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Homemade Foreign Trading

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Abstract

Using cross-border holding data from all custodians in China's Stock Connect, we provide evidence that Chinese mainland insiders tend to evade the see-through surveillance by round-tripping via the Stock Connect program. After the regulatory reform of Northbound Investor Identification in 2018, the correlation between insider trading and northbound flows decays, and so does the return predictability of northbound flows. The reduction of return predictability is especially pronounced among less prestigious foreign custodians and cross-operating mainland custodians, behind which mainland insiders are more likely to hide. Our analysis sheds light on the role of regulatory cooperation over capital market integration.

JEL Classification: F38, F65, G11, G14, G15, G28

Keywords: Cross-border Flows, Insider Trading, Northbound-Southbound, See-through Surveillance, Regulatory Arbitrage

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1 Introduction

Global integration of capital markets provides essential benefits including international diversification, growth opportunities, and information efficiency (see, for example, [Karolyi and Stulz, 2003](#); [Bekaert et al., 2007](#); and [Kacperczyk et al., 2021](#)). Over the past two decades, China has taken steps to facilitate international participation, including Qualified Foreign Institutional Investors (QFII) and Renminbi QFII (RQFII) which allow licensed international institutional investors to directly invest in Chinese securities. Among all the accesses to Chinese capital market, the Stock Connect launched on November 17, 2014 is the newest “opening-up” effort from Chinese policy makers, and it quickly became the dominant investment channel for foreign investors.¹

As we explain in Section 2, the Stock Connect program allows for trading in both directions; it works like a bridge that not only enables investors from Hong Kong and oversea areas—but also qualified investors from Mainland China—to directly trade eligible shares listed on the other market via their local exchanges, without the need to adapt to the operational practices on the other market. More importantly, investors on each side can only use their funds to trade securities in the specified market(s) on the other side, without further access to the rest of the economy in the other market. Representing one of the greatest reforming innovations by China’s top authorities, this program achieves the goal of international financial integration (in certain stock/bond markets) with the rest of world but without opening up China’s capital account.

This paper highlights one of the dark sides of the Stock Connect program. Echoing the literature on financial innovations ([Tufano, 2003](#)) where new financial products are often *created to exploit* regulatory arbitrage, we argue that the connect program *creates* regulatory loopholes for opportunistic mainland investors to arbitrage by round-tripping.² More specif-

¹By the end of the first half of 2022, international investors hold RMB 2.5 trillion of A-shares through the Stock Connect, accounting for 2.7% of A-share total market capitalization, which stands at more than ten times the amount held through the other two channels combined (QFII and RQFII, 0.2 trillion).

²Borrowed from the long-standing research on international trade, “round-tripping” typically refers to the practice of registering a firm in an offshore financial center so that investment appears to be of foreign

ically, we present evidence that a group of “homemade” mainland investors—likely Chinese corporate insiders for the purpose of identity concealment— engage in cross-border tradings via the connect program as if “foreign investors.” On December 19, 2022, the mainland and Hong Kong exchanges reached an agreement on the further expansion of eligible stocks under Stock Connect.³ With the market integration, how the connected market defends itself from homemade foreign trading is increasingly important.

But how does the Stock Connect program help conceal investors’ identities? As explained in Section 2.2, the mainland exchanges adopt a see-through surveillance scheme for trading and clearing, in which orders from any stock trading account must be mapped to the corresponding trader’s personal information. In contrast, under Hong Kong’s jurisdiction, financial intermediaries (brokers or custodians) hold their clients’ securities under the names of intermediaries. During the first three years after the launch of the Stock Connect program in 2014, northbound trading adopted the scheme that is consistent with Hong Kong’s jurisdiction. Therefore, the Stock Connect program offers an opportunity for domestic traders in mainland markets to disguise themselves by trading eligible A-shares of connected firms indirectly.

The see-through regulatory reform on northbound trading in the third quarter of 2018 is a game changer. In a joint announcement made by the two regulators on both sides on August 24, 2018, the Stock Connect program would establish the Northbound Investor Identification System, under which northbound custodians are required to assign a unique identifier to their northbound clients. Via this see-through surveillance, the mainland regulator can identify the actual beneficial owner of each northbound trade and deal with those irregular mainland investors.

A natural question then arises: Who are more likely to exploit the advantage of disguising themselves through the connect program? The most obvious candidate is mainland insiders, who possess valuable private information but are subject to heavy scrutiny when

origin (Luo and Tung, 2007).

³For more details, please refer to the Hong Kong stock exchange’s [news release](#).

trading A-share directly. As a preliminary supporting evidence, Section 2.3.1 documents that the return predictability of northbound flows weakened quite a bit in 2018. In addition, the timing of the weakening of return predictability lined up well with that of the policy shock, suggesting that at least part of the information advantage of northbound flows stems from round-tripping homemade investors.

It is challenging to perfectly distinguish these homemade foreign investors from actual northbound investors. Our main empirical analysis takes advantage of a comprehensive dataset on northbound custodian holdings, which records stock-level holding of each northbound custodian operated in the Hong Kong exchange. This dataset allows us to explore irregular trading activities that are potentially from mainland insiders based on the cross-sectional differences in custodians' reputation as well as their connection with mainland markets (and thus mainland insiders). For instance, less prestigious foreign custodians are less concerned about their reputational capital. In the mean time, cross-operating mainland custodians are better connected with mainland businesses. Hence, these categories of custodians are more likely to serve as a cover for round-tripping activities.

Using this northbound custodians' stock holding data from March, 17, 2017 to December 31, 2019, we begin with a study of return predictability of northbound flows from different origins in the Chinese A-share market. Based on the portfolio analysis and cross-sectional regressions of future stock return on past northbound flows, we find that although the trading activities of less prestigious foreign custodians and cross-operating mainland custodians were informative in the early days of the Stock Connect, their northbound flows have become uninformative about future stock since the third quarter in 2018. The declining predictive power coincided with a policy shock, i.e., the regulatory reform on Northbound Investor Identification, which aimed to crack down on homemade foreign trading from the two categories of problematic custodians mentioned above.

It is well documented in previous studies that in China, state-owned enterprises (SOEs) and non-SOEs differ in government scrutiny in ways that might make non-SOEs better ac-

commodating insiders as homemade foreign investors. Meanwhile, centrally administrated SOEs, or central-SOEs, have more levels of administration and hence lack information transparency; this also creates space for homemade foreign trading, relative to SOEs that are owned by local governments (local-SOEs). Consistent with these hypotheses, we find that for both central-SOEs and non-SOEs, the return predictability of northbound flows from problematic custodians fell after the reform, and the reduction is significantly below that of northbound flows from other custodians.

Next, we examine whether mainland insiders possess information similar to round-tripping ones. The results show that concurrent trading activities of northbound investors from problematic custodians and mainland inside sellers become relatively infrequent after the regulatory reform. Furthermore, the pattern is more pronounced in firms with a higher probability of earnings management and informed trading, consistent with the hypothesis that round-tripping insider trading before the reform is more likely to occur in a more opaque information environment.⁴

Literature Review

Unintended consequences of economic reform: Identity concealment Our article relates most directly to earlier work on the identity concealing activities as an unintended consequence of policy reforms. Typically in the international trade literature, domestic capital could disguise itself as FDI by round-tripping—i.e., channeling capital from the home market (e.g., developing economies such as mainland China and Russia) to an offshore financial center (e.g., Hong Kong, Singapore, and the British Virgin Islands) before re-entering

⁴Unlike in the U.S., where insider purchases are more informative than insider selling (Lakonishok and Lee, 2001; Jeng et al., 2003), insider buys and sales are equally informative in predicting future returns in China (He and Rui, 2016; Lian et al., 2018). Recently, Chang et al. (2021) even find that insider selling is much more responsive to firm fundamentals than insider purchases in China. Indeed, we observe a limited policy effect on the correlation between northbound flows and insider buying. We attribute this to the intuition that insiders could simply leak the information to their connections for profitable purchases, though for opportunistic selling insiders have to sell their own stakes.

the home market; this differs from our paper, which focuses on stock market trading.⁵ In the context of asset trading, our study is related to [Huang and Shiu \(2009\)](#) who show that local firms in Taiwan tend to generate their own bogus foreign investments to mislead retail investors because the presence of foreign owners is highly valued, and to [Fisman and Wang \(2015\)](#) who document that during Chinese privatization, SOE sellers tend to disguise themselves as private companies in asset transfers, because sales by SOE face greater regulatory scrutiny.⁶

Compared to the above mentioned papers that have explored tax evasion, tunneling, and market misleading through identity concealment, we examine round-tripping of insiders who choose to profit on their non-public information through the Stock Connect program. Further, our paper differs from previous studies on bogus foreign trading behaviors in at least two respects. First, our paper provides the first systematic set of evidence on custodian-level homemade foreign trading in the context of the Chinese cross-border stock market; in contrast, disguised foreign direct investments (FDI) evaluated in prior studies often involve companies' public information. Second, we empirically examine the effectiveness of the penetrating regulation that aims to strengthen regulatory cooperation and safeguard market integrity, and our results are consistent with a successful reform that disciplines homemade foreign investors without affecting the information advantage of genuine foreign investors, potentially improving the informativeness of financial markets.

Impact of China's Stock/Bond Connect program There is an emerging literature studying the impact of the China's Stock Connect program. Firms with connected stocks

⁵It is well documented that the round-tripping phenomenon in FDI is likely driven by policy reforms that originally intended to attract FDI by giving preferential treatments (e.g. lower tax, tariff reductions, credit access) to foreign capitals relative to domestic capital ([Dooley and Kletzer, 1994](#); [Chor, 2009](#); [Fung et al., 2011](#); [Ledyeva et al., 2015](#); [Casi et al., 2020](#); and [Liu et al., 2021b](#)).

⁶Examples in the developed markets include [Hanlon et al. \(2015\)](#), who show that for tax evasion purposes, U.S. individuals move funds to tax haven entities and then reinvest them back in U.S. stocks and bonds. Besides, as documented in [Silvers \(2021\)](#), across a wide range of countries, wrongdoers who recognize cross-border regulatory gaps can exploit them to evade repercussions, as regulators have no legal right to acquire information for prosecution in foreign jurisdictions.

experienced a demand-induced value appreciation (Liu, Wang and Wei, 2021a), and have increased the number of selective private meetings hosted by major foreign brokers to raise capital abroad (Yoon, 2021).⁷ Ma et al. (2021) document that connected stocks with lower covariances with the global market experience greater price appreciation, consistent with Shan et al. (2022) who argue that Chinese stocks provide diversification benefits for international investors.

Extant studies also explore the informativeness of northbound trading (Chen et al., 2019; Bian et al., 2020; Lundblad et al., 2022). For example, using foreign investors’ daily trading data from Shanghai Stock Exchange, Lundblad et al. (2022) show that order flows from the Stock Connect as well as QFII and RQFII can predict stock price movements. They argue that the predictive power mainly comes from foreign investors’ ability to process firm-level information, which is “private” before its public release.

Based on custodian-level daily trading information, we show that one of the information advantages of foreign investors in the Chinese stock market comes from round-tripping mainland insiders. By documenting different trading behaviors of northbound investors from different origins of custodians, we uncover a new channel of identity concealing as one of the unintended consequences of China’s market liberalization.

Finally, as explained in Amstad and He (2020), China launched Bond Connect in July 2017 as a separate and mostly independent effort; like Stock Connect, Bond Connect enables investors from mainland China and overseas to trade in each other’s bond markets via related mainland and Hong Kong financial infrastructures. Clayton et al. (2022) emphasize that the history of the introduction of Bond Connect presents China’s gradual approach to liberalizing capital inflows as balancing the desire to gain international currency status against the risks of sudden capital outflows.

⁷For studies on the real effect of the Stock Connect program, see Carpenter et al. (2021) and Ma et al. (2021), among others. For instance, Ma et al. (2021) show that the Stock Connect can reduce domestic credit misallocation at the cost of higher sensitivity to extra volatility in funding costs in the aftermath of liberalization.

Insider trading With the copious literature on insider trading, our paper contributes to the branch on the identification of irregular insider trading.⁸ In recent years, the rising incidents of cross-border insider tradings have led to an increasing willingness by the SEC as well as other regulatory authorities to pursue enforcement actions with substantial international cooperations (Lehtman and White, 2013). In this way, our paper offers supportive evidence for the effectiveness and necessity of cross-border supervision cooperation.⁹

2 Institutional Background and Policy Shock

This section provides the institutional background of the Stock Connect program. Before describing our data and sample construction, we explain the key institutional details about the regulatory differences between the Chinese mainland and Hong Kong stock markets, the regulatory reform on northbound investor identification, and its market impact.

2.1 The Stock Connect and Custodian Services

On April 10, 2014, the China Securities Regulatory Commission (CSRC, the regulator of the stock market on the side of mainland China) and the Securities and Futures Commission (SFC, the regulator on the side of Hong Kong) approved the development of a pilot program for establishing mutual stock market access between the two stock exchanges in mainland China (Shanghai Stock Exchange, SSE, and Shenzhen Stock Exchange, SZSE) and Hong Kong Exchange (HKEX) in Hong Kong. Following this announcement, the “Shanghai-Hong

⁸Identifying irregular insider trades is challenging considering the fact that illegal insiders have strong motivation to conceal their identity (Cornell and Sirri, 1992), although several papers distinguish opportunistic insider trades from routine ones based on the seasonality (Cohen et al., 2012) or the profitability of insider trades just before earnings announcements (Ali and Hirshleifer, 2017).

⁹Our paper is also related to previous studies examining broker tipping of insider trades. By establishing direct connections between insiders and brokers, McNally et al. (2017) document that some traders mimic insider positions, which is consistent with the hypothesis that brokers tip their non-insider clients about insider trades. Similarly, the information generated by executing informed trades can be leaked to other clients (Di Maggio et al., 2019), broker-affiliated analysts and mutual fund managers (Li et al., 2021). In this paper, we show that certain types of brokers serve those cross-border customers whose trading exhibits similar patterns as firm insiders in the mainland market, a phenomenon that is consistent with, and also an extension of previous literature.

Kong Stock Connect” and “Shenzhen-Hong Kong Stock Connect” were officially launched on November 17, 2014 and December 5, 2016, respectively. Throughout the paper we refer to these two programs as the Stock Connect program, or simply the connect program.

2.1.1 Northbound and southbound flows

Under these two programs, qualified investors in each market are able to trade eligible stocks—e.g., the constituent stocks in major indexes—on the other market, using their local brokers and clearing houses. Take international investors as an example; via the connect program, they are able to place orders to the mainland exchanges through locally registered securities brokers and custodian banks in the central clearing and settlement system (CCASS) operated by Hong Kong Securities Clearing Company Limited (HKSCC), a wholly-owned subsidiary of the HKEX. In this example, connected stocks in mainland exchanges are all quoted and traded in RMB, with the HKSCC providing settlement as well as auxiliary currency exchange services.

From the perspective of capital account liberalization, these funds in the Stock Connect program can only circle inside a closed system, as the connect program is “disconnected” from the rest of the economy on the other market. In light of this, as one of the most representative reforming innovations in the Chinese stock market, the Stock Connect program achieves the goal of international financial integration with the rest of world *without* opening up China’s capital account.

All international investors are allowed to trade eligible A-shares through the connect program, while mainland investors with account balances above RMB 500,000 are allowed to trade eligible shares listed on the HKEX. Since Hong Kong lies in the south of China, international investor flow on A-shares is termed “northbound flow” originated from HKEX while mainland investor flow on Hong Kong shares is termed “southbound flow” originated from SSE and SZSE.

The exchanges on both sides of the Stock Connect program disclose certain trading

information to their respective investors.¹⁰ Before March 17, 2017, after the market close investors on both sides could only observe the daily aggregate holdings via the connect. The trading information expanded to daily stock-level holdings after March 17, 2017. Using data on stock-level northbound holding starting from March 17, 2017, [Chen et al. \(2019\)](#) demonstrate that northbound investors possess information advantage over domestic traders on the Chinese mainland market. In this light, our paper further explores the informativeness of northbound investors from different origins and the potential “sources” of information.

