IMF Economic Review (2020) 68:643–692
https://doi.org/10.1057/s41308-020-00113-5

RESEARCH ARTICLE

The Determinants of China's International Portfolio Equity Allocations

Isha Agarwal[1] · Grace Weishi Gu[2] · Eswar Prasad[3,4,5]

Published online: 24 May 2020

Abstract

We analyze shifts in the structure of China's capital outflows over the past decade. The composition of gross outflows has shifted from accumulation of foreign exchange reserves by the central bank to non-official outflows. Unlocking the enormous pool of domestic savings could have a significant impact on global financial markets as China continues to open up its capital account and as domestic investors look abroad for returns and diversification. We analyze in detail the allocation patterns of Chinese institutional investors (IIs), which constitute the main channel for foreign portfolio investment outflows. We find that, relative to benchmarks based on market capitalization, Chinese IIs underweight developed countries and high-tech sectors, respectively, in their international portfolio allocations but overinvest in high-tech stocks in developed countries. To further examine Chinese IIs' joint decisions on destination country–sector pairs, we construct continuous measures of revealed comparative advantage and disadvantage in a sector for a country based on trade patterns. We find that, in their foreign portfolio allocations, Chinese IIs overweight sectors in which China has a comparative disadvantage. Moreover, Chinese IIs concentrate such investments in countries that have higher comparative advantage in those sectors. Diversification and information advantages related to foreign imports to China seem to influence patterns of foreign portfolio allocations, while yield-seeking and learning motives do not.

JEL Classification F2 · F3 · F4

Electronic supplementary material The online version of this article (https://doi.org/10.1057/s41308-020-00113-5) contains supplementary material, which is available to authorized users.

✉ Eswar Prasad
eswar.prasad@cornell.edu

Extended author information available on the last page of the article

1 Introduction

Our objective in this paper is to provide an overview of the status of and prospects for China's integration into international financial markets, both from a macro-perspective and from the perspective of institutional investors. We then analyze the implications for the Chinese economy itself, other emerging market economies, and the global financial system. Although it is now the second largest economy and also has the third largest fixed-income markets in the world in terms of market capitalization (after the USA and Japan), China's footprint in global finance has been relatively modest. By contrast, China's impact on international trade has been large, and its effects on the USA and world economies have been studied extensively. This paper will attempt to complement such studies by focusing on cross-border financial flows. In particular, we study the foreign portfolio allocation of Chinese institutional investors' investment and the potential impact of changes in the volume and structure of China's capital outflows on global financial markets.

We first analyze China's international investment position and show how the structure of China's capital outflows has changed over time.[1] In 2008, foreign exchange reserves held by the central bank, the People's Bank of China (PBC), accounted for two-thirds of the country's total stock of external assets of $3 trillion. In the ensuing decade, external assets rose to more than $7 trillion but foreign exchange reserves accounted for only 44% of these assets at the end of 2018. The sharp fall in this ratio is in part because the PBC used nearly $1 trillion of its stock of reserves to cushion depreciation pressures on the renminbi (RMB) that started in July 2014 and intensified during 2015–2016. However, the Chinese government has also put in place a number of measures over the last decade to free up capital outflows as part of its broader move toward capital account liberalization.

There are two major incentives for China to liberalize capital outflows, notwithstanding the risks associated with a more open capital account. First, due to the composition of its external assets, the return on China's vast stock of such assets has been low, both in absolute terms and relative to the returns that foreign investors have earned on their investments in China, which have largely been in the form of FDI and portfolio investments. Second, China has a large pool of domestic savings, with bank deposits alone amounting to about 170% of GDP. The return on these deposits has typically been low or negative in inflation-adjusted terms, and this was true even before the global financial crisis drove down interest rates worldwide. Hence, from a household welfare perspective, there would be merit to giving households access to foreign investment opportunities. We speculate about how much capital could flow out of China as Chinese investors look to foreign assets for diversification as well as higher returns.

