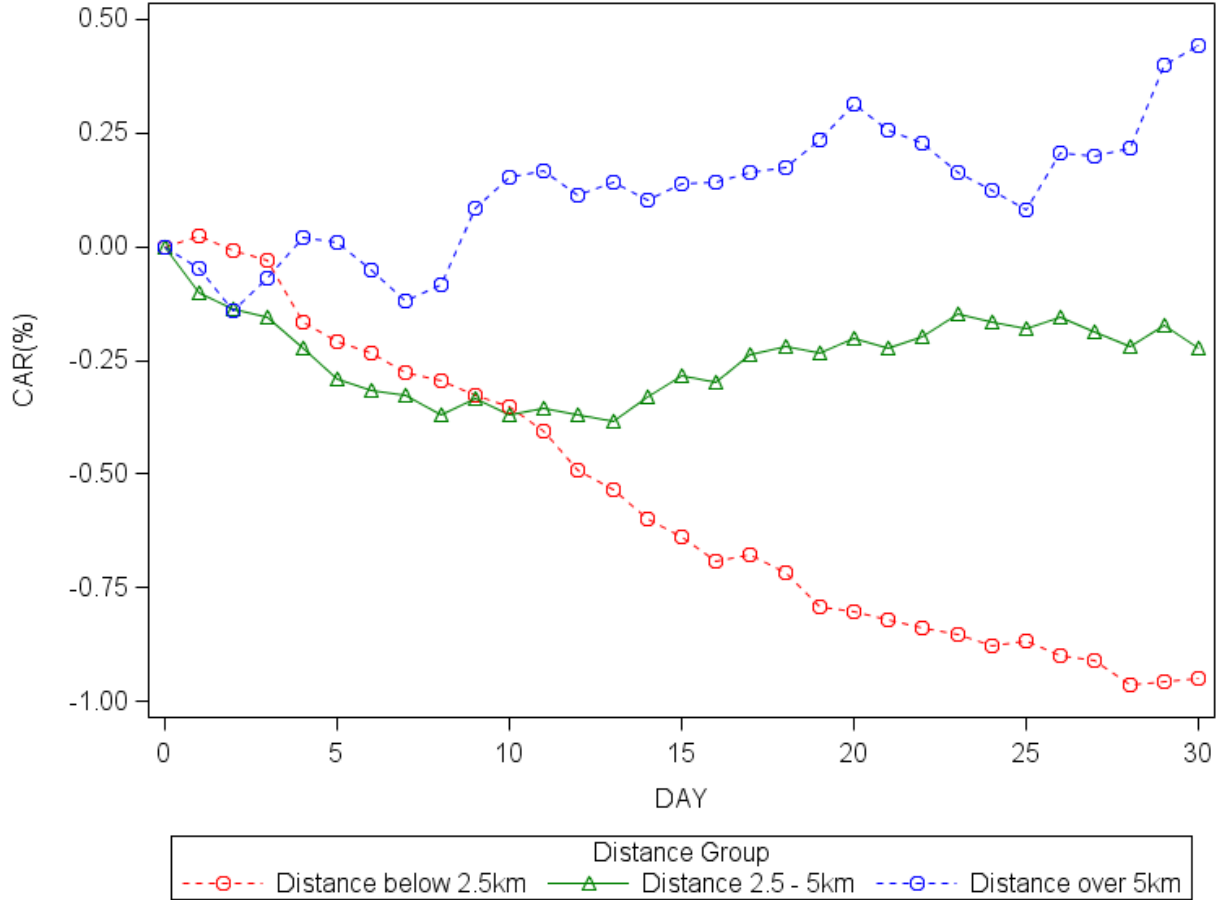
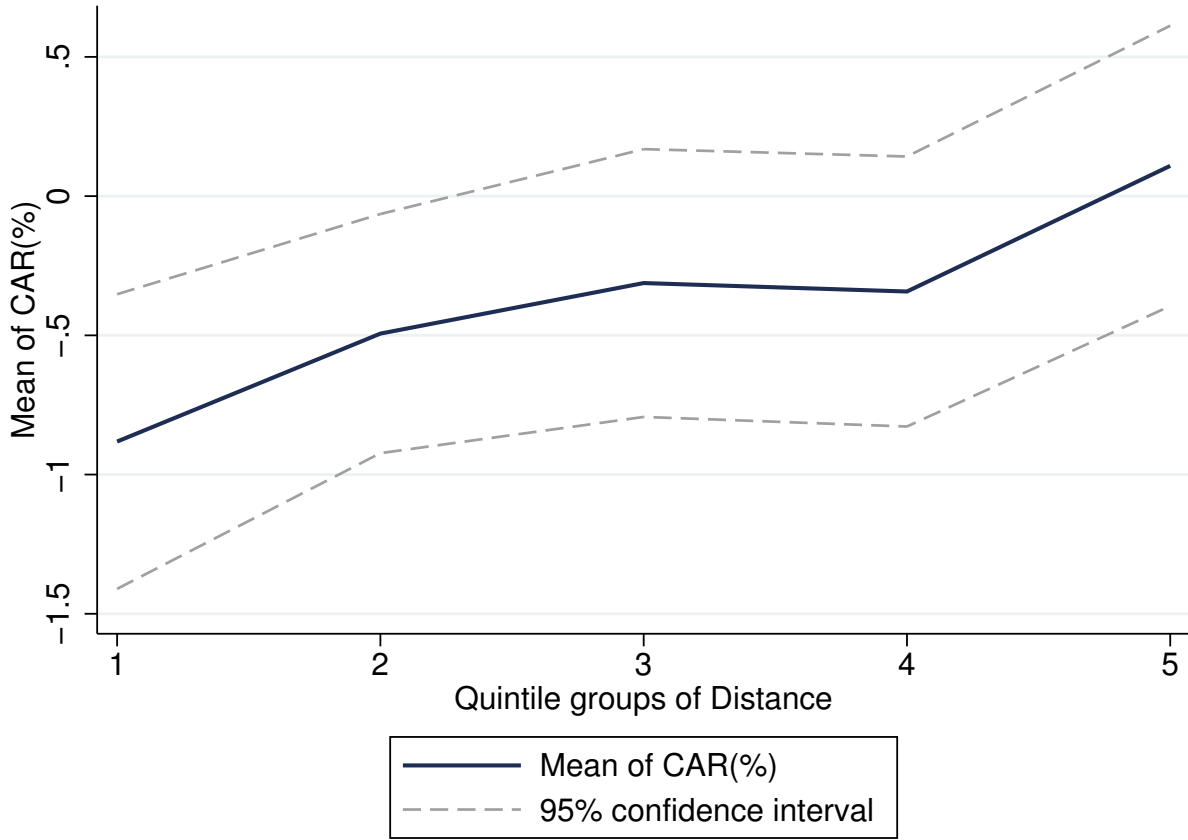


Figure 4: CAR[1,20] by distance quintile

Panel A shows the average cumulative abnormal stock return following a short trade by distance quintile for the London sample. Panel B shows the regression coefficients of CAR(1,20) on these distance quintile dummies, with the same set of control variables as in Table 2. These control variables include $\ln(\text{Market cap})$, the natural logarithm of the market capitalization, *Market-to-book ratio*, the ratio of market value of equity to book value of equity, *Past return (t-1)*, the return from the previous month, *Past return (t-12, t-2)*, the return from the past 12 months, excluding the most recent month, *Asset growth*, the annual growth rate of total assets, and *Volatility*, the standard deviation of daily stock returns in the previous month, as well as stock, fund, and time fixed effects to control for any stock- or fund-specific factors as well as market timing.

