The Effect of the China Connect *

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Abstract

We analyze the effects on Chinese firms of the "China Connect" equity market liberalization. Because China is a capital abundant country, unlike typical emerging markets in the literature, the benefits and costs of liberalization are logically different. Nonetheless, the liberalization brought benefits: lower funding costs, higher stock prices, and more investment for connected firms compared to unconnected firms, despite a common negative effect on all firms from capital outflows. These benefits come from a new channel: reducing domestic credit misallocation between private- and state-owned enterprises. We also document costs: connected firms became more sensitive to external shocks than unconnected firms.

Keywords: Capital Account Liberalization; Capital Controls; Global Financial Cycle; Foreign Spillovers; Equity Returns; Corporate Investment

JEL Classification: F38; E40; E52; G15

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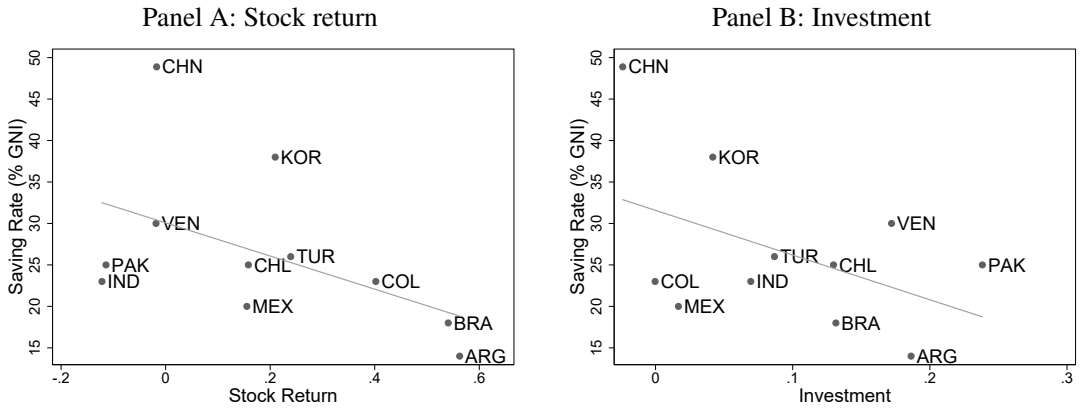
1 Introduction

Many developing countries have opened their capital accounts, allowing foreign (domestic) investors to participate in the domestic (foreign) stock market. There is growing consensus that stock market liberalization improves allocative efficiency and boosts investment and growth, at least for capital scarce countries that are typically the subject of investigation (Chari and Henry 2004, 2008, Bekaert, Harvey, and Lundblad 2005). Whether these benefits apply to a *capital abundant country* is an open question, however. Juxtaposed to these benefits, moreover, open capital markets can be costly as they create a channel for speculative foreign capital, which in the extreme can lead to financial crises (Reinhart and Reinhart 2008). Even outside of crisis episodes, countries that are financially integrated internationally seem to be subject to external shocks such as the global financial cycle (Rey 2015, Chari, Dilts Stedman, and Lundblad 2021, di Giovanni, Kalemli-Ozcan, Ulu, and Baskaya forthcoming). Although existing literature lacks causal evidence to blame the liberalization for increased sensitivity to external shocks, policymakers seem to believe so: many countries that pursued an open capital account have started to manage capital inflows by imposing controls. The International Monetary Fund has changed important elements of its view on capital account management under certain circumstances (Basu, Boz, Gopinath, Roch, and Unsal 2020). These considerations call for further analysis of stock market liberalization.

One conclusion from the literature on previous liberalizations is that countries with lower national savings rates enjoy larger post-liberalization gains in stock prices and investment, a finding we portray in Figure 1. For low-savings countries like Brazil and Argentina three decades ago, liberalizations brought large increases in stock prices and investment. However, the Shanghai (Shenzhen)-Hong Kong "Stock Connect" program, or "China Connect", also depicted in Figure 1, differed in many respects, including that it was a two-way liberalization and that China has massive savings trapped domestically plus large capital investment. Thus, unlike liberalizations in capital scarce countries, the beneficial effects emphasized in previous literature might not apply to China, or as we argue in this paper, apply in different ways.

We use the launch of the China Connect as a policy experiment to study both the benefits and

Figure 1 COUNTRIES WITH LOWER SAVINGS BENEFIT MORE FROM EQUITY MARKET LIBERALIZATION: STOCK RETURNS AND INVESTMENT AROUND LIBERALIZATIONS



NOTE. Source: authors calculations. Panel A (B) plots gross savings (% GNI) and stock return (investment) adjustment around liberalization episodes (taken from Chari and Henry 2004). We calculate average monthly stock return less pre-liberalization average for all listed firms within a country upon liberalization. We calculate average annual corporate investment less pre-liberalization average for all listed firms within the country in the liberalization year. Firm-level data is from Worldscope. The national saving rate is from World Development Indicators. Argentina (Sep 1989), Brazil (May 1991), Chile (Oct 1989), Columbia (Dec 1991), India (Nov 1992), Korea (Jan 1992), Mexico (May 1989), Pakistan (Feb 1991), Turkey (Aug 1989) and Venezuela (Jan 1996). For China (Nov 2014). See Appendix A.

costs of stock market liberalization on Chinese firms' stock prices and investment. The program allows investors on both sides of the markets in mainland China and Hong Kong to trade *eligible* stocks listed on the other market, with these trades working through the exchange and clearing houses in their "own" market and settled in RMB. The first wave of the Connect, announced in April 2014 and begun in November 2014, linked the Shanghai exchange to Hong Kong. In December 2016, the program was extended to the Shenzhen exchange.[1]

The Connect is an ideal setting to assess costs and benefits of liberalization, due to two unique institutional features. First, the Connect does not include all mainland stocks, as only eligible (connected) ones can be traded by foreign investors.[2] Therefore, different from other stock market

[1]Cross-boundary fund flows are cleared and settled on net through subsidiaries set up by local exchanges and there exist daily quotas. The daily quota of trading capitalization was 13 billion RMB for the Shanghai Exchange and 10.5 billion RMB for the Hong Kong Exchange. In addition, naked short selling through the Connect is forbidden.

[2]For the Shanghai-Hong Kong Connect, eligible stocks include all the constituent stocks of the SSE 180 Index, SSE 380 Index, and all SSE-listed A shares that are not included as constituent stocks of the relevant indices but which have corresponding H shares listed on SEHK (so called "A-H" dual listed stocks), except for SSE-listed shares which are not traded in RMB and SSE-listed shares which are under risk alert (including shares of "ST companies", "*ST companies companies" and shares subject to the delisting process under the SSE rules). Inclusion is similarly structured for Shenzhen-Hong Kong. See https://www.hkex.com.hk/Mutual-Market/Stock-Connect/Getting-Started/Information-Booklet-and-FAQ?sc_lang=en.

liberalizations, the China Connect provides a natural experiment, as it exogenously divides the Chinese mainland market into control and treatment groups. Second, the overall capital controls policy in China was kept tight around the launch of the Connect and has remained so.[3] Although the Connect is an important loosening of capital account restrictions, it is carefully designed to avoid excessively volatile capital flows (see Prasad 2017 and Song and Xiong 2018). Importantly, at least for the purpose of econometric identification, the Connect did not coincide with other major policy reforms, also distinguishing it from previous liberalization episodes.

Another distinguishing aspect of the Connect liberalization leads to what we show as the "common negative effect" of the Connect on mainland Chinese firms. The Connect was launched not so much to utilize cheaper financing from global markets but to promote international usage of the RMB. The program both facilitates increasing diversification demands of foreign investors and satisfies the growing needs of domestic residents to invest overseas. Because domestic Chinese residents are able to invest externally under the Connect, there could be a *negative* effect on domestic stock prices and investment. That said, although the conventional benefits from liberalization may not materialize in China, firms are greatly heterogenous within China. One element of that heterogeneity that we emphasize is political connections, as captured by ownership structure. As is well-established in the literature, private-owned enterprises (POEs) are more likely to be financially constrained than state-owned enterprises (SOEs) (Song, Storesletten, and Zilibotti 2011, Cull, Li, Sun, and Xu 2015). As a result, POEs might benefit more from the Connect than the relatively unconstrained SOEs. It is for these reasons that, as alluded to above, we argue that the beneficial effects emphasized in previous literature apply to China in subtly different ways.

We guide our empirical analysis with a simple model that reflects the uniqueness of the Chinese liberalization. One such feature is allowing both foreign and domestic investors to trade eligible stocks on the other market. Reflecting this, our model implies that liberalization potentially has two opposite effects on stock prices. More foreign capital coming into the domestic market should raise stock prices, while more domestic capital going out of China and into Hong Kong should

[3] See Appendix Figure A1 for a detailed illustration.

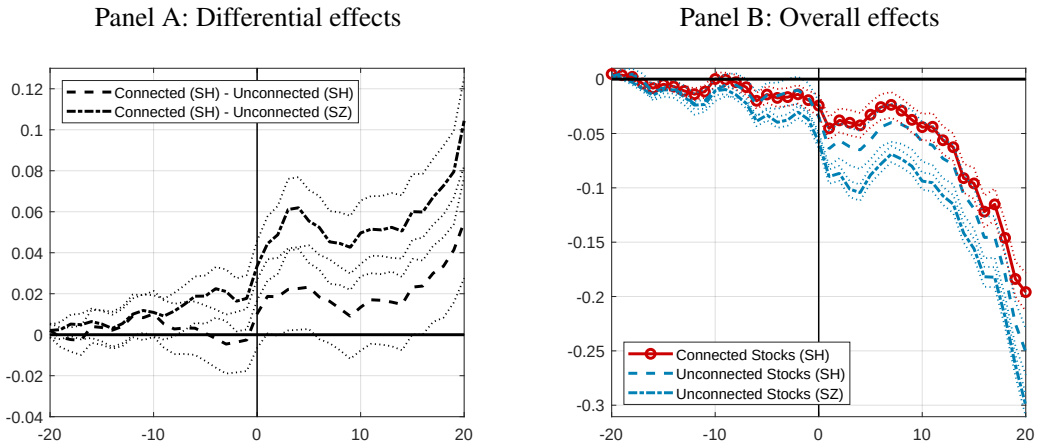
lower domestic stock prices. As stock prices affect the cost of capital, the liberalization can affect corporate investment through a funding cost channel (Chari and Henry 2008). We also use the model to analyze foreign spillover effects. China might be presumed immune to external shocks due to tight capital controls and low level of foreign currency debt. We argue nonetheless that the Connect creates a channel through which U.S. monetary policy shocks can spill over. A tighter U.S. monetary policy could raise global interest rates and/or global risk aversion. This induces a portfolio rebalancing by foreign investors that includes connected Chinese stocks.[4] We thus expect a price response of connected stocks that is different from unconnected ones. Moreover, the rich firm-level heterogeneity helps shed light on the transmission of U.S. monetary policy shocks. Global interest rate shocks affect connected stocks homogeneously while the global risk aversion shock affects connected stocks differentially, in proportion to the covariance with the global market. As U.S. monetary policy shocks can affect both global interest rates and risk aversion, our model predicts both a common effect and a firm-specific effect on connected stocks.

We have three main findings, fortified with many details, presented in the three subsections of Section 5. First, we examine the announcement effect around the Connect launch in 2014 on stock prices and investment, using an event-study following Chari and Henry (2004). As seen in Figure 2 and expounded upon below, connected stock prices rise significantly relative to unconnected stocks. The magnitude is comparable to that found in previous liberalization episodes (Chari and Henry 2004). As seen in Panel B, stock prices of both connected and unconnected firms fall, but by less for connected firms. The decline reflects a negative common effect for all stocks, consistent with the view that liberalization might result in capital outflows from a capital abundant country. Regressions using monthly stock returns centered on Nov. 2014 confirm the positive differential effect and negative common effect. We also find that connected stocks having a lower covariance with the global market experience a higher price revaluation, consistent with the notion that Chinese stocks provide diversification benefits (Shan, Tang, Wang, and Zhang 2020). In addition, we find that these effects on connected stocks transmit to unconnected stocks through

[4]This is consistent with Jotikasthira, Lundblad, and Ramadorai (2012), who find that global funds substantially alter portfolio allocations in emerging markets in response to funding shocks.

portfolio rebalancing: when foreigners purchase connected stocks, domestic investors have to sell, thus rebalancing towards unconnected stocks. This beneficial effect of liberalization on unconnected stocks is qualitatively different from previous literature. For example, Chari and Henry (2004) also find a positive effect on unconnected stocks, but that effect is due to a change in the risk-free rate affecting all stocks. In the case of China, there is no change in the risk-free rate, as capital controls remained tight.

Figure 2 DAILY STOCK RETURNS AROUND THE CONNECT ANNOUNCEMENT: 10 NOV 2014



NOTE: Cumulative abnormal return (CAR) based on a market model centered on Nov 10, 2014 (with 95% c.i.). Estimation window is [-300, -30] and we restrict firms to have at least 100 trading days at the estimation window. Panel A plots the differences between connected stocks (SH) and unconnected stocks in Shanghai (SH) and between connected stocks (SH) and unconnected stocks in Shenzhen (SZ). Panel B plots the CAR for three different groups of stocks based on their status when the China Connect announced.

Second, we relate this change in stock prices to corporate investment and find that connected firms invest more than unconnected ones, 0.4% more on average, in the eight quarters after the launch.[5] Compared with the average investment rate of around 3.0%, this is moderate. We further show that the boost in investment comes primarily from the connected firms that are *private owned rather than state owned*. This is because private owned enterprises are more financially constrained and thus benefit more from liberalization. We also find that connected firms have (i) higher profitability and sales growth, and (ii) lower funding costs in both debt and equity. The lower cost of capital also encourages connected firms to issue more equity than unconnected ones, which explains the economic channel from lower funding costs to higher investment. Furthermore,

[5] As with stock prices, investment by all Chinese firms falls, just less so for connected firms.

they reduce their demand for bank loans and thus have a lower leverage ratio.

Third, we investigate whether U.S. monetary policy shocks affect stock prices and investment more after the launch of the Connect. We find that excess returns fall in response to contractionary U.S. monetary policy shocks more for connected firms than unconnected firms. This effect appears only post-Connect. Concerning the stock price response, we also find that only capital flows *into* mainland China through the Connect are correlated with the U.S. monetary policy shock (on FOMC announcement days). Flows into the Hong Kong market do not show the same pattern. This evidence is consistent with the workings of our model: foreigners rebalance their portfolios including connected Chinese stocks following U.S. monetary policy shocks. We also find that the investment sensitivity of connected firms to these shocks is higher than that of unconnected ones after the Connect.[6] However, the transmission mechanism of U.S. monetary policy to the Chinese economy works more through the risk-free rate rather than risk-aversion, consistent with Bekaert et al. (2021b) and the fact that Chinese stocks have a rather low covariance with the global market.

Mechanisms: cost of funding and ownership structure

We provide evidence that a key mechanism explaining our results is that liberalization lowered firm funding costs. As direct evidence of a funding cost channel, we find that connected firms issue more equity in terms of seasoned equity offering than unconnected ones after the launch of the Connect.[7] In addition, we use measures from the existing literature and show that connected firms who experience either a higher stock price adjustment initially or have greater reliance on external finance à la Rajan and Zingales (1998) respond more, as do smaller firms, both in terms of investment adjustment to the launch of the Connect and investment sensitivity to U.S. monetary policy shocks once included in the Connect.

We also explore the role of firm ownership structure. Consistent with private owned enterprises

[6] We run robustness tests that control for the effects of potential confounding factors, paying special attention to firm size. We also find robustness to including external shocks other than U.S. monetary policy shocks, and we run various placebo tests.

[7] A potential explanation for our findings on investment would be if firms directly raised capital from the Connect program. However, this is not true by and large, as the Connect does not support initial public offerings (*Information Book for Investors*, HKEX website).

being more financially constrained, we find that the POE sector responds more to the launch of the Connect.[8] Although ownership structure matters for the increased investment, we show, it does not account for the increased sensitivity to U.S. monetary policy shocks, either for SOEs or POEs. We argue that this result should not be surprising because the important channel is through foreign investors' portfolio rebalancing towards *all* connected stocks—both SOEs and POEs—following a contractionary monetary policy shock. As connected stock prices and thus funding costs experience extra volatility from external shocks due to the Connect, their investment sensitivity also increases. This finding is not inconsistent with the fact that most state-owned firms are not financially constrained. They do not respond to the lower funding costs brought by the liberalization simply because they are not short of capital for investment.

Taken together, our results suggest that the effects of liberalization that have been documented elsewhere are likely manifest in China not because China has a shortage of capital investment but because of credit misallocation within China. One benefit of liberalization is thus to reduce domestic credit misallocation. Although state-owned enterprises are not short of capital investment, this does not shield them from extra volatility in their funding costs in the aftermath of liberalization. This result suggests a powerful transmission mechanism for external shocks even with tight capital controls policy, and adds a cautionary note to the ongoing Chinese liberalization such as the *Cross-boundary Wealth Management Connect Scheme* recently.

Methodological concerns: sample selection

We devote considerable attention to methodological concerns, which effectively emerge from the fact that connected firms were not selected randomly, that this choice may not be orthogonal to unobserved factors that also affect firm equity returns, financing costs, investment, etc., and that the effect of the Connect may vary as a function of firm characteristics. This concern would be more worrisome if selection were made on a firm-by-firm basis, with firms lobbying to influence the decision. However, selection is made by the China Securities Index Co., Ltd, monitored by

[8] Ownership can also be viewed as a proxy for funding costs, given that SOEs have preferential access to capital, at a minimum, and investment mandates, at a maximum.

the regulator, the China Security Regulatory Commission. Selection follows the construction of stock indexes in the market. There is no evidence that firms can affect the index construction methodology. Nevertheless, we have carefully undertaken standard methods like propensity score matching and Heckman corrections, as well as running discontinuity regressions. We conclude that our inferences concerning the effects of the China Connect are not the result of sample selection bias. In order to save space, we display this material in Appendix section I.

Related literature

We contribute to several strands of literature. First, to a large literature on the effects of stock market liberalization. There is large consensus that liberalization helps capital scarce countries enjoy lower funding costs and boosts investment and economic growth (Bekaert and Harvey 2000, Bekaert et al. 2005, Chari and Henry 2004, 2008 and Quinn and Toyoda 2008), as noted above, but the economic channels are less clear.[9] Furthermore, the literature has very little to say about the outflow effects of liberalization for capital abundant countries (Henry 2007). Related to the costs of liberalization, the literature offers somewhat mixed results. Financial integration can provide more risk-sharing and thus help lower the volatility of output growth and consumption (Bekaert, Harvey, and Lundblad 2006), but might also expose the domestic economy to external shocks (Levchenko et al. 2009, Rey 2015, Miranda-Agrippino and Rey 2020). We contribute to this literature by documenting benefits for a capital abundant country, showing a common negative effect from capital outflows, and uncovering a *new* channel for the benefits of liberalization in reducing the domestic

[9]For example, Bekaert et al. (2005) document an annual 1% boost to real output growth following equity market liberalization, an effect that is larger than found elsewhere (see Kose, Prasad, Rogoff, and Wei 2009 for example). Considerable efforts have been made to understand the channels for these output growth effects. Gupta and Yuan (2009) find that liberalization reduces financial constraints and thus boosts the size of existing firms. Larrain and Stumpner (2017) find an improvement in capital allocation following liberalization by investigating the response of sector-level marginal product of capital. Moshirian et al. (2020) find greater technological innovation after the liberalization. Some researchers use firm-level data, as we do, to assist identification. For example, Chari and Henry (2004, 2008) and Mitton (2006) use the investible and non-investible index lists constructed by the International Finance Corporation (IFC). This classification is based on the selection criterion adopted by the IFC based on the IFC analysts' reviewing a stock's trading activity. However, foreign investors can still trade non-investible stocks by other channels, as authorities opened all stocks for trade. In contrast, foreign investors cannot easily trade "non-investible" stocks in the China Connect as it is prohibited by the program. Moreover, unlike the China Connect, past liberalizations always coincide with other economic reforms, making identification difficult (McLean et al. 2017).

credit misallocation between POEs and SOEs. We also document the costs of liberalization in the larger spillovers from U.S. monetary policy after the liberalization.

Second, our paper belongs to the literature on the transmission of U.S. monetary policy. For example, Ottonello and Winberry (2020) focus on the transmission to U.S. firms. In the international context, see Dedola et al. (2017), Curcuru et al. (2018), Degasperi et al. (2020), Bräuning and Ivashina (2020), Bekaert et al. (2021b), and Chari et al. (2021), who look at the effects of U.S. monetary policy shocks on a number of macroeconomic and financial variables. We also provide evidence on the effects of U.S. monetary policy on capital flows, stock prices, and corporate investment. But we focus on the increased spillovers due to stock market liberalization and investigate the transmission of U.S. monetary policy into the largest emerging market economy.

Third, our paper contributes to the literature on capital controls. One conclusion from the literature is that capital controls can create a useful wall against external shocks (Jeanne et al. 2012). However, the empirical evidence for the effectiveness of capital controls is mixed (Rebucci and Ma 2020, Erten, Korinek, and Ocampo 2021). One identification difficulty is that the policy is usually endogenous and sticky: many countries put capital controls in place simultaneously with adverse events and do not change them frequently (see Alfaro, Chari, and Kanczuk 2017 for an exception). Analyzing the China Connect allows us to side-step those hindrances—the liberalization took place amid an overall tight and barely changed capital controls policy in China and the Connect only allows a subset of firms to be traded by foreign investors (those with less protection from capital controls). As stock market liberalization can be viewed as a relaxation of capital controls policy, our findings on the China Connect also apply to capital controls policy.

2 Institutional background

China's two domestic stock exchanges, the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE), were established in December 1990 and April 1991, respectively. Their A share markets combined are the second largest in the world in terms of market capitalization, trailing only

the United States. The number of listed firms has been growing since market inception, with more than 3,600 firms listed and traded at the end of 2019.

Foreign investors were traditionally restricted from trading in the A-share market. After the Asian financial crisis, the China Securities Regulatory Commission (CSRC) has taken a gradual and prudential approach to opening the financial markets (Song and Xiong 2018). Foreign investors were restricted to trading only on the B-share market, but in late 2001 B-shares became open to domestic investors. The B shares listed on the Shanghai and Shenzhen Stock Exchanges are denominated in USD and HKD, respectively (Fernald and Rogers 2002). However, B-share issuance died out after 2002 when the Qualified Foreign Institutional Investor (QFII) program was initiated to certain overseas *institutional* investors, which allowed limited access to A-share stocks. Obtaining QFII licences was extremely difficult, requiring applicants to meet certain standards for financial stability. In the first year, only 12 qualified foreign investors were approved and approval ceased during 2006-2007.[10] The QFII program allows foreign investors to first convert their FX into RMB and then invest in RMB-denominated assets. The Renminbi Qualified Foreign Institutional Investors (RQFII) program introduced in 2011 allows foreign investors to use their offshore RMB as opposed to foreign currency directly. This program, although limited in size and only targeting *qualified institutional investors*, quickly became popular as global investors diversified into China. The presence of international investors in China under these programs can boost stock price informativeness (see Carpenter, Lu, and Whitelaw 2020).