2.1.2 Custodian services and see-through surveillance

Consistent with the former colonial power (i.e., Britain), Hong Kong has adopted an indirect holding system of securities, with the HKSCC providing securities depository service and acting as the central clearing house for transactions in the Hong Kong market. More specifically, securities are held in custody of brokers/banks, who are exchange/clearing participants of the CCASS operated by the HKSCC and provide custodian services for investors. Importantly, the depository system in Hong Kong keeps the identities of the actual beneficial holders behind a veil; in other words, financial intermediaries hold their clients’ securities under the names of intermediaries and track the corresponding ownership records in their books.¹¹ As a result, the actual beneficial owner of a security would not appear as the security’s owner on the security issuer’s register. The SFC, the regulator in Hong Kong’s stock market, normally obtains trading information, by requiring individual custodians to identify clients, orders and trades for regulatory and market surveillance purposes.¹²

The arrangement, however, was quite different in the mainland market. The mainland

¹⁰In the early days of the Shanghai-Hong Kong connect, northbound trading, computed as the dollar amount of northbound investors’ net inflows, was subject to an aggregate quota of RMB 300 billion on its cumulative balance, together with a daily quota of RMB 13 billion monitored on a real-time basis; the same quotas apply to the Shenzhen-Hong Kong connect. The aggregate quota was removed in August 2016, and the daily quota has increased four-fold to 42 billion since May 1, 2018 for both programs.

¹¹The common practice refers to “nominee accounts” in “Regulation of Nominee Accounts in Emerging Markets - Final Report” issued by the International Organization of Securities Commissions (IOSCO) in October 2011. For more details, see <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD362.pdf>.

¹²For more details, please refer to Page 12 of the HKEX [report](#).

markets adopt a so-called “see-through” market supervision model for trading and clearing. Under this model, investor accounts are registered with investors’ real names at the China Securities Depository and Clearing Corporation (CSDC), the central securities depository on the mainland side. More precisely, orders originating from the mainland exchanges must be labelled with the account numbers mapping to the personal-level information. The term “see-through surveillance” is also referred to as “penetrating surveillance” or “penetrating supervision,” and in this article we use these three terms interchangeably.

During the early days of the Stock Connect program, northbound trading followed the arrangement consistent with Hong Kong’s stock market. Specifically, when international investors place orders to the mainland exchanges through securities brokers and custodian banks registered in Hong Kong, only identifiers of these “northbound custodians” were submitted to the HKEX. As a result, the mainland side of the Stock Connect can only see the names of custodians, instead of those of actual beneficial owners.¹³

Among many important implications of the distinct regulatory environments on the two sides of the trading venue, one issue stands out which is particularly relevant for mainland investors. Compared to trading eligible A-shares directly in mainland exchanges, trading these A-shares indirectly through the connect could help mainland investors conceal their identities, and often times for illegal purposes. On June 13, 2018, a news release issued by the CSRC credited the law enforcement cooperation framework between the CSRC and the SFC, reporting successful investigations of 176 cases on suspicious Stock Connect trades since 2017.¹⁴

¹³Detailed custodian-level holdings are available to public investors via the [website](#) of “CCASS Shareholding Search.” In terms of corporate governance issues, when aggregate northbound holdings rank among the top ten largest shareholders, the code “CCASS” would appear on the annual reports of firms listed on the mainland stock market as the nominee northbound owner.

¹⁴For instance, in the first ever illicit homemade foreign trading uncovered by the CSRC in November 2016, several local investors manipulated prices through the Stock Connect to intentionally mislead other retail investors, by controlling three HKEX accounts and one SSE account to create artificial trading volumes and inflated prices of a targeted A-share stock, Zhejiang China Commodities City Group (600415.SH). For more details, please refer to the news releases on the CSRC website, <http://www.csrc.gov.cn/csrc/c100028/c1001259/content.shtml>.

2.2 Regulatory Reform on Northbound Investor Identification

Since the launch of the connect program, the regulatory discrepancy regarding investor identification between the two sides of the Stock Connect has concerned the top authorities in China’s financial system. In September 2016, to better facilitate the market surveillance in accordance with the “Home Market Principle,” the CSRC published a press release, stating that mainland and Hong Kong regulatory authorities had reached a consensus in establishing an investor identification system for northbound trading. According to that principle, “trading via Stock Connect has to observe the trading rules and arrangement of others’ market,” which, in this particular context, mandates international investors observe the see-through surveillance requirement on the Mainland market. As a result of this joint effort, in November 2017, the HKEX issued a document, announcing a later rollout of Northbound Investor Identification System from the third quarter of 2018:¹⁵

“The plan to implement a reciprocal investor identification regime for Stock Connect demonstrates the SFC and the CSRC’s resolve to further strengthen regulatory cooperation in combatting market misconduct through effective monitoring and surveillance. This is critical to safeguard market integrity and to strengthen the protection of investors in both markets.”

However, the exact date of the regulatory reform, as well as the details of its implementation, remained unclear.

On August 24, 2018, the CSRC published a press release stating that the Northbound Investor Identification System would come into force. In this investor identification system which was officially launched on September 26 in that year, brokers assigned a unique number, known as the Broker-to-Client Assigned Number (BCAN), to each northbound client; every northbound order routed to the mainland exchanges was tagged with the BCAN on a real-time basis. Each BCAN was mapped to the Client Information Data (CID) of that

¹⁵Please refer to the [news release](#) issued by the HKEX, and the [press release](#) in September 2016.

particular client which includes the client's name, identity document issuing country, ID type and ID number. Each broker is required to submit the BCAN-CID mappings for all of its northbound trading clients to the HKEX, who then send the mapping files received to the mainland exchanges every trading day. On October 22, 2018, front-end controls for Northbound trading based on the BCAN went online, which can automatically reject ineligible trading requests. According to follow-up press releases by the CSRC, the see-through surveillance based on BCAN has allowed the HKEX to actively assist mainland regulators when fighting against financial crimes and enhancing law enforcement in the Stock Connect program.¹⁶

We emphasize that the see-through surveillance mainly affects round-tripping mainland investors who are subject to domestic legal enforcement in China, while leaving genuine foreign investors in the Hong Kong Exchange largely unaffected. There are several reasons for this claim. First, from the perspective of the mainland, the enhanced surveillance is designed to conform with the mainland regulatory environment and complement its supervision of mainland investors. Using account level information of mainland investors collected by two exchanges in Shanghai and Shenzhen, the mainland authorities have established a dominant advantage in detecting suspicious trades by mainland investors (say, related parties transactions) over foreign investors. Second, Hong Kong, thanks to its common-law origin inherited from the British colonial era, has earned a world-renowned reputation for its transparent and strong legal systems, together with its effective law-enforcement against criminal activities in financial markets. Based on the public information released by the SFC, the Hong Kong authorities have been effectively tackling market misconduct of insiders and brokers even before the 2018 see-through surveillance reform. Last but not least, after the 2018 see-through surveillance reform, very few enforcement actions taken by the SFC were against genuine foreign investors in the Stock Connect.¹⁷

¹⁶For more details, please refer to the news releases on the CSRC website and the website of Shanghai Stock Exchange, <http://www.csrc.gov.cn/csrc/c100028/c1000989/content.shtml>.

¹⁷For more details, please refer to the website of the SFC, <https://apps.sfc.hk/edistributionWeb/>

In sum, the see-through surveillance system, which is established to conform the trading protocols of the northbound direction in the Stock Connect program to those in mainland exchanges,¹⁸ significantly enhances the information that the regulators can see, while it barely affects the information available to public investors. Any mainland investor can always observe the daily stock-level northbound holdings and northbound custodians' holdings, before and after the regulatory reform; in contrast, after the reform the mainland regulator can identify whether some seemingly “foreign” beneficiary owners are in fact round-tripping homemade mainland investors.

2.3 Market Responses to the Policy Shock

Who are these homemade foreign investors that are targeted by the penetrating surveillance launched by the regulatory reform? The answer to this question offers important leads for our study of market reactions to the policy shock.

The most obvious candidate for such investor groups is mainland insiders, who possess valuable information but are subject to heavy scrutiny in the mainland markets. Before the penetrating surveillance, the Stock Connect program provides an alternative channel—i.e., round-tripping—for domestic insiders to exploit their private information for illicit but lucrative gains by concealing themselves behind their HKEX custodians. After the launch of surveillance, these connected firms' insiders will be concerned about being detected, which effectively deters them from sending their orders to the Stock Connect.

[gateway/EN/news-and-announcements/news/enforcement-news/](#).

¹⁸In the same document issued in November 2017 mentioned in Section 2.2, the HKEX also noted that the CSRC has agreed to provide similar Investor ID information in respect of southbound trading to the SFC, which will be implemented as soon as possible after the implementation of the Investor Identification model for northbound trading; see this [press release](#), Page 3. However, the establishment of the southbound trading surveillance system is much delayed. On December 20, 2019, which is almost the end of our sample period (12/31/2019), the CSRC published the rules and arrangements of the Southbound Investor Identification System, and the new system was officially launched on January 13, 2020.

2.3.1 The impact on return predictability

If the regulatory reform implemented in August 2018 is effective in fighting against round-tripping, it should affect the information advantage and thus return predictability of northbound investor flows. Figure 1 plots the cumulative returns of a weekly-rebalanced long-short strategy between the top- and bottom-decile portfolios sorted by northbound investor flows, starting from March 17, 2017 (the date on which regulators started releasing the daily stock-level northbound flows to the public) to December 31, 2019 (when Covid-19 hit China). Consistent with the literature mentioned above (Chen et al., 2019; Lundblad et al., 2022), Figure 1 shows that this long-short strategy generates an annual return of 37.2% during the 17-month period before the see-through surveillance reform on August 2018, which is extremely impressive compared to the contemporaneous annualized market excess return of -11.7%.

Intriguingly, there is a dramatic weakening of the return predictability of northbound flows, which lined up surprisingly well with the timing of the see-through surveillance reform. As shown in Figure 1, during the post-reform period which spans about 16 months after August 2018, the excess return from the same long-short strategy is a mere 8.8% annualized (for comparison, the contemporaneous market excess return is 9.6%). Consistent with the hypothesis that the see-through surveillance mainly affects round-tripping mainland investors who are subject to domestic legal enforcement in China, this striking empirical pattern suggests that a major source of the information advantage of “foreign” investors is those Chinese mainland traders who decide to route their trades via the Stock Connect. In this regard, our paper directly speaks to the predictability of cross-border investor flows (e.g., Chen et al., 2019; Lundblad et al., 2022): from our perspective, a significant part of the information advantage comes from “homemade” foreign investors.

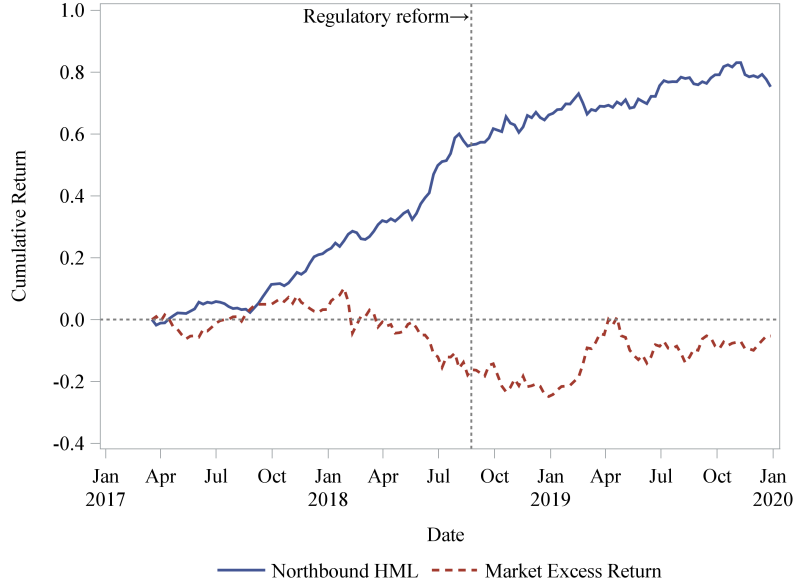


Figure 1: Return predictability of northbound investor flows

This figure shows the cumulative returns of a long-short strategy between the top- and bottom-decile portfolios sorted by aggregate northbound investor flows with weekly rebalancing (in blue solid), and the cumulative return of the entire A-share market portfolio in excess of the one-month China Development Bank bond yield as a proxy for the risk-free benchmark following [Amstad and He \(2020\)](#) (in red dash). The sample spans from March 17, 2017 when the HKEX started to release daily northbound holding, to December 31, 2019. We weight stocks by their floating market capitalization winsorized at the 5% and 95% levels. The vertical line corresponds to the announcement date of the regulatory reform by the CSRC on August 24, 2018.

2.3.2 The effect on insider trading in the mainland market

As explained above, one of the direct targets of the “see-through” regulatory reform is mainland corporate insiders. Taking the homemade foreign trading hypothesis as a whole, we hence conjecture that mainland insider trades among the connected firms should first experience a decline after the Stock Connect program; and this trend should reverse after the 2018 see-through surveillance system, if the reform is effective.

Figure 2 presents how the wedge in insider selling between connected firms and unconnected firms evolves over time, together with the associated 95% confidence intervals. Recall the official launch date for the Stock Connect program was 11/17/2014. As the list of con-

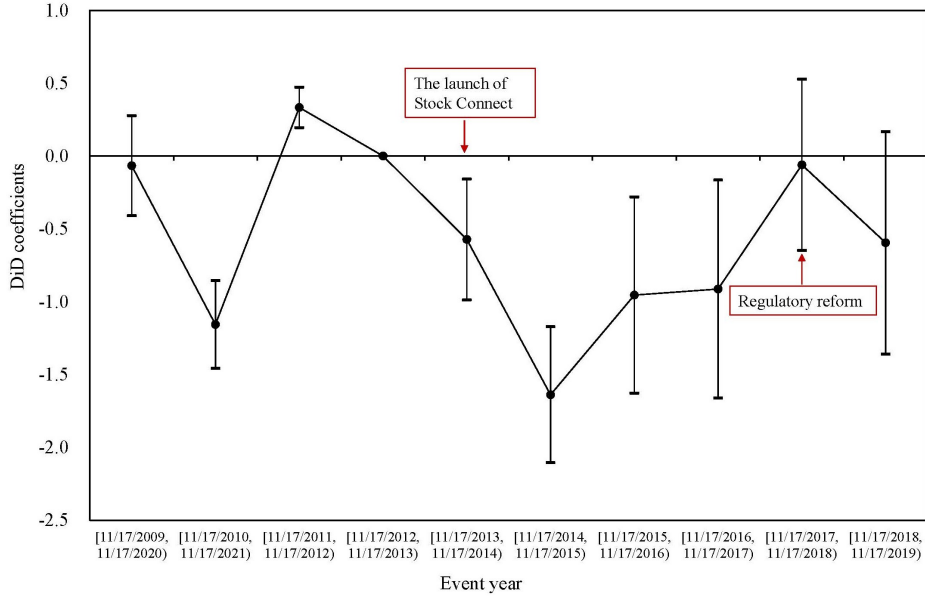


Figure 2: Difference of insider trades between connected and unconnected firms
The dynamic evolution of differences in insider selling between connected firms and unconnected firms and the associated 95% confidence intervals calculated from standard errors clustered by firm and year. The x -axis displays the years since the launch of the Shanghai-Hong Kong Connect Program (11/17/2014), ranging from 2009 to 2019. The y -axis displays the differences in the natural logarithm of one plus total RMB amount of insider selling. Since the list of connected firms was announced in early 2014, to alleviate the concern of market anticipation we take the year before the launch of Stock Connect program (i.e., 11/17/2012 to 11/17/2013) as the benchmark year. The firm fixed effects and event-year fixed effects are included.

connected firms was announced in advance in early 2014, to reduce the contamination caused by market anticipation we take the period from 11/17/2012 to 11/17/2013 as the benchmark period. Also, to minimize the potential contamination by a few mega stocks, we take the eligible stocks that rank bottom 70% for both size and turnover (i.e., the two key drivers of eligibility) in 2013 as the treated group, and Shenzhen-listed unconnected firms whose size and turnover are within the range of the treated group serve as the control group.¹⁹

In Figure 2, we observe a significant drop in insider selling in the connected (treated) firms on the year of the launch of the Stock Connect program, consistent with our hypothesis

¹⁹Typically, the list of connected stocks is updated every half year. We did not choose Shanghai-listed firms whose size and turnover are within the range of the treated group, because these firms—although unconnected when the Shanghai-Stock Connect got launched—would most likely become connected in the following updates. For this reason we select the control group from Shenzhen-listed unconnected firms.

that mainland insiders were substituting their direct trading activities in mainland exchanges with “indirect” northbound Stock Connect tradings. In the raw data, during the period from 11/17/2016 to 11/17/2017, the average log dollar amount of insider selling in the connected firms only increases by 14 percentage points compared with the benchmark year (i.e., 11/17/2012 to 11/17/2013); in contrast, the increase is 111 percentage points in the unconnected firms. The difference of 97 percentage points roughly matches the coefficient of -0.91 for the dummy of 11/17/2016 to 11/17/2017.

