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The way back home: Trading behaviours of foreign institutional investors in China amid the COVID-19 pandemic

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ABSTRACT

By using foreign institutional investors’ daily trading data on 958 firms in China and COVID-19 infection data of six countries, this paper aims to investigate how the pandemic has influenced foreign institutional investors’ trading behaviours during the first half year of 2020. In addition to domestic returns and foreign returns, ‘pull factors’ of COVID-19 pandemic in host country and ‘push factors’ of COVID-19 pandemic in home country were used to explain net foreign inflows. We find that ‘push factors’ of COVID-19 in home country are dominant in explaining the reduction of net foreign inflows in five out of 11 sectors, and ‘pull factors’ of domestic returns are dominant in explaining net foreign inflows in most sectors. The price impact of net foreign flows differs across sectors as well. A strong negative correlation between net foreign outflows and same-day return could be identified in the Financials sector. On the flip side, positive correlation between net foreign inflows and same-day return could be identified in seven other sectors. Finally, a pattern of flight-to-liquidity was discovered, as foreign institutional investors strategically sell illiquid stocks to conserve liquidity when market uncertainty is heightened.

1. Introduction

Cross-border equity investment has surged rapidly in recent years. Despite many well documented growth benefits such as reducing capital scarcity and facilitating information transmission and technology diffusion (Bae et al., 2012; He and Shen, 2014), foreign investors as typical momentum investors (Richards, 2005) may destabilize the stock market in the face of a crisis in developing countries (Li et al., 2011). Stiglitz thus calls capital market liberalisation as a premature act if the institutional and regulatory supports are not established, and claims that emerging markets must avoid it (Stiglitz, 1999, 2000).

While trading behaviours of foreign investors have been investigated in terms of interconnectedness and contagion for the period of Global Financial Crisis (Kenourgios et al., 2011; Dimitriou et al., 2013; Bekiros, 2014; Luchtenberg and Vu, 2015; Yarovaya et al., 2016), similar investigations of the outbreak of COVID-19 pandemic have remained limited especially with developing countries as the focus. It remains unclear whether panic-driven foreign capital outflows occur, what their determinants are, and what the impacts of foreign capital outflows during the COVID-19 pandemic were; it was a crisis that was systematic and global as the financial crises, but it was arguably more of an exogenous shock to capital traders. More specifically, in this paper, three main questions will be answered: first, were foreign capital flows driven by the severity of the pandemic in host or home markets?; second, were there asymmetric impacts between foreign capital inflows and outflows on the stock price and if so, how did such impacts differ across sectors?; and

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finally, will outflows of foreign capital from host countries to home countries, i.e., the way ‘back home’, feature a flight-to-liquidity during the COVID-19 pandemic?

The literature is inconclusive about foreign capital flows amid market uncertainties. Foreign institutional investors are usually less informed and thus characterised as ‘prone-panic’ (Borensztein and Gelos, 2003), which means that they overreact to price fluctuations by rebalancing the portfolio disproportionately and consequently cause price contagions (Brennan and Cao, 1997). An opposing view is that trading reflects the process by which information is incorporated into price, such that foreign investors might not amplify price fluctuations or contagions as they have an edge over domestic investors on processing and incorporating investment information (Albuquerque et al., 2009; Bae et al., 2012; DeLong et al., 1990). Li et al. (2011) further suggested that strong commitment and the potential monitoring role of foreign investors could also produce a stabilising effect of their trading behaviour. However, regarding the behaviour of foreign traders during the COVID-19 pandemic, we expected two changes that would result in capital outflows from emerging countries. The first is that pandemic outbreaks in emerging markets with the misfortune of being host countries could spell disaster to their economy and trigger anxieties in foreign investors. The second is that as the pandemic developed into a global public health crisis and hit the home countries of many foreign investors as well, a retreat of overseas capital investment might also arise as a result of the liquidity shortage of investors (Ramelli and Wagner, 2020; Corbet et al., 2020). This paper identifies capital outflows and reveals the relative importance of the ‘push’ and ‘pull’ effects pandemic outbreaks generate in the host country for these flows, based on the existing research of Bohn and Tesar (1996), Froot et al. (2001), and Richards (2005).

In this paper, we are concerned with foreign institutional investors in China to conduct the empirical investigation for two reasons. Firstly, China is the largest emerging market and the second-largest global capital market. The stability of its economy and the financial sector bears importance for the world. Second and most importantly, a substantial growth of foreign investors has been witnessed in China’s A-share market since 2017 with the noted capital account liberalisation (Fig. 1). The outbreak of the pandemic could thus trigger large-scale international capital outflows from China.

This paper exploits a new and potentially superior source of daily foreign fund-flow data during the first half year of 2020. Unlike the previous studies, which used weekly, or quarterly data (Bohn and Tesar, 1996; Clark and Berko, 1997; Brennan and Cao, 1997; Karolyi, 2002a, 2002b; Dahlquist and Robertsson, 2004 and Richards, 2005), this study uses daily data to get a closer analysis of high-frequency relationships between COVID-19 contagion effects and foreign fund flows. The dataset includes foreign institutional investors’ trades from different countries through the Shanghai-Hong Kong and Shenzhen-Hong Kong Stock Connection Schemes (SH&SZ-HKSC hereafter). Therefore, the present paper includes a broader coverage of foreign investor groups than any other datasets, which covered only one group of investors (e.g., U.S. investors in Bekaert et al. (2002) and Borensztein and Gelos (2003)). The concern of heterogeneous trading behaviours across various investor types could be minimized in our paper.