There are also programs that relax restrictions on domestic Chinese residents purchasing overseas stocks. Beginning in 2006, domestic institutional investors have been allowed to purchase foreign stocks under the Qualified Domestic Institutional Investor (QDII) program. This reform facilitates domestic residents' enlarging their investment outlets and more flexibly managing asset allocations. Chinese policymakers understand the long-desired diversification motive of Chinese households and business toward global assets. Their concern, however, is the potential for sharp capital outflows and RMB depreciation, like in the Asian Financial Crisis.

[10]Detailed comparison between the QFII/QDII and the Stock Connect can be found at: http://english.sse.com.cn/investors/shhkconnect/introduction/comparing.

An important motivation for launching the China Connect was to facilitate international usage of the RMB. This applies both to foreign investors, so that they can invest more easily in RMB-denominated assets, and to domestic investors to invest RMB overseas. Since 2013, China's capital account management has undergone a paradigm shift (Miao and Deng 2020). China had become increasingly concerned about "hot money" inflows and over-accumulation of reserves, and was therefore more willing to relax controls on outflows. Nevertheless, the China Connect is a carefully designed and controllable mutual market access experiment—all transactions are settled in RMB; Cross-boundary fund flow are cleared and settled on net through subsidiaries set up by local exchanges; there exist daily quotas on both sides of flows and can be adjusted by policymakers.

Different from the QFII and QDII programs, which are relatively small and apply only to qualified institutional investors, the China Connect is a big liberalization that includes both *institutional and retail investors*.[11] The program was first proposed in 2007 by the Binhai New Area of Tianjin and the Bank of China. However, regulators postponed the program until April 10, 2014, when the CSRC and Hong Kong Securities and Futures Commission (SFC) made a joint announcement to start the program.[12] The program included all foreign investors as well as any mainland investors who have a stock account with balances no less than 500,000 RMB (approximately 72,000 USD), regarded as a relatively low barrier to enter both markets.[13] The Connect was officially launched on November 17, 2014 with the participant list of stocks released on November 10, 2014 (Table A1). On December 6, 2016, the Shenzhen Stock Exchange was also connected to the Hong Kong Stock Exchange, with the joint announcement released early on August 6, 2016 and the actual participant list released on November 25, 2016.[14] The Shenzhen Exchange includes both growth and high-tech startup firms like ChiNext. Overall, more than one thousand stocks from the mainland have become connected to overseas investors, including both value stocks and growth stocks.

As noted above, only eligible mainland (Hong Kong) stocks can be traded by foreigners (do-

[11] Figure A2 displays the composition of foreign investors in Chinese markets under the QFII and China Connect.

[12] See http://www.gov.cn/xinwen/2014-04/10/content_2656483.htm.

[13] Detailed information can be found on the website of the Hong Kong Stock Exchange. https://www.hkex.com.hk/-/media/HKEX-Market/Mutual-Market/Stock-Connect/Getting-Started/Information-Booklet-and-FAQ/Information-Book-for-Investors/Investor_Book_En.pdf

[14] Details in http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201608/t20160816_302227.html.

mestic investors) though the China Connect. Regulators update the list periodically according to a certain criterion, largely based on whether those stocks belong to some indexes. Once connected, eligible securities are included and excluded based on adjustments made to the indexes and the timing at which relevant A shares are placed under risk alert or released from risk alert. The authority makes adjustments semi-annually. We have carefully examined firm characteristics in affecting the inclusion and exclusion into the Connect. Firm size seems to be an important factor, which we pay special attention to in both our baseline regression and appendix section on sample selection.

We note that foreign capital in the Chinese market is not huge overall. Nonetheless, we argue that it can plausibly create a non-negligible effect on the domestic market. Figure A2 shows the relative size of foreign and domestic investors, as well as industry distribution, in the Connect program. The share of foreign capital in total tradable market value is around $0.3 trillion (3% of the market) in 2019, less than that for domestic institutional investors, at around $1 trillion (10%). However, foreign capital has been shown to be "smart", improving market efficiency and thus influencing stock prices (Bae et al. 2006, Bae et al. 2012, Bian et al. 2020 and Kacperczyk et al. 2021). Moreover, this $0.3 trillion in foreign investment in China is sizable compared to other countries, e.g., $0.16 trillion (8% of market) for India, which has a capital controls policy similar to China's (Bena, Ferreira, Matos, and Pires 2017). Therefore, to the extent that foreign capital improves market efficiency and corporate governance, it plausibly generates effects even with a relatively small market share. And to the extent that foreign capital serves as "smart" money which leads domestic investors, it will generate the sorts of effects we document.

3 Conceptual motivation

A simple framework guides our empirical analysis. The model is similar in spirit to Chari and Henry (2004) but differs from their case with complete liberalization since we focus on an environment with partial liberalization (our Federal Reserve working paper version follows their framework). We consider a static setting with three types of assets for domestic investors: con-

nected and unconnected domestic stocks and eligible Hong Kong stocks. Domestic investors with mean-variance utility trade those assets and thus in equilibrium affect their prices. Denote stock prices by P^i, with $i \in \{C, UC\}$ where C and UC stand for connected and unconnected stocks. Domestic investors take Hong Kong stock prices as given because they are unlikely to be the marginal investor in that market. Thus, we normalize P^{HK} to 1. Similarly, denote the dividend (or cash flow) by $\mu^i + \varepsilon^i$ with μ^i is the expected value, $E[\varepsilon^i] = 0$ and $E[\varepsilon^i \varepsilon^j] \equiv \sigma^{ij}$ where $i, j \in \{C, UC, HK\}$.

Domestic investors with risk-aversion parameter γ choose among risk-free assets with a safe return r, connected stocks, unconnected stocks, and Hong Kong stocks. In equilibrium, they optimally equate the stock price with the risk-adjusted payoffs. To capture the unsatisfied diversification demand for Hong Kong stocks due to capital controls, we assume that there exists a quantity restriction on investing in the Hong Kong market, captured by $\bar{x}^{HK} + \Delta\bar{x}^{HK}$, with $\bar{x}^{HK}, \Delta\bar{x}^{HK} > 0$. This could be due to regulatory restrictions or other behavioral factors. The launch of the China Connect arguably relaxes this constraint, i.e. $\Delta\bar{x}^{HK} > 0$. Denote the total net supply of connected and unconnected stocks available to domestic investors by $\bar{x}^C - \Delta\bar{x}^C > 0$ and $\bar{x}^{UC}$, respectively. More foreign capital flowing into connected stocks lowers the available stocks to domestic investors, i.e. $\Delta\bar{x}^C > 0$. Given those conditions, one can define an equilibrium that includes stock prices for both connected and unconnected stocks and optimal quantity holdings by domestic investors of risk-free assets, connected stocks, unconnected stocks, and Hong Kong stocks. In particular, we are interested in equilibrium stock prices given by (see Appendix C):

$$P^C = \bar{P}^C + \frac{\gamma\sigma^{C,C}}{1+r}\Delta\bar{x}^C - \frac{\gamma\sigma^{HK,C}}{1+r}\Delta\bar{x}^{HK} \tag{1}$$

$$P^{UC} = \bar{P}^{UC} + \frac{\gamma\sigma^{UC,C}}{1+r}\Delta\bar{x}^C - \frac{\gamma\sigma^{HK,UC}}{1+r}\Delta\bar{x}^{HK} \tag{2}$$

where $\bar{P}^C \equiv \frac{\mu^C - \gamma(\bar{x}^C\sigma^{C,C} + \bar{x}^{UC}\sigma^{UC,C} + \bar{x}^{HK}\sigma^{HK,C})}{1+r}$ and $\bar{P}^{UC} \equiv \frac{\mu^{UC} - \gamma(\bar{x}^{UC}\sigma^{UC,UC} + \bar{x}^C\sigma^{UC,C} + \bar{x}^{HK}\sigma^{HK,UC})}{1+r}$ denote the equilibrium stock prices before the launch of the China Connect.

Although we assume that domestic investors take Hong Kong stock prices as given, the launch of the Connect did coincide with a rise in the prices of Hong Kong eligible stocks (see Table

A13). This likely reflects flow pressures from mainland China to Hong Kong. This is not taken to suggest that Chinese investors play the role of marginal investor in the Hong Kong market through the China Connect. Rather, it suggests that there exists an inelastic demand for foreign assets on the part of domestic investors. Needless to say, such a demand might change with other factors such as the expected return and risks in the Hong Kong market or the exchange rate. At the launch of the China Connect, the increased demand for Hong Kong assets is arguably a reflection of the growing and unsatisfied diversification needs for global assets, something constrained by existing capital controls. For that reason, we assume that the optimal quantity of Hong Kong assets is constrained exogenously by $\bar{x}^{HK}$, and that the China Connect simply relaxes this constraint by $\Delta\bar{x}^{HK} > 0$.

We also assume that there is a reduction in connected stocks available to domestic investors because of the China Connect. This is denoted by $\Delta\bar{x}^{C} > 0$. In a simple portfolio choice model for a mean-variance global investor with risk aversion coefficient γ^*, one can easily derive the demand function for global investors on connected stocks given by

$$\Delta\bar{x}^{C} = \frac{r^{C} - r^{*} - \gamma^{*}\bar{x}^{W}\sigma^{C,W}}{\gamma^{*}\sigma^{C,C}} \tag{3}$$

where r^C is the expected return on connected stocks, r^* is the global risk-free rate, $\bar{x}^W$ is the equilibrium holding by foreign investors of global stocks and $\sigma^{C,W}$ is the covariance term between connected stocks and the global market.[15] Intuitively, global investors optimally choose the amount of connected stocks and global stocks, taking into account their risks. In particular, their demand for connected stocks is negatively correlated with their covariance risks.

The China Connect has two main implications for **stock prices**. One is through more foreign capital, i.e. $\Delta\bar{x}^{C} > 0$ and the other is more diversification into global markets, i.e. $\Delta\bar{x}^{HK} > 0$. We

[15] We normalize connected stock expected returns for simplicity. As is easily seen, $1 + r^C = \frac{\mu^C}{P^C}$ holds by definition.

therefore derive the following comparative statics:

$$\frac{dP^C}{d\Delta\bar{x}^C} = \gamma\frac{\sigma^{C,C}}{1+r} > 0, \tag{4}$$

$$\frac{dP^{UC}}{d\Delta\bar{x}^C} = \gamma\frac{\sigma^{UC,C}}{1+r}, \tag{5}$$

$$\frac{dP^i}{d\Delta\bar{x}^{HK}} = -\gamma\frac{\sigma^{i,HK}}{1+r}, \text{ for } i = C, UC \tag{6}$$

Three testable implications emerge. First, for connected stocks, more foreign capital unambiguously drives up their prices. For unconnected stocks, their price responses depend on the covariance with connected stocks, $\sigma^{UC,C}$, i.e. $\frac{d}{d\sigma^{UC,C}}\left(\frac{dP^{UC}}{d\Delta\bar{x}^C}\right) = \frac{\gamma}{1+r} > 0$. Intuitively, connected stock prices rise due to more foreign capital purchases. As the total supply of connected stocks is fixed in the short run, domestic investors have to reduce their holdings of connected stocks to satisfy foreign investors' needs and then rebalance towards unconnected stocks. As a result, there is a spillover effect on unconnected stocks which depends on the covariance term with connected stocks. Second, connected stocks having a higher covariance term with global markets experience less price adjustment. For diversification purposes, global investors have a higher demand for connected stocks if they provide more diversification benefits, i.e. have a lower covariance with the global market. This is consistent with the risk-sharing mechanism in the full liberalization model in Chari and Henry (2004). Third, for both connected and unconnected stocks, the common effect of the China Connect from a diversification motive is ambiguous but negatively correlated with the covariance term with Hong Kong market, i.e. $\frac{d}{d\sigma^{i,HK}}\left(\frac{dP^i}{d\Delta\bar{x}^{HK}}\right) = -\frac{\gamma}{1+r} < 0$ for $i = C, UC$.

In addition to stock prices, we also expect a change in **capital investment** through a cost of funding channel, as suggested by new classical investment theory (see Chari and Henry 2008). For example, under the optimal investment plan, domestic firms equate the marginal product of capital to its cost of funding (equity return), $E[R_i] \equiv \frac{\mu_i}{P_i}$ given by

$$E[f_i'(k_i)] = E[R_i] \tag{7}$$

where $f_i(\cdot)$ is a concave production function, k_i is capital per unit of effective labor (total capital stock over effective labor), and $E[R_i]$ is the required equity return for firm i. Capital investment is likely to respond more slowly than stock prices due to adjustment costs. As the channel from stock prices to investment is through funding costs in our model, we also investigate this mechanism. This is relevant in light of existing literature and the unique Chinese setting. This leads to two hypotheses concerning the immediate effects of the Connect on stock prices and investment.

Hypothesis 1. *More foreign capital leads to higher stock prices and more capital investment for firms included in the Connect compared to firms left out of the program. For connected firms, these positive effects are stronger for firms with a lower covariance term with the global market, i.e.* $\sigma^{C,W}$. *For unconnected firms, there is a spillover effect from more foreign capital on connected firms, captured by the covariance term with the new investible stocks for foreign capital, i.e.* $\sigma^{UC,C}$.

Hypothesis 2. *All firms experience a common effect due to a diversification motive into Hong Kong once the China Connect is launched. This effect is negatively correlated with the covariance term with the Hong Kong market, i.e.* $\sigma^{i,HK}$.

After the launch of the China Connect, foreign investors became eligible to trade Chinese stocks that are included in the program. If external shocks affect foreign investors' opportunity costs or risk aversion, those shocks might now be transmitted to Chinese connected stocks through a portfolio rebalancing by foreign investors. As a result, connected stock prices should respond more to external shocks after the launch of the China Connect. This could ultimately affect corporate investment. This can be seen from the following comparative statics analysis.

$$\frac{dP^C}{dr^*} = \frac{dP^C}{d\Delta\bar{x}^C}\frac{d\Delta\bar{x}^C}{dr^*} = -\frac{\gamma}{\gamma^*(1+r)} < 0 \tag{8}$$

$$\frac{dP^C}{d\gamma^*} = -\frac{\gamma}{\gamma^*(1+r)}\frac{r^C - r^*}{\gamma^*} \tag{9}$$

There are two ways for an external shock to affect foreign investors and thus connected stock prices. One is through the global risk free rate r^* and the other is via the price of risk γ^*. According

to the derivation above, we expect that the effect of external shocks (global interest rates) on connected stock prices is negative. Yet, its impact through risk aversion is heterogeneous and depends on the required risk premium from global investors, i.e. $\frac{r^C - r^*}{\gamma^*}$. In a world where the global capital asset pricing model applies, the required risk premium is proportional to the covariance term with the global market, i.e. $\sigma^{C,W}$. Therefore, connected firms have more negative responses to a global risk aversion shock if they have a higher covariance risk. Similarly, we can study the spillover effect from connected to unconnected stocks. The impact of external shocks on unconnected stocks is again ambiguous and depends on the covariance term with connected stocks, $\sigma^{UC,C}$.

$$\frac{dP^{UC}}{dr^*} = -\frac{\gamma\sigma^{UC,C}}{\gamma^*\sigma^{C,C}(1+r)} \tag{10}$$

$$\frac{dP^{UC}}{d\gamma^*} = -\frac{\gamma\sigma^{UC,C}}{\gamma^*\sigma^{C,C}(1+r)}\frac{r^C - r^*}{\gamma^*} \tag{11}$$

We focus on one particular external shock, a U.S. monetary policy shock. This could affect the Chinese economy through the Connect either because the shock affects the global risk free rate r^* or global risk-aversion γ^*. In either case, Chinese stocks will be affected due to the foreigners' portfolio rebalancing through the Connect program.[16] Domestic investment could also be affected, through a funding cost channel. As the spillover effect from U.S. monetary policy on the Chinese economy works through the Connect program, we expect that connected firms—with more access to foreign capital—become more sensitive to external shocks than unconnected firms. Moreover, our simple theoretical model also provides a back-of-envelope calculation to decompose the relative importance of the risk-free rate and risk-aversion as transmission channels for U.S. monetary policy. The risk free rate channel is a common shock to all connected stocks while the risk-aversion channel is firm-specific and depends on the covariance between the firm's stock return and the global market return, i.e. $\sigma^{C,W}$. One can thus calculate their relative importance.

Hypothesis 3. *Firms included in the Connect program become more sensitive to external shocks than unconnected firms, after the Connect. Moreover, connected firms with relatively higher co-*

[16] Foreign risk aversion can change with U.S. monetary policy shocks (Miranda-Agrippino and Rey 2020).

variance with the global market (i.e., higher $\sigma^{C,W}$) have more sensitivity to risk aversion shocks after the Connect. For unconnected firms, there might be a spillover effect, captured by the covariance term with the connected stocks, i.e. $\sigma^{UC,C}$.

As noted in the Introduction, we study both the immediate effect of the Connect on firms and whether there are larger spillovers from foreign shocks after the Connect. For the former, as it is by nature "immediate", we want to rule out expectations of future inclusion in the Connect. Thus, we focus on a short window around the 2014 announcement. No Shenzhen stocks became connected at that time. For part two of our analysis, examining the spillovers from foreign shocks, we combine both the Shanghai and Shenzhen waves. In this analysis, the expectation aspect is not as concerning because the hypothesized channel is through foreigners' portfolio rebalancing. What matters for them is whether or not the stock is in the Connect.[17]

Economic mechanism and ownership structure The effect from stock prices to corporate investment works through a cost of funding channel (see Chari and Henry 2008, Gupta and Yuan 2009 among others). Previous literature suggests that a stock market liberalization raises investment by lowering the cost of external capital. We expect that firms relying more on external financing will be more responsive to funding cost changes brought about by the Connect. Moreover, firms facing tighter financial constraints or who are smaller might also be more responsive. One unique aspect of China is the ownership structure and political connection, which might distort domestic credit markets. Private-owned enterprises are more financially constrained than state-owned enterprises (Song et al. 2011), and thus we expect that the lower funding costs brought by the Connect are more likely to affect private sector investment. State-owned enterprises are less likely to respond because they are not as financially constrained—at a minimum—and are also distorted by other mandates. Although the state-owned enterprises are less likely to respond to the one-time funding cost changes due to the Connect, they still might respond to external shocks after the launch. Like the private-owned enterprises, their stock prices are more likely to be affected by external shocks

[17] Naturally, we wish to check robustness concerning the "immediate" effects of the 2016 Connect announcement on Shenzhen stocks, which we do in Appendix G.

once connected. The fluctuations in funding costs might also affect their investment decisions.

Hypothesis 4. *Connected firms' investment is more responsive to funding cost changes at the launch of the Connect and to subsequent external shocks if they rely more on external finance, face more financial constraints or are smaller in size. Private-owned enterprises are more responsive to funding cost changes, as they are more likely to be financially constrained. However, both private and state-owned enterprises are more likely to be affected by external shocks once connected.*

4 Data

Our dataset has three parts. First is information on Chinese listed firms. For firm-level accounting information, we use the China Stock Market and Accounting Research (CSMAR) Database. For return information, we use WIND, the largest financial data provider in China. For Chinese macro-level information, we use the CEIC dataset and WIND. Second, we collect information on international publicly listed firms to compare with Chinese firms. The firm-level information is from Thomson Reuters Worldscope. We also merge country-level information from World Development Indicators (WDI). Third, we collect data on measures of external shocks. Detailed construction information is in Appendix A.

Our sample starts when all A-share stocks were traded on the Shanghai and Shenzhen Exchanges. B-share stocks are excluded because they can only be traded by foreign investors. As is conventional, we drop financial and utility firms since they share different disclosure regulations and their liquidity positions are special compared with firms in other sectors. We also require firms to have at least two years of historical data. We exclude firms listed after 2014 to abstract from new IPOs. Our sample runs from 2003-19, with the beginning chosen to reflect when the CSRC required all listed firms to file quarterly financial reports.[18] We drop observations with missing key values for investment, Tobin's Q or cash flow.

[18]The announcement date is April 6, 2001 and became effective in 2002. Detailed information can be found at: http://www.gov.cn/gongbao/content/2002/content_61983.htm.

Stock prices We focus on actively traded A share stocks. Prices are dividend-inclusive and RMB-denominated. Monthly (daily) returns are constructed as the log difference in the closing price each month (day). We also construct three different measures of individual firms' covariance term: covariance with domestic connected stocks portfolio $\sigma^{i,C}$, Hong Kong eligible stocks portfolio $\sigma^{i,HK}$ and global markets $\sigma^{i,W}$. We use the equal weighted return of the Shanghai SSE 180 and SSE 380 index as a proxy for domestic connected stocks portfolio before 2016. We add the Shenzhen SZSE Component Index and Small and ChiNext Index after December 2016 when the Shenzhen market became connected. For Hong Kong eligible stocks, we use the average return of the Hang Seng Composite Large Cap and Mid Cap Index.[19] For the global market, we use the RMB-denominated MSCI World Total Return Index. For all covariances, we use historical 36-month rolling windows.

Firm investment Our corporate investment variable is constructed using capital expenditures divided by beginning-of-quarter book value of total assets (lagged total assets), where capital expenditures are calculated as cash payments for the acquisition of fixed assets, intangible assets and long-term assets (from the cash flow statement) minus cash receipts from selling those assets.[20] We also include other standard variables widely used in the investment-Q specification such as Tobin's Q: the book value of total assets minus the book value of equity plus the total market value of equity (close price at quarter end multiplied by share outstanding) scaled by book value of total assets; Size, the natural logarithm of the book value of total assets; Cash flow, measured by earnings before interest and taxes (EBIT) plus depreciation and amortization minus interest expenses and taxes scaled by lagged total assets; and Sales growth, defined as the growth rate of revenue.

External shocks Our main external shock is a U.S. monetary policy shock (MPS^{US}), constructed by Rogers et al. (2018). This is a high-frequency surprise series, measuring changes in yields from 15 minutes before the FOMC announcement to 30 minutes afterward. The MPS^{US} series is matched to our sample from 2003 to 2019 (Table A2).[21] To match the U.S. monetary policy

[19] Stocks in the Hang Seng Composite Small Cap Index with market capitalization of no less than HKD 5 billion are also eligible after December 2016. The results remain unchanged if we consider that addition.

[20] Our measure of investment to asset ratio is equivalent to capital expenditure (Compustat data item # 128 CAPX) which is commonly used in U.S. based studies.

[21] The series is a combination of three surprises: Target Fed Funds rate surprises, which were zero between Decem-

shock with our quarterly firm data, we aggregate MPS^{US} within each quarter in two ways, as in Ottonello and Winberry (2020). One is a simple sum of the (typically two) surprises that occur each quarter. The idea is to capture the cumulative amount of monetary policy shocks in a quarter. Recognizing the slow adjustment of corporate investment decisions, we also use a value weighted sum to construct the quarterly MPS^{US}, where the weight is given by the number of days remaining in the quarter after FOMC announcement day. Results are highly robust, so we display only the simple aggregation. We also utilize other measures of macro shocks such as the Chinese monetary policy shock identified by Chen et al. (2018) (see Appendix A).