Panel A: Average CAR[1,20] by distance quintile



Panel B: Regression coefficients for distance quintiles

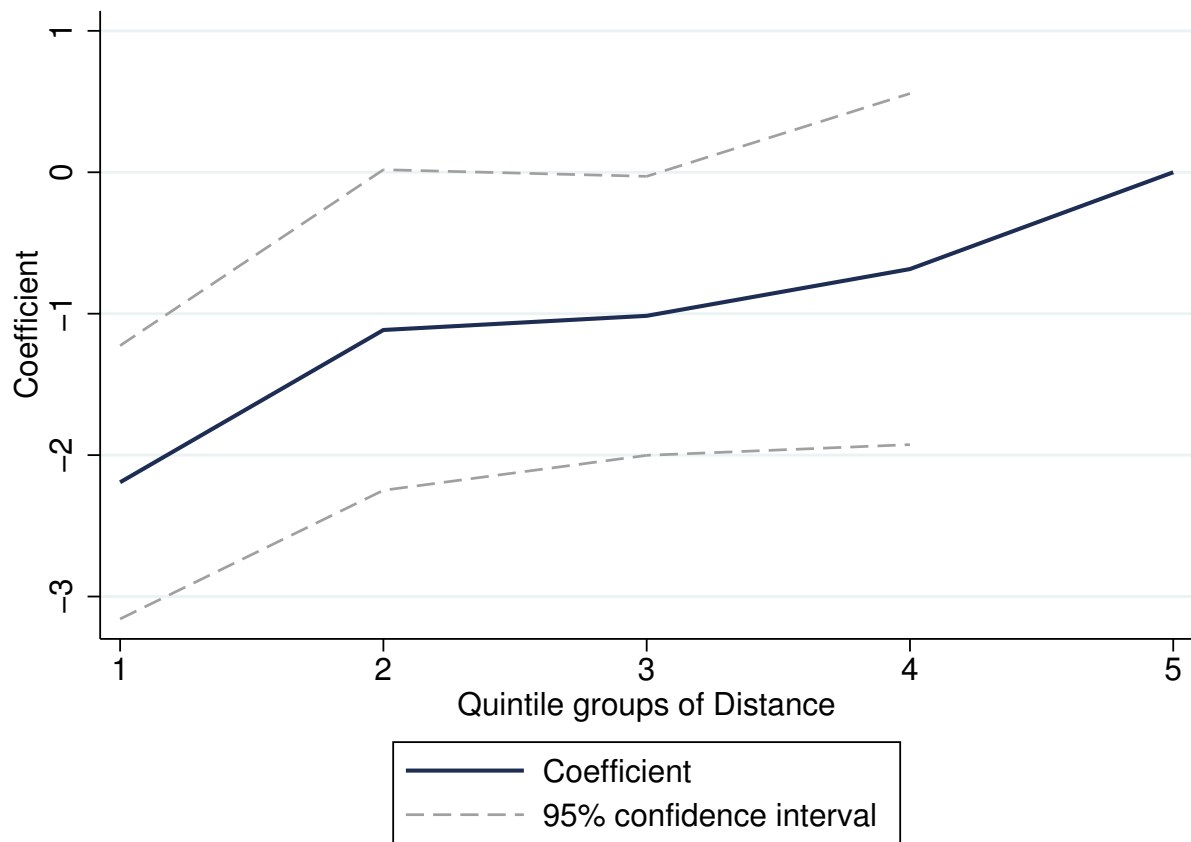


Table 1
Summary statistics

This table shows summary statistics for the London sample. *CAR*[1,20] is the cumulative abnormal stock return in the first 20 trading days, where $t = 0$ is the day when the short trade is recorded. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the institution and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. *Volume below 2.5km* is the total GBP volume of short trades in the prior 20 trading days that are conducted by institutions within 2.5km radius of the target firm. *Prior short volume* is the total GBP volume of short trades from the prior 20 trading days. *Trade size* is the GBP amount of a short trade. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. *Analyst revision* is the frequency of analyst estimate revisions. The close ratio is the ratio of close trades numbers conducted by the fund family in the past 12 months to its total trades number. The Ivol is equal to the average ivol value of all funds within each fund family, which is adjusted by ff3-factors and computed by the past 12 months monthly-level fund return data.

	Mean	Std	p10	p50	p90
Trade return					
CAR [1,20](%)	-0.388	9.795	-11.550	-0.070	10.737
Geography					
Distance (km)	3.240	2.323	0.866	2.806	6.073
Distance below 2.5km	0.435	0.496	0.000	0.000	1.000
Distance 2.5 - 5km	0.421	0.494	0.000	0.000	1.000
Short trade					
Volume below 2.5km	0.434	0.440	0.000	0.271	1.000
Prior short volume (GBP bn)	0.016	0.019	0.001	0.008	0.050
Trade size (GBP bn)	0.003	0.004	0.000	0.002	0.010
ln(Trade size)	14.171	1.393	12.188	14.229	16.075
Stock characteristics					
Market cap (GBP bn)	2.788	2.260	0.346	2.142	6.738
ln(Market cap)	21.309	1.043	19.663	21.485	22.631
Market-to-book	2.725	2.641	0.575	1.863	5.331
Past return (t-1)	-0.024	0.104	-0.173	-0.016	0.108
Past return (t-12,t-2)	-0.108	0.300	-0.534	-0.121	0.289
Asset growth	0.096	0.199	-0.098	0.039	0.348
Volatility	2.430	1.033	1.332	2.118	4.182
Analyst revision	2.650	1.081	1.125	2.571	4.400
Fund family characteristics					
Close ratio	0.227	0.206	0.000	0.173	0.455
Ivol	0.023	0.050	0.009	0.017	0.034
N	7,797				

Table 1
Comparing geographic distance in short trades

This table compares geographic distance in short trades for each institution in our sample with other institutions. For each institution, we compute the percentage of short trades on firms within 2.5km/5km radius, the mean value of distance between the institution and shorted firms (in km), and the mean value of the natural logarithm of such distances. We do the same for the all the rest of the institutions in our sample. We report the differences of these numbers between each institution and the rest of the institutions in our sample. *t*-values are reported in parentheses.

Variable	Fund itself	Other funds	Difference	t_value	N
Share of trades within 2.5km	0.505	0.500	0.005	(0.15)	115
Share of trades within 5km	0.891	0.879	0.012	(0.74)	115
Mean ln(Distance)	0.703	0.783	-0.080	(-1.32)	115
Mean Distance	2.893	3.002	-0.109	(-0.77)	115

Table 2
Stock return following short trades

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance below 2.5km	-1.117 (0.781)	-1.108*** (0.412)	-1.604*** (0.478)	-1.693*** (0.471)				
Distance 2.5 - 5km	-0.516 (0.632)	-0.191 (0.379)	-0.453 (0.438)	-0.612 (0.471)				
ln(Distance)					0.375 (0.343)	0.634** (0.283)	0.941*** (0.309)	0.900*** (0.281)
ln(Market cap)		-3.409*** (0.550)	-3.110*** (0.593)	-3.153*** (0.726)		-3.426*** (0.560)	-3.112*** (0.597)	-3.151*** (0.729)
Market-to-book		0.383* (0.194)	0.412* (0.218)	0.324* (0.176)		0.387** (0.195)	0.424* (0.219)	0.337* (0.177)
Past return (t-1)		2.026 (2.002)	1.604 (1.859)	0.378 (2.036)		2.012 (2.006)	1.585 (1.856)	0.342 (2.027)
Past return (t-12,t-2)		-5.425*** (0.918)	-5.307*** (0.936)	-5.407*** (1.010)		-5.458*** (0.924)	-5.335*** (0.943)	-5.422*** (1.011)
Asset growth		1.482 (1.661)	2.023 (1.734)	1.566 (1.463)		1.454 (1.659)	1.966 (1.736)	1.517 (1.470)
Volatility		-0.143 (0.336)	-0.287 (0.322)	-0.400 (0.410)		-0.152 (0.336)	-0.295 (0.323)	-0.415 (0.410)
Stock FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Fund FE	No	No	Yes	Yes	No	No	Yes	Yes
Year-month FE	No	No	No	Yes	No	No	No	Yes
N	7,797	7,467	7,451	7,451	7,797	7,467	7,451	7,451
R ²	0.002	0.122	0.146	0.198	0.001	0.121	0.146	0.197

Table 3
Stock return following short trades – firm characteristics

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firms for subsamples divided based on firms' information opacity. We consider three proxies for information opacity: firm size, return volatility, and analyst revision frequency. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Market cap		Volatility		Analyst revision	
	(1) Large	(2) Small	(3) Low	(4) High	(5) High	(6) Low
Distance below 2.5km	-0.664 (1.035)	-3.501*** (0.947)	-0.557 (0.735)	-3.775*** (0.842)	-1.649 (0.991)	-3.143*** (0.534)
Distance 2.5 - 5km	-0.536 (0.791)	-1.108 (1.198)	-0.247 (0.567)	-2.054*** (0.775)	-0.493 (0.730)	-2.132*** (0.419)
ln(Market cap)	-5.195*** (1.817)	-2.404** (0.980)	-1.920*** (0.717)	-3.362*** (1.211)	-4.291*** (0.842)	-3.684*** (1.248)
Market-to-book	0.144 (0.218)	0.547** (0.227)	-0.308** (0.127)	0.205 (0.183)	0.094 (0.185)	0.854*** (0.194)
Past return (t-1)	-3.643* (2.107)	0.143 (3.244)	-3.016 (2.474)	0.687 (3.042)	-3.337* (1.778)	4.718** (2.106)
Past return (t-12,t-2)	-7.473*** (0.826)	-5.072*** (1.648)	-5.175*** (0.722)	-4.371*** (1.376)	-7.823*** (1.127)	-4.107** (1.887)
Asset growth	-1.302 (0.826)	4.319* (2.298)	1.256 (1.556)	2.080 (2.198)	2.007 (1.280)	4.435* (2.319)
Volatility	-0.813*** (0.262)	-0.779 (0.642)	-2.420*** (0.842)	-0.527 (0.867)	0.986 (0.871)	-0.901 (0.608)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3,648	3,790	3,732	3,706	3,847	3,589
R ²	0.237	0.263	0.212	0.296	0.254	0.291

Table 4
Stock return following short trades – institution characteristics

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firms for subsamples divided based on institution characteristics. *Close ratio* is the percentage of short trades within the 2.5km radius of an institution. *Ivol* is idiosyncratic volatility for an institution computed from Fama-French three-factor adjusted monthly returns from the past twelve months. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Close ratio		Ivol	
	(1) High	(2) Low	(3) High	(4) Low
Distance below 2.5km	-1.340** (0.630)	-0.496 (0.689)	-2.812*** (0.637)	-0.430 (0.886)
Distance 2.5 - 5km	-0.643 (0.756)	0.840 (0.753)	-1.169* (0.598)	-0.263 (0.763)
ln(Market cap)	-1.036 (1.583)	-4.035*** (0.761)	-2.570*** (0.504)	-3.705*** (1.597)
Market-to-book	0.214 (0.219)	-0.031 (0.215)	0.546* (0.306)	0.013 (0.236)
Past return (t-1)	1.526 (2.967)	-1.288 (2.105)	-1.192 (1.846)	2.398 (3.552)
Past return (t-12,t-2)	-5.180** (1.985)	-4.449*** (1.491)	-6.872*** (1.064)	-3.316 (2.040)
Asset growth	2.569 (1.989)	1.448 (1.481)	1.674 (2.940)	1.221 (2.164)
Volatility	-0.014 (0.411)	-0.796 (0.599)	-0.220 (0.395)	-0.555 (0.726)
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
N	3,662	3,753	3,350	3,349
R ²	0.257	0.246	0.260	0.283