With daily foreign fund-flow data on 958 firms from the level-1 industries based on the WIND Industry Classification Standard (WICS) and COVID-19 infections of six countries, this paper investigates whether net foreign capital inflows depend on home country COVID-19 outbreaks as a push factor or host country COVID-19 outbreaks as a pull factor, aside from foreign and domestic investment returns. Our analysis also identifies the influence on stock price of net foreign capital flows caused by pandemic outbreaks. Moreover, implication of the trade-off between consuming and conserving liquidity motivation at a sectoral level was also added. Seeing that foreign investors usually invest on specific sectors concentratedly to reduce the cost of collecting and processing information (Kang and Stulz, 1997; Fedenia et al., 2013; Liu et al., 2014), estimation results at the aggregate level without considering sectoral heterogeneities might be biased and misleading.

This study can be summed up into four main findings. Firstly, the pandemic outbreaks in home country is dominant in explaining the reduction of net foreign inflows in the sectors of Information Technology, Health Care, Consumer Discretionary, Energy, and Consumer Staples. In contrast, the pandemic outbreaks in the host country has no reduction effect on the net foreign inflows on average.

Secondly, net foreign inflows in all sectors except telecommunication show positive feedback trading driven by foreign or domestic returns. Domestic returns on average exhibit larger effects.

Thirdly, the impact of net foreign flows on the stock return differs across sectors. We identify a strong and positive impact on the same-day return of foreign net inflows in the sectors of Information Technology, Health Care, Real Estate, Industrials, Consumer Discretionary, Materials, Energy, and Consumer Staples. However, a negative and significant correlation between net foreign outflows and same-day returns in the Financials sector was also identified.

Finally, we identified a cross-sectional relationship between foreign fund net purchases and stock liquidity within the Fama and MacBeth (1973) cross-sectional regression framework. Our results suggest that foreign institutional investors sell their illiquid stocks over their liquid stocks to conserve liquidity under extreme market uncertainty. Our results are consistent with the findings that indicate fund managers consume liquidity when market uncertainty is heightened.

We extend the literature in the following ways. Firstly, in studying foreign institutional investors’ trading behaviour of flows and their relationship with returns and COVID-19, we extend the existing research of Bohn and Tesar (1996), Froot et al. (2001) and Richards (2005) by adding COVID-19 pandemic in home country as push factors and COVID-19 pandemic in host country as pull factors, respectively, in addition to foreign returns and domestic returns. We find pandemic infections in the home country rather than

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1 The level 1 industry classification in WICS is the same as in the Global Industry Classification Standard (GICS), which is widely used in empirical studies of sectoral analysis in international financial market (see Hrazdil and Zhang, 2012; Chung et al., 2015; Fan et al., 2016; Li et al., 2020).

2 We use the S&P500 index and the MSCI World index to stand for the foreign markets, and the CSI300 stands for local market.

3 We use \( NetPurchasesInShareHolding \), to stand for this in formula (2).
those in the host country are the dominant driver of reduced foreign capital inflows. Compared with previous findings that foreign returns could explain more dynamics of cross-border capital flows than domestic returns, our results indicate that during the period of pandemic outbreaks, domestic returns are more important drivers of foreign capital inflows.

Secondly, we confirm the return-chasing effect at the firm level (Hong and Stein, 1999; Karolyi, 2002a, 2002b; Richards, 2005; Altı et al., 2012), as foreigners’ flow into ten sectors shows strong positive feedback trading with respect to domestic returns or foreign returns, especially to domestic returns of CSI300. Whereas the literature focuses on the whole of the equity markets (Grinblatt et al., 1995; Froot et al., 2001; Richards, 2005), we provide novel insights into positive-feedback trading at the firm level in China as an emerging market. Thus, our study has particular implications to return-chasing effects in other emerging markets.

Thirdly, we extend the understanding of flight-to-liquidity patterns of foreign institutional investors in an extremely uncertain market. The flight-to-liquidity is a debated concept in the literature, as fund managers could sell either liquid assets to deleverage or illiquid assets to conserve liquidity (Scholes, 2000; Brown et al., 2010; Ben-David et al., 2012). Our results have important implications regarding the trade-off between consuming and conserving liquidity by market participants of foreign institutional investors (Vayanos, 2004; Brown et al., 2010; Ben-Rephael, 2017).

The rest of the paper is structured as follows: Section 2 of this paper summarises the financial liberalisation process in China, Section 3 describes our data and econometric approaches, Section 4 discusses the empirical results, and Section 5 concludes this paper.

2. Financial liberalisation process in China

Dollar-dominated Qualified Foreign Institutional Investors (QFIIs), in effect since late 2002, and the Renminbi-denominated Qualified Foreign Institutional Investors (RQFIIs), since 2011. However, their investment in the Chinese A-share market covers a smaller percentage (less than 10%) than the Shanghai–Hong Kong Stock Connection and the Shenzhen–Hong Kong Stock Connection (SH&SZ-HKSC) schemes (see Fig. 1). The latter two schemes were launched as major financial liberalisations in China on 17 November 2014, and 5 December 2016 (Wang and Chong, 2018; Yao et al., 2018). These two schemes have allowed the flow of north and southbound investments, within a quota, between the mainland stock exchanges and the Stock Exchange of Hong Kong. Additionally, their stock-trading data and stock-holding data are reported daily, allowing this study to focus on the high-frequency relationships between foreign fund flows and firm-level stock returns.