Importantly, this “substitution” effect appears to be only at work before the establishment of the see-through surveillance system: as shown, the reduction of mainland insider selling in the treated connected firms reverted back to zero during the year of regulatory reform in 2018. Taken together with the weakening of return predictability of northbound flows (Figure 1), the dynamics of insider selling can be rationalized as the regulatory reform effectively inhibits connected firms’ insiders from disguising themselves in northbound flows, forcing insiders to circle their trades back onto the mainland market.²⁰

2.4 Categories of Northbound Custodians

In the indirect holding system adopted by Hong Kong, securities are held in custody of brokers/banks (i.e., custodians) who serve as exchange/clearing participants of the CCASS operated by the HKSCC. In contrast to the mainland’s “see-through” market supervision model, these custodians keep the identities of their clients—the actual beneficial holders of the securities in question—under a veil. This section classifies these northbound custodians based on their origins, a dimension that we will investigate in great detail.

Licensed corporations and registered institutions can apply for exchange/clearing participantship in the CCASS. The Stock Connect program is open to all exchange/clearing

²⁰Recent papers (e.g., Dai et al., 2021) have postulated that the capital market liberalization stems insider selling thanks to improved corporate governance in the presence of sophisticated foreign investors. These papers, however, are inconsistent with “reverse” insider sales post reform. Our explanation provides new insights into understanding insider trading activities from the angle of regulatory arbitrage.

participants (i.e. northbound custodians), providing that they meet certain requirements regarding technology capability, risk management and other areas specified by the relevant exchange and clearing house.²¹ In Figure 3, we plot the aggregate market value of northbound custodian holdings as a fraction of the total market capitalization of all connected stocks (the right scale), and their outstanding balances (in trillion RMB) from different origins at the end of each quarter. As shown, the northbound holdings have been increasing over time, both in terms of dollar balance and as a fraction of the whole. At the end of 2019, northbound holdings reached about 2.59% of total connected stocks.

We go through the list of 188 custodians participating in northbound trading manually in order to identify the origin of each custodian. We sort all custodians into 29 foreign custodians, 82 Hong Kong, Macau, and Taiwan custodians, and 77 Chinese mainland custodians based on their controlling shareholders' origins.

Figure 3 shows that foreign custodians, which include UBS Securities (Hong Kong) Ltd. and J.P. Morgan Broking (Hong Kong) Ltd. as leading examples (Appendix Table A2), are dominating in the custodian market for the Stock Connect program. In 2019, about 93% (or 2.41% of total connected stocks) are intermediated by foreign custodians. The market share for mainland custodians, which include CITIC Securities Brokerage (Hong Kong) Ltd. and CCB International Securities Ltd. as leading examples (the left half of Appendix Table A3), is relatively small (about 6.02% in 2019). The market share for Hong Kong, Macau and Taiwan custodians is even smaller (about 0.88% in 2019); the right half of Appendix Table A3 gives the detailed list for this category, which includes Ever-long Securities Co., Ltd. and President Securities (Hong Kong) Ltd., among others.

2.4.1 Foreign custodians: less vs more prestigious

Before the see-through surveillance reform, foreign custodian flows served as an ideal cover for mainland investors' irregular trading activities. Among them, we conjecture that

²¹For more details, please refer to the HKEX [website](#) website. For the latest list of eligible participants for the Stock Connect, see this HKEX [website](#).

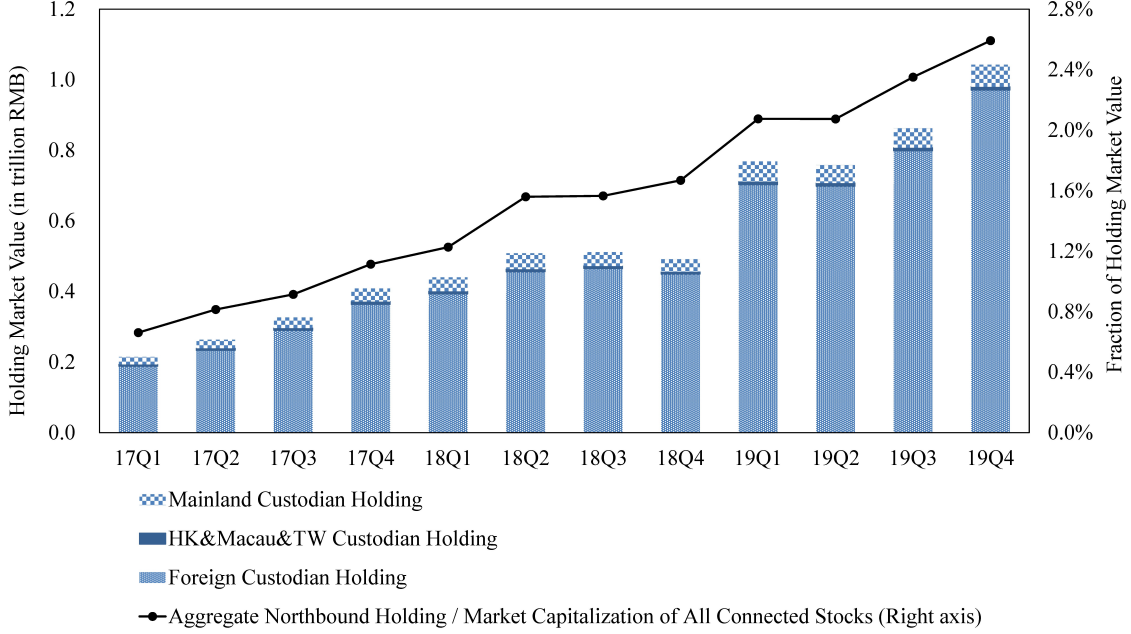


Figure 3: Northbound stock holdings by market value (in Trillion RMB)

The northbound holdings’ market value (in trillion RMB, left scale) from different origins of northbound custodians at the end of each quarter. The line (right scale) plots the aggregate northbound holdings’ market value as a fraction of all connected stocks listed on the mainland China’s stock markets.

Chinese mainland investors were more likely to engage in homemade foreign trading via those foreign custodians which were perceived as less “prestigious”. Being less prestigious, these custodians suffer less reputational damage for potential misconduct in their business dealings, and hence are more willing to provide camouflage for illicit tradings.

Specifically, we define a foreign custodian as being more prestigious, if it i) ranks above the median for “fee and commission income,” or ii) is voted as a leader in custody in the emerging markets; otherwise, the custodian is classified as less prestigious and hence with a weaker reputation.²² In our sample, 16 of 29 foreign custodians (e.g. Instinet Pacific Ltd.) are classified as less prestigious custodians and the other 13 custodians (e.g. UBS Securities Hong Kong Ltd.) are more prestigious.

²²Data on custodians’ fee and commission income are from the Bloomberg database and Data on leaders in custody awards are obtained from the website of Global Custodian Library, <https://www.globalcustodian.com/events/leaders-in-custody-2021-04-may-london/>.

2.4.2 Mainland custodians: cross-operating vs non-cross-operating

Because mainland custodians are more likely to be entrenched with stronger business connections in mainland China, it is reasonable to conjecture that they can better accommodate homemade foreign trading thanks to mainland investors' hometown preference, despite their small market share. For instance, for the Chinese mainland custodian China International Capital Corporation (CICC), its mainland parent company is the powerhouse broker-dealer in the mainland market.²³

To shed more light on the homemade foreign trading, we further categorize all mainland custodians based on whether they cross-operate both in the mainland and Hong Kong. We hypothesize that the flows from cross-operating custodians is more likely to represent homemade foreign trading, for at least two reasons. First, compared to custodians without mainland businesses, cross-operating brokers are more closely connected to firms listed on the mainland market (for example, more analyst coverage). Naturally, the greater exposure to the mainland market offers them better chances to serve mainland firm insiders (or their related parties) who are willing to exploit their private information. Second, as noted by McNally et al. (2017) and Li, Mukherjee and Sen (2021), due to business connections, cross-operating custodians have more access to material information; this information could then be leaked to their clients who cannot afford to risk litigation by executing their orders directly on mainland exchanges.

We rely on an official list as the basis of classification. By the Securities Law in China, all securities companies operating in mainland China are under the regulation of the CSRC and are mandated to join the Securities Association of China (SAC), an association for self-regulation and releasing annual operational information of all members. Our classification is based on the list of securities companies that report both mainland and overseas brokerage revenues. By manually matching the CCASS custodian with its parent company, we classify

²³For more details about mainland custodians' performance rankings, please refer to the website of the Securities Association of China, <https://www.sac.net.cn/hysj/zqgsyjpm/>.

a custodian as a cross-operating custodian if its parent company appears on the list in that year; all other mainland custodians are classified as non-cross operating ones.

Appendix Table A4 gives the detailed list of mainland custodians. Less than half of all mainland custodians are categorized as cross-operating in a given year. For example, in 2019, 29 of 77 mainland custodians (e.g. Haitong International Securities Co., Ltd.) are classified as cross-operating custodians and the other 48 custodians (e.g. BOCI Securities Ltd.) non-cross operating.²⁴

2.5 Data and Sample Construction

We obtain daily stock-level holdings of all northbound custodians from the Choice database affiliated with East Money Information Co. Ltd. Our data on market capitalizations, the historical list of connected stocks, and financial statements are from the CS-MAR database, while adjusted opening prices and free-floating shares are from the WIND database. Following Chen et al. (2019), we keep stock-date observations only when the stock was on the connected list on that day.²⁵

We collect information on northbound custodians in our sample period on the website of HKEX, and manually identify 29 foreign custodians, 82 Hong Kong, Macau, and Taiwan custodians, and 77 Chinese mainland custodians. We classify a foreign custodian as more

²⁴Our non-cross operating custodians include the investment bank arms of Chinese state-owned commercial banks; these investment banks focus on the international market without corresponding domestic operations. It is well-known that these large state-owned commercial banks play a pivotal role in almost every dimension of the Chinese financial system (He and Wei, 2022). Nevertheless, in accordance with the provisions in the Law of the People’s Republic of China on Commercial Banks, commercial banks are not allowed to engage in investment, trading or security dealing businesses in the mainland market. This is why BOCI Securities Ltd., who was incorporated in Hong Kong in 1998 as the investment bank arm of Bank of China, is only operating in the overseas market. For robustness, we also reclassify the northbound custodians affiliated with the Big Five Chinese banks (i.e., Bank of China, Construction Bank of China, Commercial and Industrial Bank of China, Agricultural Bank of China, and the Bank of Communications) to cross-operating with qualitatively similar results (untabulated but available upon request).

²⁵The mainland and Hong Kong exchanges are responsible for the semi-annual review of eligible stocks listed on the other market based on the changes in specific indices. For example, the Yonyou Network Technology (600588) was deleted from the eligible stock list for northbound investors by the HKEX on June 12, 2017 as a result of deletion from SSE 180 index (announced on May 31, 2017), and was added back on June 11, 2018 as a result of addition to SSE 180 index (announced on May 28, 2018). We thus exclude it from June 12, 2017 to June 11, 2018 when forming portfolios.

prestigious based on whether it ranks above the median for “fee and commission income,” or it is voted as a leader in custody in emerging markets; and we classify a mainland custodian as cross-operating if it reports both mainland and overseas brokerage revenues to the Securities Association of China. (For more details on these classifications, see Section 2.4). We focus on these two types of problematic custodians throughout the paper, i.e., less prestigious foreign custodians, and cross-operating mainland custodians.

The sample period is from March 17, 2017 to December 31, 2019.²⁶ We construct stock-level northbound investor holdings (NIH) by origin, which are calculated as the ratio of aggregate northbound equity holdings by origin to free-float shares as of the last trading day of each week (in percent; this measure is free of valuation changes due to price fluctuations). Weekly northbound investor flow (NIF , in percent) is calculated as the weekly change in NIH , and NIF_f , NIF_{hk} and NIF_m denote weekly NIF from foreign custodians, Hong Kong, Taiwan and Macau custodians (hereafter HK custodians), and the Chinese mainland custodians, respectively.

Table 1 reports the summary statistics. A couple of observations are worth emphasizing. First, northbound holding of different origins is right-skewed with a majority of ownership concentrating on a relatively small number of connected stocks. Second, among the three categories of northbound custodians, on average foreign custodians have the largest value-weighted northbound investor holdings (NIH_f) of 4.2% as a fraction of free-float shares, with a corresponding value-weighted average weekly flow (NIF_f) of 0.03%. Third, we report the average AR(1) coefficients for all connected stocks; as shown in the last column, northbound flow from mainland custodians is the least persistent among northbound flows from different origins, suggesting that investors from mainland custodians are more likely short-term investors.

Table 2 presents the summary statistics when we break into the subcategories within

²⁶Since March 17, 2017, the HKEX has been releasing daily stock-level northbound holdings of all custodians through the Stock Connect after the market closes. Each day, all market participants can download the historical northbound holding information for the past 12 months, but no earlier than March 17, 2017 on the HKEX website. We choose the end date as December 31, 2019 when COVID-19 hit China.

mainland and foreign custodians. More prestigious foreign (cross-operating mainland) custodians are larger than less prestigious (non-cross-operating) peers from both a holding and flow point. For instance, for foreign custodians, the *NIF* measure has a mean of 0.027% for more prestigious foreign custodians, while the number is only 0.001% for their less prestigious counterparts. Meanwhile, northbound flows from less prestigious foreign custodians (cross-operating mainland custodians) are less persistent than more prestigious (non-cross-operating) peers.

3 Return Predictability of Northbound Flows

We devote this section to documenting the impact of the “see-through” surveillance on the return predictability of northbound flows from different categories of custodians, together with those for firms with different ownership structures.

3.1 Sorting by Origin

We first provide a detailed sorting analysis of return predictability of northbound investor flow by origin. Each week, we sort all connected stocks into five quintiles based on northbound investor flows from different origins of custodians during the past week. Using five value-weighted as well as equal-weighted quintile portfolios using adjusted opening price on the first trading day of the next week, we construct a long-short portfolio that longs the top quintile and shorts the bottom quintile. For value-weighted portfolios, in the spirit of [Jensen et al. \(2021\)](#), we weight stocks by their floating market capitalization winsorized at the 5% and 95% levels.²⁷

We hold the long-short portfolios for one week, and calculate the portfolios’ alphas from the LSY-three-factor model ([Liu, Stambaugh and Yuan, 2019](#)).²⁸ Specifically, the average

²⁷The results are similar with alternative choice of winsorized weightings and capped weightings following [Jensen et al. \(2021\)](#).

²⁸We also calculate the portfolios’ simple excess returns over risk-free rates as well as alphas from the

risk-adjusted returns in pre- and post-reform periods are estimates of α_{pre} and α_{post} in the following regression:

$$R_{i,t} = \alpha_{pre} \times d_{pre,t} + \alpha_{post} \times d_{post,t} + \beta \times X_t + \varepsilon_{i,t} \quad (1)$$

where $d_{pre,t}$ and $d_{post,t}$ are dummy variables indicating pre- and post-reform periods divided based on the announcement day (08/24/2018) of the regulatory reform.²⁹ In (1), X_t is the market factor, size factor, and value factor from the LSY-three-factor model, and $R_{i,t}$ is the excess return in week t on the short leg, the long leg, and their difference. The t-statistics are computed with Newey-West standard errors.³⁰

We report the estimation results in Table 3, with Panel A and Panel B for value-weighted and equal-weighted portfolios, respectively. Before the regulatory reform, the value-weighted average alphas of the long-short portfolio sorted by *NIF* from foreign custodians, reported under “HML,” is 0.498% per week (t-stat = 3.10), or about 25.9% annually; while the number is 0.254% per week (t-stat = 2.97), or about 13.2% annually, for mainland custodians. After the regulatory reform, the return predictability of foreign custodians still exists, though weakens significantly to 0.266% weekly; and the relation between net inflows from mainland custodians and future stock returns turns flat (0.124% weekly but statistically insignificant even at the 10% level). The results are quantitatively similar for equal-weighted portfolios.