We then describe the steps that China has taken to liberalize the capital account in a controlled manner that attempts to manage the associated risks of capital outflows for an economy with a managed exchange rate and significant financial system

[1] An important complement to our paper is the recent work of Horn et al. (2019), who analyze China's official overseas lending.

risks. Such outflow schemes include the Qualified Domestic Institutional Investor (QDII) scheme and various stock connect and mutual fund connect schemes. All of these provide a safety valve in that they are for specific amounts, which can be increased or decreased over time, and allow the government to calibrate the timing and quantum of outflows.

Next, we provide a descriptive analysis of China's foreign portfolio investments. We first draw upon the CDIS and CPIS databases for an initial exploration. However, China does not report outward direct investment data to the IMF (for the CDIS), which requires us to use information from destination countries for China's outflows. It started reporting data on outward portfolio investments (for the CPIS) only in 2015, but the coverage of these databases is in any event not ideal. Hence, we also draw upon a different dataset, the FactSet LionShares database of institutional investors, to examine the determinants of the international portfolio allocation patterns of Chinese institutional investors (IIs). While this sample may not necessarily be representative or comprehensive, the rising importance of such institutional investors as channels that enable retail investors to allocate their savings to foreign assets makes it useful for the purposes of shedding some light on portfolio choices of Chinese investors.[2]

Relative to the benchmark of a market capitalization-weighted portfolio, we find that Chinese IIs' portfolios underweight developed countries and those are farther away from China, while they overweight countries that have weak governance. Across sectors, we find that Chinese IIs underinvest in high-tech sectors in their international portfolio allocations but overinvest in high-tech stocks in developed countries. To further analyze Chinese IIs' joint decisions on destination country–sector pairs, we construct measures of revealed comparative advantage and disadvantage at the country–sector level based on trade patterns. If the share of a particular sector in a given country's exports is larger (smaller) than that sector's share in global exports, we classify that sector as one in which that country has a relative comparative advantage (disadvantage).

We find that, in their foreign portfolio allocations, Chinese IIs overweight sectors in which China has a comparative disadvantage. We then explore whether Chinese IIs investments in those sectors are concentrated in countries that have higher relative comparative advantage in those sectors. This is indeed the case. Further, in their domestic portfolio allocation, Chinese IIs overinvest in sectors in which China has a comparative advantage. We explore four broad categories of possible motives that could explain the above investment patterns of Chinese IIs: yield-seeking, diversification, information advantage, and learning. We confirm that diversification motives and information advantages related to foreign imports to China influence patterns of foreign portfolio allocations, while yield-seeking and learning motives do not play a significant role.

In particular, this paper makes an important contribution to the literature by decomposing the information content in trade into a country-specific component and

[2] We build on the work of Karolyi et al. (2019), who use this dataset to shed light on the international portfolio allocation patterns of institutional investors domiciled in major emerging markets.

a sector-specific component. We show that foreign investment decisions of Chinese funds entail a joint decision about investment in a destination country and in a sector. This joint decision is guided not only by funds' familiarity with a destination country or with a given sector but also by their knowledge about the sector–destination country pair. Hence, the information content from imports guides Chinese funds' investments abroad, while the information content from exports guides their investment decisions at home.

In the final section of the paper, we provide some speculative thoughts on China's impact on global financial markets. For many developing countries, China has become an important provider of foreign direct investment and portfolio capital. Moreover, as the capital account opening process continues, more domestic savings flow abroad, and the current account balance shifts to smaller surpluses or even deficits, there could be important repercussions for both fixed-income and equity markets worldwide.

2 China's Integration into International Finance

Table 1 shows China's official international investment position. Gross external assets have increased rapidly over the past decade and a half, from $929 billion in 2004 to $7.3 trillion in 2018, while gross external liabilities rose from $693 billion to $5.2 trillion over the same period. China's net asset position rose sharply from $236 billion in 2004 to nearly $2 trillion in 2013; it then declined in 2014–2015 before rising back up to $2.1 trillion in 2018. China is the world's third largest creditor—Japan and Germany had net asset positions of $3.1 and $2.4 trillion, respectively, at the end of 2018.