3. Data and methodology

3.1. Data and summary statistics

We retrieve foreign fund flows and stock returns of 958 firms from the WIND financial database (https://www.wind.com.cn) in 11 sectors at the level-1 industries, defined by the WIND Industry Classification Standard (WICS) which is based on the Global Industry Classification Standard (GICS) of Standard & Poor’s and Morgan Stanley Capital International with incorporation of China’s capital market characteristics. These 11 sectors include: Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, Utilities, and Real Estate. Note that the level 1 industry classification in WICS is the same as in GICS, which is widely used in empirical studies of sectoral analysis in international financial markets (Hrazdil et al., 2014; Chung et al., 2015; Fan et al., 2016; Li et al., 2020).

Our sample covers all trading days during the fast half year of 2020, when COVID-19 rapidly broke out around the world. We collected daily reruns for stocks held by foreign institutional investors from WIND financial database. Daily stock-holding data is also from the WIND financial database. We exclude (publicly-listed firms in China experiencing financial distress) ST firms and firms without foreign shareholding during our sample period. Finally, 958 firms were included in our sample. Table 1 presents the daily summary statistics of holding activity by foreign institutional investors at the sectoral level. The average holding percentage (value) varies from 0.59 (12.97 billion Yuan) to 5.96 (300.44 billion Yuan) per day. The highest percentages held by foreign institutional...
investors were in the Consumer Staples sector, followed by Consumer Discretionary and Health Care from 2 January 2020 to 30 June 2020. The holding values were 300.44 billion Yuan, 231.45 billion Yuan, and 174.36 billion Yuan, respectively.

The WIND database also provided data on daily confirmed cases of COVID-19 in and outside of China. The external confirmed cases came from five countries where the first largest foreign institutional investors of the firms in our sample were located (FE hereafter): the USA, UK, Singapore, France, and Switzerland (see Fig. 2). The internal confirmed cases were reported from the provinces where the firms in our sample are located (DE hereafter).

We use the CSI 300 index, a market-value-weighted index of the 300 largest and most liquid stocks traded on the Shanghai and the Shenzhen Stock Exchanges to represent the market performance. Fig. 3 displays the performance of the CSI 300 index, net foreign purchases (daily purchase minus daily sales of Chinese A-share stocks by foreign institutional investors), and cumulative net foreign purchases from 2 January to 30 June 2020. When it was confirmed that the COVID-19 was transmitted through humans on January 20, 2020, foreign institutional investors became net sellers on the Chinese equity market. This trading behaviour continued until the close of the Shanghai and the Shenzhen Exchanges for the Chinese Spring Festival Holiday on 23 January 2020. However, the cumulative net foreign purchases (assuming a zero initial value in January 2020) indicate that foreign institutional investors were still the net purchasers of Chinese equity at the beginning of the sample period. By the end of January 2020, 58.05 billion Yuan were accumulated (1031.87 billion Yuan if we consider the initial value from November 2014). However, a mass-selling of their Chinese equity began, and continued until the middle of April 2020. After that, foreign investors continued to accumulate their investment in the Chinese A-share market. The CSI 300 dropped under 3700 by the end of January 2020, and then, a double-dip was followed by a weak rebound around the middle of March 2020. This consistent change between foreign investment behaviour and the underlying market performance is the focus of this study.

Table 1
Summary Statistics of Foreign Institutional Shareholdings on Industry Level.

| Industries          | Holding Ratio (%) | Holding Value (0.1 billion Yuan) |
|---------------------|-------------------|----------------------------------|
|                     | Mean | Std.Dev | Min | Max | Mean | Std.Dev | Min | Max |
| Energy              | 0.59 | 0.06    | 0.51 | 0.71 | 129.7 | 23.29   | 105.4 | 187.36 |
| Materials           | 2.13 | 0.09    | 1.94 | 2.37 | 950.0 | 63.38   | 794.88 | 1084.47 |
| Industrials         | 2.22 | 0.12    | 1.99 | 2.45 | 1659.4 | 123.14  | 1383.02 | 1912.42 |
| Consumer Discretionary | 4.88 | 0.26    | 4.37 | 5.32 | 2314.5 | 211.16  | 1860 | 2645.62 |
| Consumer Staples    | 5.96 | 0.15    | 5.6  | 6.22 | 3004.4 | 306.73  | 2426.51 | 3648.05 |
| Healthcare          | 4.42 | 0.25    | 3.95 | 4.88 | 1743.6 | 245.84  | 1338.68 | 2330.37 |
| Financials          | 2.20 | 0.09    | 2.05 | 2.38 | 2303.5 | 203.19  | 1984.94 | 2722.48 |
| Information         | 2.56 | 0.17    | 2.23 | 3.02 | 1768.6 | 201.91  | 1408.51 | 2361.46 |
| Telecommunication   | 2.53 | 0.16    | 2.03 | 3.51 | 43.9   | 3.26    | 38.39 | 53.86 |
| Utilities           | 2.21 | 0.07    | 2.1  | 2.37 | 315.6  | 14.38   | 291.68 | 344.8 |
| Real estate         | 2.29 | 0.06    | 2.14 | 2.43 | 409.8  | 29.36   | 346.68 | 466.74 |

This table describes the daily summary statistics of foreign institutional shareholdings on sectoral level from 2 January to 30 June 2020. We collect the daily shareholding ratio and shareholding value from WIND financial database.

We collect the daily new confirmed COVID-19 cases in and out of China from WIND financial database. The external confirmed cases were from the home countries of the first largest foreign shareholding of the listed companies in our sample. These countries were the USA, UK, Singapore, France, and Switzerland. The internal confirmed cases were captured from the provinces where the listed firms in our sample are located.
Fig. 3 presents the performance of CSI 300 index’s performance, net foreign purchases, and cumulative net foreign purchases from 2 January to 30 June 2020. The daily net foreign purchases are measured by the daily purchase minus daily sales of Chinese A-share stocks by foreign institutional investors through SH&SZ HKSC Schemes. The cumulative net foreign purchases (assuming zero initial value on 1 January 2020) are the accumulated value of net foreign purchases from 1 January to 30 June 2020.