Table 5
Geographic clustering in short trades

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A provide summary statistics for the London sample, while Panel B reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the 20 trading days. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics – London

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.053	0.224	0.000	0.000	0.000
Geography					
Distance (km)	2.627	1.833	0.373	2.366	5.330
Distance below 0.5km	0.149	0.356	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.383	0.486	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.920	2.407	0.372	2.352	6.713
ln(Market cap)	21.355	1.036	19.735	21.579	22.627
Market-to-book	2.495	1.963	0.593	1.857	5.249
Past return (t-1)	-0.024	0.104	-0.173	-0.016	0.108
Past return (t-12,t-2)	-0.118	0.298	-0.532	-0.123	0.274
Asset growth	0.093	0.192	-0.098	0.039	0.348
Volatility	2.438	1.072	1.333	2.122	4.201
N	163,428				

Panel B: Geographic clustering in short trades

	(1)	(2)	(3)
Distance below 0.5km	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)
Distance 0.5 - 2.5km	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)
Stock controls	No	Yes	Yes
Year-month FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	161,685	155,227	155,227
R^2	0.464	0.461	0.463

Table 6
Geographic clustering and stock return following short trades

This table analyzes the effect of prior short selling history on the relation between post-short-selling stock return and the geographic distance. The samples are divided into two groups based on the GBP volume of short trades in the prior 20 days. The dependent variable is *CAR* (1,20), the four-factor-adjusted cumulative abnormal return following a short trade. *Volume below 2.5km* is the percentage of GBP short volume in the prior 20 days where the distance between the short seller and the target firm is less than 2.5km. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) All	(2) Low	(3) High
Volume below 2.5km	-1.211** (0.602)	-0.735 (0.931)	-2.325*** (0.638)
Distance below 2.5km	-1.670*** (0.531)	-2.982*** (0.889)	-0.031 (0.778)
Distance 2.5 - 5km	-0.803* (0.448)	-1.466** (0.664)	-0.213 (0.573)
ln(Market cap)	-3.346*** (1.103)	-2.043 (1.378)	-5.353*** (1.878)
Market-to-book	0.460** (0.178)	0.614*** (0.191)	0.360 (0.460)
Past return (t-1)	-0.135 (2.182)	2.236 (3.828)	-5.229** (2.449)
Past return (t-12,t-2)	-6.397*** (1.162)	-5.720*** (2.040)	-8.806*** (1.331)
Asset growth	2.190 (1.775)	5.158* (2.606)	-2.426 (1.828)
Volatility	-0.563 (0.427)	-0.800 (0.703)	-0.587* (0.331)
Stock FE	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
N	6,197	3,115	3,050
R^2	0.221	0.272	0.325

Table 7
Trade size and stock return following short trades

This table analyzes the effect of trade size on the relation between post-short-selling stock return and the geographic distance. The samples are divided into two groups based on the GBP amount of each short trade. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *ln(Trade size)* is the natural logarithm of the GBP amount of the trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) All	(2) Small	(3) Large
ln(Trade size)	-0.209** (0.083)		
Distance below 2.5km	-1.676*** (0.465)	-2.760*** (0.676)	-1.272 (0.846)
Distance 2.5 - 5km	-0.586 (0.466)	-1.544** (0.657)	-0.441 (0.733)
ln(Market cap)	-3.064*** (0.728)	-2.167* (1.191)	-4.366*** (0.925)
Market-to-book	0.327* (0.179)	0.484** (0.192)	-0.030 (0.161)
Past return (t-1)	0.467 (2.039)	-0.520 (2.314)	-0.185 (1.726)
Past return (t-12,t-2)	-5.312*** (1.020)	-4.500*** (1.645)	-6.441*** (0.826)
Asset growth	1.614 (1.471)	4.327* (2.213)	-1.196 (1.422)
Volatility	-0.448 (0.409)	-1.239** (0.592)	0.579 (0.375)
Stock FE	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
N	7,451	3,776	3,638
R ²	0.198	0.245	0.239

Table 8
Earnings surprises and short selling

This table analyzes the relation between short selling activities before earnings announcements and earnings surprises. Panel A provides summary statistics for the London sample, while Panel B reports regression results. The dependent variable, *SUE*, is defined as the difference in EPS between two consecutive fiscal years, divided by stock price. *Short (Distance below 2.5km)* is a dummy variable that equals one if the stock has been shorted by any institutions within 2.5km radius of its headquarter in the 30-trading day window before the earnings announcement. *Short* is a dummy variable that equals one if the stock has been shorted in the 30-trading day window before the earnings announcement. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: London sample summary statistics

	Mean	Std	p10	p50	p90
Earnings surprises					
SUE	-0.005	0.038	-0.054	0.003	0.031
Geography and short					
Short (Distance below 2.5km)	0.123	0.328	0.000	0.000	1.000
Short	0.212	0.409	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.804	3.428	0.183	1.267	8.763
ln(Market cap)	20.944	1.394	19.027	20.960	22.894
Market-to-book	3.087	3.369	0.550	1.853	6.822
Past return (t-1)	0.012	0.082	-0.106	0.015	0.119
Past return (t-12,t-2)	0.039	0.321	-0.383	0.024	0.487
Asset growth	0.100	0.202	-0.098	0.049	0.356
Volatility	2.134	0.811	1.220	1.954	3.452
N	1,197				

Panel B: Earnings surprises and short selling

	(1)	(2)
Short (Distance below 2.5km)	-0.013*** (0.005)	-0.010** (0.004)
Short	0.003 (0.004)	0.006 (0.004)
ln(Market cap)		0.013*** (0.004)
Market-to-book		-0.000 (0.000)
Past return (t-1)		-0.012 (0.023)
Past return (t-12,t-2)		0.031*** (0.006)
Asset growth		-0.003 (0.009)
Volatility		-0.017*** (0.003)
Year-month FE	Yes	Yes
Stock FE	Yes	Yes
N	1,007	983
R^2	0.270	0.426

Table 9
Returns following covering of short positions

This table analyzes the relation between stock returns following short cover and geographic distance. Panels A provide summary statistics for the London sample, while Panel B reports regression results. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a reduction of a short position. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A : London sample summary statistics

	Mean	Std	p10	p50	p90
Trade return					
CAR [1,20](%)	-0.473	9.749	-10.849	-0.334	10.565
Geography					
Distance (km)	3.324	2.351	0.881	2.856	6.140
Distance below 2.5km	0.416	0.493	0.000	0.000	1.000
Distance 2.5 - 5km	0.432	0.495	0.000	0.000	1.000
ln(Distance)	0.976	0.680	-0.127	1.049	1.815
Stock characteristics					
Market cap (GBP bn)	2.794	2.292	0.332	2.114	6.786
ln(Market cap)	21.294	1.066	19.619	21.472	22.638
Market-to-book	2.671	2.629	0.586	1.784	5.303
Past return (t-1)	-0.006	0.103	-0.151	-0.003	0.134
Past return (t-12,t-2)	-0.107	0.312	-0.536	-0.120	0.317
Asset growth	0.093	0.200	-0.099	0.038	0.365
Volatility	2.443	1.037	1.348	2.129	4.180
N	6,776				

Panel B : Regression

	(1)	(2)	(3)	(4)
Distance below 2.5km	2.238*** (0.644)	2.334*** (0.577)		
Distance 2.5 - 5km	1.903*** (0.646)	1.879*** (0.606)		
ln(Distance)			-0.437 (0.327)	-0.575* (0.337)
ln(Market cap)		-3.403*** (0.500)		-3.410*** (0.505)
Market-to-book		-0.012 (0.212)		-0.033 (0.204)
Past return (t-1)		-3.046** (1.516)		-2.968* (1.532)
Past return (t-12,t-2)		-5.300*** (0.842)		-5.304*** (0.835)
Asset growth		0.407 (1.061)		0.466 (1.066)
Volatility		-0.223 (0.333)		-0.201 (0.327)
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
N	6,744	6,497	6,744	6,497
R^2	0.185	0.194	0.183	0.193

Table 10
Covid period

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm, including the sample period in 2020 with COVID-19 pandemic. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1)	(2)	(3)	(4)	(5)	(6)
Dummy(Year = 2020) x Distance below 2.5km	1.592 (1.923)					
Dummy(Year = 2020) x Distance 2.5 - 5km	1.034 (2.011)					
Dummy(Year = 2020) x ln(Distance)		-0.140 (1.049)				
Lockdown x Distance below 2.5km			2.745 (3.425)			
Lockdown x Distance 2.5 - 5km			0.300 (3.476)			
Lockdown x ln(Distance)				-0.166 (1.055)		
Lockdown			0.190 (3.029)	1.466 (2.935)		
Dummy(The last 3 quarters in 2020) x Distance below 2.5km					2.836 (3.030)	
Dummy(The last 3 quarters in 2020) x Distance 2.5 - 5km					0.395 (3.049)	
Dummy(The last 3 quarters in 2020) x ln(Distance)						-0.140 (1.049)
Distance below 2.5km	-1.950*** (0.507)		-1.888*** (0.517)		-1.890*** (0.512)	
Distance 2.5 - 5km	-0.970* (0.573)		-0.844 (0.541)		-0.845 (0.538)	
ln(Distance)		0.957*** (0.233)		0.959*** (0.233)		0.957*** (0.233)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,230	8,230	8,230	8,230	8,230	8,230
R ²	0.191	0.191	0.192	0.191	0.192	0.191

Table 11
New cases and new deaths in London

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm, including the sample period in 2020 with COVID-19 pandemic. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