A few points are worth noting. First, although China's seemingly inexorable march toward becoming the world's largest creditor ran aground in 2014, its external assets and liabilities have continued to rise. As a result, China's de facto financial openness has increased significantly over the past decade and a half. Based on a widely used measure—the ratio of gross external assets plus gross external liabilities to nominal GDP—China's financial openness had reached 92% by 2018.

Second, the composition of external assets and liabilities has changed substantially since the beginning of this decade. From 2004 to 2010, even as China's overall external assets climbed, the share of foreign exchange reserves in total assets rose, peaking at 71.4% in 2009. Over the next 4 years, this share fell to 64.8% and has plunged since 2014, down to 43.3% in 2018. China's use of nearly a quarter of its stock of foreign exchange reserves (which peaked at almost $4 trillion in June 2014) to protect the RMB from depreciation pressures during 2014–2016 is an important reason for this drop, but the change was already in motion after 2010 when the government started opening the capital account more aggressively.

Figure 1, which shows the composition of China's gross capital outflows, reinforces these points. In this figure, we add in net errors and omissions (E&O), which represent unaccounted capital flows, to the gross outflows recorded in the balance of payments. We show negative net E&O, which reflect net outflows, as positive numbers.

Table 1 International investment position of China (in USD billions)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Net position	236	352	516	942	1390	1299	1478	1526	1675	1809	1603	1673	1950	2101	2130
Assets	929	1223	1690	2416	2957	3437	4119	4735	5213	5986	6438	6156	6507	7149	7324
Direct	53	64	91	116	186	246	317	425	532	660	883	1096	1357	1809	1899
Portfolio	92	117	265	285	253	243	257	204	241	259	263	261	367	492	498
Equity	0	0	1	20	21	55	63	86	130	153	161	162	215	298	270
Debt	92	117	264	265	231	188	194	118	111	105	101	99	152	195	228
Financial derivatives	0	0	0	0	0	0	0	0	0	0	0	36	52	59	62
Other	166	216	254	468	552	495	630	850	1053	1187	1394	1389	1680	1606	1753
Reserve assets	619	826	1081	1547	1966	2453	2914	3256	3388	3880	3899	3406	3098	3236	3168
Liabilities	693	872	1174	1474	1567	2138	2641	3209	3538	4177	4836	4483	4557	5048	5194
Direct	369	472	614	704	916	1315	1570	1907	2068	2331	2599	2696	2755	2726	2762
Portfolio	97	133	245	393	272	382	434	411	528	573	796	817	811	1099	1096
Equity	83	120	230	375	254	366	416	374	453	485	651	597	580	762	684
Debt	13	13	14	18	17	15	18	37	74	89	145	220	232	337	412
Financial derivatives	0	0	0	0	0	0	0	0	0	0	0	53	60	34	60
Other	227	268	315	378	380	442	637	891	943	1272	1440	964	984	1220	1329
Net income	−6	−18	−7	4	22	−16	−38	−85	−35	−95	−12	−69	−65	−25	−61
Inward	19	36	50	77	103	99	129	128	150	166	209	189	198	265	215
Outward	24	54	57	73	80	115	167	213	185	261	222	258	263	291	276
Net return (%)		−7.5	−2.0	0.7	2.4	−1.1	−2.9	−5.8	−2.3	−5.6	−0.7	−4.3	−3.9	−1.3	−2.9
Return on assets		3.9	4.1	4.5	4.2	3.3	3.7	3.1	3.2	3.2	3.5	2.9	3.2	4.1	3.0
Return on liabilities		7.7	6.6	6.2	5.5	7.3	7.8	8.1	5.8	7.4	5.3	5.3	5.9	6.4	5.5
Return on assets (RMB)		1.3	0.7	−2.2	−2.6	3.4	0.3	−1.5	1.9	0.3	6.1	7.6	10.5	−2.5	8.9

Data for this table are from the State Administration of Foreign Exchange. Return on assets/liabilities represents relevant income flow in a given year as a share of assets/liabilities in the previous year, expressed as a percent. Return on assets in RMB is the return on assets in USD for a given year adjusted for the change in the renminbi–dollar exchange rate from beginning to end of that year