3.2. Measurement of trading variables

(1) Daily return of stock \( i \): daily return of stock \( i \) is measured as the daily, log-differenced change in stocks held and traded by foreign institutional investors. We set the lag length at five following the Akaike and Schwartz-Bayes criteria, consistent with Richards (2005).

(2) Net inflows of foreign institutional investors in stock \( i \) at day \( t \): Foreign institutional investors’ inflows in stock \( i \) at day \( t \), minus foreign institutional investors’ outflows in stock \( i \) at day \( t \). We measured it as a percentage of total market capitalisation of stock \( i \). Foreign institutional investors are net purchasers with positive net inflows. Otherwise, they are net sellers.

\[
Netinflows_{i,t} = Foreigninflows_{i,t} - Foreignoutflows_{i,t}
\] (1)

(3) Net purchases of all foreign institutional investors in stock \( i \): It is measured by the aggregated change in shareholdings of all foreign institutional investors in stock \( i \) from day \( t-1 \) to \( t \).

\[
NetPurchaseInShareHoldings_{i,t} = \sum_{f=1}^{F} ShareHolding_{f,i,t} - \sum_{f=1}^{F} ShareHolding_{f,i,t-1} \frac{SharesOutstanding_{i,t-1}}{\text{SharesOutstanding}_{i,t}}
\] (2)

Where \( f \) stands for one foreign institutional investor among all foreign shareholders, \( F \) (Sias et al., 2006; Ben-Rephael, 2017).

3.3. Model

We tested the impact of COVID-19 on net foreign inflows at the firm-level, by examining the net purchase activity by foreign investors on COVID-19 pandemic in home country as push factors and COVID-19 pandemic in host country as pull factors. This allowed us to better analyse the impact of COVID-19 on net foreign fund inflows.

\[
Netinflows_{i,t} = a_0 + \delta_1 FE_{i,t-1} + \delta_2 DE_{i,t} + \sum_{d=1}^{5} \delta_3 dR_{i,-d} + \sum_{d=1}^{5} \delta_4 dNetinflows_{i,-d} + \delta_5 SP500_{i,-1} + \delta_6 MSCI_{i,-1} + \delta_7 CSI300_{i,-1} + \lambda_i + v_i + \varepsilon_{it}
\] (3)

Where \( DE_{i,t-1} \) represents the new confirmed COVID-19 infections in the provinces where the listed company \( i \) located at day \( t-1 \), and \( FE_{i,t-1} \) represents newly confirmed COVID-19 infections in the countries from where the largest foreign institutional investors of company \( i \) are at day \( t-1 \). \( Netinflows_{i,t} \) refers to the total net foreign inflows in stock \( i \) at day \( t \). We included lagged returns of the CSI300, as well as lagged returns and flows for stock \( i \) as control variables, as foreign flows are correlated with lagged flows, and also with contemporaneous and lagged measures of expected returns (Bohn and Tesar, 1996; Froot et al., 2001; Richards, 2005). We also included the lagged returns of the S&P500 index and the world MSCI index as controlling variables, as past returns in the foreign market, especially in the U.S. market on day \( t-1 \), are assumed to influence both day \( t \) net flows and day \( t \) returns (Karolyi, 2002a, 2002b; Richards, 2005). This pattern is consistent with the findings that foreign institutional investors engage in positive feedback trading. We set the lag length at five for both returns and flows following the Akaike and Schwartz-Bayes criteria in our regression. \( \lambda_i \) measures day fixed effects and \( v_i \) measures firm fixed effects.

We further examined whether \( Netinflows_{i,t} \) have forecasting power for contemporaneous returns after controlling for the effects of past returns. We assume that within the Chinese capital market, the causality ran from COVID-19 infections to net flows, and from net...
flows to prices, but not vice versa as in Hasbrouck (1991) and Richards (2005). We adopted a similar methodology to the one used in previous event studies, as foreign fund flows are related to foreign investors’ sentiment toward the anxiety of liquidity shortages and fundamental economic turmoil caused by the COVID-19 pandemic (Kaplanski and Levy, 2010; Ben-Rephael, 2017; Ramelli and Wagner, 2020; Corbet et al., 2020). Thus, we ran the following regression:

$$R^S_i = \delta_0 + \delta_1 \text{netflows}^i_t + \sum_{d=1}^{4} \delta_2 d \text{return}^{i-d}_t + \delta_3 \text{January effect}_t + \delta_4 bday^i_t$$

$$+ \delta_5 \text{weekday}_t + \sum_{t=1}^{4} \delta_6 \text{Di}_t + \delta_7 H_t + \nu_i + u_{it}$$

Where $R^S_i$ is the daily return of stock $i$ in sector $s$ at day $t$; $\delta_0$s is constant, $R^S_{i-d}$ is the previous $d$th day rate of return, January effect is listed to control the market anomaly for all the stocks, and bday$^i_t$ and weekday$^i_t$ refer to the best performance days and worst performance days, respectively; they are dummy variables equal to 1 if the $d$th day has the the highest (lowest) returns in our sample within ten days. $D_{i, b}$, with $i=1,2,3,4$ are dummy variables for the days of the week from Monday to Thursday. $H_t$ is a dummy variable for days after non-weekend holidays. The controlling of these variables guarantees that the outbreak of COVID-19 rarely drives the different companies, instead of due to the market anomalies and calendar effects (i.e., an annual January effect, Monday effect). Finally, $u_{it}$ is the error term.