As another important take-away, we further test the statistical significance of the return differences between pre- and post-reform, separately for each custodian category, and report them at the last column “Post-Pre HML.” Table 3 shows that none of these return differences are significant, which seems to suggest that regulatory reform has no significant impact on the predictability of northbound investor flows. This conclusion, however, changes when we

CAPM model, the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model. The main results remain quantitatively similar.

²⁹Our results are quantitatively similar if the subsamples are divided based on the effective day of the see-through surveillance reform, i.e., September 26, 2018.

³⁰We use Newey-West standard errors with three lags throughout the sorting analysis in the article.

zoom in and decompose these *NIF*'s based on within-origin heterogeneities in custodians.

3.2 Cross-Sectional Analyses within Origin

Within each custodian origin, we further explore the source of the weakening predictability in cross section. Suppose that homemade foreign trading contributes to the cross-sectional predictability. As the regulatory reform inhibits potential round-tripping behind the veil of these HKEX custodians, we hypothesize that there should be a large decline in the predictive power of northbound flows from less prestigious foreign custodians and cross-operating mainland custodians during the post-reform period. As explained in Section 2.4.1 and Section 2.4.2, this is because less prestigious foreign custodians suffer less reputational loss for potential misconduct in their business dealings while cross-operating mainland custodians are more closely connected to mainland firms because of mainland business. Hence, the disciplining effect of the regulatory reform should be stronger for the two categories of problematic custodians that are more likely to engage in homemade foreign trading.

We find strong support for this hypothesis. As shown in Table 4, before the reform, a long-short strategy based on flows from less prestigious foreign custodians generates a value-weighted LSY-three-factor abnormal return of 0.572% per week, or 29.7% annualized. After the reform, the returns from the same strategy become insignificant (0.021% weekly with $t\text{-stat} = 0.20$). Different from the statistically insignificant return predictability changes in before- and after-regulatory periods shown in Section 3.1, now we observe a significant drop of -0.551% ($t\text{-stat} = -3.08$) in value-weighted average returns per week.

In contrast, for the abnormal returns generated based on flows from more prestigious ones, the return predictability drops slightly after the regulatory reform, but the difference is insignificant, just as in the full sample in Section 3.1. Finally, in terms of the between-group difference, the weakening in return predictability of less prestigious foreign custodians is much stronger than that of more prestigious ones, both economically and statistically significant at -0.374% ($t\text{-stat} = -2.27$) per week. This result is comparable when using

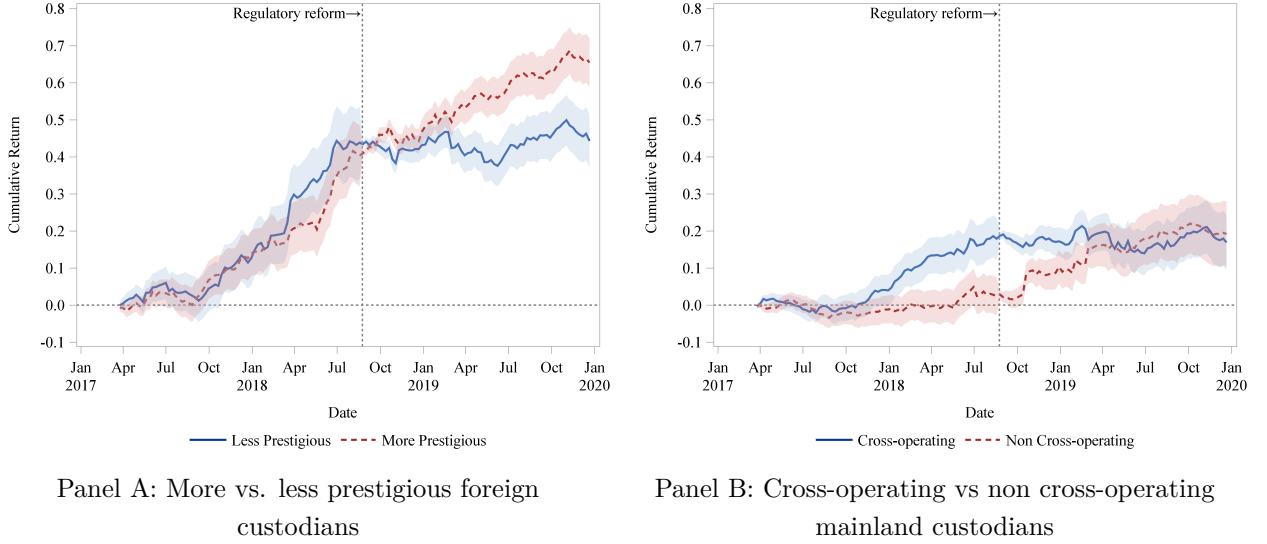


Figure 4: Cumulative returns of a long-short strategy: within origin

Cumulative returns of a long-short strategy between extreme quintile value-weighted portfolios sorted by *NIF* originated from different custodians with weekly rebalancing. The sample spans from March 17, 2017 to December 31, 2019. The vertical line corresponds to the announcement date of the regulatory reform on August 24, 2018. Panel A shows the cumulative returns of a long-short strategy based on more prestigious and less prestigious foreign custodians, and one-standard deviation intervals around the sample mean during the pre- and post-reform periods, respectively. Panel B shows the cumulative returns of a long-short strategy based on cross-operating and non-cross-operating mainland custodians, and one-standard deviation intervals around the sample mean during the pre- and post-reform periods, respectively.

equal-weighted portfolios (-0.261% per week, with $t\text{-stat} = -1.97$).

In a similar vein, Table 5 demonstrates that the return predictability of northbound flows from cross-operating custodians vanishes after the regulatory reform. In contrast, the return predictability of non-cross-operating custodians is slightly strengthened for value-weighted portfolios, and remains insignificant for equal-weighted portfolios. Importantly, the difference-in-difference test on *NIF*-sorted portfolio returns—between cross-operating custodians and non-cross-operating custodians, and before and after the regulatory reform—yields a statistically significant result. This confirms our conjecture that see-through surveillance imposes a significant negative impact on the information advantage of those cross-operating custodians' clients.

Figure 4 presents the above regression results in a visual way, by plotting the cumulative long-short returns sorted by *NIF* originating from different custodians with the same origin, for both foreign and mainland custodians. Again, the regulatory reform in the third quarter of 2018 appears to mark a watershed in terms of the information advantage of northbound flows from more problematic custodians including less prestigious foreign custodians and cross-operating mainland custodians. In sum, our results are consistent with the hypothesis that one major source of information advantage for northbound investors comes from homemade foreign investors, since a significant part (but not all) of return predictability is sensitive to the see-through surveillance reform.

3.3 Panel Regressions

Table 6 presents the results from panel regressions of weekly excess returns on *NIF* from different origins:

$$R_{i,t+1} = \alpha + \beta_1 Treat_j \times Post_t \times NIF_{i,t}^j + \beta_2 Treat_j \times Post_t + \beta_3 Treat_j \times NIF_{i,t}^j \quad (2) \\ + \beta_4 Post_t \times NIF_{i,t}^j + \beta_5 Treat_j + \beta_6 NIF_{i,t}^j + X_{i,t}'c + \gamma_i + \eta_t + \varepsilon_{i,t+1}$$

where the dependent variable $R_{i,t+1}$ denotes the weekly excess return of stock i over week $t + 1$. $NIF_{i,t}^j$ is defined as weekly northbound flow from custodian type j on firm i over week t . $Treat_j$ is a dummy variable equal to one if $NIF_{i,t}^j$ is constructed by flows from less prestigious foreign custodians (column 1 and 2) or cross-operating mainland custodians (column 3 and 4), and zero otherwise. The $Post_t$ dummy equals one for observations after the announcement day of regulatory reform (8/24/2018).

The results are reported in Table 6. We begin with a benchmark regression of future returns on northbound flows with no controls (column 1 and 3). Firm characteristics and stocks' past returns are then added (in column 2 and 4) as control variables (X_{it}), including firm size (*SIZE*), book-to-market ratio (*BM*), return on assets (*ROA*), weekly turnover

(*TOVER*), a dummy variable indicating state-owned enterprises (*SOE*), a dummy variable indicating MSCI-China index constituents (*MSCI*), stock returns over the past four weeks (Ret_{1m}), and stock returns over the past one year (Ret_{12m}) following Liu et al. (2019). We include firm fixed effects (γ_i) and weekly fixed effects (η_t) in all regressions and cluster standard errors by industry.³¹

Our hypothesis is that the predictive power of northbound flows among genuine foreign investors persists after the regulatory reform, while the predictive power of custodians who are more likely to cover homemade foreign investors gets weakened. As shown in Column (2), the coefficient estimate in the triple interaction term is significantly negative, suggesting that the negative effect of the regulatory reform on the return predictability of northbound flow is stronger for less prestigious foreign custodians compared with more prestigious ones. The economic magnitude of the difference is large. That is, an interquartile increase in weekly northbound flows from foreign custodians is associated with a lower next-week stock return of 0.58% ($= 0.063 \times 0.092$, or 30.2% annualized) for less prestigious foreign custodians from the pre-reform periods to the post-reform periods, compared to more prestigious ones. Similarly, the results in Column (4) confirm that the policy effect on the predictive power is also strong for northbound flows from cross-operating mainland custodians.

3.4 Ownership Heterogeneity

We now probe the effects of penetrating regulatory reform on northbound flows' predictive power for firms with different ownership structures. Intuitively, non-SOEs that are subject to less government scrutiny should have a better chance of accommodating insiders as homemade foreign investors. Nevertheless, we conjecture that homemade foreign trading could also occur in SOEs for two reasons. First, it is well recognized by the literature

³¹More details of the variable construction are provided in Appendix Table A1. As a robustness check, we also include contemporaneous northbound flows to control for the potential flow-induced price pressure, and the results are similar. We also investigate the relation between northbound flows and stock future returns using the Fama-MacBeth methodology, with Appendix Table A5 reporting results that are similar to those in our panel regression setting.

that SOEs lack information transparency in the Chinese stock market (Piotroski et al. 2015; Leippold et al. 2022). SOEs, especially centrally administrated stated-owned enterprises (central-SOEs), are more likely to reside in a vertical organization structure with more levels of administration, from which a significant arbitrage space could arise for insiders to exploit information asymmetry. Second, a typical SOE senior management team involves high-level government officials whose trading accounts are heavily regulated in the mainland market.³² Such investors are particularly likely to be interested in concealing their identity in trading.

To examine this possibility, each year, we sort stocks into non-SOEs, local-SOEs (i.e., locally administrated stated-owned enterprises), and central-SOEs, and repeat the same panel regressions as in Section 3.3. As shown in Table 7, for both central-SOEs and non-SOEs, we observe a decline of informativeness for northbound flows from problematic custodians after the reform. For example, the estimated coefficients for the triple interaction terms in Column (2) are significantly negative, suggesting that among non-SOEs, the negative effect of reform on the return predictability of northbound flows is stronger for less prestigious foreign custodians (compared with their more prestigious peers). In terms of economic magnitude of this effect, an interquartile increase in weekly northbound flows (from foreign custodians) is associated with a weekly return differential of 0.55% (-0.060×0.092 , or 28.7% annualized) when we compare the pre-reform and post-reform periods.

Somewhat surprisingly, we find a stronger result for central-SOEs. As shown in Table 7, the coefficient on the triple interaction term in Column (10) is -0.110 (t-stat = 5.23), suggesting a significant weakening in return predictability on central-SOEs following the reform. Meanwhile, we find that the reform effect is also negative in local-SOEs, albeit insignificant, perhaps due to their relatively flat organization structure compared with central-SOEs (and therefore less opaque).

³²Compelling evidence for the existence of foreign custodians intimately connected with insiders in Chinese SOEs is provided by media reports. Foreign custodians offered jobs and consulting contracts to the children of well-connected officials including the heads of SOEs and senior government officials to win business deals in China. Please refer to the news release <https://globalanticorruptionblog.com/2014/12/30/jp-morgan-sons-daughters-and-the-rule-of-law/> and <https://www.wsj.com/articles/j-p-morgan-hires-were-referred-by-china-ipo-clients-1448910715> for more details.

4 Mainland Insider Trading and Northbound Flows

As illustrated by Figure 2 in Section 2.3.2, the dynamics of insider selling of connected firms (relative to their unconnected peers) lines up well with the launch of the Stock Connect, and the subsequent regulatory reform deters inside sellers from round-tripping. We therefore turn our attention to insider trading in this section.

4.1 Correlation Between Insider Trading and Northbound Flows

Our analysis rests on a simple idea that mainland insiders possess similar information with round-tripping ones. To formally examine the relationship between insider selling and northbound flows, and its interaction with different custodians, we run the panel regressions as follows:

$$\begin{aligned} InsiderSell_{i,t} = & \alpha + \beta_1 Treat_j \times Post_t \times NIF_{i,t}^j + \beta_2 Treat_j \times Post_t \\ & + \beta_3 Treat_j \times NIF_{i,t}^j + \beta_4 Post_t \times NIF_{i,t}^j + \beta_5 Treat_j \\ & + \beta_6 NIF_{i,t}^j + X_{i,t}'c + \gamma_i + \eta_t + \epsilon_{i,t} \end{aligned} \quad (3)$$

Here, the dependent variable we examine is the ratio of insider selling as a percentage to the firm i 's market capitalization on day t . $NIF_{i,t}^j$ is defined as daily northbound flow from custodian type j at firm i at the beginning date of insider transactions, which is never later than the transaction announcement date in our sample. We define $Treat_j$ as a dummy variable that equals one if $NIF_{i,t}^j$ is constructed by flows from less prestigious foreign custodians (cross-operating mainland custodians), and zero otherwise, and $Post_t$ as a dummy variable that equals one if t is after the announcement day of the penetrating regulatory reform, and zero otherwise. γ_i and η_t denote firm fixed effects and week fixed effects, respectively. Standard errors are clustered by industry.

Similar to Section 3.3, the triple interaction term, which captures how the regulatory

reform affects the correlation between mainland insider selling and northbound flows depending on the custodian category, is our key variable of interest. The coefficient of this triple interaction term should be negative (i.e., $\beta_1 < 0$), as the correlation between mainland insider selling and northbound trading activities should show a sign of decay after the penetrating reform.

Table 8 presents the results. Controlling for firm characteristics, the coefficients of $\hat{\beta}_3 = 0.132$ (t-stat = 0.90) suggests that on average, there is a slightly higher correlation between mainland insider sells and northbound trading activities of less prestigious foreign custodians, compared to more prestigious ones. More importantly, the coefficient of $\hat{\beta}_1 = -0.231$ (t-stat = 1.90) in Column (2) implies that compared with more prestigious foreign custodians, less prestigious foreign custodians experienced a sharper decline in terms of their flow correlation with mainland insider selling after the reform. Take a less prestigious foreign custodian; one-standard-deviation increase in daily northbound flows is associated with 0.0039% ($= -0.231 \times 0.017\%$) less insider selling compared to that with more prestigious ones, which amounts to a 4.3% of the sample mean of *InsiderSell* (0.09%). Similarly, Column (4) shows similar qualitative results (though statistically insignificant) for cross-operating mainland custodians. Taken together, our results suggest that concurrent trading activities of northbound investors from problematic custodians and mainland insiders become relatively infrequent after the regulatory reform.

From a theoretical perspective, one expects to identify a significant $\beta_1 < 0$ only if there is a significant positive correlation between northbound flows and mainland insider trades before the reform. This requires that mainland insiders—who could route their transactions through the Stock Connect in an inconspicuous way—still chose to conduct some of their information-based trades in the mainland market before the regulatory reform. To see this point, suppose that all mainland insiders in connected firms channel their information-based pre-reform trades through the Stock Connect; then even prior to the reform, we should observe a low correlation between northbound flows and mainland insider trades, implying

little change of their correlations post-reform (i.e., $\beta_1 \simeq 0$). In other words, the observed mainland insider trades could be a poor proxy for true insider-information-driven trades before the reform, which likely drives the relatively weak effects of the regulatory reform identified in Table 8.

We repeat the same exercise on mainland insider buying. As shown in Appendix Table A6, we observe a limited policy effect, suggesting that insider buying is less likely hidden in northbound flows.³³ One potential reason for the differential outcomes between insider buying versus insider selling is that insiders could simply leak the information to their connections (e.g., distant relatives, friends or related parties) for profitable purchases, though for opportunistic selling insiders have to sell their own stakes of the firms in question.