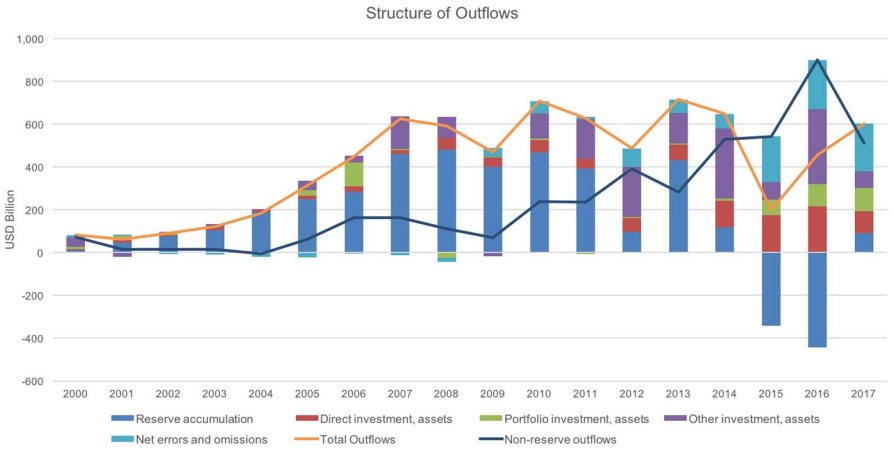

Fig. 1 Structure of gross outflows. This figure shows the composition of gross outflows of China using balance of payments data from the IMF BOP statistics database. Net errors and omissions are shown as positive values

In principle, E&O, calculated as a residual in the balance of payments, could just be a reconciling item that reflects misreporting, misinvoicing, and various types of errors. However, in China, E&O follow a very specific pattern suggesting that they are unaccounted capital flows that represent attempts to evade capital controls. During the period 2000–2008, when there were appreciation pressures on the RMB and the government was trying to stanch inflows that were intensifying those pressures (as indicated by the substantial amount of foreign exchange reserves accumulated through PBC intervention in foreign exchange markets), E&O were positive. In other words, there were more unaccounted inflows than outflows, exactly as would be expected. That changed after 2008 and, particularly since depreciation pressures on the RMB started intensifying in late 2014, net E&O turned substantially negative and have averaged about $220 billion annually over the period 2015–2017.

Figure 1 shows that, after rising rapidly from 2000 to 2006, gross outflows leveled off until 2014, before falling in 2015 and then picking back up in 2016–2017. However, much of the change since 2014 has been driven by changes in official reserve accumulation. The figure shows that non-reserve outflows, which had been modest until 2009, rose steadily and substantially through 2016. In 2017, as the government tightened up on capital controls to protect the currency, even non-reserve outflows fell.

While our analytical focus in the remaining sections of the paper is on the allocation of China's external portfolio equity investments, it is worth keeping in mind that this category accounted for only 4% of China's external assets in 2018. However, as noted above, foreign exchange reserves used to account for a substantial fraction of China's external assets before 2015 but that share has fallen sharply since then. Moreover, over the period 2009–2018, China's foreign portfolio equity assets have grown by 35% per year on average (a cumulative increase of $215 billion). With China's continued liberalization of portfolio equity flows (both outflows and

inflows), we expect this pattern to continue, rendering our paper a potentially useful benchmark for future work in this area.

3 Incentives for Outflows

This section discusses two issues relevant to understanding the motives for liberalization of capital outflows, one from an official perspective and the other from the perspective of retail investors. This discussion also has implications for potential capital outflows from China if and when China pursues further capital account liberalization.

3.1 Structure of and Returns on External Portfolio

The composition of China's external assets has had an important implication for the average returns on those assets. Reserve managers around the world typically use three criteria in making investment decisions—safety, liquidity, and yield. Given one of the key purposes of foreign exchange reserves for emerging market economies that are not issuers of a reserve currency—the ability to deploy those reserves to insulate these economies from balance of payments pressures—the first two of these criteria tend to dominate reserve managers' investment decisions.