We further estimated the effect of stock liquidity on net shareholdings ($NetPurchaseInShareHolding_{is}$) within the Fama and MacBeth (1973) cross-sectional regression framework, to check whether foreign institutional investors sell their liquid or illiquid stocks first. Other characteristics related to stock cross-sectional returns were controlled.

$$NetPurchaseInShareHolding_{is} = cons + \beta AL_{i, t-1} + \text{StockControls}_{is, t-1} + \epsilon_{it}$$

$AL_{i, t-1}$ is the Amihud and Noh (2002) stock liquidity measure.4 Other controlling variables include market capitalisation, book-to-market ratio (BM Ratio, hereafter), the risk loading factors of the MKT, the SBM, the HML, and the MOM are from the Fama-French-Carhart four-factor model (FFC4, Carhart (1997)) based on previous 36–60 monthly observations. The error terms are clustered by firm.

4. Regression results

4.1. Regression estimates of the COVID-19 pandemic on foreign net inflows

Following the procedure illustrated by Froot et al. (2001) and Richards (2005), we ran panel regressions of firm-level foreign fund net inflows on COVID-19 pandemic in home country as push factors and COVID-19 pandemic in host country as pull factors, as well as contemporaneous domestic market returns (CSI300), and lagged foreign market returns (S&P500 index) and lagged world market returns (the MSCI world index), and lagged stock return series and lagged stock flow series ($R^S_{i-d}$ and net inflow$^{i-d}_t$). We ran the regression with the fixed effect model for different sectors separately to control for the firm level and sectoral level heterogeneities.

Table 2 presents the panel regression results for each of the 11 different sectors, including Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, Utilities, and Real Estate. (see column (1) to column (11)). For each sector, the coefficient estimates of COVID-19 pandemic in home country and COVID-19 pandemic in host country are reported in lines 1 and 2, respectively. The regression results reported in line 1 confirm that COVID-19 pandemic in home country has had a negative and significant influence on five sectors’ foreign net inflows, including Information Technology, Health Care, Consumer Discretionary, Energy, and Consumer Staples.. Among these sectors, the Consumer Staples sector was affected strongest by COVID-19 pandemic in home country. A 1% increase in the confirmed cases of COVID-19 in home countries caused a 5.8% reduction on the foreign net inflows in this sector. These reduction effects were 2.1%, 3.5%, 2.2%, and 3.5%, respectively for the previously mentioned sectors. Whereas COVID-19 pandemic in host country has no reduction effect on the foreign net inflows on average, it has a positive and significant effect on the Consumer Discretionary sector. Our results are consistent with the findings that the consumer discretionary sector had cumulative gains in the period in the U.S. (Matos et al., 2021). Table 2 displays the results that indicate that COVID-19 pandemic in home country is dominant in explaining the reduction of net foreign inflows (i.e., Information Technology, Health Care, Consumer Discretionary, Energy, and Consumer Staples). Our results suggest that foreign portfolio investment (FPI) in China was substantially affected by COVID-19 conditions in their home countries.

Table 2 also presents the coefficient estimates of lagged stock return series and lagged stock flow series ($R^S_{i-d}$ and net inflow$^{i-d}_t$) from row 3 to row 6.5 Our regression results in row 3 show that prior overnight foreign inflows are significant explanations of foreign net inflows in seven sectors, including Financials, Information Technology, Health Care, Real Estate, Industrials, Consumer Discretionary, and Materials. The explanatory power varies from 0.154 in the Consumer Discretionary to 0.404 in the Financials sectors. We also found that prior overnight return series significantly influenced flows in seven of the 11 sectors (row 5 in Table 3), indicating that higher returns led to higher inflows. Our results are consistent with the findings that indicate foreign

4 We also use Hasbrouck (2009) effective bid-ask spread (HR) as our liquidity measure for robustness in appendix A.

5 We set the lag length at five, we only report the regression coefficient at the length 2 to save space.
Table 2
The Impact of COVID-19 pandemic on Foreign-fund-flows in Chinese A-share Market.