4.2 Information Environment Heterogeneity

The relationship between insider selling and northbound flows should depend on the information environment under which the firm operates. In the spirit of Ali and Hirshleifer (2017), firms with opportunistic insiders have a higher probability of earnings management, as proxied by the absolute value of discretionary accruals (DA) from Dechow et al. (1995), and thus a less transparent information environment. Similarly, we also use volume-synchronized probability of informed trading (VPIN) to label firms with a higher probability of informed trading, corresponding to a more asymmetric information environment (Easley et al., 1996, 2012).

We therefore divide all A-share firms into halves based on their absolute value of DA each year and their value of VPIN each week, respectively, and repeat the same exercise as in Table 8. As shown in Table 9, we only find a strong policy effect on the correlation between northbound flows from problematic custodians and mainland insider selling in the subsamples with a more opaque information environment. For example, Column (3) reports

³³In China, in contrast to the findings in the U.S. (Lakonishok and Lee, 2001; Jeng et al., 2003), insider selling is informative about stock returns, and even more responsive to firm fundamentals than insider purchases (He and Rui, 2016; Lian et al., 2018; Chang et al., 2021).

a greater estimate ($\hat{\beta}_1 = -0.553$) than that in the full sample. For a less prestigious foreign custodian, during the reform, a one-standard deviation increase in daily northbound flows is associated with 0.0094% ($= -0.553 \times 0.017\%$) less insider selling, compared to that with more prestigious ones. The difference translates to about 10% of the sample mean of *InsiderSell*. Similarly, we find a larger effect ($\hat{\beta}_1 = -0.473$) using the subsample of firms with average daily VPIN above median within each week in Column (7), nearly double that in the full sample ($\hat{\beta}_1 = -0.231$). Overall, the results lend support to our conjecture that the concurrent trading activities of northbound investors from problematic custodians and mainland insiders are more sensitive to the regulatory reform among firms with greater information asymmetry.

4.3 Robustness Tests

Northbound holding value varies across custodians. We perform a robustness test to confirm that the portfolio results are not driven by any dominant custodian. Fixing one stock for each custodian, we first scale its stock-level northbound holdings by its own dollar amount of HKEX trading in 2021, and then aggregate this scaled holding to the custodian category level.³⁴ We then repeat the same excises as in Table 4 and Table 5. Appendix Table A7 shows that, compared to our baseline setting in Table 4, the effect of regulatory reform is slightly larger when using scaled northbound flows. A long-short strategy based on scaled flows from less prestigious foreign custodians generates a value-weighted average return of 0.547% (t-stat = 3.69) per week prior to reform, and after the reform, the average weekly return drops by -0.519% (t-stat = -3.14). The weakening in return predictability of less prestigious foreign custodians is stronger than that of more prestigious ones, highly significant at -0.383% (t-stat = -2.80).

In the spirit of Jensen et al. (2021), we also try capped value-weighting in our portfolio construction to ensure that our portfolio-based results are not driven by a few mega

³⁴Data on the dollar amount of broker trading in the year of 2021 are from the website of AiIPO, <https://aipo.myiqdii.com/broker/index>.

stocks. Specifically, we weight stocks by their market values winsorized at the 80th percentile of the entire A-share market, with results reported in Appendix Table A9. Again, for less prestigious foreign custodians (cross-operating mainland custodians), we observe a significantly stronger weakening in return predictability after reform compared with more prestigious peers (non-cross-operating peers). In terms of magnitude, the reform effect using capped-value weighting lies between value-weighted and equal-weighted in Table 4.

Finally, Appendix Table A10 also presents the portfolios' simple excess returns over risk-free rates, together with alphas from the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model. The main results remain quantitatively similar. For example, the weakening in return predictability of less prestigious foreign custodians is much stronger than that of more prestigious ones at a weekly excess return of -0.274% , a weekly Fama and French (1993) three-factor alpha of -0.405% , and a weekly Carhart (1997) four-factor alpha of -0.368% , respectively. These numbers correspond to 14.25%, 21.06%, and 19.14% in annualized returns.

5 Conclusion

Based on comprehensive data on the daily stock-level holdings of all northbound custodians in the Stock Connect program, this paper examines the evolution of northbound investors' trading performance before and after the Northbound Investor Identification reform. Our analyses shed light on the ability of Chinese regulators to reconcile wedges that arise over the course of capital markets integration, highlighting the imperativeness of cooperation between securities regulators in curbing cross-border regulatory arbitrage.

We present two primary results. First, we show weakening return predictability of northbound flows from less prestigious foreign custodians and cross-operating mainland custodians after the see-through surveillance reform, which presumably inhibits round-tripping insider trades. Second, the correlation between northbound flows from problematic cus-

todians and mainland insiders fell sharply following the regulatory reform. Both pieces of evidence point to the presence of homemade “foreign” investors who are likely to be mainland insiders concealing themselves behind northbound flows, and hence urge caution regarding the conclusions of prior studies showing the informativeness of foreign investors in China.

In the era of global regulatory cooperation, the effort to crack down on cross-border regulatory arbitrage continues. On June 24, 2022, the CSRC made an amendment to the regulations on investor eligibility: starting July 25, 2022, northbound brokers are no longer allowed to set up trading accounts for mainland investors.³⁵ This presumably leads to an elevated transaction cost and litigation risk for engaging in homemade foreign trading in China, and hopefully can encourage the flow of genuine foreign investment into the emerging capital market and improve market efficiency.

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³⁵For more details, please refer to the news release on the CSRC website, <http://www.csrc.gov.cn/csrc/c101953/c3874209/content.shtml>.

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Table 1: Summary statistics: northbound custodians by origin

This table reports the summary statistics of our key variables by origin. NIH denotes the level of northbound investor holdings (in percent) as of the end of each week. The variable is calculated as the ratio of northbound equity holdings to free-float shares. NIF denotes weekly northbound investor flows (in percent). The variable is computed as the difference between NIH as of the last trading day of week t and week $t - 1$. The subscript “ hk ” denotes northbound custodians originating from Hong Kong, Macau and Taiwan. The subscript “ m ” denotes Chinese Mainland custodians and the subscript “ f ” denotes foreign custodians. The sample spans from March 17, 2017 to December 31, 2019.

	Obs	EW mean	VW Mean	Std. Dev	P1	P25	Median	P75	P99	AR(1)
NIF_f	192728	0.020	0.028	0.275	-0.683	-0.032	0.003	0.060	0.840	0.036
NIF_{hk}	144443	0.000	0.000	0.036	-0.027	0.000	0.000	0.000	0.028	-0.125
NIF_m	187933	0.002	0.001	0.084	-0.214	-0.008	0.000	0.011	0.228	-0.156
NIH_f	192728	1.617	4.156	3.473	0.002	0.132	0.447	1.377	19.738	0.821
NIH_{hk}	144443	0.045	0.058	0.271	0.000	0.002	0.008	0.027	0.624	0.686
NIH_m	187933	0.203	0.270	0.450	0.000	0.025	0.082	0.211	2.117	0.735

Table 2: Summary statistics: northbound custodians within origin

This table presents the summary statistics of NIF and NIH of different categories of mainland and foreign custodians. NIH denotes the level of northbound investor holdings (in percent) as of the end of each week. The variable is calculated as the ratio of northbound equity holdings to free-float shares. NIF denotes weekly northbound investor flows (in percent) computed as the difference between northbound holding as of the last trading day of week t and week $t - 1$. We classify a foreign custodian as more prestigious if it ranks above the median for “fee and commission income,” or if it is voted as leaders in custody in emerging markets; and we classify a mainland custodian as cross-operating if it reports both mainland and overseas brokerage revenues to the Securities Association of China. The sample spans from March 17, 2017 to December 31, 2019.

Panel A: Foreign Custodians

	Obs	EW mean	VW Mean	Std. Dev	P1	P25	Median	P75	P99	AR(1)
$NIF_f^{lessprestigious}$	170269	0.001	0.001	0.053	-0.127	-0.005	0.000	0.007	0.136	-0.148
$NIF_f^{moreprestigious}$	192601	0.019	0.027	0.263	-0.651	-0.028	0.003	0.054	0.809	0.037
$NIH_f^{lessprestigious}$	170269	0.088	0.152	0.594	0.000	0.003	0.017	0.061	1.053	0.587
$NIH_f^{moreprestigious}$	192601	1.541	4.009	3.351	0.001	0.117	0.413	1.306	18.763	0.803

Panel B: Mainland Custodians

	Obs	EW mean	VW Mean	Std. Dev	P1	P25	Median	P75	P99	AR(1)
$NIF_m^{Cross-operating}$	182706	0.001	0.001	0.077	-0.203	-0.008	0.000	0.010	0.216	-0.178
$NIF_m^{NonCross-operating}$	159521	0.000	0.000	0.038	-0.047	0.000	0.000	0.000	0.054	-0.046
$NIH_m^{Cross-operating}$	182706	0.146	0.166	0.330	0.000	0.013	0.048	0.145	1.740	0.685
$NIH_m^{NonCross-operating}$	159521	0.072	0.110	0.305	0.000	0.004	0.019	0.059	0.696	0.743

Table 3: Portfolio analysis: northbound flows by origin

This table presents the LSY-three-factor adjusted returns of portfolios sorted by weekly *NIF* from different origins of custodians. We first classify all northbound custodians into foreign custodians, custodians originating from Hong Kong, Macau and Taiwan, and Chinese mainland custodians. Each week, we sort all connected stocks into five quintiles based on *NIF* during the past week, and construct value-weighted as well as equal-weighted quintile portfolios using opening price on the first trading day of the next week. We hold the portfolios for one week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column “Post-Pre” reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Foreign	-0.050 (-0.48)	0.448*** (3.78)	0.498*** (3.10)	0.002 (0.02)	0.267*** (2.64)	0.266*** (3.07)	-0.232 (-1.32)
Hong Kong	0.097 (1.37)	0.018 (0.19)	-0.079 (-0.89)	0.065 (0.59)	0.031 (0.25)	-0.034 (-0.41)	0.045 (0.38)
Mainland	0.009 (0.10)	0.263*** (2.74)	0.254*** (2.97)	-0.053 (-0.49)	0.072 (0.58)	0.124 (1.26)	-0.130 (-0.99)

Panel B: Equal weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Foreign	0.054 (0.59)	0.457*** (4.26)	0.403*** (3.33)	0.034 (0.33)	0.267*** (2.58)	0.232*** (2.75)	-0.171 (-1.15)
Hong Kong	0.073 (0.95)	0.035 (0.43)	-0.038 (-0.61)	0.062 (0.59)	0.048 (0.43)	-0.015 (-0.21)	0.024 (0.25)
Mainland	0.121 (1.50)	0.239*** (3.08)	0.118* (1.83)	0.022 (0.25)	0.084 (0.71)	0.062 (0.65)	-0.056 (-0.47)

Table 4: Portfolio analysis: more / less prestigious foreign custodians

This table presents the LSY-three-factor adjusted returns of portfolios by sorting on weekly *NIF* from more prestigious and less prestigious foreign custodians. A custodian is classified as more prestigious based on whether it ranks above the median for “fee and commission income,” or it is voted as a leader in custody in emerging markets. Each week, we sort all connected stocks into five quintiles based on *NIF* during the past week, and construct value-weighted as well as equal-weighted quintile portfolios using opening price on the first trading day of the next week. We hold the portfolios for one week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column “Post-Pre” reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Less prestigious	-0.066 (-0.73)	0.506*** (3.95)	0.572*** (3.56)	0.149 (1.25)	0.170* (1.76)	0.021 (0.20)	-0.551*** (-3.08)
More prestigious	-0.016 (-0.15)	0.404*** (3.59)	0.420*** (2.79)	0.001 (0.01)	0.244** (2.39)	0.243*** (3.05)	-0.177 (-1.07)
Less - More	-0.079 (-1.09)	0.073 (0.86)	0.152 (1.13)	0.118 (1.33)	-0.103** (-2.16)	-0.221** (-2.03)	-0.374** (-2.27)

Panel B: Equal weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Less prestigious	0.057 (0.59)	0.514*** (4.16)	0.457*** (3.62)	0.143 (1.50)	0.196* (1.92)	0.053 (0.66)	-0.405*** (-2.92)
More prestigious	0.056 (0.63)	0.436*** (4.39)	0.380*** (3.45)	0.031 (0.28)	0.267** (2.57)	0.236*** (2.75)	-0.143 (-1.03)
Less - More	-0.029 (-0.53)	0.049 (0.58)	0.078 (0.84)	0.083 (1.02)	-0.101** (-1.97)	-0.184 (-1.64)	-0.261** (-1.97)

Table 5: Portfolio analysis: cross-operating / non cross-operating mainland custodians

This table presents the LSY-three-factor adjusted returns of portfolios by sorting on weekly *NIF* from cross-operating and non cross-operating mainland custodians. Custodians are classified based on Securities Association of China's list. Each week, we sort all connected stocks into five quintiles based on *NIF* during the past week, and construct value-weighted as well as equal-weighted quintile portfolios using opening price on the first trading day of the next week. We hold the portfolios for one week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column "Post-Pre" reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Cross-operating	0.066 (0.71)	0.326*** (3.43)	0.260*** (2.97)	0.023 (0.22)	0.024 (0.18)	0.001 (0.01)	-0.259* (-1.93)
Non Cross-operating	0.047 (0.64)	0.128 (1.44)	0.081 (1.00)	-0.121 (-0.98)	0.128 (1.06)	0.249* (1.93)	0.168 (1.21)
Cross - Non Cross	-0.010 (-0.14)	0.169** (2.23)	0.179 (1.51)	0.114 (1.18)	-0.134 (-1.46)	-0.248 (-1.48)	-0.427** (-2.28)

Panel B: Equal weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Cross-operating	0.161** (1.99)	0.290*** (3.48)	0.129* (1.89)	0.074 (0.87)	0.060 (0.50)	-0.015 (-0.16)	-0.144 (-1.20)
Non Cross-operating	0.085 (1.15)	0.101 (1.28)	0.016 (0.25)	-0.056 (-0.48)	0.073 (0.70)	0.129 (1.46)	0.113 (1.23)
Cross - Non Cross	0.047 (0.81)	0.160** (2.34)	0.113 (1.06)	0.101 (1.10)	-0.043 (-0.69)	-0.144 (-1.11)	-0.257* (-1.65)

Table 6: Northbound flows' return predictability: panel regressions

This table presents the results from panel regressions using a stock-week-custodian category panel. The dependent variable is the weekly excess returns. In Columns (1) and (2), *Treat* is a dummy variable equal to one if *NIF* is that of less prestigious foreign custodians, and zero for more prestigious foreign custodians. In Columns (3) and (4), *Treat* is a dummy variable equal to one if *NIF* is that of cross-operating mainland custodians, and zero for non cross-operating mainland custodians. The *Post* dummy equals one after the announcement day of penetrating regulatory reform, August 24, 2018. Firm characteristics and stocks' past returns are then added as control variables, including firm size (*SIZE*), book-to-market ratio (*BM*), return on assets (*ROA*), weekly turnover (*TOVER*), a dummy variable indicating state-owned enterprises (*SOE*), a dummy variable indicating MSCI-China index constituents (*MSCI*), stock returns over the past four weeks (*Ret_{1m}*), and stock returns over the past one year (*Ret_{12m}*). The sample period is from March 17, 2017 to December 31, 2019. All continuous explanatory variables are winsorized at the 5% and 95% levels. We include firm fixed effects and week fixed effects, and cluster standard errors by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Foreign		Mainland	
<i>Treat</i> $\times$ <i>Post</i> $\times$ <i>NIF</i>	-0.060*** (-3.26)	-0.063*** (-3.42)	-0.242*** (-2.70)	-0.265** (-2.88)
<i>Treat</i> $\times$ <i>Post</i>	-0.000*** (-4.83)	-0.000*** (-3.98)	0.000 (0.83)	0.000 (0.36)
<i>Treat</i> $\times$ <i>NIF</i>	0.057*** (5.17)	0.056*** (5.25)	0.088*** (2.72)	0.084** (2.21)
<i>Post</i> $\times$ <i>NIF</i>	-0.011*** (-4.84)	-0.010*** (-4.55)	0.223** (2.45)	0.246*** (2.63)
<i>Treat</i>	0.001*** (8.40)	0.001*** (8.24)	0.000 (1.69)	0.000 (0.74)
<i>NIF</i>	0.016*** (5.91)	0.015*** (5.78)	-0.074** (-2.31)	-0.070* (-1.86)
Control	No	Yes	No	Yes
Observations	340,710	336,279	323,258	320,280
Stock FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Adj. R^2	0.312	0.317	0.309	0.314