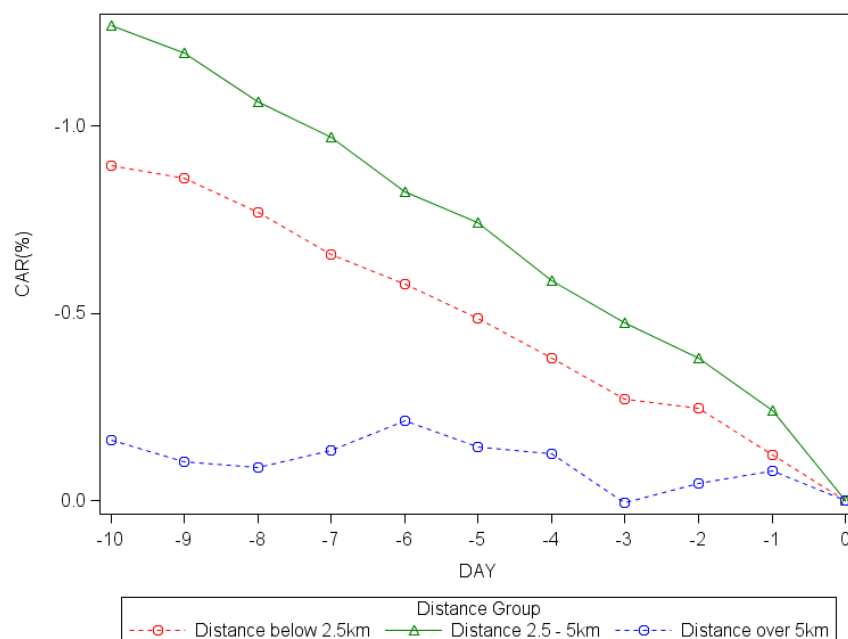
	(1)	(2)	(3)	(4)
ln(New cases in London) x Distance below 2.5km	0.246 (0.327)			
ln(New cases in London) x Distance 2.5 - 5km	0.169 (0.294)			
ln(New cases in London) x ln(Distance)		0.024 (0.152)		
ln(New cases in London)	0.109 (0.562)	0.245 (0.588)		
ln(New deaths in London) x Distance below 2.5km			0.246 (0.327)	
ln(New deaths in London) x Distance 2.5 - 5km			0.169 (0.294)	
ln(New deaths in London) x ln(Distance)				0.024 (0.152)
ln(New deaths in London)			0.109 (0.562)	0.245 (0.588)
Distance below 2.5km	-1.930*** (0.485)		-1.930*** (0.485)	
Distance 2.5 - 5km	-0.956* (0.519)		-0.956* (0.519)	
ln(Distance)		0.930*** (0.270)		0.930*** (0.270)
Controls	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
N	8,230	8,230	8,230	8,230
R ²	0.192	0.191	0.192	0.191

Internet Appendix

IA.1 Abnormal return of stocks prior to short trades

Figure IA.1: Cumulative abnormal return of stocks prior to short trades

This figure shows the average cumulative abnormal stock return prior to a short trade for the London sample. We divide our samples into three groups based on the distance between the short seller and the target firm: (1) distance below 2.5km (the red line); (2) distance between 2.5km and 5km (green line); (3) distance over 5km. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.



IA.2 The distribution of short trades

Table IA.1
The distribution of short trades – by year

This table reports the number of short trades by year for the London sample. For each institution and each stock on a reporting day, we compare the short position reported with that on the previous reporting day. If the short position increases, we record a short selling transaction at the end of this reporting day. If an institution has more than one short position record for a stock in a day, we keep the last record as the end-of-the day position. If a short position is recorded on a non-trading day, we adjust the record date to the ensuing trading day. .

Year	Number of trade	Percentage
2013	610	8%
2014	709	9%
2015	1,082	14%
2016	1,331	17%
2017	1,425	18%
2018	1,474	19%
2019	1,166	15%
Total	7,797	100%

IA.3 Geographic clustering in short trades – additional specifications

Table IA.2
Geographic clustering in short trades - by week

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A and B provide summary statistics for the London sample and the UK sample, while Panel C reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the following week. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics – London

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.051	0.219	0.000	0.000	0.000
Geography					
Distance (km)	2.625	1.830	0.372	2.366	5.330
Distance below 0.5km	0.151	0.358	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.378	0.485	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	3.004	2.458	0.385	2.461	6.762
ln(Market cap)	21.387	1.034	19.769	21.624	22.635
Market-to-book	2.562	2.060	0.604	1.885	5.335
Past return (t-1)	-0.021	0.100	-0.157	-0.014	0.108
Past return (t-12,t-2)	-0.108	0.286	-0.503	-0.116	0.276
Asset growth	0.095	0.194	-0.098	0.039	0.349
Volatility	2.376	1.030	1.314	2.088	4.067
N	132,309				

Panel B: Clustering of short trades– London

	(1)	(2)	(3)
Distance below 0.5km	0.009*** (0.003)	0.010*** (0.003)	0.010*** (0.003)
Distance 0.5 - 2.5km	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)
Stock controls	No	Yes	Yes
Week FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	130,420	125,214	125,214
R^2	0.446	0.442	0.445

Table IA.2
Geographic clustering in short trades - by month

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A and B provide summary statistics for the London sample and the UK sample, while Panel B reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the following month. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.047	0.212	0.000	0.000	0.000
Geography					
Distance (km)	2.594	1.830	0.370	2.366	5.219
Distance below 0.5km	0.156	0.362	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.373	0.483	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	3.024	2.546	0.390	2.392	6.873
ln(Market cap)	21.380	1.047	19.782	21.595	22.651
Market-to-book	2.562	1.999	0.620	1.910	5.344
Past return (t-1)	-0.017	0.096	-0.151	-0.012	0.109
Past return (t-12,t-2)	-0.098	0.284	-0.495	-0.106	0.279
Asset growth	0.098	0.196	-0.098	0.041	0.365
Volatility	2.322	1.000	1.289	2.062	3.923
N	89,018				

Panel B: Clustering of short trades

	(1)	(2)	(3)
Distance below 0.5km	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)
Distance 0.5 - 2.5km	0.006*** (0.002)	0.006*** (0.002)	0.006*** (0.002)
Stock controls	No	Yes	Yes
Year-month FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	86,434	82,945	82,945
R^2	0.433	0.433	0.436

IA.4 Additional analysis

Figure IA.2: Cumulative abnormal return of stocks following short trades

This figure shows the distribution of cumulative abnormal stock returns in the first 20 trading days ($CAR[1,20]$) following a short trade for the London sample. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.

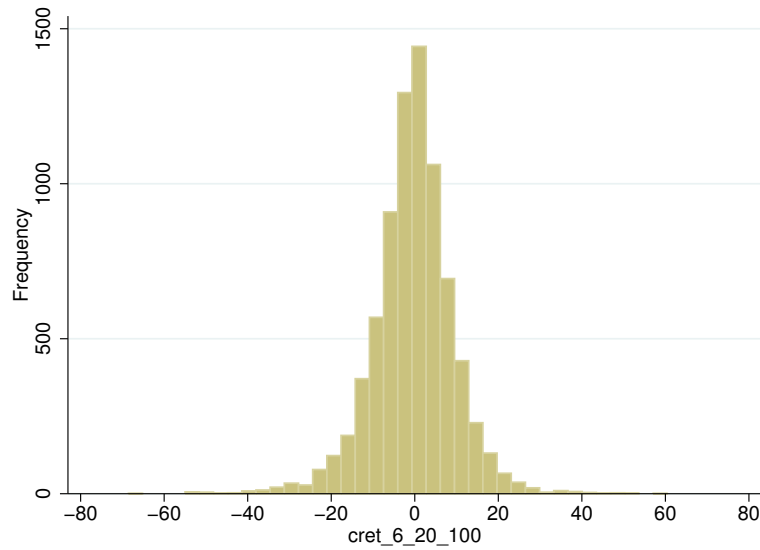


Table IA.3
Stock return following short trades – different specifications

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm. The dependent variable is *CAR (1,20)*, the cumulative abnormal return following a short trade. We adjust daily returns by either subtracting the daily market return, or using the Fama-French three-factor model. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) Mkt-adj	(2) FF3-model
Distance below 2.5km	-1.098** (0.513)	-1.482*** (0.466)
Distance 2.5 - 5km	-0.203 (0.567)	-0.516 (0.501)
ln(Market cap)	-3.794*** (0.774)	-3.999*** (0.791)
Market-to-book	0.411*** (0.136)	0.434** (0.167)
Past return (t-1)	-1.155 (2.067)	-1.828 (2.048)
Past return (t-12,t-2)	-4.061*** (1.130)	-3.916*** (1.254)
Asset growth	1.831 (1.419)	2.068 (1.539)
Volatility	-0.861** (0.347)	-0.623 (0.431)
Stock FE	Yes	Yes
Fund FE	Yes	Yes
Year-month FE	Yes	Yes
N	7,451	7,451
R ²	0.207	0.214