| netinflows | Financials | Information Technology | Health Care | Real Estate | Industrials | Consumer Discretionary | Materials | Utilities | Energy | Consumer Staples | Telecomunication |
|------------|------------|------------------------|------------|------------|------------|------------------------|-----------|-----------|--------|-----------------|-----------------|
| FE<sub>-1</sub> | -0.005 | -0.021*** | -0.035*** | 0.012 | -0.007 | -0.022*** | -0.007 | 0.003 | -0.035** | -0.058*** | -0.014 |
| (0.006) | (0.007) | (0.008) | (0.006) | (0.007) | (0.007) | (0.010) | (0.017) | (0.016) | (0.044) | | |
| DE<sub>-1</sub> | 0.004 | 0.005 | 0.010 | 0.002 | 0.006 | 0.025** | 0.001 | 0.007 | 0.013 | 0.032 | 0.004 |
| (0.008) | (0.009) | (0.010) | (0.011) | (0.007) | (0.010) | (0.009) | (0.014) | (0.018) | (0.023) | (0.062) | |
| netinflows<sub>-1</sub> | 0.404*** | 0.279** | 0.305*** | 0.469*** | 0.262*** | 0.154** | 0.347*** | 0.302 | -1.053 | -0.027 | 0.277 |
| (0.131) | (0.113) | (0.058) | (0.121) | (0.084) | (0.062) | (0.128) | (0.207) | (0.679) | (0.161) | (0.342) | |
| netinflows<sub>-2</sub> | 0.135 | 0.267** | 0.077 | 0.277** | 0.435*** | 0.083 | 0.507*** | 0.28 | -0.853 | -0.002 | -0.610 |
| (0.137) | (0.12) | (0.057) | (0.118) | (0.083) | (0.064) | (0.122) | (0.205) | (0.687) | (0.002) | (0.364) | |
| R^2<sub>-1</sub> | 0.002*** | -0.001 | 0.001 | 0.002*** | 0.002*** | 0.002*** | 0.002*** | 0.003* | 0.003* | 0.001 | 0.003 |
| (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.002) | (0.004) | |
| R^2<sub>-2</sub> | 0.001 | -0.002** | -0.004*** | -0.003*** | -0.002** | -0.002** | -0.003*** | 0.000 | 0.002*** | 0.000*** | -0.006*** | -0.006 |
| (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.004) | |
| SP500<sub>-1</sub> | 0.001 | 0.004*** | 0.003*** | 0.003*** | 0.002*** | 0.005*** | 0.001 | -0.001 | 0.001 | -0.002 | 0.003 |
| (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.006) | |
| MSCI<sub>-1</sub> | 0.003*** | 0.002*** | 0.002 | 0.002** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** |
| (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.003) | (0.009) | |
| CSI300<sub>-1</sub> | 0.004*** | 0.004*** | 0.005*** | 0.006*** | 0.005*** | 0.008*** | 0.003*** | 0.006*** | 0.003*** | 0.01*** | -0.01 |
| (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.002) | (0.001) | (0.004) | (0.008) | | |
| day FE | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| firm FE | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | Yes |
| N | 9462 | 19,152 | 11,742 | 4674 | 21,774 | 12,198 | 14,820 | 3990 | 3534 | 7752 | 1140 |
| Adj_R2 | 0.058 | 0.034 | 0.046 | 0.055 | 0.049 | 0.051 | 0.049 | 0.062 | 0.034 | 0.043 | 0.052 |

This table reports the panel regression results of the regression Eq. (3) for 11 sectors in China, including Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, Utilities and Real Estate. The estimated equations are in rows, and the estimated coefficients are in columns. We collect foreign institutional investors' daily trading data on 958 firms in China and COVID-19 infections of six countries from 2 January 2020 to 30 June 2020 to estimate the impact of internal and external COVID-19 pandemic on foreign net inflows. Robust standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively.
Table 3
The Impact of Foreign Net Flows on Stock Returns.

| R²  | δ₁       | δ₂₁       | δ₂₂       | δ₃       | δ₄       | δ₅       | Firm FE | N      | Adj. R² |
|-----|----------|-----------|-----------|----------|----------|----------|---------|--------|---------|
|     | netflows | netflows  | netflows  | January effect | bdays | wdays |         |        |         |
| Panel A. Abnormal returns on days with netinflows | | | | | | | | | |
| Information Technology | 0.088*** | 0.103*** | 0.054*** | −0.066 | 3.999*** | −3.611*** | Yes | 19,152 | 0.034 |
| (0.021) | (0.010) | (0.008) | (0.107) | (0.129) | (0.121) |            |        |        |
| Health Care | 0.027** | 0.165*** | 0.004 | 0.047 | 4.311*** | −4.299*** | Yes | 11,742 | 0.057 |
| (0.012) | (0.009) | (0.008) | (0.081) | (0.097) | (0.098) |            |        |        |
| Real Estate | 0.041*** | 0.095*** | 0.043*** | −0.243*** | 3.035*** | −2.175*** | Yes | 4674 | 0.045 |
| (0.012) | (0.010) | (0.010) | (0.077) | (0.094) | (0.110) |            |        |        |
| Industrials | 0.032** | 0.101*** | 0.052*** | −0.216*** | 3.462*** | −2.793*** | Yes | 21,774 | 0.038 |
| (0.007) | (0.005) | (0.005) | (0.044) | (0.052) | (0.058) |            |        |        |
| Consumer Discretionary | 0.020** | 0.102*** | 0.039*** | −0.340*** | 3.745*** | −2.922*** | Yes | 12,198 | 0.043 |
| (0.010) | (0.006) | (0.006) | (0.060) | (0.065) | (0.073) |            |        |        |
| Materials | 0.053*** | 0.199*** | 0.041*** | −0.374*** | 3.503*** | −3.211*** | Yes | 14,820 | 0.039 |
| (0.012) | (0.008) | (0.007) | (0.073) | (0.086) | (0.086) |            |        |        |
| Consumer Staples | 0.013* | 0.061*** | 0.041*** | −0.701*** | 4.106*** | −3.303*** | Yes | 3990 | 0.047 |
| (0.007) | 0.010 | 0.009 | 0.08 | 0.109 | 0.111 |            |        |        |
| Panel B. Abnormal returns on days with netoutflows | | | | | | | | | |
| Financials | −0.027* | 0.058*** | 0.078*** | −0.106 | 2.113*** | −1.558*** | Yes | 9462 | 0.05 |
| (0.014) | (0.010) | (0.009) | (0.067) | (0.085) | (0.102) |            |        |        |

This table shows estimates of average percentage abnormal returns on foreign net flows for 11 sectors in Chinese A-share market over 2 January to 30 June 2020. We divide the sample into days with net inflows and days with net outflows. Abnormal returns are calculated as the residual from a regression of returns on a constant, the lagged domestic return of CSI 300, lagged returns on the S&P 500, lagged returns on the world MSCI, and the returns in the contemporaneous Hong Kong, Singapore, and Tokyo markets. Panel A reports the results of regression of daily abnormal returns on the net foreign purchases and a series of control variables. Regression coefficients on the net inflows and other controlling variable as shown, with Standard errors in parentheses. Panel B shows the results of regression of daily abnormal returns on the net foreign sells and a series of control variables, with Standard errors in parentheses. *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively.

institutional investors are momentum investors (Grinblatt and Keloharju, 2000).