Table 7: Return predictability: ownership heterogeneity

This table presents the results from panel regressions using a stock-week-custodian category panel. Each year, we first sort stocks into non-SOEs, local-SOEs and central-SOEs. The dependent variable is the weekly excess returns. For foreign custodians, $Treat$ is a dummy variable equal to one if NIF is that of less prestigious foreign custodians, and zero for more prestigious foreign custodians. For mainland custodians, $Treat$ is a dummy variable equal to one if NIF is that of cross-operating mainland custodians, and zero for non cross-operating mainland custodians. The $Post$ dummy equals one after the announcement day of penetrating regulatory reform, August 24, 2018. Firm characteristics and stocks' past returns are then added as control variables, including firm size ($SIZE$), book-to-market ratio (BM), return on assets (ROA), weekly turnover ($TOVER$), a dummy variable indicating MSCI-China index constituents ($MSCI$), stock returns over the past four weeks (Ret_{1m}), and stock returns over the past one year (Ret_{12m}). The sample period is from March 17, 2017 to December 31, 2019. All continuous explanatory variables are winsorized at the 5% and 95% levels. We include firm fixed effects and week fixed effects, and cluster standard errors by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	non-SOEs		(5)	local-SOEs		(8)	Foreign		central-SOEs		(12)
			Foreign	Mainland		Foreign	Mainland		Foreign	Mainland			
$Treat \times Post \times NIF$	-0.057*** (-3.18)	-0.060*** (-3.37)	-0.321*** (-2.93)	-0.343*** (-3.03)	-0.015 (-0.62)	-0.017 (-0.70)	-0.016 (-0.11)	-0.034 (-0.25)	-0.107*** (-4.97)	-0.110*** (-5.23)	-0.214 (-1.56)	-0.247** (-1.93)	
$Treat \times Post$	-0.010*** (-3.50)	-0.009*** (-3.38)	0.295*** (2.67)	0.318** (2.76)	-0.013*** (-7.37)	-0.013*** (-6.25)	0.031 (0.22)	0.051 (0.38)	-0.011** (-2.68)	-0.010** (-2.57)	0.174 (1.29)	0.206 (1.65)	
$Treat \times NIF$	0.054*** (4.55)	0.053*** (4.74)	0.114** (2.64)	0.106** (2.20)	0.028 (1.45)	0.026 (1.39)	0.063 (1.21)	0.057 (1.08)	0.089*** (5.24)	0.087*** (5.20)	0.051 (0.61)	0.058 (0.70)	
$Post \times NIF$	-0.001*** (-6.82)	-0.000*** (-4.70)	0.000 (1.59)	0.000 (0.75)	-0.000 (-1.24)	-0.000* (-1.77)	-0.000 (-1.04)	-0.000 (-0.29)	-0.000 (-1.31)	-0.000 (-0.89)	-0.000 (-0.38)	-0.000 (-0.31)	
$Treat$	0.013*** (4.78)	0.013*** (4.85)	-0.094** (-2.22)	-0.087* (-1.81)	0.020*** (10.26)	0.020*** (9.08)	-0.075 (-1.32)	-0.069 (-1.20)	0.017*** (4.20)	0.017*** (4.22)	-0.018 (-0.23)	-0.024 (-0.32)	
NIF	0.001*** (9.32)	0.001*** (8.47)	0.000 (0.96)	0.000 (0.65)	0.000*** (4.04)	0.000*** (5.03)	0.000 (1.46)	0.000 (0.46)	0.000** (2.63)	0.001*** (3.05)	0.000 (0.87)	-0.000 (-1.03)	
Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	
Observations	211,409	211,409	195,329	195,329	74,784	74,784	73,707	73,707	54,517	54,517	54,222	54,222	
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Adj. R^2	0.311	0.316	0.305	0.310	0.334	0.340	0.331	0.337	0.331	0.338	0.330	0.337	

Table 8: Correlation between insider selling and northbound flows

This table shows the results of regressing insider selling on the contemporaneous northbound flows. The dependent variable is the dollar amount of insider selling relative to firms' market capitalization (in percent). In Columns (1) and (2), *Treat* is a dummy variable equal to one if *NIF* is that of less prestigious foreign custodians, and zero for more prestigious foreign custodians. In Columns (3) and (4), *Treat* is a dummy variable equal to one if *NIF* is that of cross-operating mainland custodians, and zero for non cross-operating mainland custodians. *NIF* is defined as daily northbound flow at the firm at the beginning date of insider transactions (in percent). The *Post* dummy equals one after the announcement day of penetrating regulatory reform, August 24, 2018. Firm characteristics and stocks' past returns are then added as control variables, including firm size (*SIZE*), book-to-market ratio (*BM*), return on assets (*ROA*), weekly turnover (*TOVER*), a dummy variable indicating state-owned enterprises (*SOE*), a dummy variable indicating MSCI-China index constituents (*MSCI*), stock returns over the past four weeks (*Ret_{1m}*), and stock returns over the past one year (*Ret_{12m}*). The sample period is from March 17, 2017 to December 31, 2019. All continuous variables are winsorized at the 5% and 95% levels. We include firm fixed effects and week fixed effects, and cluster standard errors by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Foreign		Mainland	
<i>Treat</i> $\times$ <i>Post</i> $\times$ <i>NIF</i>	-0.233*	-0.231*	-0.043	-0.209
	(-1.94)	(-1.90)	(-0.02)	(-0.08)
<i>Treat</i> $\times$ <i>Post</i>	0.001	0.001	-0.002	-0.002
	(1.02)	(0.86)	(-1.36)	(-1.37)
<i>Treat</i> $\times$ <i>NIF</i>	0.124	0.132	-3.085	-2.997
	(0.86)	(0.90)	(-1.62)	(-1.49)
<i>Post</i> $\times$ <i>NIF</i>	0.064	0.060	0.242	0.376
	(1.11)	(1.11)	(0.09)	(0.14)
<i>Treat</i>	0.001	0.001	-0.001	-0.001
	(0.63)	(0.50)	(-0.52)	(-0.52)
<i>NIF</i>	-0.099**	-0.097**	2.903	2.845
	(-2.71)	(-2.90)	(1.50)	(1.40)
Control	No	Yes	No	Yes
Observations	11,340	11,340	10,177	10,177
Stock FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Adj. R^2	0.367	0.371	0.375	0.379

Table 9: Correlation between insider selling and northbound flows: heterogeneity analysis

This table shows results of regressing insider selling on the contemporaneous northbound flows in heterogeneous samples. We rank firms into halves based on their absolute value of discretionary accruals (DA) proposed by [Dechow et al. \(1995\)](#) each year, and their value of volume-synchronized probability of informed trading (VPIN) proposed by [Easley et al. \(2012\)](#) each week, respectively. The dependent variable is the dollar amount of insider selling relative to firms' market capitalization (in percent). $Treat$ is a dummy variable equal to one if NIF is that of less prestigious foreign custodians (cross-operating mainland custodians) and zero otherwise. NIF is defined as daily northbound flow at the firm at the beginning date of insider transactions (in percent). The $Post$ dummy equal one after the announcement day of penetrating regulatory reform, August 24, 2018. Firm characteristics and stocks' past returns are then added as control variables, including firm size ($SIZE$), book-to-market ratio (BM), return on assets (ROA), weekly turnover ($TOVER$), a dummy variable indicating state-owned enterprises (SOE), a dummy variable indicating MSCI-China index constituents ($MSCI$), stock returns over the past four weeks (Ret_{1m}), and stock returns over the past one year (Ret_{12m}). The sample period is from March 17, 2017 to December 31, 2019. All continuous variables are winsorized at the 5% and 95% levels. We include firm fixed effects and week fixed effects, and cluster standard errors by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Low abs(DA)		High abs(DA)		High abs(DA)		Low VPIN		Low VPIN		High VPIN		High VPIN		Mainland	
	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland	Foreign	Mainland
$Treat \times Post \times NIF$	0.119 (0.53)	2.432 (0.87)	-0.553** (-2.25)	-0.518 (-0.17)	0.078 (0.48)	2.830 (1.45)	0.078 (0.48)	2.830 (1.45)	-0.473** (-2.22)	0.462 (0.08)	-0.473** (-2.22)	0.462 (0.08)	-0.473** (-2.22)	0.462 (0.08)	-0.473** (-2.22)	0.462 (0.08)
$Treat \times Post$	0.001** (2.19)	-0.001 (-0.34)	0.001 (0.47)	-0.002 (-1.60)	-0.000 (-0.62)	0.001 (1.26)	-0.000 (-0.62)	0.001 (1.26)	0.003 (1.64)	-0.003 (-1.42)	0.003 (1.64)	-0.003 (-1.42)	0.003 (1.64)	-0.003 (-1.42)	0.003 (1.64)	-0.003 (-1.42)
$Treat \times NIF$	-0.092 (-0.43)	-4.309* (-2.09)	0.285 (1.15)	-3.557 (-1.44)	-0.120 (-0.74)	-3.654** (-2.66)	-0.120 (-0.74)	-3.654** (-2.66)	0.412** (2.13)	-4.147 (-0.80)	0.412** (2.13)	-4.147 (-0.80)	0.412** (2.13)	-4.147 (-0.80)	0.412** (2.13)	-4.147 (-0.80)
$Post \times NIF$	0.061 (0.97)	-2.335 (-0.84)	0.051 (0.87)	0.731 (0.24)	-0.002 (-0.03)	-2.623 (-1.34)	-0.002 (-0.03)	-2.623 (-1.34)	0.084*** (3.31)	-0.509 (-0.08)	0.084*** (3.31)	-0.509 (-0.08)	0.084*** (3.31)	-0.509 (-0.08)	0.084*** (3.31)	-0.509 (-0.08)
$Treat$	0.001 (1.41)	-0.001 (-0.27)	0.000 (0.09)	-0.001 (-1.13)	0.002** (2.35)	-0.003*** (-4.83)	0.002** (2.35)	-0.003*** (-4.83)	-0.002 (-1.33)	0.000 (0.25)	-0.002 (-1.33)	0.000 (0.25)	-0.002 (-1.33)	0.000 (0.25)	-0.002 (-1.33)	0.000 (0.25)
NIF	-0.111** (-2.83)	4.247* (2.07)	-0.093** (-2.61)	3.340 (1.33)	-0.034 (-1.10)	3.522** (2.48)	-0.034 (-1.10)	3.522** (2.48)	-0.121*** (-4.84)	4.091 (0.79)	-0.121*** (-4.84)	4.091 (0.79)	-0.121*** (-4.84)	4.091 (0.79)	-0.121*** (-4.84)	4.091 (0.79)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,852	4,284	6,429	5,825	5,252	4,770	5,252	4,770	5,528	4,877	5,528	4,877	5,528	4,877	5,528	4,877
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.492	0.499	0.369	0.374	0.475	0.477	0.475	0.477	0.386	0.390	0.386	0.390	0.386	0.390	0.386	0.390

Appendix A Data and Replication Manual

A.1 Portfolio analysis

For stock i , equity holdings are aggregated over all custodians within custodian category j to obtain northbound investor holding (NIH_{it}^j) at the end of week t . For custodian category j , weekly northbound investor flow (NIF_{it}^j) is computed as the weekly change of NIH_{it}^j . For forming portfolios, we keep stock-date observations only when the stock was on the connected list on that day. For example, the Yonyou Network Technology (600588) was deleted from the eligible stock list for northbound investors on June 12, 2017 as a result of deletion from SSE 180 index (announced on May 31, 2017), and was added back on June 11, 2018 as a result of addition to SSE 180 index (announced on May 28, 2018). We thus exclude it from June 12, 2017 to June 11, 2018.

We then drop stocks that cannot be traded normally (with the variable of “trading status” from the CSMAR database not equal to one) when forming portfolios. We sort all remaining connected stocks into five quintiles based on NIF_{it}^j with weekly rebalancing. Since weekly northbound investor flow over week $t - 1$ becomes public after the market closes on the last trading day of week $t - 1$, we calculate the percent change of adjusted opening prices from the first trading day of week t to that of week $t + 1$ as weekly stock returns. We consider both equal-weighting and value-weighting for portfolio analysis. In terms of value-weighting, the floating market capitalization at the end of week $t - 1$ are used as weights, and all weights are winsorized at the 5% and 95% levels.

In Section 3.4, we sort SOEs into local-SOEs and central-SOEs each year based on the variable of “firm ownership” from the WIND database.

A.2 Insider Trading

The insider trade data at firm-date level are from WIND database. We drop insider trades that are i) with missing values in beginning dates (i.e., the dates when the insider

trade starts), ii) through the block trading system, and iii) from institutional shareholders. Following the literature (Lakonishok and Lee, 2001; Ali and Hirshleifer, 2017), we also exclude insider trades of less than 1,000 shares to focus on significant insider transactions. We then aggregate all transactions by firm and trading beginning date to calculate the net trading amount, and classify each observation as sell (buy) based on its sign.

1. In the difference-in-differences specification in Section 2.3.2, each year, for each firm, we calculate the natural logarithm of one plus the total amount of insider sells as our dependent variables. To minimize the potential contamination by a few mega stocks, treated firms include the eligible stocks that rank bottom 70% for both size and turnover (i.e., the two key drivers of eligibility) in 2013. We select control firms from Shenzhen-listed firms whose size and turnover are within the range of the treated group. Also, to minimize the potential contamination of control firms by the launch of the Shenzhen-Hong Kong Stock Connect, we exclude Shenzhen-listed firms that became eligible on the implementation day of the Shenzhen-Hong Kong Stock Connect (12/5/2016). Since the list of connected firms was announced in advance in early 2014, we take the period from 11/17/2012 to 11/17/2013 as the benchmark period to reduce the contamination caused by market anticipation. The point estimate then is normalized to zero.

2. In Section 4.1, we run panel regressions of insider selling on the contemporaneous northbound flows from different origins of custodians. The dependent variable is the ratio of the dollar amount of insider selling to the floating market capitalization at the firm-day level. The independent variable, i.e., NIF , is defined as daily northbound flow from one subdivided custodian group at a specific firm at the beginning date of insider transactions.