Summary statistics Table A4 reports summary statistics used in both monthly stock price and quarterly investment regressions. As is conventional, we winsorize our sample at the top and bottom 1% of all continuous variables to mitigate outliers. The average monthly return is 5.5% at Nov. 2014 for all firms. Unsurprisingly, firms have a higher covariance with connected stocks $\sigma^{i,C}$, followed by the covariance with Hong Kong $\sigma^{i,HK}$ and lowest with the world market $\sigma^{i,W}$. The low covariance with the world market suggests that global investors can have a higher diversification benefit by investing in China (Shan et al. 2020). We also show a correlation table in Table A5. Those three covariance terms are correlated, in particular for $\sigma^{i,W}$ and $\sigma^{i,HK}$. Moreover, those covariance terms are both negatively correlated with market cap. Quarterly capital expenditure is 3.0% on average, with a standard deviation of 3.8%.[22] Tobin's Q is 2.4 on average with a standard deviation of 1.7. Size is 21.9 on average with a standard deviation of 1.3. The mean of cash flow is 3.1% with a standard deviation of 4.5%. Sales growth is 0.39 on average with a standard deviation of 0.78. All statistics are consistent with previous studies on China (e.g., Cao et al. 2016).

Connected and unconnected firms Table A6 compares ex-ante differences between connected and unconnected firms, for the two big waves of the Connect one period before the Connect. Consistent with the purpose of index stocks, firms that would eventually become connected are

ber 2008 and December 2015; Forward Guidance surprises; and Large Scale Asset Purchase surprises (zero before QE1). The series also includes a handful of inter-meeting announcements. See the original paper for the underlying data and details on construction of the surprises. We use the Eastern U.S. time zone, a half-day behind China. This is not an issue for our analysis of quarterly data.

[22] For comparison, in Ottonello and Winberry (2020), they report that the U.S. quarterly investment rate is about 0.5% on average with a standard deviation of 9.3%.

larger and have lower return volatility. As noted above, we pay special attention to minimize the effect of these differences in affecting our results (see Appendix section I).

Ownership structure We define state-owned enterprises as firms whose ultimate owner or block-holder is a government related entity. It should be noted that the ownership structure might change periodically. We construct a dummy variable for state-owned enterprises to reflect such changes. In our firm-quarter observations (2003-2019), 42% of firms are state-owned enterprises. The first wave of the Connect in Nov. 2014 mainly involved state-owned enterprises. For example, 330 out of 505 connected stocks are SOE (65%) compared with 715 out of 1969 unconnected stocks being SOE (36%). In the second wave, 843 stocks were newly connected, of which only 255 were SOE (30%) (see Table A1). Table A7 presents the differences between private-owned enterprises and state-owned enterprises. Compared to POEs, SOEs have a lower investment rate, larger firm size and a lower Tobin's Q, consistent with the literature (Song et al. 2011).

5 Empirical results

5.1 Stock price adjustment

We use an event-study approach to examine stock price changes around the launch of China Connect. We first look at the announcement effect and then study monthly stock price adjustment. In this way, we test the first two hypotheses of our simple theoretical framework. This focuses on the implications for mainland China of having both more foreign capital and more diversification opportunities in the Hong Kong market.

Announcement effects

We start with the announcement effects of the Connect on stock prices. Stock prices are forward-looking and their adjustments should incorporate relevant information related to expected liberalization. As there are two big waves of the Connect, we expect the first wave in Shanghai to have a stronger effect than the second one in Shenzhen. Connecting Shanghai to Hong Kong surely gave

investors expectations of a future liberalization in Shenzhen, and stock prices might reflect those expectations well before Shenzhen was connected.[23] The Shanghai Connect program was first announced in April, 2014. On Nov 10, 2014, the specific list of eligible stocks was first confirmed (Liu et al. 2021). We look at both the differential effect on connected vs. unconnected stocks and the overall common effects on all stocks.

Panel A of Figure 2, displayed above, plots the difference in a market-model based cumulative abnormal returns between connected and unconnected stocks in the announcement window (trading days [-20, 20]) centered on Nov. 10, 2014. Consistent with our conceptual framework, the announcement affects connected and unconnected stock prices differently. Upon announcement, connected stocks in Shanghai experience a significant appreciation compared to unconnected ones. Compared with Shanghai unconnected stocks, connected stocks experience nearly a 2% rise in abnormal returns when the program is launched and a persistent rise to 5% even after 20 days. Compared with Shenzhen unconnected stocks, the effects are even more pronounced, an initial rise of 4% and persistent increase to 10% after 20 days. This is reasonable as the first wave of the China Connect did not discriminate among stocks in Shenzhen. This positive differential effect in Shanghai is consistent with previous literature (Liu et al. 2021).

In addition to the positive effect on stock prices from more foreign capital, there could be also a negative effect from local investors rebalancing towards Hong Kong through the China Connect, as in our simple model. To assess this, we look separately at both connected and unconnected stocks in Panel B. Indeed, stock prices fall upon announcement of the Shanghai-HK Connect. The fall starts even before announcement day but becomes more dramatic afterwards, even more so five trading days after the announcement day (Nov 17, 2014) when the program was formally launched. Economically, the overall effects are large and persistent, around -2% initially for the connected stocks and up to -20% after 20 days. For unconnected stocks, the negative effects are

[23] Further complicating analysis of the Shenzhen Connect, there are four groups of stocks in the market once Shenzhen is liberalized: old connected Shanghai Stocks, old unconnected Shanghai Stocks but indirectly affected by the Shanghai Connect, newly connected Shenzhen stocks and unconnected Shenzhen stocks. Exploring the Shenzhen wave is thus more challenging and results should be read with caution. We display results for the Shenzhen Connect announcement separately in Appendix G.

even more pronounced, initially -3% (-6%) for Shanghai (Shenzhen) unconnected stocks and up to -25% (-30%) after 20 days.

On average, all stock prices fell after the launch of the Connect. There are many possible reasons for this negative effect. In our theoretical framework, when domestic investors rebalance their portfolios from the domestic market to Hong Kong eligible stocks, it will lower stock prices. Alternatively, stock prices might be over-valued before the launch of the Connect and liberalization makes the market more efficient by allowing more foreign capital into an otherwise retail-driven setting. There could be other reasons to explain this negative effect on stock prices, but it is difficult to identify them in an event study figure. Thus, we turn to cross-sectional regressions on monthly stock prices, as well as a cross-country analysis, to assess this.[24]

Monthly stock prices

The announcement effect results confirm our priors on stock prices: both a positive differential effect and a negative overall effect. It might take some time for stock prices to incorporate new information and for the portfolio rebalancing mechanism to work through. We look at monthly stock return adjustment centered on Nov 2014 and ask: Do connected firms experience a positive price revaluation? Do all Chinese firms experience a negative common shock?

We estimate the following regressions to test Hypotheses 1 and 2.

$$\Delta ln(\text{Stock Price}_i[0]) = \alpha + \left(\beta_1 + \beta_2 * \sigma^{i,W}\right) * \text{Connect}_i + \beta_3 \sigma^{i,C} + \beta_4 \sigma^{i,HK} + \beta_5 Z_i + \varepsilon_i \qquad (12)$$

where the dependent variable is $\Delta ln(\text{Stock Price}_i[0])$, i.e. the month "0" unexpected stock price change in Nov 2014. Following Chari and Henry (2004), we define the unexpected stock price change for a firm i in the liberalization month as its monthly return minus its average pre-liberalization monthly return. This unexpected monthly return should incorporate news from the liberalization.

[24] We find that the magnitude and persistence for the Shenzhen wave are weaker, as investors already anticipate that the Connect program will be extended to Shenzhen. We portray the announcement effects from the Shenzhen Connect in Figure A3. There is a positive effect on connected stocks from more foreign capital and negative effect on all stocks from locals' diversification opportunities in Hong Kong.

Accordingly, we also look at the cumulative unexpected change in months [0, +1]. In the regression, the key independent variable is a Connect dummy that flags the eligible stocks for foreign investors. We also include firm-level variables such as $\sigma^{i,W}$ (covariance term with global market), $\sigma^{i,C}$ (covariance term with the portfolio of connected stocks), $\sigma^{i,HK}$ (covariance term with the portfolio of eligible stocks in the Hong Kong market for domestic investors), market capitalization, turnover ratio, volatility, share held by domestic funds, share held by QFII investors and future sales growth (minus its pre-liberalization average level). To facilitate comparison, we standardize all covariance terms. The firm control on future sales growth is important. Stock prices reflect both cash flow news and discount rate news. Future sales growth controls for cash flow news, thus leaving the price change a signal for discount rate news.

Our theory predicts that connected firms should have a larger price revaluation than unconnected firms due to more foreign capital. If global investors purchase connected stocks for diversification purpose, one would expect that they buy stocks less correlated with the global market. Therefore, we allow the effect of the China Connect on connected stock prices to have a common positive effect, $\beta_1 > 0$, and a negative correlation with $\sigma^{i,W}$, i.e. $\beta_2 < 0$. Table 1 confirms our theoretical predictions. The total positive differential effect on connected stocks relative to unconnected stocks is very robust and economically sizable, as captured by the coefficient on the connect dummy in column (1) and (5). In the liberalization month, connected stock prices rise by 3.3% relative to unconnected stocks and rise to 13.4% cumulatively in two months, compared with an average monthly return of 5.5% in Nov 2014. The price revaluation is comparable in magnitude to those in previous liberalization episodes like Chari and Henry (2004), who document a 6% price difference between eligible and ineligible stocks.

We also find evidence that the effect on connected stocks depends on their covariance term with the global market. Our estimates indicate that two connected firms with one standard deviation different $\sigma^{i,W}$ experience a 1.9% price difference in addition to the average 2% common effect once included in the program (column (2)). Such a cross-sectional difference in $\sigma^{i,W}$ from liberalization is consistent with the notion that the diversification motive into the Chinese market from global

Table 1 STOCK PRICE REVALUATION AROUND THE CONNECT: NOV 2014

	Month [0]				Month [0,1]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Connect	0.033***	0.020***	0.017***	0.015	0.134***	0.092***	0.080***	0.113***
	(0.004)	(0.006)	(0.006)	(0.011)	(0.010)	(0.012)	(0.013)	(0.022)
$\sigma^{i,C}$		0.053***	0.055***	0.054***		0.142**	0.155**	0.145**
		(0.021)	(0.021)	(0.021)		(0.058)	(0.062)	(0.059)
Connect* $\sigma^{i,W}$		-0.019*	-0.016	-0.019*		-0.089***	-0.082***	-0.085***
		(0.011)	(0.012)	(0.011)		(0.025)	(0.027)	(0.025)
$\sigma^{i,HK}$		0.010	0.011	0.009		0.025	0.028	0.021
		(0.013)	(0.013)	(0.013)		(0.037)	(0.040)	(0.037)
Market cap*Connect			0.091***				0.521***	
			(0.032)				(0.078)	
Market cap*Unconnect			0.033*				0.200***	
			(0.020)				(0.035)	
Turnover*Connect				0.914**				1.766***
				(0.363)				(0.569)
Turnover*Unconnect				0.761***				2.788***
				(0.273)				(0.446)
Market cap	0.053***	0.052***			0.278***	0.273***		
	(0.018)	(0.018)			(0.032)	(0.030)		
Turnover	1.081***	0.862***			3.348***	2.630***		
	(0.249)	(0.242)			(0.352)	(0.372)		
Volatility	5.066***	4.922***	5.594***	5.087***	4.627***	3.502***	5.058***	4.411***
	(0.666)	(0.637)	(0.587)	(0.626)	(0.536)	(0.554)	(0.638)	(0.576)
Domestic fund share	-0.002***	-0.001***	-0.001***	-0.001***	-0.004***	-0.002***	-0.001**	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
QFII share	0.002*	0.002	0.002	0.002	0.004*	0.004	0.003	0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.005)
Sales growth [+1]	0.008	0.006	0.005	0.007	-0.007	-0.009	-0.012	-0.005
	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)	(0.008)	(0.008)	(0.008)
Constant	-0.096***	-0.047**	-0.042**	-0.045**	-0.277***	-0.114***	-0.085**	-0.129***
	(0.013)	(0.019)	(0.019)	(0.020)	(0.017)	(0.040)	(0.041)	(0.041)
Observations	2044	2044	2044	2044	2006	2006	2006	2006
Adjusted R^2	0.261	0.301	0.294	0.297	0.285	0.358	0.338	0.329

NOTE. The dependent variable is the cumulative log stock return (adjusted for pre-liberalization mean) around the China Connect in Nov 2014. Time 0 means the month of November, 2014. Columns (1)-(4) use the month 0 while Columns (5)-(8) use the month of Nov and Dec. The independent variables are a connect (unconnect) dummy variable for those (in)eligible stocks for foreign investors, $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,C}$ (covariance term with domestic connected stocks), market cap, turnover, volatility, domestic fund share, QFII share and future sales growth (adjusted for pre-liberalization average). We standardized all the covariance terms. Robust standard errors clustered at the firm level are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All variable constructions are reported in Appendix A.

investors is strong (Shan et al. 2020).

When more foreign capital flows into China, it affects both connected and unconnected stocks. One effect is through a portfolio rebalancing—when foreigners purchase connected stocks, domestic investors have to sell. Domestic investors thus rebalance towards unconnected stocks. Our theory implies that this portfolio rebalancing on unconnected stocks is positively correlated with $\sigma^{i,C}$, implying that $\beta_3 > 0$. Indeed, we find evidence consistent with this spillover effect on unconnected stocks (column (2) and (6)). Note that this positive effect of liberalization on unconnected stocks is qualitatively different from findings in the previous literature. For example, Chari and Henry (2004) also find a positive effect on unconnected stocks. However, that effect is due to a change in the risk-free rate affecting all stocks. In the case of China, there is virtually no change in the risk-free rate, as capital controls remained tight.

Following Chari and Henry (2004), we also control for the effect of firm size and turnover in columns (3), (4), (7), and (8). These specifications address the concern that price pressure from more demand might explain the positive effects of the China Connect. We find that larger firms experience a larger price revaluation once connected. Similarly, firms with a higher liquidity (turnover) also experience a higher price evaluation. Adding those terms dwarfs the coefficient on the Connect dummy. Nonetheless, the baseline effects are robust.

The negative common effect

We expect a negative overall effect on stock prices from capital outflows. Although the negative effect is challenging to identify, we take several approaches using both within China variation and cross-country comparison. First is to look at the constant term α in the monthly stock price regression. As it is estimated in the liberalization month, it captures the average effect of the China Connect on all stocks, similar to Chari and Henry (2004). We find that the constant term in all specifications is significantly negative, consistent with the message from the announcement effect in Figure 2. Moreover, the economic magnitude of the negative constant term is large. For example, column (1) shows a negative common effect around 9.6%, larger than the positive differential effect

at 3.3%. This suggests that the China Connect is likely to lower stock prices, rather than increase stock prices as in previous liberalization episodes (Chari and Henry 2004). Connected firms fall less than unconnected firms due to more foreign capital.

Second, we run a cross-country regression that places the mainland Chinese market in a global setting. By doing so, we can control for the confounding effect of macro-level variables and also compare the performance of all Chinese stocks with global markets. We run a cross-sectional monthly regression for all listed firms in 46 countries similar to the regression (12) in the month before, of, and after Nov. 2014.[25] Table A8 presents our estimation results. Compared with global markets, Chinese stocks experience a lower monthly return of around 2.4% in the month of Nov. 2014, controlling for both firm-level and macro-level variables. Moreover, this negative coefficient, as captured by the dummy variable for all Chinese listed firms, $\mathbb{1}^{\text{Mainland China}}$, is not significant in Month [-1] and Month [2]. This analysis thus suggests a non-negligible negative effect from the China Connect on all stock prices, consistent with results in the announcement analysis.

Third, we note that one potential reason for the negative common effect on stock prices is due to a more efficient market from more foreign investors in an otherwise retail-driven setting. Chinese stocks might be over-valued before the launch of the Connect due to the trapped savings and limited investment outlets in China (a famous example is the long-standing A-H premium). Prices of many assets, including equities, are larger than might be expected based on global comparables, the opposite problem from the usual narrative in previous liberalization episodes. Thus, foreign presence might make prices fall. We test this by adding a measure that captures whether stock prices are over-valued globally. Specifically, we define a sector-level earnings yield difference between China and the U.S. as in Bekaert et al. (2021c), i.e. Earnings yields$^{CH/US}$ $\equiv$ Earnings yields$^{\text{China}}$ $-$ Earnings yields$^{\text{US}}$, where Earnings yields$^{\text{China}}$ (Earnings yields$^{\text{US}}$) is the earnings yield at the sector level for China (U.S.). We expect that firms in a relatively high P/E ratio industry (compared to the U.S.) experience a larger price decline when the China Connect is launched. As earnings

[25] We use internationally listed firms in Worldscope, dropping financial firms and utility firms (SIC code 6000-6999 and 4900-4999). We also drop Hong Kong listed firms since the Connect could positively affect those firms. Our cross-country analysis includes 43251 firms in 46 economies. See Table A3 for summary statistics.

yields are the inverse of P/E ratios, the coefficient on Earnings yields$^{CH/US}$ should be positive. Table A9 presents the results. Indeed, the coefficient on Earnings yields$^{CH/US}$ is statistically positive, suggesting that the China Connect lowers stock prices for firms in a high P/E ratio (low earnings yields) industry. Moreover, the effects are stronger for connected stocks, as can be seen from the positive coefficient on the interaction term between Connect and Earnings yields$^{CH/US}$. Although the negative effect can be partially explained by the industry-level earnings yields, both the magnitude and statistical significance for the constant term are only marginally changed once adding Earnings yields$^{CH/US}$ to the regression (comparing the constant term in Table 1 and A9).[26]

5.2 Corporate investment

The adjustment of stock prices documented above can affect corporate investment if the cost of capital also changes (Bekaert et al. 2005, Mitton 2006, Chari and Henry 2008). If we interpret price adjustment in our monthly stock price regressions as a change in funding cost, a reasonable assumption given that we control for future sales growth, we also expect investment to adjust following the launch of the Connect. Because investment adjustment might be slow, we look at several quarters after the launch. Again, we test whether there is a differential effect and an overall effect of the Connect on investment, and focus on the Shanghai wave.

Specifically, we estimate the following panel regressions

$$I_{it} = \alpha + (\beta_1 + \beta_2 * \sigma^{i,W}) * \text{Connect}_i + \beta_3 * \sigma^{i,C} + \beta_4 * \sigma^{i,HK} + \beta_5 Z_{it} + \varepsilon_{it} \tag{13}$$

where I_{it} is the abnormal investment rate for firm i at time t, defined as the deviation of investment rate from the average investment rate in the three-year period immediately preceding the liberalization as in Chari and Henry (2008). The idea is to examine the abnormal investment rate that can be

[26] Another approach would have been to test the effect from locals having more diversification opportunities towards Hong Kong stocks. When it occurs, all mainland stocks should fall due to portfolio rebalancing, as illustrated in our simple model. Moreover, stocks with a higher covariance term with Hong Kong eligible stocks, $\sigma^{i,HK}$, fall more, i.e., $\beta_4 < 0$. We did not find support for this channel. The coefficient on $\sigma^{i,HK}$ is insignificantly positive in all specifications. This suggests a rather limited effect on domestic stock prices from local's diversification towards Hong Kong.

attributed to the China Connect.[27] The key variables include a Connect dummy for eligible stocks and firm-level historical covariance term with different market portfolios, such as $\sigma^{i,W}, \sigma^{i,HK}, \sigma^{i,C}$. We again standardize all covariance terms. We also include standard firm-level controls such as firm size, Tobin's Q, cash flow, and sales growth, and the local GDP growth rate that matches firms by their headquarter location, in order to control for any potential macro-level confounding factors. We include industry fixed effects to control for unobserved time-invariant trends in each industry. As quarterly investment presents strong seasonality, we also add a quarter seasonality fixed effect. The standard errors are clustered at both industry and quarter.

Our theory predicts a positive effect on connected firms investment from more foreign capital. This is due to their diversification needs. Table 2 reports consistent results, captured by the Connect dummy in columns (1), (3), and (5) for horizons of 4 quarters, 8 quarters and 12 quarters after Nov 2014. Connected firms' abnormal investment rate is statistically higher than unconnected firms at around 0.4%. Compared to the average corporate investment rate of 3.0% in our sample, this magnitude is economically moderate. Compared to the findings in previous liberalization episodes, however, the number is much smaller. For example, Chari and Henry (2008) report an average of 4.1% on the investment rate for historical liberalization episodes. This is consistent with the message in Figure 1, as China has massive savings trapped domestically. Nevertheless, there is still a non-trivial positive effect on investment from more foreign capital when the China Connect is launched. As explored in Section 6.2, this is due to private sector firms being more financially constrained and thus benefiting/responding more once being included in the Connect.

In addition to the positive effect on connected firms' investment, there also exists a negative common effect, captured by the negative coefficient on the constant term, α in regression (13). As the regression is conducted a few quarters after the launch of the China Connect, the constant term thus captures the average effect from the Connect on all firms investment. The magnitude is much

[27] Notice that this approach is different from the standard difference-in-difference estimation method. We prefer this methodology as it facilities comparison with previous literature. By construction, it adjusts the firm specific investment trend before the China Connect and focuses on the abnormal investment response after the China Connect. For robustness, we also conduct a standard difference-in-difference estimation around the same time period ([-8Q: 8Q] centered at 2014 Q4). The results are in Table A11. The message is similar.

Table 2 INVESTMENT ADJUSTMENT AFTER THE CHINA CONNECT: 2014 Q4

	1-4 Q		1-8 Q		1-12 Q	
	(1)	(2)	(3)	(4)	(5)	(6)
Connect	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$\sigma^{i,C}$		0.000		-0.000		-0.000
		(0.001)		(0.001)		(0.001)
$\sigma^{i,HK}$		0.002		0.001*		0.002**
		(0.001)		(0.001)		(0.001)
Connect*$\sigma^{i,W}$		0.002		0.005		0.007*
		(0.002)		(0.003)		(0.004)
Size	0.001***	0.001***	0.001**	0.001**	0.001**	0.001**
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Lag Tobin's Q	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash flow	0.041**	0.043***	0.031**	0.033**	0.020	0.022*
	(0.015)	(0.014)	(0.013)	(0.013)	(0.012)	(0.012)
Sales growth	-0.000	-0.001	-0.000	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Local GDP growth	-0.026	-0.027	-0.016	-0.016	-0.032*	-0.032*
	(0.021)	(0.021)	(0.016)	(0.016)	(0.018)	(0.018)
Constant	-0.064***	-0.064***	-0.061***	-0.061***	-0.065***	-0.066***
	(0.011)	(0.011)	(0.012)	(0.013)	(0.013)	(0.013)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7747	7747	15686	15686	23730	23730
Adjusted R^2	0.132	0.132	0.118	0.119	0.115	0.115

NOTE. The dependent variable is quarterly abnormal corporate investment rate, defined as the difference between investment rate and its pre-liberalization average. The independent variables are a connect dummy variable for those stocks eligible to foreign investors, $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,C}$ (covariance term with domestic connected stocks), Tobin's Q, cash flows, sales growth and regional GDP growth rate. We standardize all covariance terms. We also include industry fixed effects and quarter seasonal fixed effects. All standard errors are clustered at both industry and quarter and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All variable construction is described in Appendix A.

larger than the positive Connect dummy, around -6%. This is suggestive evidence of an overall negative impact on investment in the periods after the Connect, consistent with overall stock price decreases (thus funding cost increases) documented above for monthly stock prices.