Finally, we also find that both domestic returns of CSI 300 and foreign returns of the S&P500 and the MSCI world indices have a positive and significant effect on foreign fund inflows in sectors of Information Technology, Health Care, Real Estate, Industrials, and Consumer Discretionary (rows 7 through 9), our results indicate that foreign institutional investors are positive feedback traders. Unlike the findings that foreign returns are more important in explaining the dynamics of inflows into emerging markets (Brennan and Cao, 1997; Richards, 2005). Our results indicate that domestic returns explain a greater percentage of the net flows than foreign returns in that the coefficient estimates of the CSI 300 are higher than the coefficient estimates of the S&P 500 and the MSCI world indices. Taking the Real Estate sector as an example, domestic returns of CSI 300 on average explain 6% of foreign net inflows, twice as much as the 3% for the foreign returns of the S&P 500, and three times as much as the foreign returns of the MSCI world index.

4.2. Regression estimates of the price impact of daily net flows

We further followed Kaplanski and Levy (2010) and Ben-Rephael (2017) to estimate the regression between stock returns and net foreign fund flows (see Table 3) to understand the price impact of daily fund flows. We divide the sample into days when foreign institutional investors are net buyers or net sellers. We run panel regression of stock returns on foreign capital inflows and outflows separately. The regression results are reported in panel A and panel B, respectively. We identified a positive and significant correlation between the foreigners’ net inflows and same-day returns in the sectors of Information Technology, Health Care, Real Estate, Industrials, Consumer Discretionary, Materials, and Consumer staples. Our regression results imply that a 1% increase in foreign net inflows would be associated with a contemporaneous price increase of 8.8%, 2.7%, 4.12%, 3.17%, 2.02%, 5.28%, and 1.33%, respectively for each sector (column (1) in Table 3). Furthermore, we identified a negative correlation between net outflows and same-day returns in the Financials and Telecommunication sectors, although the latter was not significant. Our results indicate that a 1% increase in foreign net outflows would be associated with a contemporaneous price decrease of 2.7% (column (1) in Table 3). Our results indicate that although foreign institutional investors, as a whole, became net sellers of Chinese equity during the COVID-19 pandemic period from 17 March 2020 to 9 April 2020, there is aggregate rebalancing across the different sectors during the whole sample period, foreign fund managers tend to reduce their exposure to illiquid stocks (e.g., stocks in the Financials and Telecommunication Sectors) first to conserve liquidity.

We then turned to check the liquidity and performance across different sectors (see Table 4). Table 4 suggests that the sectors of Information Technology, Health Care, Real Estate, Industrials, Consumer Discretionary, Materials, and Consumer staples have

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To save space, we only report the results that foreign net flows have significant effect on the domestic equity returns.
4.3. Robustness check

To further confirm whether foreign institutional investors reduced their exposure in illiquid stocks during COVID-19 pandemic, we run Fama and MacBeth (1973) cross-sectional regression of net foreign shareholdings (\(\text{NetPurchaseInShareHolding}\)) on stock liquidity (Table 5). We used Amihud and Noh (2002) liquidity measure in our regression. We also controlled for other risk characteristics, such as MKT, SMB, HML, and MOM. Table 5 displays the results with and without risk-controlling factors (column 1 and column 2, respectively). Both results in column 1 and column 2 show that the coefficients of stock liquidity measures are negative and significant in Table 5. Our results provide clear evidence that foreign institutional investors decreased their shareholdings in illiquid stocks during the COVID-19 pandemic period. We also presented the regression results using Hashrouck's (2009) stock liquidity measure for robustness (see Table A1 in Appendix). The results are consistent with the findings which indicate that fund managers might act more strategically under expectations of future shocks caused by the COVID-19 pandemic, and sell their illiquid securities first to conserve liquidity (Vayanos, 2004; Brown et al., 2010; Ben-Rephael, 2017). Our results that foreign institutional investors sell illiquid stocks first in response to the deterioration in market conditions also indicate that foreign funds consumed liquidity under extreme market uncertainty, adding evidence to the foreign participants' lack of liquidity provision during extreme market periods (Nagel, 2012).

Finally, we use portfolio analysis to confirm that the flight-to-liquidity premium in stock returns can be captured by long-short portfolios based on the Amihud and Noh (2002) liquidity measure across size terciles (see Figs. 4-6). Figs. 4-6 show that the returns of long-short portfolios dropped to \(-40\%\) at the peak for the small-size tercile, and \(-20\%\) for the large-size tercile. We also found that the relative return of the small size tercile took around five months to fully recover. However, the large size tercile took around two months to recover.

5. Conclusions

With data on daily new confirmed COVID-19 infections in six countries, and 958 firms held by foreign institutional investors in 11 sectors, this paper provides new evidence on the determinants of net foreign flows and the price impact of these net foreign flows during the COVID-19 pandemic. Specifically, there are four major findings of this study. Firstly, COVID-19 pandemic in the home country is dominant in explaining the reduction of foreign net inflows in the sectors of Information Technology, Health Care, Consumer Discretionary, Energy, and Consumer Staples. Among those sectors, Consumer Staples was affected strongest by COVID-19 pandemic in home country, a 1% increase in the confirmed cases of COVID-19 in the home country caused a 5.8% reduction of the foreign net inflows in this sector. Also, whereas COVID-19 pandemic in the host country had no reduction effect on the foreign net inflows on average, it had a positive and significant effect on the Consumer Discretionary sector. These results are consistent with the findings that indicate that the Consumer Discretionary sector had cumulative gains in the period in the U.S. (Matos et al., 2021).