IA.5 Earnings surprise – Additional specifications

Table IA.4

Earnings surprises and short selling regression – additional specifications

This table analyzes the relation between short selling activities before earnings announcements and earnings surprises. We consider two alternative short-selling windows: 15 days or 60 days before the earnings announcement. The dependent variable, *SUE*, is defined as the difference in EPS between two consecutive fiscal years, divided by stock price. *Short (Distance below 2.5km)* is a dummy variable that equals one if the stock has been shorted by any institutions within 2.5km radius of its headquarter in the 15- or 60-trading day window before the earnings announcement, and zero otherwise. *Short* is a dummy variable that equals one if the stock has been shorted in the 30-trading day window before the earnings announcement, and zero otherwise. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) 15 days	(2) 60 days
Short (Distance below 2.5km)	-0.009 (0.006)	-0.012** (0.005)
Short	0.005 (0.005)	0.006* (0.004)
ln(Market cap)	0.013*** (0.004)	0.013*** (0.004)
Market-to-book	-0.000 (0.000)	-0.001 (0.000)
Past return (t-1)	-0.011 (0.023)	-0.012 (0.023)
Past return (t-12,t-2)	0.031*** (0.007)	0.031*** (0.006)
Asset growth	-0.003 (0.009)	-0.004 (0.009)
Volatility	-0.017*** (0.003)	-0.017*** (0.003)
Year-month FE	Yes	Yes
Stock FE	Yes	Yes
N	983	983
R^2	0.424	0.427

IA.6 The relation between the probability of short selling and distance

Table IA.5

The relation between the probability of short selling and distance

This table shows the regression results of trading probability on geographic distance. The dependent variable is *trade prob*, a dummy variable that equals one if an institution shorts a stock, and zero otherwise. In column (1) to (2), the analyses are conducted at the distinct fund-stock pair level. In column (3) to (4), the analyses are conducted at the fund-stock- trade level. Stock control variables are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Aggregate level		Trade level	
	(1)	(2)	(3)	(4)
Distance below 2.5km	-0.009 (0.009)		-0.005 (0.007)	
Distance 2.5 - 5km	-0.010 (0.008)		-0.004 (0.008)	
ln(Distance)		0.000 (0.003)		-0.000 (0.001)
Stock controls	No	No	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	No	No	Yes	Yes
N	19,780	19,767	436,901	436,616
R^2	0.186	0.186	0.081	0.081

IA.7 UK analysis

Figure IA.3: Short seller and target firm locations – United Kingdom

This figure provides the locations of short sellers' offices (red dots) and target firm headquarters (blue dots).

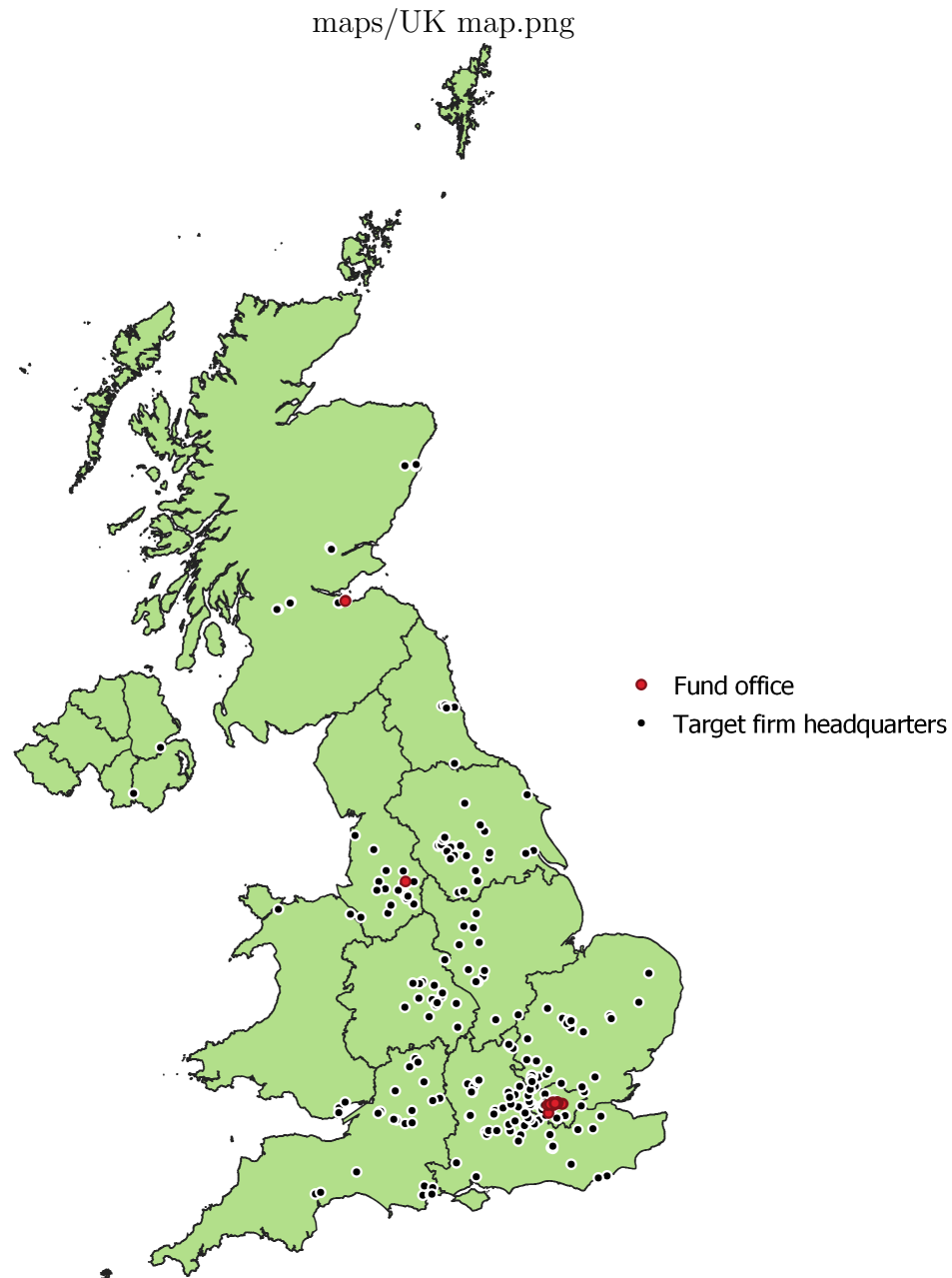


Figure IA.4: The distribution of distance – United Kingdom

This figure shows the distribution of the distance between the short seller office and the target firm headquarters for the UK sample. We obtain geographic coordinates based on the zip codes from the addresses of the short seller's office and the target firm's headquarter. We filter institutions' offices based on institution types and manager job titles, since many fund management firms have purely administrative offices which are not involved in the actual investment decisions. We compute geographic distance based on these coordinates. If a short seller has multiple offices, we use the most proximate office.

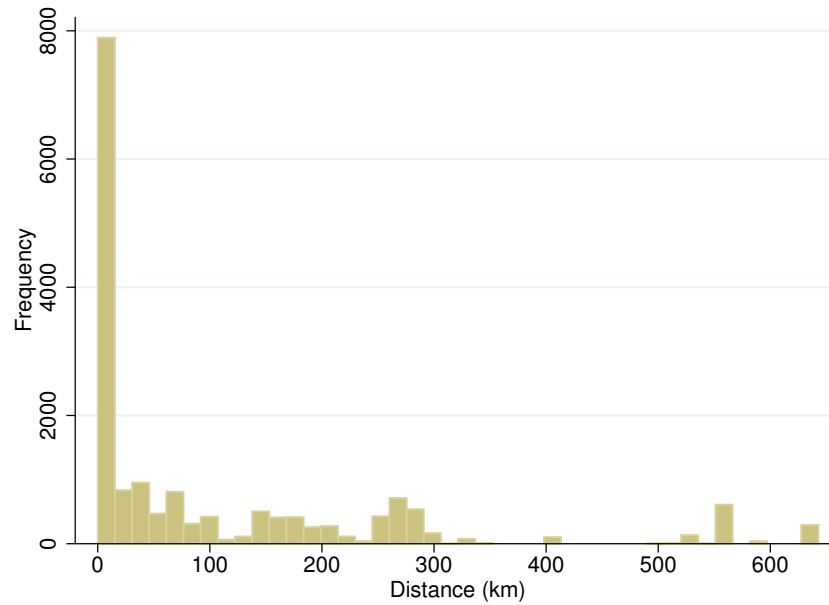


Figure IA.5: Cumulative abnormal return of stocks following short trades – United Kingdom

This figure shows the average cumulative abnormal stock return following a short trade for the UK sample. We divide our samples into three groups based on the distance between the short seller and the target firm: (1) distance below 2.5km (the red line); (2) distance between 2.5km and 5km (green line); (3) distance over 5km. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.

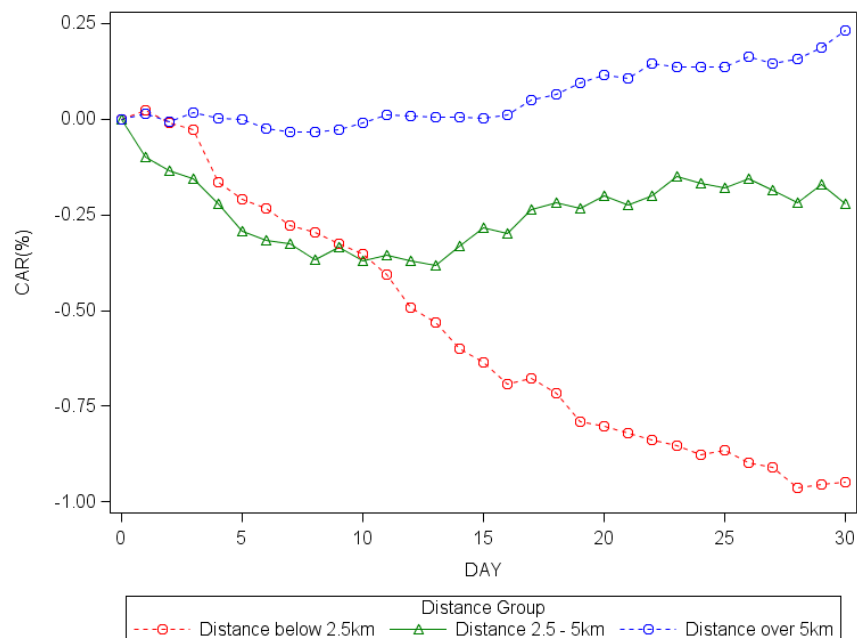


Table IA.6
Summary statistics – United Kingdom

This table shows summary statistics for the UK sample. *CAR[1,20]* is the cumulative abnormal stock return in the first 20 trading days, where $t = 0$ is the day when the short trade is recorded. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the institution and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. *Volume below 2.5km* is the total GBP volume of short trades in the prior 20 trading days that are conducted by institutions within 2.5km radius of the target firm. *Prior short volume* is the total GBP volume of short trades from the prior 20 trading days. *Trade size* is the GBP amount of a short trade. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. *Analyst revision* is the frequency of analyst estimate revisions. The close ratio is the ratio of close trades numbers conducted by the fund family in the past 12 months to its total trades number. The Ivol is equal to the average ivol value of all funds within each fund family, which is adjusted by ff3-factors and computed by the past 12 months monthly-level fund return data.