Again, this regression specification cannot completely rule out other potential confounding macro-level factors. One might argue that, e.g., Chinese GDP growth lowers all firms' investment during the estimation window. Therefore, the negative constant term α might pick up other factors independent of the launch of the China Connect. Like in the stock price specification, we run a cross-country regression for all listed firms in 46 economies and control for both firm- and country-level variables. We then include in the regression a dummy variable $\mathbb{1}^{\text{Mainland China}}$ that flags all mainland Chinese listed firms. The dummy variable thus indicates the performance of Chinese firm investment relative to other countries, controlling for other variables. We then estimate the regression year-by-year after the launch of the Connect. Table A10 presents the results. Chinese corporate investment is higher in 2014, when the Connect is launched in November. Afterward, annual investment falls by 0.1% in 2015, 1% in 2016 and 1.5% in 2017, much lower than the magnitude of the constant term in Table 2 for quarterly investment. This evidence is consistent with the hypothesis that the China Connect lowered average corporate investment for all listed firms, due to a fall in stock prices (higher funding costs).

Finally, we do not find evidence in our firm investment regressions that firm-specific characteristics are significant. For example, although foreign investors purchase connected stocks for diversification purposes, i.e., related to $\sigma^{i,W}$, those connected stocks with a lower covariance term do not experience a significant investment adjustment after the launch of the Connect. Similarly, we do not find that firm investment adjustment is related either to $\sigma^{i,C}$, a proxy for the spillover effect from more foreign capital purchasing connected stocks on unconnected stocks, or $\sigma^{i,HK}$, a proxy for the more diversification opportunities into Hong Kong. These results are consistent with Chari and Henry (2008), who find that only the common shock to the cost of capital drives changes in investment, while firm specific changes in the cost of capital do not.[28]

[28]For comparison, we investigate investment adjustment for Shenzhen firms in the second wave of the Connect in Table A15. We find weaker but non-negligible effects. This is consistent with the evidence in Section 6.2 below that

We explore additional firm outcomes in Table A12 in the online appendix. For example, we find that connected firms have (i) higher profitability and sales growth, and (ii) lower funding costs in both debt and equity. These ultimately encourage firms to shift from bank loans to equity issuance and as a result have lower leverage ratios. The finding of a higher seasoned equity offering for connected firms is important because it explains the link from lower funding costs to higher investment, direct evidence of the funding cost channel, which we explore further in Section 6.

5.3 Stock price and investment sensitivity to external shocks

Although the China Connect brings benefits to the domestic economy by lowering funding costs and increasing investment, it also creates a channel through which foreign capital can influence the domestic economy via equity trading. Following an external shock, foreign investors rebalance their portfolios including Chinese connected stocks. Fluctuations in those equity prices may in turn affect corporate investment, thus potentially making connected firms' investment expenditures more sensitive to external shocks after the Connect, even with the tight national capital controls. We conduct difference-in-differences estimation of both stock price and investment sensitivity to U.S. monetary policy shocks. We use a longer sample period, 2003-2019, and focus on a firm-specific time variant variable, Connect_{it} that flags the eligible status of Chinese stocks at time t.

Stock price sensitivity to U.S. monetary policy shocks around FOMC days

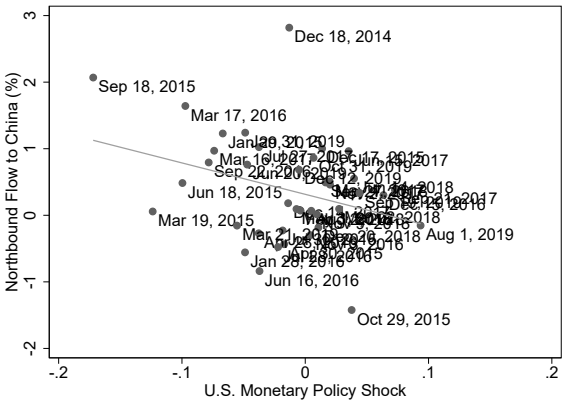
Impressionistic evidence shown in Figure 3 indicates that capital flows into China through the Connect (northbound flows) are negatively correlated with U.S. monetary policy shocks while capital flows into Hong Kong are not (see Chari, Dilts Stedman, and Lundblad 2021 for related evidence). This suggests that U.S. monetary policy shocks might affect connected stock prices through capital flows.

We investigate the effect of U.S. monetary policy shocks on connected stocks relative to un-

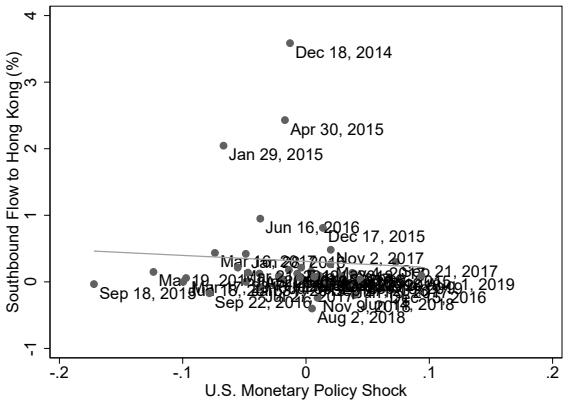
the Connect mainly benefits connected private-owned firms, as they are more likely to be financially constrained and the Shenzhen market includes relatively more private firms.

Figure 3 CHINA CAPITAL FLOWS AND U.S. MONETARY POLICY SHOCKS

Panel A: Northbound flows into Mainland China



Panel B: Southbound flows into Hong Kong



NOTE. Figure shows the correlation between capital flows (through the Connect program) and U.S. monetary policy shocks on FOMC announcement days (in Chinese local time). Panel A shows northbound net flows (in percentage change) into mainland China and Panel B shows southbound net flows (in percentage change) into Hong Kong.

connected stocks using difference-in-differences centered on FOMC announcement days,[29]

$$r_{it} = \alpha + \beta_1 * \text{Connect}_{it} * \text{MPS}_t^{\text{US}} + \beta_2 * \text{MPS}_t^{\text{US}} + \beta_3 \text{Connect}_{it} + \beta_4 Z_{it} + \varepsilon_{it} \tag{14}$$

where r_{it} is the cumulative excess return on FOMC date t, $\text{Connect}_{it} = 1$ when the stock i is in the Connect program at time t, MPS_t^{US} is the U.S. monetary policy shock, and Z_{it} includes standard firm-level controls for stock price regressions such as firm size, leverage, and return on assets. Our specifications include 137 FOMC meetings from 2003 to 2019.[30] We include an FOMC time fixed effect to control for unobserved time variant factors, which absorb MPS_t^{US} in the regression.

Table 3 presents results. Our variable of interest is the interaction term between MPS_t^{US} and Connect_{it}, which captures the differential effect of U.S. monetary policy shocks on connected firms relative to unconnected firms after the launch of the Connect. A one standard deviation U.S. mone-

[29] Different from the typical difference-in-difference approach, the control and treatment groups in our analysis change with periodic adjustments to the index stocks. We conduct a "parallel trend" analysis by looking at the period before the launch of the Connect. We then define the treatment group ("connected stocks") as firms eligible in Nov. 2014. We then re-estimate the regression (14) in this period and present the results in Table A18. It suggests that treated stocks do not respond differently from control stocks, which then justifies the parallel trend assumption. For further treatment of sample selection issues, see Appendix section I.

[30] There are 144 FOMC meetings from 2003 to 2019. We drop 7 meetings because they were scheduled on public holidays, typically Chinese New Year.

tary policy shock (0.14) lowers the excess return for connected firms by around 0.42% (=0.14*3%) on FOMC announcement days, relative to unconnected stocks. This is both statistically and economically significant. We also find evidence that the reaction of connected stocks to U.S. monetary policy shocks depends on the covariance term with the global market (column (3) and (6)), consistent with our theory and the notion that foreign investors rebalance their portfolios according to covariance risk. Such a differential effect on $\sigma^{i,W}$ gets larger in the two-day horizon. The effect is economically significant: for connected firms with one unit of standardized $\sigma^{i,W}$, their return falls by 0.7% (3%) on the first day (two days).

Table 3 STOCK PRICE SENSITIVITY TO U.S. MONETARY POLICY SHOCKS

	Cumulative excessive return [0]			Cumulative excessive return [0, 1]		
	(1)	(2)	(3)	(4)	(5)	(6)
$MPS_t^{US} * Connect_{it}$	-0.028***	-0.024***	-0.029***	-0.034***	-0.031***	-0.040***
	(0.007)	(0.006)	(0.007)	(0.012)	(0.011)	(0.013)
$MPS_t^{US} * Connect_{it} * \sigma^{i,W}$			-0.007			-0.030***
			(0.008)			(0.011)
$MPS_t^{US} * \sigma^{i,C}$			-0.006**			-0.010***
			(0.003)			(0.003)
Ln(TA)		-0.000**	-0.000***		-0.000	-0.000*
		(0.000)	(0.000)		(0.000)	(0.000)
Leverage		0.001**	0.002**		0.001	0.001
		(0.001)	(0.001)		(0.001)	(0.001)
ROA		0.009***	0.008***		0.011***	0.009***
		(0.003)	(0.003)		(0.003)	(0.003)
$Connect_{it}$	-0.001***	-0.000	0.000	-0.002***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Constant	-0.001	0.003	0.009***	-0.001	0.003	0.024***
	(0.001)	(0.002)	(0.003)	(0.001)	(0.003)	(0.004)
FOMC FE	Yes	Yes	Yes	Yes	Yes	Yes
#FOMC Meeting	137	137	137	137	137	137
Observations	305277	297044	247716	294696	286789	242711
Adjusted R^2	0.015	0.033	0.036	0.027	0.043	0.045

NOTE. The dependent variable is cumulative excess return on FOMC announcement days (day 0 and 1). All standard errors are clustered at both industry and FOMC meeting days and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Variable construction is described in Appendix A.

The relative importance of the common effect and differential effect from U.S. monetary policy shocks also helps us understand the importance of risk-free rate and risk aversion channels. According to our theory, the interest rate shock affects connected stocks homogeneously while only a global risk aversion shock affects connected stocks differently. As we find both a common effect and a differential effect on connected stocks, it suggests that the U.S. monetary policy shock

affects both the global risk-free rate and risk aversion. Based on column (3), we can then estimate the relative importance of these two shocks. The part that can be attributed to the global risk-free rate shock on connected stocks is captured by -0.029 while the part due to global risk aversion shocks is captured by $-0.007 * \sigma^{i,W}$. As we standardized all covariance terms, the importance of risk-aversion shocks needs to be multiplied by its standard deviation. We find that the importance of the risk aversion shock is small compared to the risk-free shock.[31] This finding is different from Chari et al. (2021) who find that global risk aversion shocks are relatively more important, at least in the unconventional monetary policy period. Our results, however, suggest that the global risk free shock is more important for the transmission of U.S. monetary policy to China.[32] This is reasonable because China is still mostly closed to global markets and its stocks have a rather low covariance with rest of the world. Therefore, the first-order effect for investing in China is more on the common component as opposed to the firm-specific risk-premium part.

We also find that global trading on connected stocks spills over to unconnected stocks, as captured by $\sigma^{i,C}$. For unconnected firms with different $\sigma^{i,C}$, this effect is on average 0.6% for one unit of standardized $\sigma^{i,C}$. This average effect is small because the standard deviation of $\sigma^{i,C}$ is only 0.24% for unconnected stocks, much smaller than the direct effect on connected stocks (0.3% based on the interaction term between Connect and the monetary policy shock in column (3)).

[31] Column (3) in Table 3 estimates the equation $r_{it} = \alpha + \beta_1 * \text{Connect}_{it} * \text{MPS}_t^{\text{US}} + \beta_2 * \text{MPS}_t^{\text{US}} * \text{Connect}_{it} * \sigma^{i,W} + \beta_3 * \text{MPS}_t^{\text{US}} * \sigma^{i,C} + \beta_4 Z_{it} + \varepsilon_{it}$. Therefore, the effect of U.S. monetary policy shocks on connected firm returns is given by $\beta_1 + \beta_2 * \sigma^{i,W}$. As we standardize the covariance term, the quantitative effect of $\beta_2 * \sigma^{i,W}$ is given by $-0.007 * 0.07\% = -0.00049\%$ because the standard deviation of $\sigma^{i,W}$ for connected firms is 0.07%. This is small compared with the estimates of β_1, -0.029. The message is similar in column (6).

[32] This result is consistent with Bekaert et al. (2021b), who find that monetary policy effects through a persistent interest rate shock rather than a risk premium effect.

Investment sensitivity to U.S. monetary policy shocks

We also investigate whether corporate investment is more sensitive to external shocks. We utilize the following augmented version of the standard investment-Q specification,[33]

$$I_{it} = \alpha + \beta_1 \text{Connect}_{it} + \beta_2 \text{MPS}_t^{\text{US}} + \beta_3 \text{MPS}_t^{\text{US}} \times \text{Connect}_{it} + \Gamma Z_{it} + \varepsilon_{it} \tag{15}$$

where i indexes the firm and t is a time index (quarterly frequency). The dependent variable is corporate investment I_{it}, defined as quarterly capital expenditure scaled by book value of total assets at the beginning of the quarter. The controls Z_{it} include both firm-level and macro-level variables that could potentially affect corporate investment decisions. Following the literature, we use lagged Tobin's Q, cash flows, sales growth, and firm size to control for firm heterogeneity. We also use the quarterly change of nominal GDP at the provincial level to control for local economic cycles, with the firm's headquarter address identifying its location. We add both firm and year fixed effects to control for unobserved individual and year effects, and quarter dummies to adjust for seasonality. Standard errors are clustered at both firm and year level (see Petersen 2009). We also try clustering at both industry and year level and the results remain unchanged.

Column (1) in Table 4 displays estimates of the investment specification (15). Connected firms' investment is more sensitive to U.S. monetary policy shocks than unconnected firms after the launch of the Connect. A one-standard deviation increase in the U.S. monetary policy shock (0.14) leads to a reduction in corporate investment by around 0.25% (=0.14*0.018) for connected firms compared to unconnected ones, after controlling for investment opportunities and economic conditions. This effect is economically moderate compared to the average quarterly corporate in-

[33] Our empirical specification for investment is difference-in-differences. Causal inference requires satisfaction of the assumption of parallel trends. Because our control and treatment groups change with adjustment to the index stocks, we construct dummy variables that flag time periods before a firm is selected into the Connect. We then estimate the specification $I_{it} = \alpha + \sum_{s=-2}^{3} \beta_s \text{Connect}_{it+s} * \text{MPS}_t^{\text{US}} + \text{Connect}_{it} + \text{MPS}_t^{\text{US}} + \Gamma Z_{it} + \varepsilon_{it}$ and plot the coefficients of $\{\beta_s\}_{s=-2}^{3}$ in Figure A4. We see a statistically insignificant difference between connected and unconnected firms before selection into the Connect and a significant difference afterwards. For robustness, we also estimate equation (15) in the period before the launch of the Connect. We then define the treatment group as firms eligible in Nov. 2014. The results are in Table A18 as a placebo test. Treated firms do not respond differently to U.S. monetary policy shocks than do the control group stocks, again justifying the parallel trend assumption.

vestment rate of 3.0%. The average effect of U.S. monetary policy shocks on unconnected firms is around half that captured by the coefficient in the MPS^{US}, suggesting that the investment sensitivity for connected firms is around three times larger than for unconnected firms. The result on the increased investment sensitivity to external shocks is robust to adding other potential macro-level variables such as the bilateral RMB/USD exchange rate, total QFII holdings, total trade between the U.S. and China, and domestic interest rate (1-year lending rate), as seen in column (2).

In column (3), we allow the investment sensitivity to U.S. monetary policy shocks for connected firms to depend on the covariance term with the global market $\sigma^{i,W}$. We also allow a spillover effect from global investors' trading on connected stocks to unconnected stocks depending on the covariance term with connected stocks, $\sigma^{i,C}$. We find that connected stocks with a higher covariance term with the global market have a higher investment sensitivity to U.S. monetary policy shocks, consistent with the theoretical predictions. For connected firms with one unit higher standardized $\sigma^{i,W}$, their investment sensitivity to U.S. monetary policy shocks is higher by 0.9%. The overall economic significance, however, is small because the standard deviation of $\sigma^{i,W}$ is small. Again, this evidence suggests that the transmission mechanism of U.S. monetary policy shocks on Chinese firm investment is through the risk-free rate channel rather than the risk-aversion channel.[34] Meanwhile, we do not find a negative spillover effect from U.S. monetary policy shocks to unconnected stocks. The coefficient is positively significant, opposite from the theory.

Columns (4)-(6) control for important firm-level heterogeneity that might potentially contaminate our results. In column (4), we control for the fact that large firms might have a different investment sensitivity to U.S. monetary policy shocks. Adding an interaction of MPS_t^{US} and firm

[34] The risk-free rate channel can be proxied by the coefficient on $\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$ in column (3) of Table 4, i.e. -0.018 while the risk-aversion channel can be proxied by the coefficient on $\text{MPS}_t^{\text{US}} * \text{Connect}_{it} * \sigma^{i,W}$, i.e. $-0.009 * \sigma^{i,W}$. As $\sigma^{i,W}$ is standardized and its standard deviation is rather low, around 0.07%, the risk-aversion channel ($-0.009 * \sigma^{i,W}$) is small compared to the risk-free rate channel (-0.018). Alternatively, one can directly compare the U.S. monetary policy shock with measures of risk-aversion, such as the VIX. The transmission mechanism through the risk-free rate (risk-aversion) is estimated by the interaction between Connect and the U.S. monetary policy shock (VIX). We have that horse race estimation in Table A16. The message is similar. For example, one standard deviation (0.14) higher U.S. monetary policy shock lowers connected firm investment by 0.3% (=0.019*0.14) while one standard deviation higher VIX index change lowers connected firm investment by 0.1%(=0.003*0.35). Similar conclusions can be reached using other measures of risk-aversion. The risk-free rate channel seems to be more important than the risk-aversion channel in the transmission of external shocks to the Chinese economy.

Table 4 INVESTMENT SENSITIVITY TO U.S. MONETARY POLICY SHOCKS

	Quarterly investment: 2003-2019					
	(1)	(2)	(3)	(4)	(5)	(6)
$MPS_t^{US} * Connect_{it}$	-0.018***	-0.014***	-0.018***	-0.010***	-0.014***	-0.028***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
$MPS_t^{US} * Connect_{it} * \sigma^{i,W}$			-0.009**			
			(0.004)			
$MPS_t^{US} * \sigma^{i,C}$			0.003***			
			(0.001)			
$MPS_t^{US} * Size_{it}$				-0.003***		
				(0.001)		
$MPS_t^{US} *$ QFII share$_{it}$					0.030	
					(0.120)	
$MPS_t^{US} *$ Foreign sales$_{it}$						-0.028**
						(0.014)
MPS_t^{US}	-0.009***	-0.008***	-0.009***	0.052***	-0.008***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.014)	(0.001)	(0.001)
$Connect_{it}$	0.002***	0.002***	0.002***	0.002***	0.002***	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Size	0.003***	0.003***	0.003***	0.003***	0.003***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lag Tobin's Q	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash flow	0.105***	0.104***	0.080***	0.104***	0.103***	0.135***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Sales growth	0.001***	0.001***	0.001***	0.001***	0.001	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Local GDP growth	0.003	0.000	-0.023**	0.001	0.003	0.010
	(0.009)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)
Constant	-0.039***	-0.238***	-0.291***	-0.240***	-0.157***	-0.197***
	(0.007)	(0.019)	(0.023)	(0.019)	(0.023)	(0.021)
Macro Controls	No	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	101908	97627	84144	97627	75349	81776
Adjusted R^2	0.424	0.428	0.459	0.428	0.453	0.444

NOTE. The dependent variable is quarterly investment. MPS_t^{US} is the U.S. monetary policy shock of Rogers et al. (2018). $Connect_{it}$ is a dummy variable for connected stocks at quarter t. Firm level controls include standardized covariance term $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,C}$ (covariance term with domestic connected stocks), QFII share, foreign sales share, size, Tobin's Q, cash flows, sales growth and regional GDP growth rate. Macro controls include bilateral RMB/USD exchange rate, total QFII holdings (%, change), total trade volumes between U.S. and China, and domestic interest rate (1-year lending rate). All standard errors are clustered at both firm and year level and reported in the parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All variable constructions are in Appendix A.

size indeed takes away some of the magnitude on the MPS_t^{US} coefficient. However, the results remain significant. As firm size is an important difference between connected and unconnected firms, we devote further attention to it. In column (5), we add an interaction of MPS_t^{US} and firm-level QFII holdings to control for the effect of QFII, the other important channel for foreign investors to trade domestic Chinese stocks. Column (6) adds an interaction term between MPS_t^{US} and firm-level foreign sales to control for firms' exposure to U.S. monetary policy through real business activity. Our results are robust to both specifications.

We conduct further robustness by comparing the effects of U.S. monetary policy shocks to other shocks; further examining the role of firm size; and performing placebo tests such as estimating in the pre-liberalization sample and using a randomly generated Connect dummy. All results are robust (Appendix H). Furthermore, as noted above, we pay close attention to sample selection issues through standard methods like propensity score matching and Heckman corrections, as well as running discontinuity regressions (Appendix section I).

6 Mechanisms: cost of funding and ownership structure

6.1 Cost of funding

Theory suggests that corporate investment decisions are tied to the cost of funding. We analyze this in the context of the China Connect. We use measures for funding costs widely employed in the literature, including stock price changes, and explore the firm-level heterogeneous responses to the launch of the Connect. Because stock price responses incorporate both cash flow and discount rate news, we add into our investment regression a proxy for future cash flows (e.g. sales growth).

Table 5 presents the results. First, we use the stock price response $\Delta \log P_i$ between the announcement time to the execution time of the Connect as a measure of funding cost. Other things equal, a higher price adjustment reflects a higher funding cost change. We thus expect firms with a higher $\Delta \log P_i$ to have a larger investment adjustment when the Connect is launched in 2014. Column (1) in Panel A of Table 5 indicates that the positive effect from liberalization on investment is

explained by the stock price change $\Delta \log P_i$, suggesting a cost of funding channel explaining the investment response to liberalization (recall that we control for future cash flows). The initial stock price change $\Delta \log P_i$ can also help us understand the investment sensitivity to external shocks because it is a proxy for the firm's sensitivity of funding cost to external shocks. Those with a higher $\Delta \log P_i$ benefit more from stock market liberalization as their funding cost changes more with the launch of the Connect. Therefore, we expect their investment sensitivity to U.S. monetary policy shocks to be higher because their funding costs are more sensitive to funding shocks. In Column (1) of Panel B, we find that is the case. Connected firms with a higher initial stock price response are more responsive to U.S. monetary policy shocks after the launch of the Connect.

Second, we also expect firms relying more on external finance to have greater investment responses to external shocks. We use the traditional measure of external financing (Rajan and Zingales 1998) on firms' external equity (debt) financing, defined as industry median of the difference between capital expenditures and cash flow from operations, divided by the capital expenditure at quarter end. In column (2) of Panel A, we find that connected firms with a higher measure of external finance invest more. Furthermore, the results on investment sensitivity to U.S. monetary policy shocks are driven by connected firms relying more on external finance.