While China does not publicly reveal the currency composition of its stock of foreign exchange reserves, it is widely believed that about 60% of China's foreign exchange reserves are held in US dollar-denominated assets, along with about one-fifth in euro-denominated assets and the remainder in other major reserve currencies.[3] Most of these reserves are presumably held in advanced economy sovereign bonds which, especially since the global financial crisis, have yielded low nominal rates of return.

The penultimate (from the bottom) panel of Table 1 shows gross and net incomes on investment taken from the BOP. One crude way of calculating the overall return on China's external assets is to take the inward investment income flow in a given year and express that as a ratio of the stock of gross external assets at the beginning of the year. Similar calculations can be done for the overall return earned by foreign investors on China's external liabilities. In principle, China's official IIP is marked to market so that it captures valuation effects, both in terms of currency and asset price movements.

The bottom panel of Table 1 shows that, over the period 2005–2018, the average annual return on China's external assets has been 3.6% in US dollar terms. (The IIP

[3] The 2018 annual report of the State Administration of Foreign Exchange, which manages China's international reserves, for the first time revealed that 58% of its foreign exchange reserves were held in dollar-denominated assets in 2014. Prasad (2019) discusses why that number might have gone back up above 60% in the succeeding years.

and investment income data are all reported in US dollars.)[4] The overall return on assets in RMB terms has been more volatile but yields an even lower annual average of 2.3% because of the renminbi's substantial appreciation relative to the dollar over this period (about 25%).

The overall return on China's external liabilities has been higher than the return on assets in every year shown in the table, often substantially higher. The average annual return was about 7% in dollar terms. The return differential has been large enough to offset the much larger stock of external assets relative to liabilities, with the result that China has experienced a negative net investment income position in every year since 2009.

Thus, while China has been a net creditor relative to the rest of the world, it has paid out more in investment income to foreign investors than it has earned on its large stock of investments abroad. This is of course a consequence of the composition of its external assets, which until 2013 were heavily weighted toward safe but low-yielding assets. By contrast, foreign capital inflows into China have been in relatively high-risk high-average return forms such as FDI and portfolio equity. These two categories together accounted for 66.4% of China's total external liabilities in 2017, with FDI alone accounting for 53.2% of the share.

The composition of external liabilities also reflects China's policies toward capital account liberalization, which have tended to favor FDI. In 2009, the year before China started opening up to capital inflows, FDI accounted for as much as 61.5% of external liabilities.[5]

One implication of the discussion above is that the Chinese government might have realized the benefits of allowing for private capital outflows that could generate higher returns, without additional risk being carried on the central bank balance sheet. Indeed, one indication of the dissatisfaction with the low rate of return on China's external assets was the setting up of a sovereign wealth fund, the China Investment Corporation (CIC), in 2007 with registered capital of $200 billion, drawn (indirectly) from the PBC's stock of foreign exchange reserves.[6] As noted on the company's website, it "was established as a vehicle to diversify China's foreign exchange holdings and seek maximum returns for its shareholder within acceptable risk tolerance." The CIC reported that, at the end of 2017, it had more than $940 billion of assets under management. Its international investment portfolio had achieved a cumulative annualized return of 5.94% (in US dollar terms) in the decade since its inception.

[4] The 2018 SAFE annual report indicates that China earned an average annual return of 3.68% (in dollar terms) on its foreign exchange reserve portfolio over the period 2005–2014.

[5] Scissors (2018) documents that the private sector share of China's outward FDI has risen from about 10% in 2010 to about 45% in 2018. He et al. (2012) make the case that China's private sector will turn its external net liability position into a balanced position, and that the official sector will reduce its net asset position significantly, relative to the country's GDP.

[6] Technically, the capital was raised through the issuance of Ministry of Finance bonds in the amount of RMB 1550 billion. One subsidiary of the CIC, Central Huijin, undertakes equity investments in key state-owned financial institutions in China. It is not clear from the CIC's annual report how much of its investments are domestic rather than foreign.