	Mean	Std	p10	p50	p90
Trade return					
CAR [1,20](%)	-0.129	9.557	-11.118	0.027	10.831
Geography					
Distance (km)	104.704	150.884	1.290	29.336	277.583
Distance below 2.5km	0.199	0.399	0.000	0.000	1.000
Distance 2.5 - 5km	0.193	0.394	0.000	0.000	1.000
Short trade					
Volume below 2.5km	0.201	0.369	0.000	0.000	1.000
Prior short volume (GBP bn)	0.015	0.018	0.001	0.008	0.041
Trade size (GBP bn)	0.003	0.004	0.000	0.001	0.008
ln(Trade size)	14.111	1.353	12.168	14.137	15.922
Stock characteristics					
Market cap (GBP bn)	2.446	2.065	0.364	1.676	5.827
ln(Market cap)	21.204	0.979	19.713	21.239	22.486
Market-to-book	3.251	3.125	0.759	2.176	7.294
Past return (t-1)	-0.022	0.104	-0.166	-0.015	0.110
Past return (t-12,t-2)	-0.085	0.299	-0.475	-0.105	0.333
Asset growth	0.109	0.201	-0.090	0.054	0.382
Volatility	2.348	0.956	1.354	2.075	3.826
Analyst revision	2.450	1.058	1.053	2.300	4.000
Fund family characteristics					
Close ratio	0.200	0.175	0.000	0.163	0.367
Ivol	0.024	0.050	0.009	0.017	0.034
N	17,019				

Table IA.6
Comparing geographic distance in short trades

This table compares geographic distance in short trades for each institution in our sample with other institutions. For each institution, we compute the percentage of short trades on firms within 2.5km/5km radius, the mean value of distance between the institution and shorted firms (in km), and the mean value of the natural logarithm of such distances. We do the same for the all the rest of the institutions in our sample. We report the differences of these numbers between each institution and the rest of the institutions in our sample. *t*-values are reported in parentheses.

Variable	Fund itself	Other funds	Difference	t_value	N
Share of trades within 2.5km	0.240	0.223	0.017	(0.73)	135
Share of trades within 5km	0.414	0.395	0.019	(0.70)	135
Mean ln(Distance)	2.894	3.014	-0.120	(-1.01)	135
Mean Distance	99.318	107.965	-8.647	(-1.05)	135

Table IA.7
Stock return following short trades

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance below 2.5km	-0.917** (0.463)	-1.088** (0.463)	-1.080** (0.422)	-1.022** (0.440)				
Distance 2.5 - 5km	-0.316 (0.327)	-0.183 (0.409)	-0.211 (0.484)	-0.188 (0.536)				
ln(Distance)					0.086 (0.059)	0.653** (0.284)	0.566** (0.272)	0.450* (0.265)
ln(Market cap)		-2.721*** (0.427)	-2.431*** (0.450)	-2.150*** (0.521)		-2.729*** (0.431)	-2.434*** (0.454)	-2.149*** (0.527)
Market-to-book		0.281*** (0.088)	0.211** (0.093)	0.142* (0.082)		0.282*** (0.087)	0.213** (0.091)	0.144* (0.081)
Past return (t-1)		-0.385 (1.544)	-0.924 (1.441)	-1.359 (1.410)		-0.388 (1.546)	-0.936 (1.445)	-1.385 (1.417)
Past return (t-12,t-2)		-4.585*** (0.625)	-4.452*** (0.628)	-4.375*** (0.629)		-4.597*** (0.629)	-4.466*** (0.632)	-4.384*** (0.631)
Asset growth		-0.197 (0.688)	-0.173 (0.707)	-0.498 (0.789)		-0.209 (0.688)	-0.188 (0.709)	-0.513 (0.791)
Volatility		0.065 (0.245)	0.053 (0.251)	0.072 (0.265)		0.061 (0.245)	0.048 (0.252)	0.068 (0.266)
Stock FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Fund FE	No	No	Yes	Yes	No	No	Yes	Yes
Year-month FE	No	No	No	Yes	No	No	No	Yes
N	17,019	16,059	16,046	16,046	17,019	16,059	16,046	16,046
R ²	0.001	0.111	0.129	0.164	0.000	0.111	0.129	0.164

Table IA.8
Stock return following short trades – firm characteristics

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firms for subsamples divided based on firms' information opacity. We consider three proxies for information opacity: firm size, return volatility, and analyst revision frequency. The dependent variable is *CAR* (1,20), the four-factor-adjusted cumulative abnormal return following a short trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Market cap		Volatility		Analyst revision	
	(1) Large	(2) Small	(3) Low	(4) High	(5) High	(6) Low
Distance below 2.5km	0.088 (0.684)	-2.649** (1.068)	-0.077 (0.362)	-2.107** (0.857)	-0.282 (0.715)	-2.518** (1.156)
Distance 2.5 - 5km	-0.242 (0.543)	-0.316 (1.255)	0.139 (0.401)	-0.609 (0.960)	0.499 (0.498)	-1.614 (1.478)
ln(Market cap)	-3.003*** (0.985)	-0.848 (0.904)	-0.987 (0.624)	-2.494*** (0.835)	-1.947* (1.022)	-2.019** (0.868)
Market-to-book	0.047 (0.151)	0.229* (0.123)	-0.126 (0.125)	0.317*** (0.114)	0.069 (0.126)	0.259* (0.149)
Past return (t-1)	-0.201 (1.408)	-3.170* (1.673)	-5.373*** (1.581)	-1.405 (2.507)	-4.467** (2.044)	0.037 (1.509)
Past return (t-12,t-2)	-6.096*** (0.670)	-3.634*** (1.050)	-4.554*** (0.614)	-4.148*** (0.893)	-5.278*** (0.678)	-4.074*** (1.331)
Asset growth	-0.359 (0.670)	-0.244 (1.680)	-1.255 (0.882)	1.384 (1.323)	0.717 (0.843)	0.020 (1.160)
Volatility	0.069 (0.283)	-0.246 (0.405)	-0.464 (0.633)	0.221 (0.494)	1.297*** (0.457)	-0.530 (0.384)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,045	7,989	8,174	7,833	8,287	7,720
R ²	0.227	0.183	0.217	0.220	0.187	0.222

Table IA.9
Stock return following short trades – institution characteristics

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firms for subsamples divided based on institution characteristics. *Close ratio* is the percentage of short trades within the 2.5km radius of an institution. *Ivol* is idiosyncratic volatility for an institution computed from Fama-French three-factor adjusted monthly returns from the past twelve months. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Close ratio		Ivol	
	(1) High	(2) Low	(3) High	(4) Low
Distance below 2.5km	-2.144*** (0.649)	-0.036 (0.620)	-2.499*** (0.764)	-0.413 (0.817)
Distance 2.5 - 5km	-1.628* (0.902)	1.161 (0.709)	-1.167 (0.721)	-0.256 (0.650)
ln(Market cap)	-1.892* (1.050)	-1.821*** (0.555)	-1.787** (0.752)	-2.449*** (0.637)
Market-to-book	0.344** (0.153)	-0.061 (0.177)	0.291** (0.137)	0.015 (0.119)
Past return (t-1)	-0.723 (1.870)	-2.286 (1.844)	-5.074*** (1.274)	0.480 (2.288)
Past return (t-12,t-2)	-5.110*** (1.234)	-2.906*** (1.085)	-5.400*** (0.790)	-3.051** (1.261)
Asset growth	0.588 (0.993)	-1.317 (0.938)	0.887 (1.134)	-0.611 (1.515)
Volatility	0.350 (0.227)	-0.038 (0.441)	0.051 (0.354)	-0.069 (0.457)
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
N	7,935	8,069	7,161	7,263
R ²	0.207	0.199	0.221	0.211

Table IA.10
Geographic clustering in short trades

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A provide summary statistics for the UK sample, while Panel B reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the 20 trading days. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics – UK

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.036	0.185	0.000	0.000	0.000
Geography					
Distance (km)	3.837	25.943	0.346	2.366	5.258
Distance below 0.5km	0.158	0.364	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.375	0.484	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.478	2.057	0.392	1.724	5.833
ln(Market cap)	21.230	0.962	19.786	21.268	22.487
Market-to-book	3.293	3.220	0.777	2.170	7.543
Past return (t-1)	-0.023	0.104	-0.167	-0.016	0.110
Past return (t-12,t-2)	-0.089	0.296	-0.476	-0.108	0.322
Asset growth	0.112	0.202	-0.078	0.056	0.382
Volatility	2.341	0.957	1.352	2.070	3.844
N	543,689				