Third, we use firm size as a proxy for the degree of financial constraint. Arguably, a large firm has many advantages over a small or medium sized firm, including the funding cost. Column (3) in Panel A allows the investment response of connected firms to depend on firm size. We find that a smaller size firm increases investment more after inclusion in the Connect. Furthermore, larger firms also have a smaller investment sensitivity to U.S. monetary policy shocks, as shown in column (3) of Panel B, consistent with our prior.

Finally, we look at whether different types of funding structure matter. We construct internal equity (debt) dependence as book value of equity (long-term debt) to investment. We find that firms with greater reliance on internal equity increase their investment more once in the Connect, although it is statistically insignificant. We do not find that reliance on internal debt matters for investment adjustment. This is understandable as funding costs change once the Connect is launched.

Table 5 COST OF FUNDING CHANNEL FOR INVESTMENT

Panel A: Investment adjustment after the China Connect at 2014 Q4 (1Q-8Q)					
	(1)	(2)	(3)	(4)	(5)
Connect	0.001	-0.005**	0.051***	0.004***	0.004***
	(0.001)	(0.002)	(0.016)	(0.001)	(0.001)
Connect*$\Delta \log P_i$	0.007***				
	(0.002)				
Connect*External finance		0.008***			
		(0.001)			
Connect*Size			-0.002***		
			(0.001)		
Connect*Equity dependence				0.003	
				(0.004)	
Connect*Debt dependence					-0.001
					(0.002)
Observations	14125	15686	15686	15686	15686
Adjusted R^2	0.122	0.120	0.119	0.118	0.118
Panel B: Investment sensitivity to U.S. monetary policy shock (2003-2019)					
	(1)	(2)	(3)	(4)	(5)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.014***	-0.007	-0.160***	-0.016***	-0.017***
	(0.003)	(0.006)	(0.032)	(0.002)	(0.002)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it} * \Delta \log P_i$	-0.014**				
	(0.007)				
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$*External finance		-0.010**			
		(0.005)			
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it} * \text{Size}$			0.006***		
			(0.001)		
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$*Equity dependence				-0.174***	
				(0.038)	
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$*Debt dependence					-0.016**
					(0.007)
Connect_{it}	0.001***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MPS_t^{US}	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	91653	101908	101908	101908	101908
Adjusted R^2	0.427	0.424	0.424	0.424	0.424

NOTE. The dependent variable in Panel A is quarterly abnormal corporate investment, defined as the difference between investment rate and its pre-liberalization average level. Other firm-level controls are the same as in Table 2. Standard errors are clustered at both industry and quarter. The dependent variable in Panel B is quarterly corporate investment. Other firm level controls are the same as in Table 4. Standard errors are clustered at both firm and year level. $\Delta \log P_i$ is the stock price change between April to November 2014. The external finance measure follows Rajan and Zingales (1998). Equity (debt) dependence is constructed using book value of equity (long term debt) over investment. All standard errors are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

No matter equity or debt dependence, connected firms experience a large investment adjustment as long as they depend on internal finance. Similarly, in the long run, investment sensitivity to U.S. monetary policy shocks increases for connected firms because their funding cost is influenced by external shocks. In this case, as long as firms rely on external finance, equity or debt, their investment sensitivity to external shocks increases upon inclusion in the Connect.

6.2 Ownership structure

We dig further into the funding cost channel by examining the role of enterprise ownership structure, which is widely regarded as an important feature of China's corporate sector (Bai, Hsieh, and Song 2020). We test whether the effects of the Connect are amplified or diminished for firms that have significantly large state shares or strong political connections to the government. There arguably exists a tradeoff between the general misallocation of resources, often associated with state-ownership, and possible insurance mechanisms that ownership structure might facilitate during a negative external funding shock (see Jotikasthira, Lundblad, and Ramadorai 2013).

Table 6 presents the results. We find that connected firms experience an increase in stock prices relative to unconnected ones at the launch of the Connect, independent of ownership structure. However, connected POE firms enjoy a larger increase, as can be seen by comparing the coefficients on Connect in columns (2) and (3) (or equivalently the interaction term Connect*SOE in the full sample in column (1)). There is no reason from our simple theoretical framework for foreign investors to prefer connected state firms to connected private firms. There are thus two ways to interpret the higher price appreciation for connected private firms. One is that the stock price might incorporate future cash flow news, as private firms are more likely to be financially constrained and benefit more from liberalization by increasing investment, as can be seen in Panel B. Given that the state-owned firms do not transfer the lower funding cost brought by liberalization into a higher investment and thus cash flows, the price adjustment for connected SOEs only reflects the change in cost of capital but not the cash flows news. The second explanation is that foreign

investors might give a discount to state owned firms due to its incorporated political risk.[35]

We also find that only POEs experience a corresponding investment adjustment after the launch of the Connect. In the sub-sample test in Panel B, connected state-owned firms actually reduce their investment compared to their unconnected peers, although it is statistically insignificant. Private sector investment responds significantly more, indicating that the documented investment response in the previous section is driven by the private sector. This is consistent with the notion that the private sector is more likely to be financially constrained.[36]

Panels C and D present the results on stock price and investment sensitivity to external shocks. We find that ownership structure is statistically insignificant, as both state and private firms experience an increased sensitivity to external shocks after being included in the program. This result is not surprising because foreign investors rebalance their portfolios to all connected stocks following a contractionary monetary policy shock, with both state and private stocks. As their stock prices and thus funding costs experience extra volatility from external shocks due to the Connect, their investment sensitivity also increases. This finding is not inconsistent with the fact that most state-owned firms are not financially constrained. They do not respond to the lower funding cost brought by the liberalization because they are not short of capital for investment. Still, their investment sensitivity to U.S. monetary policy shocks suggests that their investment indeed responds to the funding cost volatility generated by the U.S. monetary policy shock.

7 Conclusion

We analyze an important and unique capital account liberalization, the Shanghai (Shenzhen)-Hong Kong stock Connect, to test hypotheses concerning the benefits and costs of stock market liberalization in a capital abundant country. The Connect allows certain stocks to be eligible for foreign

[35] Anecdotal evidence suggests that foreign investors discount firms with heavy-handed government interventions. See https://www.ft.com/content/93d46fb8-4762-11e7-8519-9f94ee97d996.

[36] And consistent with our findings on the effects of the second Connect wave in 2016 (Appendix G). Although the magnitude is smaller than in the first wave, there is still a moderate increase in investment for connected firms. One potential reason is that the Shenzhen market includes more private firms into the Connect compared to the first wave.

Table 6 EFFECTS OF THE CHINA CONNECT: OWNERSHIP STRUCTURE

	All Sample	Private-owned Enterprise	State-owned Enterprise
Panel A: Stock price revaluation around the Connect (Nov 2014)			
	(1)	(2)	(3)
Connect	0.055***	0.055***	0.025***
	(0.008)	(0.008)	(0.008)
Connect*SOE	-0.029***		
	(0.011)		
SOE	0.024***		
	(0.006)		
Observations	2008	1195	813
Adjusted R^2	0.324	0.292	0.359
Panel B: Investment adjustment after the China Connect (2014 Q4)			
	(1)	(2)	(3)
Connect	0.008***	0.007***	-0.002
	(0.001)	(0.001)	(0.001)
Connect*SOE	-0.010***		
	(0.001)		
SOE	0.010***		
	(0.001)		
Observations	15665	9658	6007
Adjusted R^2	0.132	0.124	0.136
Panel C: Stock price sensitivity to U.S. monetary policy shock (2003-2019)			
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.024***	-0.026***	-0.019***
	(0.006)	(0.008)	(0.006)
Observations	297044	150507	127483
Adjusted R^2	0.033	0.039	0.031
Panel D: Investment sensitivity to U.S. monetary policy shock (2003-2019)			
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.018***	-0.016***	-0.021***
	(0.002)	(0.003)	(0.003)
MPS_t^{US}	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)
Connect_{it}	0.002***	0.004***	-0.002**
	(0.000)	(0.001)	(0.001)
Observations	101908	53283	48507
Adjusted R^2	0.424	0.450	0.425

NOTE. Panel A replicates the regression in Table 1. Dependent variable is the one month cumulative log stock return (adjusted for pre-liberalization mean) around the China Connect in Nov 2014. Standard errors are clustered at the firm level. Panel B replicates the regression in Table 2, i.e. 1-8Q quarters after 2014 Q4. Dependent variable is the quarterly abnormal corporate investment rate, defined as the difference between investment rate and its pre-liberalization average level. Standard errors are clustered at both industry and quarter. Panel C replicates the regression in Table 3. Dependent variable is the daily excess return on FOMC announcement days. Standard errors are clustered at both industry and FOMC meeting days. Panel D replicates the regression in Table 4. Dependent variable is quarterly investment. Standard errors are clustered at both firm and year level. All standard errors are reported in the parentheses. We conduct the analysis alternatively in all sample, SOE sub-sample and POE sub-sample. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

investors while restricting other shares to remain available only to domestic investors. It is a natural experiment to test the effect of liberalization and the effectiveness of capital controls policy. We find, first, that firms in the Connect enjoy a higher stock price revaluation and higher investment rates, with ultimately lower financing costs and higher earnings and sales growth, than firms outside of the Connect. Second, we find that connected firms have higher investment sensitivity to U.S. monetary policy shocks than unconnected ones after the launch of the Connect. This reinforces the notion that U.S. monetary policy has large spillover effects, even considering China's tight national capital controls (see Han and Wei 2018, Kalemli-Ozcan 2019).

We make novel contributions to the vast related literature. We show that even for a capital abundant country like China, there are beneficial effects from liberalization. Existing literature has focused on capital scarce countries that intuitively benefit more from foreign capital, but for a capital abundant country it is less clear whether more foreign capital still benefits firm stock prices and investment. We argue that the benefits we document are due to credit misallocation between private-owned and state-owned enterprises within China. Related, we also document a negative common effect, which likely comes from capital outflows when allowing domestic residents to invest externally. The literature has a rather limited understanding of the effects of capital outflows, as most papers focus on relaxing restrictions on inflows only. However, understanding the outflow effect is important because many countries like China and India are gradually liberalizing outflows.

We also provide novel causal evidence on the costs of stock market liberalization. As the China Connect allows foreign investors to trade Chinese stocks more easily, it can provide a new transmission channel for external shocks even under tight capital controls. We find that stock prices and corporate investment for eligible stocks are more sensitive to U.S. monetary policy shocks than ineligible stocks after the launch of the Connect. These findings also fill a gap in the literature, since estimating increased spillover effect due to liberalization in previous liberalization episodes is challenging given that they typically allow foreigners to trade all stocks and they often occur simultaneously with other economic reforms and/or macroeconomic policy changes (McLean, Pontiff, and Zhao 2017).

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Internet Appendix

'The Effect of the China Connect'

(Intended for online publication only)

by C. Ma, and J. Rogers, and S. Zhou

December 2021

Table of Contents

A Variable definitions

Chinese firm-level data

Bank loan Aggregated bank loan amount for each firm within a quarter divided by the book value of total assets measured at quarter end. Source: CSMAR.

Cash Cash and cash equivalents divided by the book value of total assets measured at quarter end. Source: CSMAR.

Cash flow Income before extraordinary items plus depreciation and amortization divided by the book value of assets, measured at quarter end. Source: CSMAR.

Connect A dummy equal to one if a Chinese listed firm is included in the Shanghai (Shenzhen)-Hong Kong Connect Program and zero otherwise. Source: Hong Kong Stock Exchange.

Cost of debt Short-term market borrowing rate multiplied by short-term corporate leverage ratio plus long-term borrowing rate multiplied by long-term corporate debt ratio. Source: CSMAR.

Covariance with domestic connected portfolio $\sigma^{i,C}$ Historical covariance of firm stock return with the eligible stocks in the China Connect for foreign investors. We use the equal weighted return of the Shanghai SSE 180 and SSE 380 market index as a proxy for domestic connected stocks before Dec 2016. We add Shenzhen SZSE Component Index and Small and ChiNext Index to the eligible portfolio (equal weighted) after December 2016. We use 36-month rolling window to construct the covariance at each quarter (month) end. Source: CSMAR, WIND.

Covariance with global market $\sigma^{i,W}$ Historical covariance of firm stock return with the MSCI world stock market index (RMB denominated). We use 36-month rolling window to construct the covariance at each quarter (month) end. Source: CSMAR, MSCI, WIND.

Covariance with Hong Kong eligible stocks $\sigma^{i,HK}$ Historical covariance of firm stock return with the Hong Kong eligible stocks for mainland investors. For Hong Kong eligible stocks, we use the average return of Hang Seng Composite Large Cap and Mid Cap Index. We use 36-month rolling window to construct the covariance at each quarter (month) end. Source: CSMAR, WIND.

Debt dependence to investment Book value of debt divided by capital expenditure at each quarter end. Source: CSMAR.

Earnings yield$^{CH/US}$ Sector-level earnings yield differences between China and the U.S.. The earnings yield is the sum of earnings across all firms in the sector over the sector's market capitalization, following Bekaert et al. (2021c). Source: CSMAR and Compustat.

EBIT Earnings before income and taxes (EBIT) divided by the book value of total assets measured at quarter end. Source: CSMAR.

Equity dependence to investment Book value of shareholder equity divided by the capital expenditure at each quarter end. Source: CSMAR.

External financing Industry median of the difference between capital expenditure and cash flow from operations, divided by the capital expenditure at each quarter end. Source: CSMAR.

Foreign sales Foreign revenue divided by the total revenue at the fiscal year end. Source: WIND.

Investment Capital expenditure divided by book value of lagged assets at quarter end. Capital exp. equals cash payments for the acquisition of fixed assets, intangible assets and long-term assets (from the cash flow statement) minus cash receipts from selling those assets. Source: CSMAR.

Leverage Book value of debt divided by the book value of total assets measured at each quarter end. Source: CSMAR.

$\Delta \log(D/P)$ Change of aggregated dividend yield for each firm within a quarter. Source: CSMAR.

$\Delta \log P_i$ Stock price change for each firm between April to November 2014. Source: CSMAR.

Market cap The firm's close price at month end multiplied by its month-end share outstanding divided by the aggregated market capitalization at Chinese domestic stock market (Shanghai Stock market and Shenzhen Stock market). Source: CSMAR.

Private dummy A dummy variable equals to one if a firm's ultimate owner or blockholder is an individual or other non-government related entity, and zero otherwise. Source: CSMAR, WIND.

QFII share (%) The ratio of shares hold by qualified investor institutional investors (QFII) at quarter end. Source: CSMAR.

ROA Net income divided by book value of total assets at quarter end. Source: CSMAR.

Sales growth The firm's year-over-year change in sales. Source: CSMAR.

Seasoned equity offering Aggregated amount of equity through private placement a firm aimed to raise within a quarter divided by book value of assets measured at quarter end. Source: CSMAR.

Size Natural logarithm of the book value of total assets at quarter end. Source: CSMAR.

State dummy A dummy variable equals to one if a firm's ultimate owner or blockholder is a government related entity, and zero otherwise. Source: CSMAR, WIND.

Stock pledged Aggregated value of share pledged within a quarter divided by the book value of total assets at quarter end. Source: WIND.

Tobin's Q The book value of total assets minus the book value of equity plus the market value of equity scaled by the book value of total assets at quarter end. Source: CSMAR.

Turnover Average daily turnover over the past 12 months. Turnover is defined as trading volume (in shares) divided by total shares outstanding. Source: CSMAR.

Volatility Average daily return volatility in the past 12 months. Volatility is the standard deviation of daily stock return. Source: CSMAR.

Macro variables

Domestic credit (% GDP) Domestic credit to private sector by banks measured a share of GDP. Source: World Development Indicators.

Domestic interest rate 1-year lending rate set by PBOC at quarter end. Source: WIND.

GDP growth rate Annual percentage growth rate of GDP based on constant local currency. Source: World Development Indicators.

Gross savings (% GNI) Gross savings are calculated as gross national income less total consumption, plus net transfers. Source: World Development Indicators.

Local GDP growth Quarterly provincial nominal GDP growth rate. Source: CEIC.

Log(GDP per capita) Natural logarithm of GDP per capita (measured as GDP divided by the mid-year population) in constant 2010 U.S. dollar. Source: World Development Indicators.

Log(Population) Natural logarithm of total population based on the de facto definition of population. Source: World Development Indicators.

MPS_t^{US} Combination of three monetary policy surprises at each FOMC announcement, converted to quarterly as a simple aggregation of each surprises within each quarter. Rogers et al. (2018).

$\text{MPS}_t^{\text{China}}$ Shock to Chinese M2 growth rate. Source: Chen et al. (2018).

M2 growth Year-over-year M2 growth rate. Source: Chen et al. (2018).

Repo rate 7-day Repo rate in China. Source: Chen et al. (2018).

RMB/USD exchange rate Log change of RMB to USD index at quarter end. Source: WIND.

Trade (% GDP) The sum of exports and imports of goods and services measured as a share of GDP. Source: World Development Indicators.

Total QFII holdings (%) Percentage change in aggregated shares held by Qualified Foreign Institutional Investors at quarter end. Source: WIND.

Total trade volumes between U.S. and China Natural logarithm of the aggregate trade volume between U.S. and China at quarter end. Source: WIND.

International firm-level data

Our international firm-level data covers 43251 firms in 46 economies. The list includes ARG (110), AUS (2002), BEL (137), BGR (177), BRA (678), CAN (3406), CHE (303), CHL (176), CHN (4346), DEU (819), DNK (191), EGY (163), ESP (168), FIN (208), FRA (771), GBR (1703), GRC (280), HRV (101), IDN (575), IND (2850), ISR (454), ITA (362), JOR (121), JPN (3776), KOR (2163), LKA (193), MEX (202), MYS (931), NLD (162), NOR (256), NZL (138), PAK (282), PER (169), PHL (262), POL (546), ROU (147), RUS (449), SAU (128), SGP (643), SWE (881), THA (591), TUR (398), TWN (1991), USA (7603), VNM (901), ZAF (338). The variable

constructions are given by the following lists.

$\mathbb{1}^{j=\textbf{Mainland China}}$ A dummy variable for listed firms at mainland China. Source: Worldscope.

Investment Capital exp. (item 04601) over lagged assets (item 02999). Source: Worldscope.

Leverage Long-term debt (item 03251) over lagged assets (item 02999). Source: Worldscope.

Log (Assets) Natural log of (book value of) total assets in dollars (02999). Source: Worldscope.

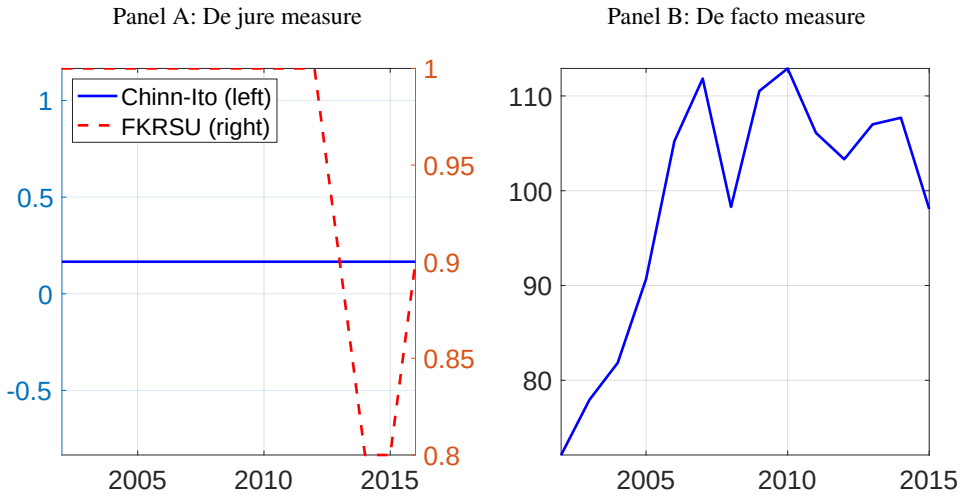
Return Natural logarithm of monthly return. The monthly return is calculated as change of monthly close price. Source: Datastream, Worldscope.

Sales growth Year-over-year sales growth, $ dollars (item 01001) Source: Worldscope.

Tobin's Q Assets (item 02999) plus market value of equity (item 08001) minus book value of equity (item 03501) divided by total assets (item 02999). Source: Worldscope.

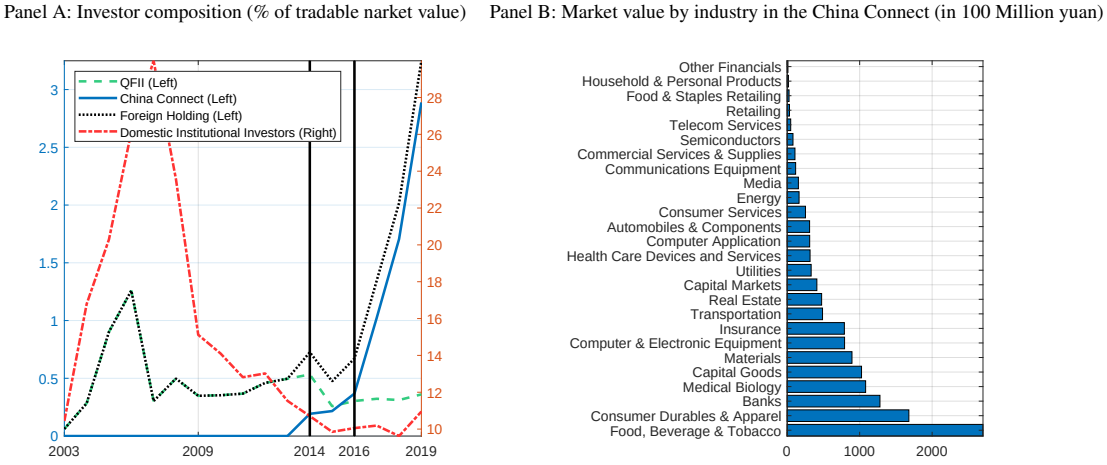
B Figures on the background to the China Connect

Figure A1 CHINESE CAPITAL ACCOUNT RESTRICTIONS



NOTE. Panel A plots de jure measures of capital controls from Chinn and Ito (2006) and Fernández, Klein, Rebucci, Schindler, and Uribe (2016). A higher value for the former (latter) means a higher (lower) degree of capital account openness. Panel B plots the de facto measure, the sum of gross stocks of foreign assets and liabilities as a ratio to GDP, from Lane and Milesi-Ferretti (2007).

Figure A2 FOREIGN INVESTORS' PARTICIPATION IN CHINESE MARKET



NOTE. Panel A plots the share of investor holdings in total tradable market value. Foreign holdings include both QFII and the China Connect. Panel B plots the industry market value for the China Connect Program at the 2019 year end.