Appendix B

Table A1: Variable construction and data sources

Variable	Definition	Source
<i>NIH</i>	Denotes the level of northbound equity holdings (in percent) at the end of each week for each category of northbound custodians. The variable is calculated as the ratio of northbound equity holdings from the Choice Database to free-floating shares from the WIND database.	Choice, WIND
<i>NIF</i>	Denotes the stock-level weekly northbound investor flows (in percent) for each category of northbound custodians. The variable is computed as the weekly change in <i>NIH</i> .	Choice, WIND
<i>SIZE</i>	Denotes the natural logarithm of the floating market capitalization at the end of each week, in thousands of RMB.	CSMAR
<i>BM</i>	Denotes the book-to-market ratio (F101001A in CSMAR database). The variable is computed as the ratio of the book value to market value of total assets. The market value is the product of close price and total shares outstanding, plus total liability as of the end of each week.	CSMAR
<i>Ret_{1m}</i>	Denotes the stock-level cumulative return from week $t - 4$ to week $t - 1$.	CSMAR
<i>Ret_{12m}</i>	Denotes the stock-level cumulative return from week $t - 52$ to week $t - 5$.	CSMAR
<i>TOVER</i>	Denotes weekly turnover, which is measured using weekly trading volume divided by total shares outstanding at the end of each week.	CSMAR
<i>ROA</i>	Denotes firm-level return on assets at the quarterly frequency, which is measured as net income divided by the most recent book value of total assets.	CSMAR
<i>SOE</i>	Denotes a dummy variable that equals one if a firm is classified as a state-owned enterprise each year, and 0, otherwise.	WIND
<i>MSCI</i>	Denotes an indicator variable for MSCI members, which equals one if a firm is in the MSCI A-share index at the end of week t , and 0, otherwise.	Choice

Table A2: Foreign custodian list

Participant ID	Participant name	Category	Prestigious
B01089	HSBC BROKING SECURITIES (HONG KONG) LTD	Foreign	More
B01110	J.P. MORGAN BROKING (HONG KONG) LTD	Foreign	More
B01121	SG SECURITIES (HK) LTD	Foreign	Less
B01161	UBS SECURITIES HONG KONG LTD	Foreign	More
B01224	MERRILL LYNCH FAR EAST LTD	Foreign	More
B01265	OCBC WING HANG SHARES BROKERAGE CO. LTD	Foreign	Less
B01274	MORGAN STANLEY HONG KONG SECURITIES LTD	Foreign	More
B01323	DEUTSCHE SECURITIES ASIA LTD	Foreign	More
B01451	GOLDMAN SACHS (ASIA) SECURITIES LTD	Foreign	More
B01469	KAISER SECURITIES LTD	Foreign	Less
B01491	CREDIT SUISSE SECURITIES (HONG KONG) LTD	Foreign	Less
B01555	ABN AMRO CLEARING HONG KONG LTD	Foreign	Less
B01590	INTERACTIVE BROKERS HONG KONG LTD	Foreign	Less
B01762	DBS VICKERS (HONG KONG) LTD	Foreign	Less
B01773	TOYO SECURITIES ASIA LTD	Foreign	Less
B01777	DAIWA CAPITAL MARKETS HONG KONG LTD	Foreign	Less
B01815	T & F EQUITIES LTD	Foreign	Less
B01824	INSTINET PACIFIC LTD	Foreign	Less
B01830	MIRAE ASSET SECURITIES (HK) LTD	Foreign	Less
B01914	JEFFERIES HONG KONG LTD	Foreign	Less
B01951	GENTING SECURITIES LTD	Foreign	Less
C00010	CITIBANK N.A.	Foreign	More
C00016	DBS BANK LTD	Foreign	Less
C00019	THE HONGKONG AND SHANGHAI BANKING	Foreign	More
C00039	STANDARD CHARTERED BANK (HONG KONG) LTD	Foreign	More
C00074	DEUTSCHE BANK AG	Foreign	More
C00093	BNP PARIBAS SECURITIES SERVICES	Foreign	More
C00100	JPMORGAN CHASE BANK, NATIONAL	Foreign	More
C00102	MACQUARIE BANK LTD	Foreign	Less

Table A3: Mainland/HK custodian list

ID	Mainland Custodians Name	ID	HK Custodians Name
B01115	SHENWAN HONGYUAN SECURITIES (H.K.) LTD	B01080	VMS SECURITIES LTD
B01130	BOCI SECURITIES LTD	B01086	SUN HUNG KAI INVESTMENT SERVICES LTD
B01138	CLSA LTD	B01118	EAST ASIA SECURITIES CO LTD
B01143	HAITONG INTERNATIONAL SECURITIES CO LTD	B01119	CELESTIAL SECURITIES LTD
B01148	CHINA MERCHANTS SECURITIES (HK) CO LTD	B01129	WOCOM SECURITIES LTD
B01181	FOSUN HANI SECURITIES LTD	B01137	CHOW SANG SANG SECURITIES LTD
B01217	TAIPING SECURITIES (HK) CO LTD	B01183	CHONG HING SECURITIES LTD
B01228	CITIC SECURITIES BROKERAGE (HK) LTD	B01184	CHINA TONGHAI SECURITIES LTD
B01256	SINOLINK SECURITIES (HONG KONG) CO LTD	B01192	SEEKERS MARKETS LTD
B01355	CHINA EVERBRIGHT SECURITIES (HK) LTD	B01213	MALAHON SECURITIES LTD
B01386	SBI CHINA CAPITAL FINANCIAL SERVICES LTD	B01231	HONG KONG INTERNATIONAL SECURITIES LTD
B01447	WONDERLAND INTERNATIONAL SECURITIES LTD	B01264	MIB SECURITIES (HONG KONG) LTD
B01462	PING AN SECURITIES LTD	B01284	HANG SENG SECURITIES LTD
B01487	CHINA RENAISSANCE BROKING SERVICES (HK)	B01289	SOUTH CHINA SECURITIES LTD
B01508	SOUTHWEST SECURITIES (HK) BROKERAGE LTD	B01298	GET NICE SECURITIES LTD
B01564	ABCI SECURITIES CO LTD	B01338	EMPEROR SECURITIES LTD
B01565	GUOTAI JUNAN SECURITIES (HONG KONG) LTD	B01345	PHILLIP SECURITIES (HONG KONG) LTD
B01649	CINDA INTERNATIONAL SECURITIES LTD	B01347	CGS-CIMB SECURITIES (HONG KONG) LTD
B01654	CHINA INTERNATIONAL CAPITAL CORPORATION	B01353	UOB KAY HIAN (HONG KONG) LTD
B01666	GLORY SUN SECURITIES LTD	B01372	FIRST WORLDSEC SECURITIES LTD
B01686	FIRST SHANGHAI SECURITIES LTD	B01373	CHRISTFUND SECURITIES LTD
B01727	ICBC (ASIA) SECURITIES LTD	B01385	FAIRWIN BROKING LTD
B01813	CCB INTERNATIONAL SECURITIES LTD	B01392	TAIFAIR SECURITIES LTD
B01825	GUOYUAN SECURITIES BROKERAGE (HONG KONG)	B01413	CORE PACIFIC - YAMAICHI INTERNATIONAL
B01826	GF SECURITIES (HONG KONG) BROKERAGE LTD	B01423	PRUDENTIAL BROKERAGE LTD
B01829	HUATAI FINANCIAL HOLDINGS (HONG KONG)	B01434	BEEVEST SECURITIES LTD
B01842	BOCOM INTERNATIONAL SECURITIES LTD	B01438	KINGSTON SECURITIES LTD
B01853	CMBC SECURITIES CO LTD	B01445	VICTORY SECURITIES CO LTD
B01866	ICBC INTERNATIONAL SECURITIES LTD	B01472	SUN GROWTH SECURITIES LTD
B01875	GUODU SECURITIES (HONG KONG) LTD	B01489	GRAND CARTEL SECURITIES CO LTD
B01885	HAFOO SECURITIES LTD	B01497	SINOPAC SECURITIES (ASIA) LTD
B01886	CNI SECURITIES GROUP LTD	B01505	SHACOM SECURITIES LTD
B01890	GUOSEN SECURITIES (HK) BROKERAGE CO LTD	B01523	EVER-LONG SECURITIES CO LTD
B01900	ORIENT SECURITIES (HONG KONG) LTD	B01550	HUAYU SECURITIES LTD
B01901	CMB INTERNATIONAL SECURITIES LTD	B01551	YUE XIU SECURITIES CO LTD
B01904	VALUABLE CAPITAL LTD	B01556	LUK FOOK SECURITIES (HK) LTD
B01905	ESSENCE INTERNATIONAL SECURITIES	B01576	SIU ON SECURITIES LTD
B01910	ALPHA INTERNATIONAL SECURITIES (HONG	B01580	OSHDORI SECURITIES LTD
B01912	THE CORE SECURITIES COMPANY LTD	B01584	CHIEF SECURITIES LTD
B01929	CHINA GALAXY INTERNATIONAL SECURITIES	B01585	SINO GRADE SECURITIES LTD
B01937	CHANGJIANG SECURITIES BROKERAGE (HK) LTD	B01600	THOMAS GLOBAL FINANCIAL SERVICES LTD
B01938	CHINA INDUSTRIAL SECURITIES	B01601	CSC SECURITIES (HK) LTD
B01939	SOOCHOW SECURITIES INTERNATIONAL	B01607	RHB SECURITIES HONG KONG LTD
B01943	PO SANG SECURITIES AND FUTURES LTD	B01610	KGI ASIA LTD
B01948	CAITONG INTERNATIONAL SECURITIES CO LTD	B01623	TAI FUNG KUENTAI SECURITIES CO LTD
B01955	FUTU SECURITIES INTERNATIONAL	B01650	KAM LUEN SECURITIES LTD
B01959	ZHONGTAI INTERNATIONAL SECURITIES LTD	B01668	BRIGHT SMART SECURITIES INTERNATIONAL
B01962	CHINA SECURITIES (INTERNATIONAL)	B01673	FULBRIGHT SECURITIES LTD
B01963	TFI SECURITIES AND FUTURES LTD	B01677	ANUENUE SECURITIES LTD
B01967	YUNFENG SECURITIES LTD	B01695	DAH SING SECURITIES LTD
B01969	CHINA VERED SECURITIES LTD	B01696	HANTEC SECURITIES CO LTD
B01971	HGNH INTERNATIONAL SECURITIES CO LTD	B01699	MASTERLINK SECURITIES (HONG KONG)
B01978	FOUNDER SECURITIES (HONG KONG) LTD	B01700	REALINK FINANCIAL TRADE LTD
B01980	SHANXI SECURITIES INTERNATIONAL LTD	B01715	PRESIDENT SECURITIES (HONG KONG) LTD
B01986	HUAJIN SECURITIES (INTERNATIONAL) LTD	B01739	CHUNG LEE SECURITIES CO LTD
B01998	FIRST CAPITAL SECURITIES LTD	B01810	ASTRUM CAPITAL MANAGEMENT LTD
B01999	CF SECURITIES LTD	B01814	WELL LINK SECURITIES LTD
B02000	TIAN YUAN FINANCE LTD	B01818	I-ACCESS INVESTORS LTD
B02003	DONGXING SECURITIES (HONG KONG) CO LTD	B01848	CATHAY SECURITIES (HONG KONG) LTD
B02014	YUET SHEUNG INTERNATIONAL SECURITIES LTD	B01851	RICHE BRIGHT SECURITIES LTD
B02023	DONGHAI INTERNATIONAL SECURITIES	B01852	FREEMAN SECURITIES LTD
B02029	HONOR SECURITIES (HK) LTD	B01858	YUANTA SECURITIES (HONG KONG) CO LTD
B02030	SR WEALTH SECURITIES LTD	B01897	CENTRAL WEALTH SECURITIES INVESTMENT LTD
B02032	FORTHRIGHT SECURITIES CO LTD	B01917	CHINA TIMES SECURITIES LTD
B02046	CHINA ZHONG HENG FINANCE GROUP LTD	B01928	ENHANCED SECURITIES LTD
B02089	TONGFANG SECURITIES LTD	B01935	STUDIUM SECURITIES LTD
B02120	LIVERMORE HOLDINGS LTD	B01947	FUBON SECURITIES (HONG KONG) LTD
B02136	HS SECURITIES LTD	B01949	GRAND CHINA SECURITIES LTD
B02141	XIN YONGAN INTERNATIONAL SECURITIES	B01974	ARISTO SECURITIES LTD
B02145	CIF SECURITIES FUTURES LTD	B02061	GRAND PARTNERS SECURITIES LTD
C00033	BANK OF CHINA (HONG KONG) LTD	B02065	AMC WANHAI SECURITIES LTD
C00036	CHINA CONSTRUCTION BANK (ASIA)	B02068	CANFIELD SECURITIES CO LTD
C00037	SHANGHAI COMMERCIAL BANK LTD	B02072	SBI E2-CAPITAL SECURITIES LTD
C00040	INDUSTRIAL AND COMMERCIAL BANK OF CHINA	B02091	RUIFENG SECURITIES LTD
C00042	CMB WING LUNG BANK LTD	B02099	DA INTERNATIONAL FINANCIAL SERVICE LTD
C00058	CHINA CITIC BANK INTERNATIONAL LTD	B02102	ZINVEST GLOBAL LTD
C00088	CHINA MERCHANTS BANK CO LTD	B02104	MAGPIE SECURITIES LTD
		B02162	GAMMA SECURITIES LTD
		C00012	DAH SING BANK LTD
		C00026	CHONG HING BANK LTD
		C00092	CTBC BANK CO LTD
		C00099	TAISHIN INTERNATIONAL BANK CO., LTD

Table A4: List of cross-operating mainland custodians

Participant ID	Year	Participant Name
B01143	2016	HAITONG INTERNATIONAL SECURITIES CO LTD
B01654	2016	CHINA INTERNATIONAL CAPITAL CORPORATION
B01138	2016	CLSA LTD
B01355	2016	CHINA EVERBRIGHT SECURITIES (HK) LTD
B01565	2016	GUOTAI JUNAN SECURITIES (HONG KONG) LTD
B01148	2016	CHINA MERCHANTS SECURITIES (HK) CO LTD
B01825	2016	GUOYUAN SECURITIES BROKERAGE (HONG KONG)
B01938	2016	CHINA INDUSTRIAL SECURITIES
B01959	2016	ZHONGTAI INTERNATIONAL SECURITIES LTD
B01900	2016	ORIENT SECURITIES (HONG KONG) LTD
B01929	2016	CHINA GALAXY INTERNATIONAL SECURITIES
B01826	2016	GF SECURITIES (HONG KONG) BROKERAGE LTD
B01962	2016	CHINA SECURITIES (INTERNATIONAL)
B01115	2016	SHENWAN HONGYUAN SECURITIES (H.K.) LTD
B01905	2016	ESSENCE INTERNATIONAL SECURITIES
B01937	2016	CHANGJIANG SECURITIES BROKERAGE (HK) LTD
B02003	2016	DONGXING SECURITIES (HONG KONG) CO LTD
B01462	2016	PING AN SECURITIES LTD
B01890	2016	GUOSEN SECURITIES (HK) BROKERAGE CO LTD
B01948	2016	CAITONG INTERNATIONAL SECURITIES CO LTD
B01829	2016	HUATAI FINANCIAL HOLDINGS (HONG KONG)
B01939	2016	SOOCHOW SECURITIES INTERNATIONAL
B02023	2016	DONGHAI INTERNATIONAL SECURITIES
B01256	2016	SINOLINK SECURITIES (HONG KONG) CO LTD
B01980	2016	SHANXI SECURITIES INTERNATIONAL LTD
B01978	2016	FOUNDER SECURITIES (HONG KONG) LTD
B01963	2016	TFI SECURITIES AND FUTURES LTD
B01143	2017	HAITONG INTERNATIONAL SECURITIES CO LTD
B01654	2017	CHINA INTERNATIONAL CAPITAL CORPORATION
B01138	2017	CLSA LTD
B02003	2017	DONGXING SECURITIES (HONG KONG) CO LTD
B01355	2017	CHINA EVERBRIGHT SECURITIES (HK) LTD
B01565	2017	GUOTAI JUNAN SECURITIES (HONG KONG) LTD
B01829	2017	HUATAI FINANCIAL HOLDINGS (HONG KONG)
B01938	2017	CHINA INDUSTRIAL SECURITIES
B01148	2017	CHINA MERCHANTS SECURITIES (HK) CO LTD
B01825	2017	GUOYUAN SECURITIES BROKERAGE (HONG KONG)
B01959	2017	ZHONGTAI INTERNATIONAL SECURITIES LTD
B01826	2017	GF SECURITIES (HONG KONG) BROKERAGE LTD
B02023	2017	DONGHAI INTERNATIONAL SECURITIES
B01962	2017	CHINA SECURITIES (INTERNATIONAL)
B01508	2017	SOUTHWEST SECURITIES (HK) BROKERAGE LTD
B01980	2017	SHANXI SECURITIES INTERNATIONAL LTD
B01905	2017	ESSENCE INTERNATIONAL SECURITIES
B01929	2017	CHINA GALAXY INTERNATIONAL SECURITIES
B01900	2017	ORIENT SECURITIES (HONG KONG) LTD
B01115	2017	SHENWAN HONGYUAN SECURITIES (H.K.) LTD
B01948	2017	CAITONG INTERNATIONAL SECURITIES CO LTD
B01937	2017	CHANGJIANG SECURITIES BROKERAGE (HK) LTD
B01256	2017	SINOLINK SECURITIES (HONG KONG) CO LTD
B01875	2017	GUODU SECURITIES (HONG KONG) LTD
B01890	2017	GUOSEN SECURITIES (HK) BROKERAGE CO LTD
B01978	2017	FOUNDER SECURITIES (HONG KONG) LTD
B01462	2017	PING AN SECURITIES LTD
B01963	2017	TFI SECURITIES AND FUTURES LTD
B01143	2018	HAITONG INTERNATIONAL SECURITIES CO LTD
B01654	2018	CHINA INTERNATIONAL CAPITAL CORPORATION
B01980	2018	SHANXI SECURITIES INTERNATIONAL LTD