Panel B: Geographic clustering in short trades

	(1)	(2)	(3)
Distance below 0.5km	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
Distance 0.5 - 2.5km	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)
Stock controls	No	Yes	Yes
Year-month FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	538,548	509,668	509,668
R ²	0.389	0.385	0.386

Table IA.11
Geographic clustering and stock return following short trades

This table analyzes the effect of prior short selling history on the relation between post-short-selling stock return and the geographic distance. The samples are divided into two groups based on the GBP volume of short trades in the prior 20 days. The dependent variable is *CAR* (1,20), the four-factor-adjusted cumulative abnormal return following a short trade. *Volume below 2.5km* is the percentage of GBP short volume in the prior 20 days where the distance between the short seller and the target firm is less than 2.5km. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) All	(2) Low	(3) High
Volume below 2.5km	-1.279** (0.618)	-0.966 (0.943)	-2.588*** (0.640)
Distance below 2.5km	-0.767 (0.508)	-1.976** (0.827)	0.474 (0.624)
Distance 2.5 - 5km	-0.240 (0.486)	-0.441 (0.973)	-0.054 (0.465)
ln(Market cap)	-1.903*** (0.684)	-1.880** (0.836)	-1.133 (1.085)
Market-to-book	0.209* (0.108)	0.401*** (0.132)	-0.505* (0.299)
Past return (t-1)	-1.125 (1.566)	0.100 (2.334)	-2.673* (1.357)
Past return (t-12,t-2)	-4.331*** (0.728)	-4.376*** (0.980)	-4.726*** (1.180)
Asset growth	-0.635 (0.999)	0.282 (1.800)	-2.262** (0.964)
Volatility	0.128 (0.266)	-0.159 (0.375)	0.473 (0.308)
Stock FE	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
N	13,170	6,588	6,533
R ²	0.185	0.207	0.265

Table IA.12
Trade size and stock return following short trades

This table analyzes the effect of trade size on the relation between post-short-selling stock return and the geographic distance. The samples are divided into two groups based on the GBP amount of each short trade. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a short trade. *ln(Trade size)* is the natural logarithm of the GBP amount of the trade. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) All	(2) Small	(3) Large
ln(Trade size)	-0.117* (0.061)		
Distance below 2.5km	-1.012** (0.434)	-1.979*** (0.697)	-0.558 (0.565)
Distance 2.5 - 5km	-0.173 (0.530)	-0.761 (0.961)	-0.026 (0.482)
ln(Market cap)	-2.093*** (0.508)	-1.792** (0.802)	-2.325*** (0.596)
Market-to-book	0.144* (0.082)	0.221** (0.110)	-0.057 (0.123)
Past return (t-1)	-1.299 (1.405)	-2.287 (1.839)	-1.407 (1.379)
Past return (t-12,t-2)	-4.300*** (0.642)	-3.838*** (1.021)	-5.001*** (0.660)
Asset growth	-0.497 (0.790)	0.403 (1.565)	-1.276* (0.717)
Volatility	0.053 (0.267)	-0.383 (0.407)	0.779*** (0.230)
Stock FE	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
N	16,046	8,067	7,897
R ²	0.164	0.192	0.202

Table IA.13
Earnings surprises and short selling

This table analyzes the relation between short selling activities before earnings announcements and earnings surprises. Panels A provide summary statistics for the UK sample, while Panel B reports regression results. The dependent variable, *SUE*, is defined as the difference in EPS between two consecutive fiscal years, divided by stock price. *Short (Distance below 2.5km)* is a dummy variable that equals one if the stock has been shorted by any institutions within 2.5km radius of its headquarter in the 30-trading day window before the earnings announcement. *Short* is a dummy variable that equals one if the stock has been shorted in the 30-trading day window before the earnings announcement. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: summary statistics

	Mean	Std	p10	p50	p90
Earnings surprises					
SUE	-0.004	0.035	-0.042	0.004	0.025
Geography and short					
Short (Distance below 2.5km)	0.050	0.217	0.000	0.000	0.000
Short	0.189	0.392	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.163	2.986	0.133	0.898	6.204
ln(Market cap)	20.644	1.367	18.705	20.616	22.548
Market-to-book	3.717	3.833	0.707	2.352	8.645
Past return (t-1)	0.011	0.081	-0.102	0.012	0.121
Past return (t-12,t-2)	0.061	0.320	-0.350	0.041	0.502
Asset growth	0.102	0.198	-0.092	0.053	0.359
Volatility	2.132	0.808	1.260	1.930	3.447
N	2,965				

Panel B: Earnings surprises and short selling

	(1)	(2)
Short (Distance below 2.5km)	-0.009** (0.004)	-0.010*** (0.003)
Short	-0.004 (0.002)	0.002 (0.002)
ln(Market cap)		0.009*** (0.003)
Market-to-book		-0.001 (0.000)
Past return (t-1)		-0.000 (0.015)
Past return (t-12,t-2)		0.025*** (0.004)
Asset growth		-0.004 (0.005)
Volatility		-0.016*** (0.002)
Year-month FE	Yes	Yes
Stock FE	Yes	Yes
N	2,542	2,474
R^2	0.221	0.355

Table IA.13
Returns following covering of short positions

This table analyzes the relation between stock returns following short cover and geographic distance. Panel A provides summary statistics for the UK sample, while Panel B reports regression results. The dependent variable is *CAR (1,20)*, the four-factor-adjusted cumulative abnormal return following a reduction of a short position. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A : UK sample summary statistics

	Mean	Std	p10	p50	p90
Trade return					
CAR [1,20](%)	-0.015	9.241	-10.361	0.068	10.560
Geography					
Distance (km)	103.542	149.647	1.366	29.740	277.404
Distance below 2.5km	0.188	0.391	0.000	0.000	1.000
Distance 2.5 - 5km	0.195	0.396	0.000	0.000	1.000
ln(Distance)	3.083	2.089	0.312	3.392	5.625
Stock characteristics					
Market cap (GBP bn)	2.423	2.081	0.352	1.632	5.820
ln(Market cap)	21.180	0.996	19.679	21.213	22.485
Market-to-book	3.203	3.064	0.751	2.139	7.294
Past return (t-1)	-0.004	0.100	-0.142	-0.000	0.128
Past return (t-12,t-2)	-0.081	0.312	-0.492	-0.100	0.353
Asset growth	0.105	0.199	-0.096	0.048	0.368
Volatility	2.373	0.982	1.353	2.092	3.913
N	15,032				

Panel B : Regression

	(1)	(2)	(3)	(4)
Distance below 2.5km	1.962** (0.758)	1.945*** (0.651)		
Distance 2.5 - 5km	1.429* (0.723)	1.341** (0.648)		
ln(Distance)			-0.671** (0.303)	-0.709** (0.298)
ln(Market cap)		-2.496*** (0.353)		-2.490*** (0.356)
Market-to-book		-0.038 (0.109)		-0.042 (0.106)
Past return (t-1)		-4.470*** (0.808)		-4.454*** (0.810)
Past return (t-12,t-2)		-3.782*** (0.357)		-3.779*** (0.354)
Asset growth		-0.123 (0.713)		-0.120 (0.729)
Volatility		0.152 (0.190)		0.163 (0.189)
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
N	14,977	14,161	14,977	14,161
R ²	0.143	0.157	0.142	0.157

Figure IA.6: Cumulative abnormal return of stocks prior to short trades

This figure shows the average cumulative abnormal stock return prior to a short trade for the UK sample. We divide our samples into three groups based on the distance between the short seller and the target firm: (1) distance below 2.5km (the red line); (2) distance between 2.5km and 5km (green line); (3) distance over 5km. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.

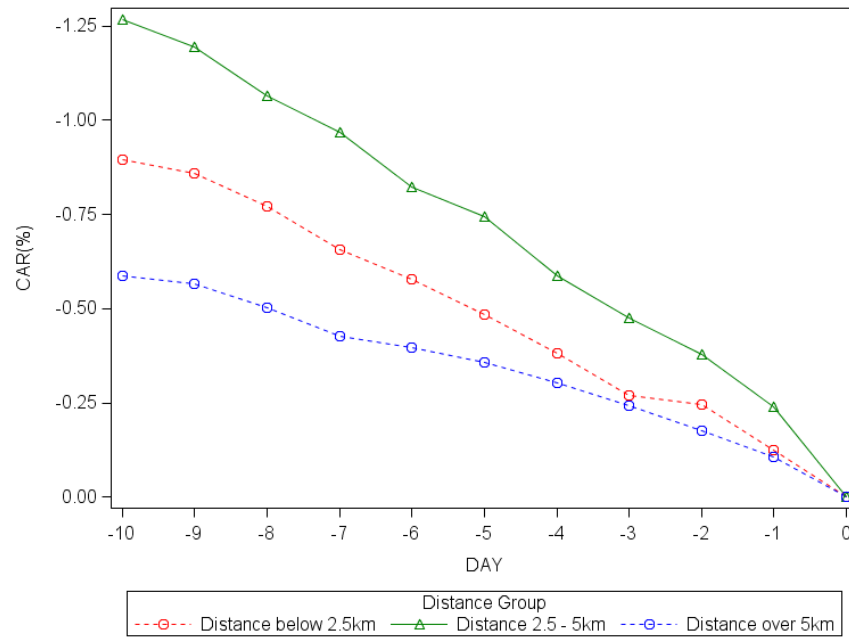


Table IA.13
The distribution of short trades – by year

This table reports the number of short trades by year for the the UK sample. For each institution and each stock on a reporting day, we compare the short position reported with that on the previous reporting day. If the short position increases, we record a short selling transaction at the end of this reporting day. If an institution has more than one short position record for a stock in a day, we keep the last record as the end-of-the day position. If a short position is recorded on a non-trading day, we adjust the record date to the ensuing trading day.