C A simple theoretical framework

We consider a simple static setting to illustrate the effect of the Connect on domestic stock prices, modeling domestic investors and global investors separately. For domestic investors, the maximization problem is given by

$$\max_{x^C, x^{UC}, x^{HK}, y} E[W_1] - \frac{\gamma}{2} Var[W_1], \tag{A1}$$

$$\text{s.t.} \quad W_0 = y + P^C x^C + P^{UC} x^{UC} + x^{HK}, \tag{A2}$$

$$W_1 = y(1+r) + x^C(\mu^C + \varepsilon^C) + x^{UC}(\mu^{UC} + \varepsilon^{UC}) + x^{HK}(\mu^{HK} + \varepsilon^{HK}) \tag{A3}$$

$$x^{HK} \leq \bar{x}^{HK} + \Delta\bar{x}^{HK} \tag{A4}$$

where the last constraint (A4) is rationalized as the capital controls policy on domestic investors' investing at Hong Kong market.

We first solve the optimality conditions without the last constraint (A4) given by

$$P^C = \frac{\mu^C - \gamma(x^C \sigma^{C,C} + x^{UC} \sigma^{UC,C} + x^{HK} \sigma^{HK,C})}{1+r} \tag{A5}$$

$$P^{UC} = \frac{\mu^{UC} - \gamma(x^{UC} \sigma^{UC,UC} + x^C \sigma^{UC,C} + x^{HK} \sigma^{HK,UC})}{1+r} \tag{A6}$$

$$x^{HK} = \frac{\mu^{HK} - 1 - r - \gamma(x^C \sigma^{C,HK} + x^{UC} \sigma^{UC,HK})}{\gamma \sigma^{HK,HK}} \tag{A7}$$

We further assume that the optimal diversification needs of domestic investors on Hong Kong stocks are not met. Thus, the optimal diversification level x^{HK} exceeds the capital controls policy, $\bar{x}^{HK} + \Delta\bar{x}^{HK}$. In equilibrium, investing in Hong Kong is given by the maximum amount $\bar{x}^{HK} + \Delta\bar{x}^{HK}$. The asset markets for both connected and unconnected stocks also clear.

$$x^C = \bar{x}^C - \Delta\bar{x}^C \tag{A8}$$

$$x^{UC} = \bar{x}^{UC} \tag{A9}$$

In equilibrium, the following relationship for stock prices holds.

$$P^C = \frac{\mu^C - \gamma((\bar{x}^C - \Delta\bar{x}^C)\sigma^{C,C} + \bar{x}^{UC}\sigma^{UC,C} + (\bar{x}^{HK} + \Delta\bar{x}^{HK})\sigma^{HK,C})}{1+r} \tag{A10}$$

$$P^{UC} = \frac{\mu^{UC} - \gamma(\bar{x}^{UC}\sigma^{UC,UC} + (\bar{x}^C - \Delta\bar{x}^C)\sigma^{UC,C} + (\bar{x}^{HK} + \Delta\bar{x}^{HK})\sigma^{HK,UC})}{1+r} \tag{A11}$$

For international investors, assume that they take domestic connected stock prices and thus return as given and choose a portfolio of global risk-free asset with return r^*, domestic connected stocks with return $r^C + \varepsilon^C$ and global stocks with dividend $\mu^W + \varepsilon^W$. Furthermore, we assume that the international investor is a marginal investor for global stocks and holds all the world stocks in equilibrium. Her maximization problem is given as

$$\max_{\Delta\bar{x}^C, x^W, A^F} E[W_1^F] - \frac{\gamma^*}{2} Var[W_1^F], \tag{A12}$$

$$\text{s.t.} \quad W_0^F = A^F + \Delta\bar{x}^C + P^W x^W, \tag{A13}$$

$$W_1^F = A^F(1+r^*) + \Delta\bar{x}^C(1 + r^C + \varepsilon^C) + x^W(\mu^W + \varepsilon^W) \tag{A14}$$

The optimality conditions imply that

$$\Delta\bar{x}^C = \frac{r^C - r^* - \gamma^* x^W \sigma^{C,W}}{\gamma^* \sigma^{C,C}} \tag{A15}$$

In equilibrium, foreign investors hold all global stocks, $\bar{x}^W$, which implies that

$$\Delta\bar{x}^C = \frac{r^C - r^* - \gamma^* \bar{x}^W \sigma^{C,W}}{\gamma^* \sigma^{C,C}} \tag{A16}$$

D Summary statistics tables

Table A1 SHANGHAI (SHENZHEN)-HONG KONG STOCK CONNECT PROGRAM OVERVIEW

Effective date	Initial announcement	Formal announcement	Number of firms (SOEs) added	Number of firms (SOEs) on list	Number of firms (SOEs) not on list
11/17/2014	04/10/2014	11/10/2014	505 (330)	505 (330)	1969 (715)
12/05/2016	08/16/2016	11/25/2016	843 (255)	1348 (585)	1631 (790)

NOTE. Number of stocks included in the Shanghai (Shenzhen)-Hong Kong Connect program in our sample.

Table A2 U.S. MONETARY POLICY SHOCK: SUMMARY STATISTICS

	Daily	Quarterly sum	Quarterly value-weighted
Mean	-0.012	-0.026	-0.010
Median	-0.005	0.006	0.001
Std	0.101	0.138	0.061
Min	-0.465	-0.635	-0.309
Max	0.301	0.190	0.152
Num	144	68	68

NOTE. The original daily data (2003-2019) is from Rogers et al. (2018). Quarterly sum takes the simple sum of the shocks within a quarter. Quarterly value-weighted takes the value weighted sum within a quarter, where the weight is given by the number of days left in the quarter.

Table A3 SUMMARY STATISTICS FOR INTERNATIONAL FIRM-LEVEL DATA

Panel A: Variables used in the monthly stock price regressions (Oct, 2014 - Jan, 2015)						
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	Obs	Mean	Std	P25	Median	P75
Return	118,964	0.02	9.22	-0.11	-0.01	0.07
Log(Assets)	118,040	18.62	2.54	17.17	18.72	20.24
Tobin's Q	118,049	3.04	8.23	0.92	1.26	2.14
Sales growth	109,052	1.17	0.89	0.94	1.05	1.17
Leverage	115,358	0.32	0.62	0.03	0.19	0.38
Panel B: Variables used in the annual corporate investment regressions (2010-2017)						
Investment	200,432	0.06	0.11	0.01	0.03	0.07
Log(Assets)	209,863	18.62	2.51	17.17	18.71	20.22
Tobin's Q	209,873	3.03	8.24	0.92	1.26	2.12
Sales growth	193,648	1.19	0.92	0.94	1.05	1.19
Leverage	204,124	0.32	0.63	0.03	0.19	0.38

NOTE. Summary statistics for international firm-level data. Panel A is for the variables used in the monthly stock price regressions in Table A8 (Oct, 2014-Jan, 2015), including return, Log(Assets), Tobin's Q, sales growth and leverage. Panel B is for variables used in the annual corporate investment regressions in Table A10 (2010-2017), including investment, Log(Assets), Tobin's Q, sales growth and leverage. Detailed definitions can be found in Appendix A. All continuous variables are winsorized at the top and bottom 1%.

Table A4 CHINESE FIRM LEVEL DATA: SUMMARY STATISTICS

Panel A: Variables used in the monthly stock price regression (Nov. 2014)				
	(1)	(2)	(3)	(4)
	Obs	Mean	Median	Std
Return [0]	2,191	0.055	0.040	0.109
$\sigma^{i,C}(\%)$	2,285	0.380	0.390	0.233
$\sigma^{i,W}(\%)$	2,285	0.089	0.086	0.095
$\sigma^{i,HK}(\%)$	2,285	0.180	0.176	0.146
Market cap	2,293	0.102	0.053	0.139
Turnover	2,293	0.021	0.018	0.013
Volatility	2,288	0.025	0.023	0.009
Domestic fund share (%)	2,053	4.220	1.074	6.784
QFII share (%)	2,053	0.173	0.000	1.482
SOE dummy	2,234	0.396	0.000	0.489
Panel B: Variables used in the quarterly corporate investment regression (2003-2019)				
	(1)	(2)	(3)	(4)
	Obs	Mean	Median	Std
Investment	106,319	0.030	0.016	0.038
Size	106,319	21.911	21.773	1.317
Tobin's Q	106,319	2.421	1.896	1.725
Cash flow	106,319	0.031	0.025	0.045
Sales growth	101,908	0.389	0.478	0.784
Domestic fund share (%)	80,899	3.777	1.490	5.707
QFII share (%)	80,899	0.136	0.000	1.041
SOE dummy	106,197	0.472	0.000	0.499

NOTE. Summary statistics for key variables used in our regression analysis. Panel A is the summary statistics for variables used in the monthly stock price regressions at Nov, 2014, including monthly return at Nov. 2014, $\sigma^{i,C}$ (covariance term with domestic connected stocks), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), market cap, turnover, volatility, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Panel B is the summary statistics for variables used in the quarterly corporate investment regressions from 2003 to 2019, including investment, firm size, Tobin's Q, cash flow, sales growth, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Detailed definitions can be found in Appendix A. All continuous variables are winsorized at the top and bottom 1%.

Table A5 CORRELATION TABLE FOR CHINESE FIRM LEVEL DATA

Panel A: Correlations for variables used in the monthly stock price regression (Nov. 2014)	A1	A2	A3	A4	A5	A6	A7	A8	A9
A1: $\sigma^{i,C}(\%)$	1.000								
A2: $\sigma^{i,W}(\%)$	-0.046	1.000							
A3: $\sigma^{i,HK}(\%)$	0.243*	0.741*	1.000						
A4: Market cap	-0.027	-0.093*	-0.084*	1.000					
A5: Turnover	0.085*	0.163*	0.177*	-0.090*	1.000				
A6: Volatility	-0.050	0.177*	0.187*	0.045	0.478*	1.000			
A7: Domestic fund share (%)	-0.213*	-0.117*	-0.195*	0.402*	-0.133*	-0.121*	1.000		
A8: QFII share (%)	-0.009	-0.005	-0.002	0.087*	-0.034	-0.032	0.034	1.000	
A9: SOE dummy	0.222*	0.119*	0.179*	-0.087*	0.073*	-0.035	-0.073*	-0.015	1.000
Panel B: Correlations for variables used in the quarterly corporate investment regression (2003-2019)	B1	B2	B3	B4	B5	B6	B7	B8	
B1: Investment	1.000								
B2: Size	0.017*	1.000							
B3: Tobin's Q	-0.045*	-0.418*	1.000						
B4: Cash flow	0.318*	0.088*	0.057*	1.000					
B5: Sales growth	0.128*	-0.020*	0.014*	0.037*	1.000				
B6: Domestic fund share (%)	0.136*	0.068*	0.150*	0.252*	-0.061*	1.000			
B7: QFII share (%)	0.012*	0.037*	-0.004	0.047*	-0.007	0.044*	1.000		
B8: SOE dummy	-0.024*	0.221*	-0.208*	-0.016*	-0.010*	-0.018*	0.006	1.000	

NOTE. Correlation matrix for key variables at connection period. Panel A is the correlation table for variables used in the monthly stock price regressions at Nov, 2014, including $\sigma^{i,C}$ (covariance term with domestic connected stocks), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), market cap, turnover, volatility, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Panel B is the correlation table for variables used in the quarterly corporate investment regressions from 2003 to 2019, including investment, firm size, Tobin's Q, cash flow, sales growth, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Detailed definitions can be found in Appendix A. * indicates statistical significance at 1% level.

Table A6 EX-ANTE DIFFERENCES FOR CONNECTED AND UNCONNECTED FIRMS

	Connected (a)			Unconnected (b)			Difference (a)-(b)		
	Mean (1)	Median (2)	S.D (3)	Mean (4)	Median (5)	S.D (6)	Mean Diff (7)		T-test (8)
Panel A: Snapshot for variables used in the monthly stock price regression at one month before the China Connect (Oct, 2014)									
$\sigma^{i,C}$ (%)	0.439	0.439	0.162	0.363	0.378	0.242	0.076	***	6.47
$\sigma^{i,W}$ (%)	0.089	0.091	0.069	0.089	0.085	0.101	0.000		0.05
$\sigma^{i,HK}$ (%)	0.197	0.198	0.112	0.175	0.169	0.153	0.022	***	2.88
Market cap	0.088	0.052	0.119	0.107	0.055	0.144	-0.019	**	-2.63
Turnover	0.019	0.016	0.013	0.021	0.018	0.014	-0.002	***	-3.07
Volatility	0.022	0.021	0.008	0.026	0.024	0.010	-0.003	***	-6.66
Domestic fund share (%)	5.434	2.234	7.680	3.906	0.751	6.487	1.528	***	4.27
QFII share (%)	0.322	0.000	1.557	0.129	0.000	1.456	0.192	**	2.46
SOE dummy	0.639	1.000	0.481	0.332	0.000	0.471	0.307	***	12.47
Panel B: Snapshot for variables used in the quarterly investment regressions at one quarter before the China Connect (2014 Q3)									
Investment	0.032	0.024	0.029	0.034	0.023	0.034	-0.002		-1.01
Size	23.134	22.983	1.314	21.691	21.595	1.061	1.444	***	23.72
Tobin's Q	1.626	1.393	0.824	2.494	1.998	1.612	-0.867	***	-10.79
Cash flow	0.032	0.026	0.031	0.025	0.022	0.035	0.007	***	3.89
Sales growth	1.186	1.124	0.360	1.285	1.196	0.443	-0.100	***	-4.27
Domestic fund share (%)	3.039	1.370	4.190	3.459	1.840	4.223	-0.420	*	-1.79
QFII share (%)	0.241	0.000	0.831	0.139	0.000	1.503	0.102		1.32
SOE dummy	0.652	1.000	0.477	0.301	0.000	0.459	0.351	***	13.96

NOTE. Ex-ante differences in summary statistics for connected and unconnected firms. Panel A is a snapshot for variables used in the monthly stock price regressions at one month before the China Connect (i.e. Oct, 2014), including $\sigma^{i,C}$ (covariance term with domestic connected stocks), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), market cap, turnover, volatility, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Panel B is a snapshot for variables used in the quarterly corporate investment regressions at one quarter before the China Connect (i.e. 2014 Q3), including investment, firm size, Tobin's Q, cash flow, sales growth, domestic fund share, QFII share and SOE dummy (a dummy variable for state-owned enterprises). Detailed definitions can be found in Appendix A. All continuous variables are winsorized at the top and bottom 1%. We compare the summary statistics differences between the connected and unconnected firms. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A7 SUMMARY STATISTICS DIFFERENCES IN OWNERSHIP STRUCTURE

	Private-owned Enterprises (a)			State-owned Enterprises (b)			Difference (a)-(b)		
	Mean (1)	Median (2)	S.D (3)	Mean (4)	Median (5)	S.D (6)	Mean Diff (7)		T-test (8)
Investment	0.031	0.017	0.038	0.029	0.015	0.038	0.002	***	7.82
Size	21.636	21.581	1.137	22.218	22.028	1.432	-0.582	***	-73.73
Tobin's Q	2.759	2.190	1.925	2.040	1.625	1.372	0.719	***	69.36
Cash flow	0.032	0.026	0.047	0.030	0.024	0.042	0.001	***	5.25
Sales growth	0.396	0.484	0.796	0.380	0.473	0.771	0.016	***	3.16
Domestic fund share (%)	3.869	1.600	5.610	3.666	1.370	5.823	0.202	***	5.01
QFII share (%)	0.131	0.000	1.291	0.143	0.000	0.626	-0.012		-1.59

NOTE. Summary statistics differences in ownership structure for key variables used in the quarterly investment regression (2003-2019) including investment, firm size, Tobin's Q, cash flow, sales growth, domestic fund share and QFII share. Detailed definitions can be found in Appendix A. We also present the differences between private-owned enterprises (POEs) and state-owned enterprises (SOEs) in column (7). *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

E Robustness on impact effects of the China Connect

Table A8 CHINESE STOCK PRICE REVALUATION COMPARED TO INTERNATIONAL MARKETS AROUND THE CONNECT: NOV 2014

	Monthly return			
	Month [-1]	Month [0]	Month [1]	Month [2]
	(1)	(2)	(3)	(4)
$\mathbb{1}^{j=\text{Mainland China}}$	0.438	-0.024***	-0.089***	0.425
	(0.472)	(0.008)	(0.008)	(0.453)
Lag return	-1.730	-0.000***	-0.047**	-0.409
	(1.668)	(0.000)	(0.021)	(0.484)
Log (Assets)	-0.131	0.003**	0.006***	-0.003
	(0.135)	(0.001)	(0.001)	(0.002)
Tobin's Q	-0.081	-0.000	0.001	-0.011
	(0.079)	(0.001)	(0.001)	(0.010)
Sales growth	-0.022	-0.009***	-0.006*	-0.047
	(0.030)	(0.003)	(0.003)	(0.044)
Leverage	1.858	0.001	-0.013	0.129
	(1.832)	(0.008)	(0.009)	(0.089)
GDP growth	-0.002	-0.007***	-0.001	-0.004
	(0.006)	(0.001)	(0.001)	(0.003)
Trade (% GDP)	0.018	-0.002	-0.017***	-0.008
	(0.027)	(0.004)	(0.004)	(0.007)
Domestic credit (% GDP)	-0.214	0.015**	0.011*	0.045***
	(0.206)	(0.007)	(0.006)	(0.008)
Log (population)	0.055	0.003*	-0.004**	-0.015**
	(0.058)	(0.002)	(0.002)	(0.006)
Log (GDP per capita)	0.116	-0.009***	0.004*	-0.011**
	(0.120)	(0.002)	(0.003)	(0.005)
Constant	0.277	-0.018	-0.113***	0.409***
	(0.332)	(0.047)	(0.044)	(0.134)
Industry F.E.	Yes	Yes	Yes	Yes
Observations	22667	22648	22618	21740
R^2	0.004	0.013	0.027	0.001

NOTE. This table estimates the following equation $y_{ij} = \alpha + \beta_1 \mathbb{1}^{j=\text{Mainland China}} + \beta_2 Z_{ij} + \varepsilon_{ij}$. The dependent variable y_{ij} is the monthly stock log return around the China Connect at the first wave in Nov 2014 for firm i located in country j. We adjust the dependent variables by their pre-liberalization level. $\mathbb{1}^{j=\text{Mainland China}}$ is a dummy variable for all listed firms in mainland China. Other independent variables include lagged return, log (assets), Tobin's Q, sales growth, leverage, GDP growth, trade (% GDP), domestic credit (% GDP), log(population) and log(GDP per capita). We add industry fixed effect and cluster standard errors at firm level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All the variable constructions and summary statistics table are reported in Appendix A and Table A3.

Table A9 EXPLORING THE NEGATIVE COMMON EFFECT: PRICE-EARNINGS YIELDS

	Month [0]		Month [0,1]	
	(1)	(2)	(3)	(4)
Connect	0.031***	0.035***	0.128***	0.131***
	(0.004)	(0.005)	(0.009)	(0.010)
Earnings yields$^{CH/US}$	0.445***	0.344***	1.402***	1.319***
	(0.083)	(0.094)	(0.168)	(0.193)
Connect*Earnings yields$^{CH/US}$		0.392**		0.319
		(0.193)		(0.382)
Market cap	0.058***	0.056***	0.289***	0.287***
	(0.018)	(0.018)	(0.030)	(0.031)
Turnover	1.100***	1.113***	3.385***	3.400***
	(0.249)	(0.249)	(0.351)	(0.351)
Volatility	5.133***	5.108***	4.634***	4.616***
	(0.670)	(0.670)	(0.530)	(0.528)
Domestic fund share	-0.002***	-0.002***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.001)	(0.001)
QFII share	0.002**	0.001**	0.003**	0.003**
	(0.001)	(0.001)	(0.002)	(0.002)
Sales growth	0.007	0.007	-0.006	-0.006
	(0.006)	(0.006)	(0.009)	(0.009)
Constant	-0.092***	-0.093***	-0.259***	-0.260***
	(0.013)	(0.013)	(0.017)	(0.017)
Observations	2028	2028	1993	1993
Adjusted R-squared	0.273	0.274	0.308	0.308

NOTE. The dependent variable is the cumulative log stock return (adjusted for pre-liberalization mean) around the China Connect in Nov 2014. Time 0 means the month of November, 2014. Columns (1)-(2) use monthly return of November while Columns (3)-(4) use the cumulative monthly return from November to December. The independent variables are a connect dummy variable for those eligible stocks for foreign investors, sector-level earnings yield difference between China and U.S., market cap, turnover, volatility, domestic fund share, QFII share and future sales growth (adjusted for pre-liberalization average). Robust standard errors clustered at the firm level are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All variable constructions are reported in Appendix A.

Table A10 CHINESE INVESTMENT ADJUSTMENT COMPARED TO INTERNATIONAL MARKETS AFTER THE CHINA CONNECT (2014 Q4)

	Annual Investment			
	2014	2015	2016	2017
	(1)	(2)	(3)	(4)
$\mathbb{1}^{j=\text{Mainland China}}$	0.008***	-0.001	-0.010***	-0.015***
	(0.003)	(0.003)	(0.004)	(0.004)
Lag investment	-0.279***	-0.028	0.095***	0.161***
	(0.016)	(0.018)	(0.022)	(0.020)
Log (Assets)	0.000	0.001*	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Tobin's Q	-0.001**	0.000	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Sales growth	0.006***	0.003*	0.012***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	0.019***	0.013***	0.018***	0.016***
	(0.003)	(0.004)	(0.004)	(0.004)
GDP growth	-0.002***	-0.002***	-0.003***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)
Trade (% GDP)	0.003**	0.001	-0.002	-0.000
	(0.001)	(0.002)	(0.002)	(0.002)
Domestic credit (% GDP)	-0.008***	-0.002	0.006***	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Log (population)	-0.002**	-0.003***	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Log (GDP per capita)	-0.000	0.001	-0.002*	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.022	0.019	0.013	-0.028
	(0.016)	(0.018)	(0.019)	(0.019)
Industry F.E.	Yes	Yes	Yes	Yes
Observations	22105	21175	20156	19430
R^2	0.127	0.050	0.075	0.066

NOTE. This table estimates the equation $y_{ij} = \alpha + \beta_1 \mathbb{1}^{j=\text{Mainland China}} + \beta_2 Z_{ij} + \varepsilon_{ij}$. The dependent variable y_{ij} is the annual investment after the China Connect at 2014 for firm i located in country j. We adjust the dependent variables by their pre-liberalization level. $\mathbb{1}^{j=\text{Mainland China}}$ is a dummy variable for all listed firms in mainland China. Other independent variables include lagged investment, log (assets), Tobin's Q, sales growth, leverage, GDP growth, trade (% GDP), domestic credit (% GDP), log(population) and log(GDP per capita). We add industry fixed effect and cluster standard errors at firm level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All the variable constructions and summary statistics table are reported in Appendix A and Table A3.