Secondly, foreigners' flows into four sectors show positive feedback trading with respect to both foreign and local returns, including sectors of Information Technology, Real Estate, Industrials, and Consumer Discretionary. Pull factors of domestic returns, on average, affected flows more than push factors of foreign returns.

\[\text{Our conclusions are consistent if we use Ann. out-PRFM over Benchmark in the fourth column in Table 4.}\]
Third, foreigners’ trading impact as net sellers or net buyers was different across sectors. We identified strong positive and significant correlations between the net purchases of foreigners in the sectors of Information Technology, Health Care, Real Estate, Industrials, Consumer Discretionary, Materials, and Consumer Staples, and same-day returns. We also identified a negative and significant correlation between net foreign outflows and same-day return in the Financials sector. These results indicate that foreign

### Table 5
Regression of foreign institutional investors aggregate changes in shareholdings on stock liquidity.

|                  | (1)       | (2)       |
|------------------|-----------|-----------|
| \( AL_{t-1} \)   | \(-0.001^{***}\) | \(-0.022^*\) |
|                  | \((-3.67)\) | \((-1.84)\) |
| \( DE_{t-1} \)   | \(-0.001\) | \(-0.099\) |
|                  | \((-0.55)\) | \((0.33)\) |
| \( FE_{t-1} \)   | \(-0.01^{***}\) | \(-0.419^{***}\) |
|                  | \((-5.67)\) | \((-3.31)\) |
| \( \text{return}_{t-1} \) | \(-0.435^{***}\) | \(-3.761\) |
|                  | \((-17.25)\) | \((-1.95)\) |
| \( SMB_{Beta} \) | \(-3.598\) | \(-3.598\) |
|                  | \((-0.53)\) | \((-0.53)\) |
| \( HML_{Beta} \) | \(-5.799\) | \(-5.799\) |
|                  | \((-0.47)\) | \((-0.47)\) |
| \( MKT_{Beta} \) | \(-4.881\) | \(-4.881\) |
|                  | \((-1.12)\) | \((-1.12)\) |
| \( MOM_{Beta} \) | \(-1.125\) | \(-0.711\) |
|                  | \((-0.711)\) | \((-0.711)\) |
| \( \text{Constant} \) | 0.014 | 0.0235 |
|                  | \(8.22\) | \(2.14\) |

This table reports the Fama and MacBeth (1973) cross-sectional regression results of Eq. (5). Amihud and Noh (2002) stock liquidity measure is used in our regression. The risk loading factors of the MKT, the SBM, the HML, and the MOM are from the Fama-French-Carhart four-factor model (FFC4, Carhart (1997)) based on previous 36–60 monthly observations. T-statistics are reported in parentheses. *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively.
fund managers strategically rebalance their portfolios across sectors.

Finally, we identified a cross-sectional relationship between the foreign fund net shareholdings ($NetPurchaseInShareHolding_i,t$) and stock liquidity within the Fama and MacBeth (1973) cross-sectional regression framework, suggesting that foreign institutional investors sell their illiquid stocks over liquid stocks to conserve liquidity under extreme market uncertainty. Our results are consistent with the findings that fund managers basically consumed liquidity during the worst timing possible.

Our findings indicate that fund managers strategically sell their illiquid stocks (e.g., stocks in Financials sectors) over liquid stocks to conserve liquidity in response to poor market conditions. Our results are consistent with the findings that fund managers consumed liquidity during the worst timing possible.

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Appendix A

Table A1
Regression of foreign institutional investors aggregate changes in shareholdings on stock liquidity.

|                     | (1)       | (2)       |
|---------------------|-----------|-----------|
| $DE_{i,t-1}$        | -0.153    | -0.146    |
|                     | (1.3)     | (1.25)    |
| $FE_{i,t-1}$        | -0.483*** | -0.488*** |
|                     | (-2.84)   | (-2.66)   |
| $HR_{i,t-1}$        | -0.316*** | -0.317*** |
|                     | (-12.43)  | (-12.68)  |
| $return_{i,t-1}$    | 5.836***  | 6.384***  |
|                     | (3.21)    | (3.28)    |
| $SMB\_Beta_{i,t-1}$ | -2.933    | -0.27     |
|                     | (-0.27)   | (-0.03)   |
| $HML\_Beta_{i,t-1}$ | -0.533    | -0.67     |
|                     | (-0.03)   | (-0.67)   |
| $MKT\_Beta_{i,t-1}$ | -4.261    | 0.512     |
|                     | (-0.21)   | (0.21)    |
| $MOM\_Beta_{i,t-1}$ | -0.162    | -0.172    |
|                     | (-0.99)   | (-1.05)   |
| Constant            | 109,212   | 109,212   |
| N                   |           |           |

This table reports the Fama and MacBeth (1973) cross-sectional regression result of Eq. (5). we follow Hasbrouck’s (2009) to use the effective bid-ask spread (HR) as our liquidity measure. The risk loading factors of the MKT, the SMB, the HML, and the MOM are from the Fama-French-Carhart four-factor model (FFC4, Carhart (1997)) based on previous 36–60 monthly observations. T-statistics are reported in parentheses. *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively.