Year	Number of trade	Percentage
2013	1,171	7%
2014	1,407	8%
2015	2,052	12%
2016	2,789	16%
2017	3,321	20%
2018	3,558	21%
2019	2,721	16%
Total	17,019	100%

IA.8 Geographic clustering in short trades – additional specifications

Table IA.14
Geographic clustering in short trades - by week

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A provides summary statistics for the UK sample, while Panel B reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the following week. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.034	0.181	0.000	0.000	0.000
Geography					
Distance (km)	3.899	26.643	0.343	2.366	5.219
Distance below 0.5km	0.160	0.366	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.372	0.483	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.520	2.092	0.399	1.768	5.923
ln(Market cap)	21.246	0.963	19.804	21.293	22.502
Market-to-book	3.391	3.345	0.791	2.225	7.845
Past return (t-1)	-0.020	0.100	-0.157	-0.015	0.109
Past return (t-12,t-2)	-0.083	0.289	-0.462	-0.104	0.318
Asset growth	0.115	0.204	-0.073	0.056	0.410
Volatility	2.296	0.913	1.339	2.043	3.758
N	445,044				

Panel B: Clustering of short trades

	(1)	(2)	(3)
Distance below 0.5km	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Distance 0.5 - 2.5km	0.003** (0.001)	0.003** (0.001)	0.003** (0.001)
Stock controls	No	Yes	Yes
Week FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	439,321	416,462	416,462
R^2	0.373	0.369	0.371

Table IA.14
Geographic clustering in short trades - by month

This table analyzes the relation between institutions' clustered trading and their geographic distance. Panels A provide summary statistics for the UK sample, while Panel B reports the regression results. The dependent variable is *Same trade*, a dummy variable that equals one if both institutions in the institution-pair short the same stock within the following month. Stock-level controls are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

Panel A: Summary statistics

	Mean	Std	p10	p50	p90
Geographic clustering					
Same trade	0.032	0.176	0.000	0.000	0.000
Geography					
Distance (km)	3.970	27.626	0.342	2.339	5.017
Distance below 0.5km	0.165	0.371	0.000	0.000	1.000
Distance 0.5 - 2.5km	0.367	0.482	0.000	0.000	1.000
Stock characteristics					
Market cap (GBP bn)	2.492	2.104	0.394	1.717	5.972
ln(Market cap)	21.227	0.969	19.791	21.264	22.510
Market-to-book	3.490	3.442	0.797	2.275	8.110
Past return (t-1)	-0.016	0.096	-0.150	-0.012	0.109
Past return (t-12,t-2)	-0.080	0.282	-0.455	-0.097	0.318
Asset growth	0.119	0.207	-0.073	0.061	0.445
Volatility	2.255	0.885	1.316	2.008	3.691
N	305,284				

Panel B: Clustering of short trades

	(1)	(2)	(3)
Distance below 0.5km	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Distance 0.5 - 2.5km	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
Stock controls	No	Yes	Yes
Year-month FE	No	No	Yes
Fund 1-stock FE	Yes	Yes	Yes
Fund 2-stock FE	Yes	Yes	Yes
N	297,786	282,496	282,496
R ²	0.368	0.367	0.368

Figure IA.7: Cumulative abnormal return of stocks following short trades

This figure shows the distribution of cumulative abnormal stock returns in the first 20 trading days ($CAR[1,20]$) following a short trade for the UK sample. Daily abnormal returns are computed as the daily four-factor adjusted returns, where the factor loadings are estimated from a regression using daily returns from the past six months. $t = 0$ is the day (or the ensuing trading day) when the short trade is reported.

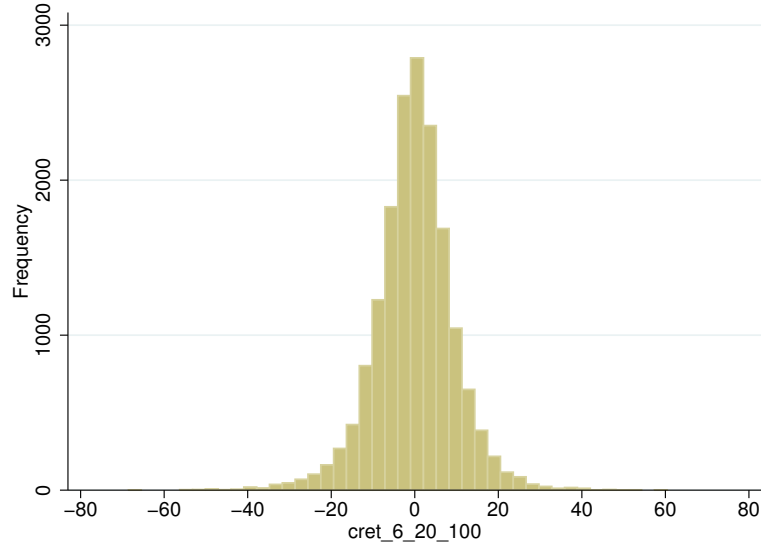


Table IA.15
Stock return following short trades – different specifications

This table reports panel regressions of the post-short-selling stock return on the geographic distance between the short seller and the target firm. The dependent variable is *CAR (1,20)*, the cumulative abnormal return following a short trade. We adjust daily returns by either subtracting the daily market return, or using the Fama-French three-factor model. *Distance* is the geographic distance between the short seller's office and the target firm headquarter, measured in kilometers. *Distance below 2.5km* is a dummy variable that equals one if the distance between the short seller and the target firm is below 2.5km, and zero otherwise. *Distance 2.5 - 5km* is a dummy variable that equals one if the distance between the institution and the target firm is between 2.5km and 5km, and zero otherwise. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) Mkt-adj	(2) FF3-model
Distance below 2.5km	-0.689* (0.401)	-0.937** (0.449)
Distance 2.5 - 5km	-0.012 (0.530)	-0.215 (0.562)
ln(Market cap)	-2.537*** (0.466)	-2.638*** (0.547)
Market-to-book	0.265*** (0.068)	0.236*** (0.076)
Past return (t-1)	-2.673* (1.411)	-2.350* (1.342)
Past return (t-12,t-2)	-3.271*** (0.657)	-3.249*** (0.710)
Asset growth	-0.287 (0.783)	0.034 (0.779)
Volatility	-0.173 (0.288)	-0.056 (0.288)
Stock FE	Yes	Yes
Fund FE	Yes	Yes
Year-month FE	Yes	Yes
N	16,046	16,046
R ²	0.160	0.171

Table IA.16

Earnings surprises and short selling regression – additional specifications

This table analyzes the relation between short selling activities before earnings announcements and earnings surprises. We consider two alternative short-selling windows: 15 days or 60 days before the earnings announcement. The dependent variable, *SUE*, is defined as the difference in EPS between two consecutive fiscal years, divided by stock price. *Short (Distance below 2.5km)* is a dummy variable that equals one if the stock has been shorted by any institutions within 2.5km radius of its headquarter in the 15- or 60-trading day window before the earnings announcement, and zero otherwise. *Short* is a dummy variable that equals one if the stock has been shorted in the 30-trading day window before the earnings announcement, and zero otherwise. *Market cap* is the market capitalization of the target firm. *Market-to-book ratio* is the ratio of market value of equity to book value of equity. *Past return (t-1)* is the return from the previous month. *Past return (t-12, t-2)* is the return from the past 12 months, excluding the most recent month. *Asset growth* is the annual growth rate of total assets. *Volatility* is the standard deviation of daily stock returns in the previous month. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	(1) 15 days	(2) 60 days
Short (Distance below 2.5km)	-0.007* (0.004)	-0.008* (0.004)
Short	0.000 (0.002)	0.000 (0.002)
ln(Market cap)	0.010*** (0.003)	0.010*** (0.003)
Market-to-book	-0.001 (0.000)	-0.001 (0.000)
Past return (t-1)	-0.000 (0.015)	-0.000 (0.015)
Past return (t-12,t-2)	0.025*** (0.004)	0.025*** (0.004)
Asset growth	-0.004 (0.005)	-0.004 (0.005)
Volatility	-0.016*** (0.002)	-0.016*** (0.002)
Year-month FE	Yes	Yes
Stock FE	Yes	Yes
N	2,474	2,474
R ²	0.354	0.355

Table IA.17

The relation between the probability of short selling and distance

This table shows the regression results of trading probability on geographic distance. The dependent variable is *trade prob*, a dummy variable that equals one if an institution shorts a stock, and zero otherwise. In column (1) to (2), the analyses are conducted at the distinct fund-stock pair level. In column (3) to (4), the analyses are conducted at the fund-stock-trade level. Stock control variables are the same as before. Heteroscedasticity-consistent standard errors, clustered by fund, are shown in parentheses. Significance levels: * 0.1, ** 0.05, *** 0.01.

	Aggregate level		Trade level	
	(1)	(2)	(3)	(4)
Distance below 2.5km	-0.005 (0.005)		-0.004 (0.005)	
Distance 2.5 - 5km	-0.007 (0.005)		-0.003 (0.006)	
ln(Distance)		-0.000 (0.002)		0.000 (0.001)
Stock controls	No	No	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	No	No	Yes	Yes
N	55,620	55,601	975,117	974,746
R^2	0.188	0.188	0.079	0.079