Table A11 INVESTMENT RESPONSE TO THE CHINA CONNECT AROUND 2014 Q4

	Time: [-8Q: 8Q]		
	All Sample	Private	State
	(1)	(2)	(3)
$\text{Connect}_i * \text{Post}_t$	0.002***	0.004***	-0.001
	(0.001)	(0.001)	(0.001)
Size	-0.000	-0.001	0.003**
	(0.001)	(0.001)	(0.001)
Lag Tobin's Q	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Cash flow	0.088***	0.076***	0.084***
	(0.008)	(0.010)	(0.012)
Sales growth	-0.002***	-0.001*	-0.002***
	(0.001)	(0.001)	(0.001)
Local GDP growth	0.014	0.028	0.044
	(0.015)	(0.019)	(0.034)
Constant	0.038**	0.050**	-0.049*
	(0.018)	(0.022)	(0.029)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Observations	32898	20067	12789
Adjusted R^2	0.553	0.555	0.558

NOTE. This table estimates the effect of the China Connect on investment using a difference-in-difference approach in a short window [-8Q: 8Q] around 2014 Q4. Post is a dummy variable that equals to one if the period is after the China Connect and zero otherwise. We estimate the specification $I_{it} = \alpha * \text{Connect}_i * \text{Post}_t + \beta Z_{it} + \varepsilon_{it}$, where Z_{it} is the firm-level and macro-level controls. We add both firm and time fixed effects in the regression and estimate the specification alternatively for all the sample, private-owned and state-owned sub-samples. Standard errors are clustered at both firm and year level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A12 EFFECTS OF THE CHINA CONNECT ON FIRM OUTCOMES

	EBIT	Sales growth	Cost of debt	$\Delta\log(D/P)$	Leverage	Seasoned equity offering	Stocks pledged	Bank loan
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Connect	0.016**	0.022***	-0.129***	-0.048***	-0.016***	0.019***	-0.113***	-0.004**
	(0.008)	(0.003)	(0.021)	(0.012)	(0.004)	(0.006)	(0.027)	(0.002)
Size	-0.002**	-0.002	0.071***	0.020***	0.007***	-0.014***	-0.021	0.000
	(0.001)	(0.001)	(0.015)	(0.006)	(0.002)	(0.003)	(0.016)	(0.001)
Lag Tobin's Q	0.002	-0.007***	-0.067***	0.017***	-0.003***	0.001	0.126***	0.000
	(0.002)	(0.001)	(0.013)	(0.002)	(0.001)	(0.002)	(0.015)	(0.000)
Cash Flow	0.755***	0.049	-1.222***	-0.495*	-0.370***	0.029	0.393	-0.037**
	(0.103)	(0.061)	(0.388)	(0.257)	(0.056)	(0.053)	(0.444)	(0.017)
Sales Growth	0.009	0.923***	0.062**	0.054***	-0.001	-0.010	0.098***	0.001
	(0.006)	(0.010)	(0.026)	(0.008)	(0.003)	(0.008)	(0.030)	(0.002)
GDP Growth	-0.353**	0.403**	2.127***	-0.454	-0.184*	0.352*	1.459***	0.054
	(0.164)	(0.165)	(0.436)	(0.339)	(0.107)	(0.201)	(0.370)	(0.037)
Constant	0.025	-0.417***	1.572***	-0.492***	-0.135**	0.262***	0.251	0.015
	(0.027)	(0.027)	(0.357)	(0.126)	(0.052)	(0.068)	(0.398)	(0.014)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15686	15686	15686	14749	15686	15686	15686	15678
Adjusted R^2	0.003	0.973	0.074	0.023	0.028	0.009	0.113	0.020

NOTE. The dependent variables are quarterly corporate outcomes, 1-8 quarters after the China Connect at the first wave in Nov 2014, including EBIT (EBIT to book assets) in column (1), sales growth in column (2), cost of debt in column (3), Change of log(Dividend to price) in column (4), leverage ratio (debt to book assets) in column (5), seasoned equity offering in column (6), stocks pledged in column (7) and bank loans in column (8). All quarterly corporate outcomes are adjusted by pre-liberalization average. We also include industry fixed effect in all specifications. All standard errors are clustered at both industry and year level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

F The effect of the China Connect on Hong Kong stocks

Table A13 THE EFFECT OF THE CHINA CONNECT ON HONG KONG STOCKS

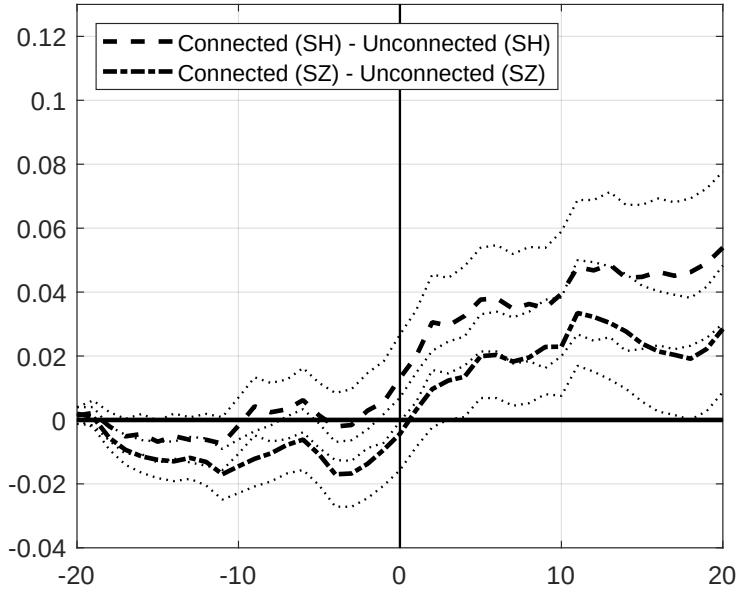
	CAR(-1, 0)			CAR(-1, 1)			CAR(-1, 3)			CAR(-1, 5)		
$\text{Connect}^{\text{Hong Kong}}$	0.011**	0.011*	0.010*	0.014***	0.012**	0.013***	0.018***	0.020***	0.022***	0.013**	0.016***	0.017***
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)
MV		-0.000**	-0.000**		-0.000	-0.000		-0.000	-0.000		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Volatility		-0.178	-0.125		-0.140	-0.148		0.437*	0.482*		1.060***	1.199***
		(0.113)	(0.123)		(0.145)	(0.153)		(0.250)	(0.276)		(0.254)	(0.281)
Amihud		-0.000***	-0.000***		-0.000***	-0.000***		-0.000***	-0.000***		-0.000**	-0.000*
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Age			-0.001			-0.004			-0.008			-0.014**
			(0.003)			(0.003)			(0.006)			(0.006)
BHR			-0.021**			0.008			-0.009			-0.067***
			(0.010)			(0.013)			(0.019)			(0.021)
Lev			0.015**			0.003			-0.004			-0.001
			(0.007)			(0.009)			(0.012)			(0.014)
N	1314	1308	1279	1306	1300	1272	1305	1299	1271	1307	1301	1273
Adjusted R^2	0.034	0.055	0.061	0.027	0.046	0.045	0.031	0.048	0.050	0.015	0.063	0.079

NOTE. This table reports the regression analysis for cumulative abnormal return (CAR) of connected and unconnected Hong Kong stocks at the moment when the China Connect is announced at Nov 10, 2014, $\text{CAR}_i = \alpha_0 + \alpha_1 \text{Connect}_i^{\text{Hong Kong}} + \beta \mathbf{Z_i} + \varepsilon_i$, where CAR_i is the cumulative abnormal return based on CAPM model for firm i. $\text{Connect}_i^{\text{Hong Kong}}$ is a dummy variable for Hong Kong stocks eligible for the mainland investors in the Connect. Control variables include market capitalization (MV), volatility, Amihud illiquidity measure (Amihud), firm listing year (Age), buy and hold return (BHR) and leverage (Lev). We also add industry fixed effects. Robust standard errors are clustered at the industry level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

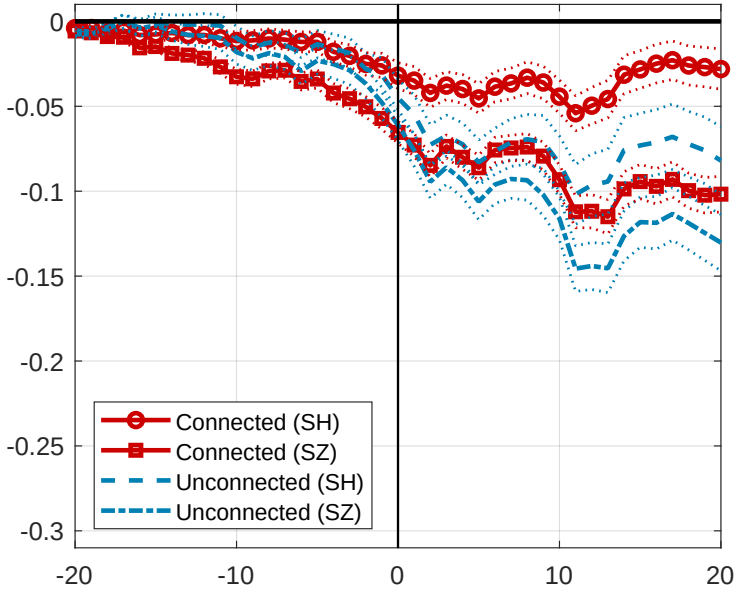
G The Shenzhen-HK Connect in 2016

Figure A3 ANNOUNCEMENT EFFECTS OF THE CHINA CONNECT: NOV 25, 2016

Panel A: Differential effects



Panel B: Overall Effect



NOTE. Cumulative abnormal return (CAR) based on a market model centered on Nov 25, 2016 (with 95% c.i.). Estimation window is [-300, -30] and we restrict firms to have at least 100 trading days at the estimation window. Panel A plots the differences between connected stocks (SH) and unconnected stocks in Shanghai (SH) and between connected stocks (SH) and unconnected stocks in Shenzhen (SZ). Panel B plots the CAR for different groups of stocks based on whether connected into the program and their trading markets. As seen in Panel A, connected stocks rise relative to unconnected stocks, with stocks in Shanghai experience more price evaluation than in Shenzhen. Compared with the first wave, the magnitude of positive differential effect on connected stocks is smaller.

Table A14 STOCK PRICE REVALUATION AROUND THE CONNECT: NOV 2016

	Month [0]				Month [0, 1]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Connect	0.010**	0.007	0.008	0.004	-0.004	-0.009	-0.018	-0.012
	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)	(0.008)	(0.012)	(0.011)
$\sigma^{i,C}$		-0.029***	-0.028***	-0.029***		-0.064***	-0.069***	-0.064***
		(0.005)	(0.005)	(0.005)		(0.011)	(0.011)	(0.011)
Connect*$\sigma^{i,W}$		-0.013	-0.013	-0.014		-0.030	-0.027	-0.030
		(0.009)	(0.009)	(0.009)		(0.019)	(0.019)	(0.019)
$\sigma^{i,HK}$		0.023***	0.023***	0.023***		0.036***	0.036***	0.036***
		(0.005)	(0.006)	(0.005)		(0.012)	(0.013)	(0.012)
Market cap*Connect			0.040***				0.003	
			(0.014)				(0.026)	
Market cap*Unconnect			0.036				-0.099	
			(0.084)				(0.120)	
Turnover*Connect				-0.189				4.662***
				(0.387)				(0.719)
Turnover*Unconnect				-0.524*				4.424***
				(0.274)				(0.584)
Market cap	0.038**	0.037**			0.025	0.012		
	(0.015)	(0.015)			(0.027)	(0.026)		
Turnover	-0.297	-0.381			4.864***	4.504***		
	(0.251)	(0.241)			(0.512)	(0.514)		
Volatility	3.651***	3.792***	3.393***	3.807***	-0.962	-0.186	4.622***	-0.179
	(0.389)	(0.383)	(0.310)	(0.384)	(0.813)	(0.827)	(0.651)	(0.826)
Domestic fund share	-0.003***	-0.003***	-0.003***	-0.003***	-0.006***	-0.006***	-0.006***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
QFII share	0.002	0.001	0.001	0.002	0.007*	0.004	0.005	0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Sales growth [+1]	-0.010*	-0.010*	-0.009*	-0.009*	-0.004	-0.003	-0.003	-0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)	(0.009)	(0.008)
Constant	-0.076***	-0.077***	-0.078***	-0.072***	-0.137***	-0.145***	-0.182***	-0.143***
	(0.007)	(0.007)	(0.009)	(0.007)	(0.016)	(0.016)	(0.018)	(0.016)
Observations	1596	1596	1596	1596	1573	1573	1573	1573
Adjusted R^2	0.177	0.211	0.209	0.210	0.192	0.257	0.180	0.257

NOTE. The dependent variable is the cumulative log stock return (adjusted for pre-liberalization mean) around the China Connect in Nov 2016. We focus on firms listed in Shenzhen market only. Time 0 is November 2016. Columns (1)-(4) use the month 0 while Columns (5)-(8) use the month of Nov and Dec. The independent variables are a connect (unconnect) dummy variable for those (in)eligible stocks for foreign investors, $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,C}$ (covariance term with domestic connected stocks), market cap, turnover, volatility, domestic fund share, QFII share and future sales growth (adjusted for pre-liberalization average). We standardize all the covariance terms. Robust standard errors clustered at the firm level are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. All variable constructions are reported in Appendix A. Consistent with our theory, we find a positive effect on connected firms relative to unconnected firms due to more foreign capital. However, the economic magnitude is much smaller than in the 2014 wave. Similar to the Shanghai wave, we do not find evidence of the negative effect on stock prices from local's increased diversification opportunities into Hong Kong. The launch of the China Connect again likely brought about a negative common effect on stock prices, as proxied by the negative constant term.

Table A15 INVESTMENT ADJUSTMENT AFTER THE CONNECT: 2016 Q4

	1-4 Q		1-8 Q		1-12 Q	
	(1)	(2)	(3)	(4)	(5)	(6)
Connect	0.003***	0.004***	0.001	0.002**	0.001	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$\sigma^{i,C}$		0.002		0.001		0.000
		(0.002)		(0.002)		(0.002)
$\sigma^{i,HK}$		0.002		0.000		-0.000
		(0.002)		(0.001)		(0.001)
Connect*$\sigma^{i,W}$		0.005***		0.008***		0.008***
		(0.002)		(0.002)		(0.002)
Size	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Lag Tobin's Q	0.001*	0.001*	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash flow	-0.019	-0.015	0.013	0.014	0.020**	0.021**
	(0.014)	(0.014)	(0.014)	(0.013)	(0.008)	(0.008)
Sales growth	-0.000	-0.000	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Local GDP growth	-0.067	-0.067	-0.033	-0.031	-0.007	-0.003
	(0.052)	(0.051)	(0.047)	(0.046)	(0.041)	(0.040)
Constant	-0.094***	-0.097***	-0.104***	-0.105***	-0.110***	-0.110***
	(0.022)	(0.023)	(0.018)	(0.018)	(0.015)	(0.015)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5162	5162	10372	10372	15565	15565
Adjusted R^2	0.108	0.110	0.104	0.105	0.101	0.103

NOTE. The dependent variable is quarterly abnormal corporate investment, defined as the difference between the investment rate and its pre-liberalization average. We focus on firms listed in Shenzhen market only. The independent variables are a connect dummy variable for those eligible stocks for foreign investors, $\sigma^{i,HK}$ (covariance term with Hong Kong eligible stocks for domestic investors), $\sigma^{i,W}$ (covariance term with world market), $\sigma^{i,C}$ (covariance term with domestic connected stocks), Tobins' Q, cash flows, sales growth, and regional GDP growth rate. We also include industry fixed effects. All standard errors are clustered at both industry and quarter and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. There is a positive effect on investment in the first 4 quarters, a magnitude comparable to the first wave. Why are there still non-negligible effects on corporate investment given that stock prices (funding costs) do not change as much as in Shanghai? Our conjecture is related to the composition of firms in the two waves. In the Shenzhen wave, more private-owned firms are connected compared to the Shanghai wave. As documented in Section 6, the effect of the China Connect on investment is mainly driven by the POEs.

H Robustness on spillover effects of the China Connect

The spillover effect from U.S. monetary policy shocks to Chinese corporate investment is highly robust. Table A16 presents a horse race between U.S. monetary policy shocks and other important shocks in either the global market or Chinese market. In columns (1) to (3), we add measures of the global financial cycle widely used in the literature including the VIX, the dollar index, and a global factor constructed by Miranda-Agrippino and Rey (2020). All three lower connected firms' investment rate relative to unconnected firms in a way consistent with a contractionary U.S. monetary policy shock (a higher VIX index, a stronger dollar and a lower global factor).

Our second set of external shocks relates to global funding costs. The funding cost has two components, one on the global risk-free rate and the other on the risk premium. Columns (4) and (5) add measures for the price of risk such as a global risk aversion index constructed by Bekaert et al. (2021a) and the term premium of 10 year bonds identified by Kim and Wright (2005) respectively. Column (6) uses the TED spread, measured as the difference between interest rates on interbank loans and short-term U.S. government debt. This corresponds to changes in the global risk free rate. Among these three measures, only risk aversion affects connected firm investment in a sensible way. Again, our U.S. monetary policy shock result is robust.

Our third set of shocks includes the RMB/USD bilateral exchange rate, a Chinese monetary policy shock to M2 growth identified by Chen et al. (2018), and the Chinese Economic Policy Uncertainty index identified by Baker et al. (2016). In all specifications, the China-related measures do not create a differential effect on connected firms. Our U.S. monetary policy shock result is still robust. One can interpret this exercise as a placebo test, as there is no reason to expect connected firms to have a differential response to the exchange rate, Chinese monetary policy, or Chinese economic policy uncertainty because of the launch of the Connect.

Our fourth set of results includes different uncertainty measures, such as a U.S. monetary policy uncertainty index constructed by Husted et al. (2019), a news-based economic policy uncertainty index (EPU) from Baker et al. (2016), and a GDP-weighted average of national EPU indices for 16 countries that account for two-thirds of global output from Davis (2016). None of those shocks

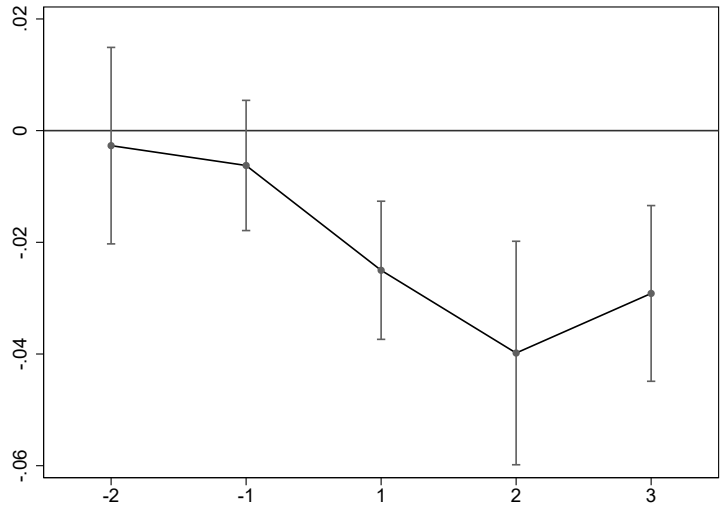
leads to a differential investment response between connected and unconnected firms. Moreover, the U.S. monetary policy shock results are still present.

We perform additional robustness tests in Table A17. In Panel A, we explore alternative specifications. Column (1) eliminates periodic adjustment to the eligible stocks and focuses only on the initially connected stocks in Shanghai and Shenzhen. Column (2) drops dual-listed stocks that are arguably already exposed to external shocks before the China Connect. Column (3) adds an industry specific time trend. In all specifications, our results on the interaction term between Connect and U.S. monetary policy shocks are robust. In Panel B, we control for other factors. We add into column (1) various interactions between firm size and other potentially important macro factors, to take into account different firms' sensitivity to those macro variables. Those variables include bilateral RMB/USD exchange rate, U.S.-China trade volume, Chinese domestic interest rate, and U.S. monetary policy shocks. These might control for the contemporaneous U.S.-China trade tension and corresponding domestic monetary policy stance. Our primary result remains significant. Column (2) adds lagged investment to the baseline specification. The new coefficient is significantly positive, suggesting that investment is persistent, while the interaction term remains statistically significant. Column (3) introduces a lag of MPS^{US} and its interaction with Connect, to see if investment responds slowly to external shocks. The coefficients on the lagged interaction term are insignificant, however.

Finally, we conduct two additional placebo tests in Table A18. First is to randomly assign stocks as being connected ones. We then re-estimate our stock price and investment sensitivity regressions to U.S. monetary policy shocks. Column (1) in Panel A and B indicates that this artificially constructed Connect dummy does not lead to the documented results above. Our second placebo test is conducted using a sample before the launch of the China Connect to test whether there are investment sensitivity differences between the (soon to be) "connected" and "unconnected" firms. We define connected firms based on Nov 2014, the first wave. Because those stocks do not have more access to foreign capital before 2014, we should not see a significant difference in investment (stock price) sensitivity between connected and unconnected firms. This exercise

can be also understood as one way to test the parallel trend assumption. Columns (2)-(4) in panel A and B of Table A18 present results. Column (3) presents results using the pre-Connect period (2004-2013), and shows that connected firms' investment sensitivity is insignificantly different from unconnected firms. U.S. monetary policy affects both connected and unconnected firms during this period. One conjecture is that foreign capital can access all Chinese stocks beginning with QFII. Indeed, when we conduct the same exercise during 1998-2003, before the launch of QFII, the effect of the U.S. monetary policy shock on investment is statistically insignificant. Therefore, the influence of foreign capital on the Chinese market can be traced back to QFII, while the Connect creates two groups of stocks that are differently affected by foreign shocks.

Figure A4 PARALLEL TRENDS



NOTE. The coefficients $\{\beta_s\}_{s=-2}^{3}$ along with the 95% confidence interval estimated from $I_{it} = \alpha + \sum_{s=-2}^{3} \beta_s \text{Connect}_{it+s} * \text{MPS}_t^{\text{US}} + \text{Connect}_{it} + \text{MPS}_t^{\text{US}} + \Gamma Z_{it} + \varepsilon_{it}$, where I_{it} is the quarterly investment for firm i at quarter t. MPS_t^{US} is the U.S. monetary policy shock of Rogers et al. (2018). Connect_{it} is a dummy variable for connected stocks at quarter t. Firm-level controls are the same as in Table 4. Standard errors are clustered at by firm and year.