Participant ID	Year	Participant Name
B01355	2018	CHINA EVERBRIGHT SECURITIES (HK) LTD
B01829	2018	HUATAI FINANCIAL HOLDINGS (HONG KONG)
B01138	2018	CLSA LTD
B01938	2018	CHINA INDUSTRIAL SECURITIES
B01565	2018	GUOTAI JUNAN SECURITIES (HONG KONG) LTD
B01959	2018	ZHONGTAI INTERNATIONAL SECURITIES LTD
B01825	2018	GUOYUAN SECURITIES BROKERAGE (HONG KONG)
B01148	2018	CHINA MERCHANTS SECURITIES (HK) CO LTD
B01948	2018	CAITONG INTERNATIONAL SECURITIES CO LTD
B02003	2018	DONGXING SECURITIES (HONG KONG) CO LTD
B01929	2018	CHINA GALAXY INTERNATIONAL SECURITIES
B01115	2018	SHENWAN HONGYUAN SECURITIES (H.K.) LTD
B02023	2018	DONGHAI INTERNATIONAL SECURITIES
B01905	2018	ESSENCE INTERNATIONAL SECURITIES
B01962	2018	CHINA SECURITIES (INTERNATIONAL)
B01937	2018	CHANGJIANG SECURITIES BROKERAGE (HK) LTD
B01256	2018	SINOLINK SECURITIES (HONG KONG) CO LTD
B01890	2018	GUOSEN SECURITIES (HK) BROKERAGE CO LTD
B01462	2018	PING AN SECURITIES LTD
B01978	2018	FOUNDER SECURITIES (HONG KONG) LTD
B01963	2018	TFI SECURITIES AND FUTURES LTD
B01875	2018	GUODU SECURITIES (HONG KONG) LTD
B01508	2018	SOUTHWEST SECURITIES (HK) BROKERAGE LTD
B01826	2018	GF SECURITIES (HONG KONG) BROKERAGE LTD
B01900	2018	ORIENT SECURITIES (HONG KONG) LTD
B01143	2019	HAITONG INTERNATIONAL SECURITIES CO LTD
B01654	2019	CHINA INTERNATIONAL CAPITAL CORPORATION
B01138	2019	CLSA LTD
B01829	2019	HUATAI FINANCIAL HOLDINGS (HONG KONG)
B01649	2019	CINDA INTERNATIONAL SECURITIES LTD
B01565	2019	GUOTAI JUNAN SECURITIES (HONG KONG) LTD
B01355	2019	CHINA EVERBRIGHT SECURITIES (HK) LTD
B01980	2019	SHANXI SECURITIES INTERNATIONAL LTD
B01825	2019	GUOYUAN SECURITIES BROKERAGE (HONG KONG)
B01929	2019	CHINA GALAXY INTERNATIONAL SECURITIES
B01959	2019	ZHONGTAI INTERNATIONAL SECURITIES LTD
B01148	2019	CHINA MERCHANTS SECURITIES (HK) CO LTD
B01826	2019	GF SECURITIES (HONG KONG) BROKERAGE LTD
B01905	2019	ESSENCE INTERNATIONAL SECURITIES
B01115	2019	SHENWAN HONGYUAN SECURITIES (H.K.) LTD
B01938	2019	CHINA INDUSTRIAL SECURITIES
B01508	2019	SOUTHWEST SECURITIES (HK) BROKERAGE LTD
B01900	2019	ORIENT SECURITIES (HONG KONG) LTD
B01963	2019	TFI SECURITIES AND FUTURES LTD
B01875	2019	GUODU SECURITIES (HONG KONG) LTD
B01948	2019	CAITONG INTERNATIONAL SECURITIES CO LTD
B02003	2019	DONGXING SECURITIES (HONG KONG) CO LTD
B01256	2019	SINOLINK SECURITIES (HONG KONG) CO LTD
B02023	2019	DONGHAI INTERNATIONAL SECURITIES
B01962	2019	CHINA SECURITIES (INTERNATIONAL)
B01890	2019	GUOSEN SECURITIES (HK) BROKERAGE CO LTD
B01462	2019	PING AN SECURITIES LTD
B01937	2019	CHANGJIANG SECURITIES BROKERAGE (HK) LTD
B01978	2019	FOUNDER SECURITIES (HONG KONG) LTD

Table A5: Fama-MacBeth regressions

This table presents the time-series averages of weekly coefficients from Fama-MacBeth regressions of weekly excess returns (in percent) on northbound flows from different categories of custodians. In Columns (1), (3), (5) and (7), only northbound flows are included as our independent variable. Firm characteristics and stocks' past returns are then added as control variables in Columns (2), (4), (6) and (8), including firm size (*SIZE*), book-to-market ratio (*BM*), return on assets (*ROA*), weekly turnover (*TOVER*), a dummy variable indicating state-owned enterprises (*SOE*), a dummy variable indicating MSCI-China index constituents (*MSCI*), stock returns over the past four weeks (*Ret_{1m}*), and stock returns over the past one year (*Ret_{12m}*). The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Foreign custodians

	Pre-reform				Post-reform			
	(1) Less Prestigious	(2) More Prestigious	(3) More Prestigious	(4) More Prestigious	(5) Less Prestigious	(6) More Prestigious	(7) More Prestigious	(8) More Prestigious
NIF_{t-1}	1.836** (2.37)	1.196** (2.18)	0.462** (2.41)	0.319** (2.10)	0.624 (1.32)	0.691 (1.67)	0.242*** (3.48)	0.217*** (3.88)
Control	No	Yes	No	Yes	No	Yes	No	Yes
Average Obs.	1008	1000	1303	1294	1182	1173	1273	1264
No. of weeks	73	73	73	73	68	68	68	68
Average Adj. R^2	0.0022	0.1112	0.0026	0.1027	0.0019	0.0918	0.0020	0.0896

Panel B: Mainland custodians

	Pre-reform				Post-reform			
	(1) Cross-operating	(2) Non cross-operating	(3) Non cross-operating	(4) Non cross-operating	(5) Cross-operating	(6) Cross-operating	(7) Non cross-operating	(8) Non cross-operating
NIF_{t-1}	0.766** (2.12)	0.631** (2.10)	-0.643 (-0.64)	-0.480 (-0.63)	-0.327 (-1.20)	-0.338 (-1.54)	1.925** (2.30)	1.363* (1.70)
Control	No	Yes	No	Yes	No	Yes	No	Yes
Average Obs.	1150	1142	1035	1027	1270	1261	1084	1076
No. of weeks	73	73	73	73	68	68	68	68
Average Adj. R^2	0.0015	0.1050	0.0013	0.1085	0.0023	0.090	0.0016	0.0926

Table A6: Correlation between insider buys and northbound flows

This table shows the results of regressing insider buys on the contemporaneous northbound flows. The dependent variable is the dollar amount of insider buys relative to firms' market capitalization (in percent). In Columns (1) and (2), *Treat* is a dummy variable equal to one if *NIF* is that of less prestigious foreign custodians, and zero for more prestigious foreign custodians. In Columns (3) and (4), *Treat* is a dummy variable equal to one if *NIF* is that of cross-operating mainland custodians, and zero for non cross-operating mainland custodians. *NIF* is defined as daily northbound flow at the firm at the beginning date of insider transactions (in percent). The *Post* dummy equals one after the announcement day of penetrating regulatory reform, August 24, 2018. Firm characteristics and stocks' past returns are then added as control variables, including firm size (*SIZE*), book-to-market ratio (*BM*), return on assets (*ROA*), weekly turnover (*TOVER*), a dummy variable indicating state-owned enterprises (*SOE*), a dummy variable indicating MSCI-China index constituents (*MSCI*), stock returns over the past four weeks (*Ret_{1m}*), and stock returns over the past one year (*Ret_{12m}*). The sample period is from March 17, 2017 to December 31, 2019. All continuous variables are winsorized at the 5% and 95% levels. We include firm fixed effects and week fixed effects, and cluster standard errors by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Foreign		Mainland	
<i>Treat</i> $\times$ <i>Post</i> $\times$ <i>NIF</i>	-0.056 (-0.48)	-0.032 (-0.27)	-0.107 (-0.06)	-0.014 (-0.01)
<i>Treat</i> $\times$ <i>Post</i>	0.001* (2.08)	0.001** (2.18)	-0.000 (-0.18)	0.000 (0.04)
<i>Treat</i> $\times$ <i>NIF</i>	-0.080 (-0.71)	-0.082 (-0.78)	-1.452** (-2.61)	-1.515** (-2.67)
<i>Post</i> $\times$ <i>NIF</i>	0.044*** (3.06)	0.044*** (2.92)	0.108 (0.06)	0.020 (0.01)
<i>Treat</i>	-0.003*** (-14.13)	-0.003*** (-13.43)	0.001** (2.78)	0.001*** (3.11)
<i>NIF</i>	-0.022*** (-3.14)	-0.021*** (-3.02)	1.423** (2.40)	1.479** (2.40)
Control	No	Yes	No	Yes
Observations	7,966	7,966	7,226	7,226
Stock FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Adj. R^2	0.508	0.511	0.521	0.523

Table A7: Portfolio analysis using scaled flows: more / less prestigious foreign custodians

This table presents the LSY-three-factor adjusted returns of portfolios by sorting on scaled *NIF* from more prestigious and less prestigious foreign custodians. A custodian is classified as more prestigious based on whether it ranks above the median for “fee and commission income,” or it is voted as a leader in custody in emerging markets. On the first trading day in each week, we sort all connected stocks into five quintiles based on scaled *NIF* during the past week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column “Post-Pre” reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Less prestigious	-0.056 (-0.65)	0.491*** (3.81)	0.547*** (3.69)	0.143 (1.37)	0.170* (1.79)	0.027 (0.32)	-0.519*** (-3.14)
More prestigious	0.017 (0.18)	0.363*** (3.25)	0.347** (2.48)	0.019 (0.17)	0.229** (2.12)	0.210** (2.11)	-0.136 (-0.85)
Less - More	-0.101* (-1.82)	0.099 (1.42)	0.200** (2.04)	0.094 (1.51)	-0.088 (-1.39)	-0.183* (-1.77)	-0.383*** (-2.80)

Panel B: Equal weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Less prestigious	0.064 (0.64)	0.516*** (4.14)	0.452*** (3.84)	0.166* (1.82)	0.242** (2.24)	0.075 (0.91)	-0.377*** (-2.74)
More prestigious	0.041 (0.50)	0.415*** (4.13)	0.375*** (3.65)	0.049 (0.50)	0.261** (2.38)	0.212*** (2.77)	-0.162 (-1.26)
Less - More	-0.005 (-0.09)	0.072 (1.00)	0.077 (1.03)	0.088* (1.79)	-0.049 (-0.85)	-0.137* (-1.66)	-0.214* (-1.94)

Table A8: Portfolio analysis using scaled flows: cross-operating/non cross-operating mainland custodians

This table presents the LSY-three-factor adjusted returns of portfolios by sorting on scaled *NIF* from cross-operating/non-cross-operating mainland custodians. Custodians are classified based on Securities Association of China's list. On the first trading day in each week, we sort all connected stocks into five quintiles based on scaled *NIF* during the past week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column "Post-Pre" reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Cross-operating	0.045 (0.50)	0.328*** (3.39)	0.284*** (3.13)	0.071 (0.68)	0.005 (0.04)	-0.066 (-0.72)	-0.350*** (-2.71)
Non Cross-operating	0.050 (0.66)	0.130 (1.44)	0.080 (0.89)	-0.073 (-0.59)	0.094 (0.83)	0.167 (1.59)	0.087 (0.68)
Cross - Non Cross	-0.035 (-0.55)	0.169** (2.21)	0.204* (1.66)	0.114 (1.58)	-0.119 (-1.43)	-0.233* (-1.75)	-0.437** (-2.54)

Panel B: Equal weighted

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Cross-operating	0.142* (1.74)	0.283*** (3.42)	0.141* (1.81)	0.069 (0.80)	0.086 (0.71)	0.017 (0.19)	-0.124 (-1.01)
Non Cross-operating	0.092 (1.22)	0.110 (1.44)	0.018 (0.31)	-0.031 (-0.27)	0.079 (0.75)	0.110 (1.36)	0.092 (1.06)
Cross - Non Cross	0.021 (0.41)	0.144** (2.26)	0.123 (1.29)	0.071 (0.94)	-0.023 (-0.35)	-0.094 (-0.83)	-0.217 (-1.50)

Table A9: Portfolio analysis: capped value-weighting

This table presents the LSY-three-factor adjusted returns of capped value-weighted portfolios by sorting on *NIF* from more / less prestigious foreign custodians in Panel A, and cross-operating / non cross-operating mainland custodians in Panel B. On the first trading day in each week, we sort all connected stocks into five quintiles based on *NIF* during the past week. Following [Jensen et al. \(2021\)](#), we weight stocks by their market value winsorized at the A-share market 80th percentile. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform subsamples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Column “Post-Pre” reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Foreign custodians

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Less prestigious	-0.034 (-0.38)	0.432*** (3.83)	0.466*** (3.81)	0.12 (1.13)	0.177* (1.77)	0.057 (0.71)	-0.409*** (-2.98)
More prestigious	-0.016 (-0.18)	0.346*** (3.46)	0.363*** (3.24)	-0.013 (-0.12)	0.232** (2.20)	0.246*** (3.03)	-0.117 (-0.85)
Less - More	-0.047 (-0.88)	0.057 (0.75)	0.104 (1.06)	0.105 (1.33)	-0.084* (-1.74)	-0.189* (-1.78)	-0.292** (-2.21)

Panel B: Mainland custodians

	Pre			Post			Post-Pre
	Low	High	HML	Low	High	HML	HML
Cross-operating	0.066 (0.75)	0.237*** (2.79)	0.171** (2.54)	0.028 (0.29)	0.003 (0.03)	-0.025 (-0.26)	-0.196 (-1.63)
Non Cross-operating	0.046 (0.57)	0.050 (0.61)	0.004 (0.07)	-0.078 (-0.72)	0.064 (0.57)	0.142* (1.67)	0.137 (1.53)
Cross - Non Cross	-0.008 (-0.15)	0.158** (2.42)	0.167* (1.70)	0.078 (0.90)	-0.089 (-1.33)	-0.166 (-1.29)	-0.333** (-2.19)

Table A10: Portfolio analysis: alternative benchmark adjustment

This table presents the excess returns and alphas from the [Fama and French \(1993\)](#) three-factor model and the [Carhart \(1997\)](#) four-factor model of portfolios by sorting on *NIF*. On the first trading day in each week, we sort all connected stocks into five quintiles based on *NIF* during the past week. The sample period is from March 17, 2017 to December 31, 2019. The pre- and post-reform sub-samples are divided based on the announcement day of penetrating regulatory reform, August 24, 2018. Reported in Columns “Pre” and “Post” are value weighted long-short portfolio returns during the pre-reform and post-reform periods, respectively. Column “Post-Pre” reports the return differences of a long-short strategy between pre- and post-reform periods. The t-statistics are computed with Newey-West standard errors with three lags. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Foreign custodians

	Excess return			FF3 alpha			Carhart4 alpha		
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Pre	Post	Post-Pre
Less prestigious	0.506*** (3.69)	0.008 (0.09)	-0.497*** (-2.95)	0.558*** (3.60)	-0.020 (-0.21)	-0.579*** (-3.09)	0.556*** (3.60)	-0.018 (-0.19)	-0.575*** (-3.08)
More prestigious	0.469*** (3.53)	0.246*** (2.83)	-0.223 (-1.40)	0.424*** (2.88)	0.251*** (3.03)	-0.173 (-1.00)	0.440*** (3.04)	0.234*** (2.72)	-0.206 (-1.20)
Less - More	0.036 (0.28)	-0.238** (-2.21)	-0.274 (-1.61)	0.134 (0.97)	-0.271*** (-2.71)	-0.405** (-2.42)	0.117 (0.84)	-0.252** (-2.53)	-0.368** (-2.24)

Panel B: Mainland custodians

	Excess return			FF3 alpha			Carhart4 alpha		
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Pre	Post	Post-Pre
Cross-operating	0.228*** (2.77)	-0.008 (-0.08)	-0.236* (-1.81)	0.273*** (3.12)	-0.009 (-0.09)	-0.282** (-2.07)	0.278*** (3.13)	-0.015 (-0.14)	-0.294** (-1.98)
Non Cross-operating	0.034 (0.46)	0.229* (1.80)	0.195 (1.33)	0.086 (1.07)	0.239* (1.89)	0.152 (1.16)	0.078 (0.93)	0.248* (1.92)	0.170 (1.22)
Cross - Non Cross	0.194* (1.88)	-0.238 (-1.49)	-0.432** (-2.28)	0.187* (1.69)	-0.248 (-1.52)	-0.435** (-2.40)	0.200* (1.77)	-0.263 (-1.54)	-0.464** (-2.38)