Table A16 INVESTMENT SENSITIVITY TO U.S. MONETARY POLICY SHOCKS: OTHER MACRO FACTORS

	VIX	Dollar index return	Global financial cycle
	(1)	(2)	(3)
$MPS_t^{US} * Connect_{it}$	-0.019***	-0.014***	-0.023***
	(0.002)	(0.002)	(0.003)
Other factor$_t$ * Connect$_{it}$	-0.003***	-0.032***	0.005***
	(0.001)	(0.006)	(0.001)
Observations	101908	101908	97862
Adjusted R^2	0.411	0.412	0.417
	Risk aversion	Term premium	Ted rate
	(4)	(5)	(6)
$MPS_t^{US} * Connect_{it}$	-0.018***	-0.017***	-0.017***
	(0.002)	(0.002)	(0.002)
Other factor$_t$ * Connect$_{it}$	-0.004***	0.000	0.004
	(0.001)	(0.001)	(0.002)
Observations	101908	101908	101908
Adjusted R^2	0.411	0.412	0.411
	RMB/USD	MPS^{China}	Chinese economic uncertainty
	(7)	(8)	(9)
$MPS_t^{US} * Connect_{it}$	-0.017***	-0.023***	-0.018***
	(0.002)	(0.003)	(0.002)
Other factor$_t$ * Connect$_{it}$	0.001	0.021	0.000
	(0.009)	(0.033)	(0.000)
Observations	101908	97862	101908
Adjusted R^2	0.411	0.417	0.411
	U.S. monetary policy uncertainty	Economic uncertainty index	EPU
	(10)	(11)	(12)
$MPS_t^{US} * Connect_{it}$	-0.018***	-0.020***	-0.018***
	(0.002)	(0.002)	(0.002)
Other Shock$_t$ * Connect$_{it}$	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)
Observations	101908	101908	101908
Adjusted R^2	0.411	0.412	0.411

NOTE. The dependent variable is quarterly corporate investment. We horse race alternative macro factors with U.S. monetary policy shock, including VIX index, dollar index return, global financial cycle factor constructed by Miranda-Agrippino and Rey (2020), risk aversion constructed by Bekaert et al. (2021a), a change in term premium of 10 year bonds identified by Kim and Wright (2005), TED spread measured as the difference between interest rates on interbank loans and short-term U.S. government debt, the RMB/USD bilateral exchange rate, Chinese monetary policy shock to M2 growth rate identified by Chen et al. (2018), Chinese Economic policy uncertainty index from Baker et al. (2016), U.S. monetary policy uncertainty index constructed by Husted et al. (2019), a news-based economic uncertainty index (EPU) from Baker et al. (2016), a GDP-weighted average of national EPU indices for 16 countries that account for two-thirds of global output from Davis (2016). Firm-level controls are the same as in Table 4. We include firm and year fixed effect in all specifications. All standard errors are clustered at both firm and year level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A17 INVESTMENT SENSITIVITY TO U.S. MONETARY POLICY SHOCKS: ROBUSTNESS

Panel A: Alternative specifications			
	Two waves	Drop dual-listed stocks	Industry specific time trend
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.019***	-0.019***	-0.018***
	(0.002)	(0.002)	(0.002)
MPS_t^{US}	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)
Connect_{it}	0.001**	0.002***	0.001***
	(0.000)	(0.000)	(0.000)
Observations	101908	94573	101742
Adjusted R^2	0.411	0.406	0.416
Panel B: Other factors			
	Size	Lag investment	Lag MPS^{US}
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.011***	-0.025***	-0.018***
	(0.002)	(0.002)	(0.002)
MPS_t^{US}	0.042***	-0.008***	-0.010***
	(0.014)	(0.001)	(0.001)
Connect_{it}	0.003***	0.001**	0.002***
	(0.000)	(0.000)	(0.000)
$\text{MPS}_{t-1}^{\text{US}} * \text{Connect}_{it}$			-0.001
			(0.003)
$\text{MPS}_{t-1}^{\text{US}}$			-0.005***
			(0.001)
I_{it-1}		0.546***	
		(0.006)	
$\text{Size}_{it} * \Delta \log(\text{RMB}/\text{USD})_t$	0.006		
	(0.004)		
$\text{Size}_{it} * \log(\text{Trade}_t^{\text{China/US}})$	-0.004***		
	(0.000)		
$\text{Size}_{it} * \text{Interest rate}_t$	0.000		
	(0.000)		
$\text{Size}_{it} * \text{MPS}_t^{\text{US}}$	-0.002***		
	(0.001)		
Observations	101908	101908	101908
Adjusted R^2	0.414	0.591	0.411

NOTE. The dependent variable is quarterly corporate investment. Panel A investigates alternative specifications, including focusing only on eligible stocks included in Nov 2014 and Nov 2016, dropping A-H and A-B dual listed stocks and controlling for industry specific time trend. Panel B controls for other factors, including firm size and its interaction with other macro variables, lagged corporate investment and lagged monetary policy shock. Control variables are the same as in Table 4. We include both firm and year fixed effect. All standard errors are clustered at both firm and year level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A18 STOCK PRICE AND INVESTMENT SENSITIVITY TO U.S. MONETARY POLICY SHOCKS: PLACEBO TEST

Panel A: Stock price sensitivity to U.S. monetary policy shock

	All sample	Period before the China Connect		
	Randomly generated Connect dummy 2003-2019	Pre-QFII 1998-2003	Pre-China Connect 2004-2013	All 1998-2013
	(1)	(2)	(3)	(4)
$MPS_t * Connect_{it}$	-0.005	0.001	-0.001	0.000
	(0.003)	(0.001)	(0.002)	(0.002)
$Connect_{it}$	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	297044	48193	145561	193754
Adjusted R^2	0.033	0.018	0.027	0.026

Panel B: Investment sensitivity to U.S. monetary policy shock

	All sample	Period before the China Connect		
	Randomly generated Connect dummy 2003-2019	Pre-QFII 1998-2003	Pre-China Connect 2004-2013	All 1998-2013
	(1)	(2)	(3)	(4)
$MPS_t * Connect_{it}$	0.001	-0.006	-0.001	-0.002
	(0.002)	(0.006)	(0.002)	(0.002)
MPS_t	-0.010***	0.007	-0.004***	-0.003***
	(0.001)	(0.010)	(0.001)	(0.001)
$Connect_{it}$	-0.000			
	(0.000)			
Observations	101908	8969	94573	101742
Adjusted R^2	0.411	0.494	0.406	0.416

NOTE. Panel A (B) conducts placebo tests for the stock price (investment) sensitivity to U.S. monetary policy shocks. The dependent variable in Panel A (B) is the daily cumulative excessive return at FOMC days (the quarterly corporate investment). There are two types of placebo tests. The first one is to randomly generate dummy variables for $Connect_{it}$ and re-estimate the stock price (investment) sensitivity to U.S. monetary policy shocks. The second one is to conduct analysis in a period before the launch of the China Connect, like a parallel trend analysis. The Connect dummy variable used in the second approach is defined as firms eligible in Nov 2014. We focus on three samples before the launch of the China Connect, pre-QFII (1998-2003), pre-China Connect (2004-2013) and all sample (1998-2013) respectively in columns (2)-(4). The firm-level controls in Panel A are the same as in Table 3. Standard errors are clustered at both industry and FOMC meeting days. The firm-level controls in Panel B are the same as in Table 4. Standard errors are clustered at both firm and year level. All standard errors are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

I Sample selection

Sample selection is a potentially serious concern if the connect decision were made at firm level, as firms would have an incentive to lobby, but for the China Connect selection occurs at the national level. But there might exist sample selection issues related to the index construction. This could bias estimation in two opposite ways. On the documented immediate effects from the launch of the Connect, i.e. the monthly stock price reaction in Nov. 2014 and the investment adjustment a few quarters after the 2014 Q4, our baseline estimation (OLS results) might over-state the effect of the Connect, i.e. the coefficient on the Connect dummy. This is because index construction tends to select firms with stable performance. On the other hand, we might potentially under-estimate stock price and investment sensitivity to U.S. monetary policy shocks. We address the potential sample selection issue in three ways. First is a Heckman two-stage estimation. Second is a propensity score matching.[A1] Third is a discontinuity method.

Heckman two-stage results We base specifics of our investigation on a reading of public information concerning index construction and the ex-ante firm differences in Table A6. In our first stage Probit model of Connect selection, we use a Shanghai-Hong Kong Connect dummy, $\text{Connect}_i^{\text{Shanghai}}$ and the periodically adjusted connected stock dummy, Connect_{it} as dependent variables, and include stock return volatility, market cap and both industry and year fixed effects.[A2] We also try other types of controls and results are consistent. As seen from Table A19, consistent with our prior, less volatile stocks and large cap stocks are more likely to be eligible stocks for foreign investors. In the second step, we include the "Inverse Mills Ratio" (IMR) from this Probit regression, as is conventional.

Propensity score matching We also conduct our analysis on a (propensity score) matched sample based on the first-stage selection model. Specifically, we start with the Probit regression in Table

[A1] Note recent critiques of the Heckman and PSM methods in Wolfolds and Siegel (2019), who argue in favor of OLS estimation.

[A2] The 180 SSE index selects stocks on size, trading values and turnover ratio. The 380 SSE index selects stocks which have listed more than five years and haven't distributed cash dividends and stock dividend in the latest five years. Detailed information can be found at: http://www.csindex.com.cn/en.

Table A19 DETERMINANTS OF CONNECTED STOCKS

	$\text{Connect}_i^{\text{Shanghai}}$ (1)	Connect_{it} (2)
Stock volatility	-1.248***	-11.753***
	(0.429)	(0.529)
Market cap	0.346***	0.553***
	(0.004)	(0.005)
Constant	-7.834***	-13.499***
	(0.088)	(0.114)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	105000	105000
Pseudo R^2	0.110	0.224

NOTE. Dependent variable is the Connect Dummy, defined as the eligible stocks in Nov. 2014, $\text{Connect}_i^{\text{Shanghai}}$, in column (1) or the periodically adjusted eligible stocks, Connect_{it}, in column (2). Probit regressions are conducted during 2003-2019 and use the stock volatility and Market cap (those are important factors according to the index construction method) as independent variables. We also control for industry and year fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

A19, then exclude (1) unconnected-firm observations whose propensity scores are less than the propensity score of the connected stocks at the first percentile of the treatment propensity score distribution and (2) all connected firms whose propensity score is greater than the propensity score of the unconnected firm at the ninety-ninth percentile of that distribution. We also calibrated at 2.5% and 5% and found that the results remain unchanged. Re-estimating the estimation model with these "nearest neighbors" on the common support region allows us to analyze the extent of this source of bias. The matching variables we chose are *Market cap, Turnover, Sales growth* and *Leverage* at the end of 2013. We also add more characteristics such as ROE, Dividend Payment to the matching criteria for robustness and the results are very similar (results available upon request). Table A20 presents evidence on the effectiveness of our propensity score matching (PSM) exercise. Panel A presents the summary statics of key variables in 2013 Q4, one year before the Connect. Without the matching, Connected firms are larger and more levered, and have a lower turnover ratio and sales growth rate. These features are consistent with the index construction method that aims to include large firms with stable performance measure. In addition, connected firms also differ from unconnected firms in other dimension such as Tobin's Q, cash flow, market to book

ratio, cash holdings, ROA, and firm age. Our procedure mimics the SSE 180 and 380 selection criteria. In Panel B, we report the results after matching. It shows that the differences in *Market cap, Turnover, Sales growth, Leverage*, and several other firm variables are mostly eliminated.

Table A21 presents the results using Heckman two-stage and PSM. Our baseline results are robust, especially for the stock price and investment sensitivity to U.S. monetary policy shocks. On the results about the immediate effects from the Connect, i.e. the stock price revaluation and investment adjustment after the Connect, Heckman two-stage estimation and PSM generate different estimates from each other. For example, on the results about investment adjustment in Panel B, the PSM generate a coefficient on Connect dummy the same as in the OLS estimation, suggesting a minimal effect of sample selection issue on the result. However, the Heckman two-stage estimation generates an estimate about twice larger than that in the OLS estimation. The disagreement of Heckman two-stage and PSM results on the sample selection issue is even larger on the results of stock price revaluation around the Connect in Panel A. In particular, PSM yields a smaller estimation for the Connect dummy than the OLS estimation. This suggests a potential sample selection bias in the OLS as the index construction aims to select stocks with stable performance. However, the Heckman two-stage procedure gives an even larger estimate than OLS.

Regression discontinuity The analysis above helps us minimize the effects of potential sample selection issues. As illustrated above, the result that is most likely to be the subject of concern is the stock price revaluation around the Connect (Panel A of Table A21). Moreover, Heckman two-stage and PSM differ in the direction of the bias. To further understand the robustness of our results on stock price revaluation, we conduct a discontinuity method that is better suited to understand the stock price results in the announcement period of the Connect. To conduct the regression discontinuity analysis, one requires a cutoff or threshold above or below which the stocks are selected into the index. In the case of the China Connect, however, there is no simple rule to select/rank stocks and thus no specific "cutoff" or threshold. Nevertheless, we make progress by utilizing another index construction method to rank Chinese stocks, i.e. the China Securities Index (CSI). Three considerations justify this approach. First, both the SSE 180 and SSE 380 (index

Table A20 EFFECTIVENESS OF PROPENSITY SCORE MATCHING

	(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)
	Connected (a)			Unconnected (b)			Difference (a)-(b)		
	Mean	Median	S.D	Mean	Median	S.D	Mean Diff		T-test
Panel A: Shanghai- Hong Kong Connect (2013Q4) before Propensity Score Matching									
Matching variables									
Market cap	23.021	22.841	1.324	21.533	21.436	1.066	1.488	***	24.53
Turnover	0.013	0.011	0.009	0.016	0.013	0.010	-0.003	***	-5.43
Sales growth	0.429	0.378	0.265	0.469	0.394	0.318	-0.039	**	-2.38
Leverage	0.234	0.230	0.156	0.194	0.160	0.171	0.040	***	4.46
Unmatching variables									
Investment	0.051	0.041	0.041	0.055	0.042	0.049	-0.003		-1.29
Tobin's Q	1.759	1.456	1.038	2.455	1.928	1.662	-0.696	***	-8.31
Cash flow	0.072	0.069	0.039	0.057	0.056	0.047	0.015	***	5.99
M/B	2.368	1.897	1.739	3.619	2.615	3.509	-1.251	***	-7.18
Cash	0.162	0.135	0.110	0.204	0.167	0.145	-0.042	***	-5.62
ROA	0.047	0.042	0.037	0.035	0.032	0.047	0.013	***	5.12
Age	16.154	16.000	4.680	14.508	14.000	5.319	1.646	***	5.88
Panel B: Shanghai- Hong Kong Connect (2013Q4) after Propensity Score Matching									
Matching variables									
Market cap	22.618	22.525	0.977	22.494	22.451	1.136	0.124		1.55
Turnover	0.014	0.012	0.009	0.015	0.012	0.011	0.000		-0.60
Sales growth	0.440	0.379	0.291	0.457	0.383	0.264	-0.018		-0.85
Leverage	0.235	0.230	0.157	0.229	0.216	0.176	0.005		0.43
Unmatching variables									
Investment	0.051	0.040	0.040	0.055	0.043	0.048	-0.004		-1.17
Tobin's Q	1.876	1.564	1.088	1.986	1.504	1.336	-0.110		-1.20
Cash flow	0.073	0.069	0.039	0.060	0.052	0.047	0.013	***	3.89
M/B	2.598	2.102	1.800	2.716	2.112	2.473	-0.118		-0.72
Cash	0.161	0.138	0.106	0.190	0.154	0.136	-0.029	***	-3.18
ROA	0.048	0.043	0.037	0.038	0.029	0.046	0.010	***	3.23
Age	16.636	16.000	4.214	15.091	15.000	5.139	1.545	***	4.35

stocks selected into the China Connect) are also constructed by the same China Securities Index company. Their selection criterion is arguably similar. Second, market capitalization (firm size) is an important factor for SSE 180 and SSE 380 indices (see Table A19) while the CSI indexes rank stocks mainly by the market capitalization. Third, SSE 180/380 only includes connected stocks while CSI indexes include both connected and unconnected stocks. This is important because one needs to rank all stocks and then explore the stock price behavior around the cutoff/threshold that separates connected and unconnected stocks.

Given these features, we make a simplifying assumption that the China Connect selects indexed stocks into the Connect according to the CSI indexes rather than SSE 180 and 380 indexes. By doing so, we are able to form a simple rule to hypothetically "rank" all Chinese stocks, including both connected and unconnected stocks. A key advantage of doing so is to have a clear cutoff/threshold so as to use the regression discontinuity analysis. The idea is similar to Chang et al. (2015) who utilize the ranking information between Russel 1000 and 2000. Specifically, we use the ranking information for CSI 300 (big cap, top 300 biggest firms in the Chinese market), CSI 500 (mid-cap, the next top 500 biggest firms in the Chinese market) and CSI 1000 (small cap, the next top 1000 biggest firms in the Chinese market) Indices at the last trading day in Oct 2014, one month before the launch of the Connect. We then decide the cutoff value as the ranking where the last SSE 180 and 380 index stock has. Clearly, the stocks above the cutoff ranking include all connected stocks by construction. We then compare the price response for stocks above and below this cutoff ranking to see whether there is some discontinuity.

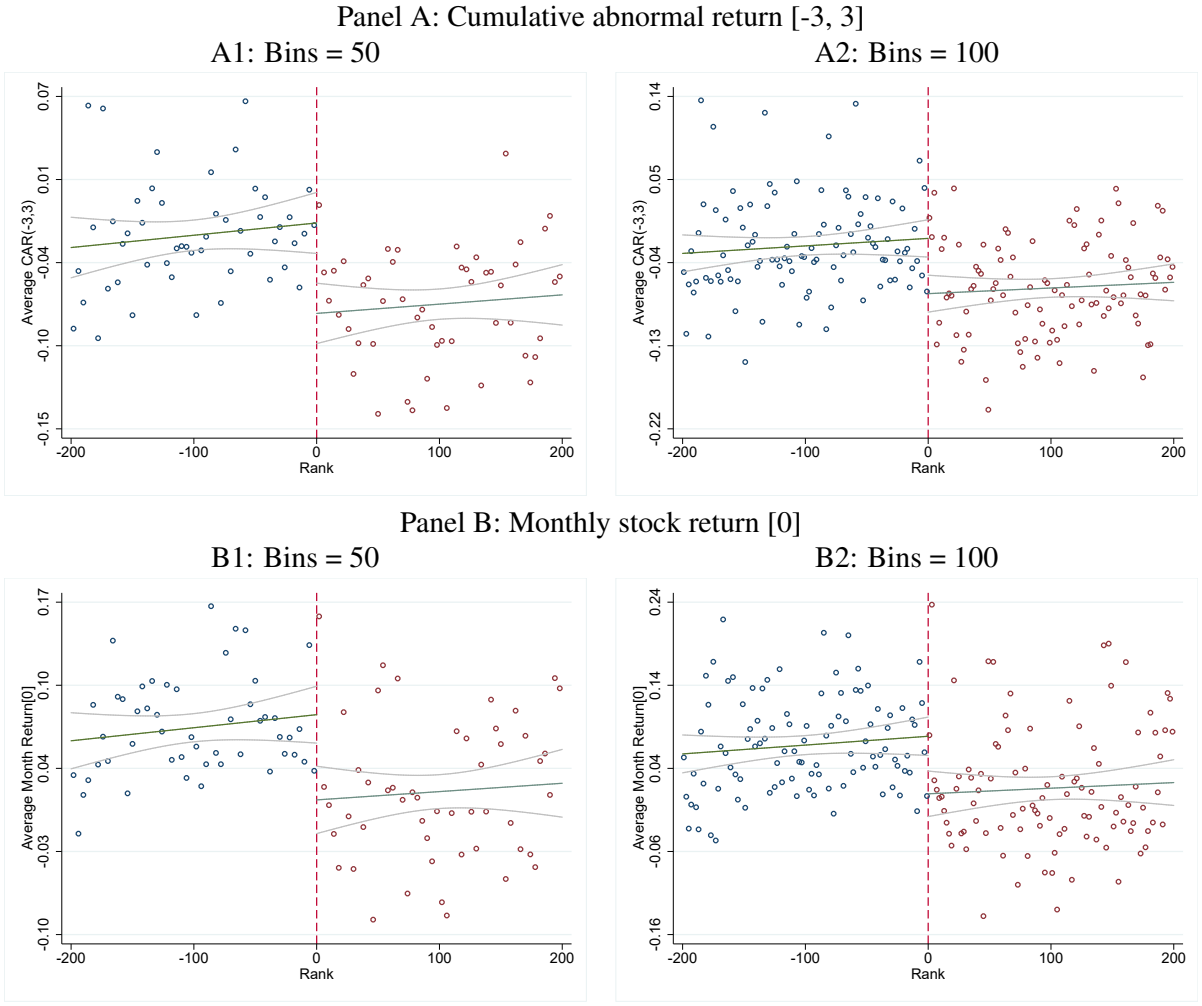
Figure A5 presents our analysis for the stock price response around the cutoff for both the cumulative abnormal return in Panel A and monthly return response in Panel B. There is visible discontinuity in asset returns for stocks that stayed in the bottom tile of the Connect program relative to those barely below the cutoff. Although this discontinuity approach is not based on an actual rule for the Connect, our analysis suggests that it does not alter our baseline conclusions. Connected stocks enjoy a price appreciation relative to unconnected stocks.

Table A21 SAMPLE SELECTION

	Heckman two-stage	Propensity score matching	OLS
Panel A: Stock price revaluation around the Connect (Nov 2014)			
	(1)	(2)	(3)
Connect	0.557***	0.042***	0.134***
	(0.026)	(0.014)	(0.010)
Constant	-0.322***	-0.271***	-0.277***
	(0.015)	(0.028)	(0.017)
Observations	1717	619	2006
Adjusted R^2	0.361	0.217	0.285
Panel B: Investment adjustment after the China Connect (2014 Q4)			
	(1)	(2)	(3)
Connect	0.009*	0.004***	0.004***
	(0.005)	(0.001)	(0.001)
Constant	-0.047**	-0.039**	-0.061***
	(0.018)	(0.016)	(0.012)
Observations	15207	5329	15686
Adjusted R^2	0.120	0.149	0.118
Panel C: Stock price sensitivity to U.S. monetary policy shock (2003-2019)			
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.023***	-0.021***	-0.028***
	(0.006)	(0.007)	(0.007)
Observations	212343	63628	305277
Adjusted R^2	0.053	0.055	0.015
Panel D: Investment sensitivity to U.S. monetary policy shock (2003-2019)			
	(1)	(2)	(3)
$\text{MPS}_t^{\text{US}} * \text{Connect}_{it}$	-0.020***	-0.014***	-0.018***
	(0.002)	(0.003)	(0.002)
MPS_t^{US}	-0.009***	-0.007***	-0.009***
	(0.001)	(0.002)	(0.001)
Connect_{it}	0.002***	0.002***	0.002***
	(0.000)	(0.001)	(0.000)
Observations	100645	30715	101908
Adjusted R^2	0.425	0.540	0.424

NOTE. Panel A replicates the regression in Table 1. Dependent variable is the two-month cumulative log stock return (adjusted for pre-liberalization mean) around the China Connect in Nov 2014. Standard errors are clustered at the firm level. Panel B replicates the regression in Table 2, i.e. 1-8Q quarters after 2014 Q4. Dependent variable is the quarterly abnormal corporate investment rate, defined as the difference between investment rate and its pre-liberalization average level. Standard errors are clustered at both industry and quarter. Panel C replicates the regression in Table 3. Dependent variable is the daily excess return on FOMC announcement days. Standard errors are clustered at both industry and FOMC meeting days. Panel D replicates the regression in Table 4. Dependent variable is quarterly investment. Standard errors are clustered at both firm and year level. All standard errors are reported in the parentheses. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Figure A5 STOCK PRICE RESPONSE AROUND THE CONNECT: A DISCONTINUITY APPROACH



NOTE. This binned scatter figure presents the regression discontinuity analysis for stock price responses around the Connect at Nov 10, 2014. Ranks for stocks are given by the CSI 300, CSI 500 and CSI 1000 indices. The cutoff value is given by the last SSE 180/380 stock's (i.e. connected stocks) ranking in the CSI indices. We then adjust the rankings (minus the cutoff ranking) in the x-axis. Connected firms are with negative rank while unconnected ones are with positive rank. The y-axis is alternatively the 7-day cumulative abnormal returns (CARs) based on a market model in panel A and monthly return [0] in panel B. Average values with the 95% c.i. are presented along with the binned scatter. We present results both with the bins of 50 and 100 respectively.