3.2 Domestic Savings

China has traditionally had a high domestic savings rate, with the household and corporate sectors accounting for the bulk of this saving. The availability of financial assets for retail investors has, however, been relatively limited in scope and depth. Stock market capitalization in China was $6.3 trillion at the end of 2018, while bond market capitalization, including both central government and corporate bonds, stood at $7.8 trillion (Figs. 2, 3).[7] However, given the extensive corporate cross-holdings of equities and bonds, it is not evident what proportion of these stocks are held by final investors, once cross-corporate holdings are netted out. Central government bonds are, to a large extent, held by commercial banks to meet regulatory guidelines.

Bank deposits account for a substantial fraction of domestic savings. At the end of 2018, total deposits in the Chinese banking system amounted to $22.4 trillion, or 171% of GDP (Figs. 2, 3). Household and corporate deposits stood at $10.5 trillion and $11.9 trillion, respectively. The returns on these deposits have been very low. The nominal return on one-year deposits, a benchmark rate set by the PBC, has averaged 2.36% over this decade. Adjusted for inflation (trailing CPI inflation), returns have been negative or close to zero over most of this period. Most bank deposits of course represent safe assets, which in part accounts for their low yield, and China is hardly an exception in terms of its low interest rate environment. Non-guaranteed wealth management products (WMPs) accounted for 14% of total deposits (and 31% of household deposits) in commercial banks at the end of 2018. These products offered an average return of about 5% during 2018, compared to the baseline one-year deposit rate of 1.5%. (The three-year deposit rate was 2.75% during 2018.)[8]

One thought experiment in terms of potential capital outflows from China can be gleaned from the numbers discussed in this section. Assuming that even 10% of bank deposits move offshore in search of higher returns or for diversification purposes, the resulting outflows could, over a few years, amount to as much as $2 trillion. One of the reasons the government is proceeding gradually on liberalizing outflows is the risk that, in the event of concerns about domestic financial stability, such outflows could take place within a short period and prove enormously disruptive to the banking system and to foreign exchange markets.

[7] Stock market capitalization is based on the valuation of all stocks listed on the Shanghai and Shenzhen exchanges. The USD equivalent is calculated using the end-December 2018 exchange rate of 1 USD to 6.876 RMB. Bonds issued by financial corporations are not included in the calculations reported here. At the end of 2018, the market value of those bonds was $4.7 trillion.

[8] There is a widely held view that deposits in the banking system, which is mostly state-owned, are implicitly fully backed by the government. The government has fully liberalized bank deposit rates to foster competition among deposit-taking institutions and, in 2017, the government introduced an explicit deposit insurance system with the aim of creating more market discipline. It is not clear these policy changes have had the intended effect—most banks still pay a deposit rate close to the PBC's benchmark rate. It is not clear whether WMPs issued by commercial banks are covered by deposit insurance. Shadow banks have also issued WMPs.

An alternative view about potential capital outflows can be gleaned from a capital markets perspective.[9] Taking a very conservative estimate that only 50% of the capitalization of stock and bond markets represents liquid investments by retail investors, one could then construct benchmarks based on which to discern the potential for capital outflows. For instance, a crude assumption that domestic investors might choose to take 10% of their equity and fixed-income investments offshore for diversification purposes would yield additional outflows of about $700 billion. (As mentioned above, total capitalization of stock and bond markets was about $14.1 trillion at the end of 2018.) Again, these outflows could be smooth and spread out over a number of years or could be much more abrupt in the event of stock market or other financial turmoil in China.

It is precisely such concerns about the potentially destabilizing effects of outflows that has led the Chinese government to open the capital account in a gradual and cautious manner, as we describe in the next section.

4 Controlled Liberalization of Outflows

China has taken a controlled and calibrated approach to liberalization of both inflows and outflows.[10] In this section, we focus on measures to liberalize outflows. Some non-reserve outflows are intermediated through the sovereign wealth fund, as noted earlier, and also through financing provided for offshore projects by the China Development Bank and the Export–Import Bank of China. Some of the projects under the Belt and Road Initiative (BRI), for instance, have been funded by such institutions.[11] The list below excludes such official institutions and is limited to channels for non-reserve outflows that occur through institutional investors or are undertaken directly by retail investors.

[9] Bayoumi and Ohnsorge (2013), using evidence from capital outflow liberalization episodes in other countries, argue that China could experience significant outflows from domestic equity and bond markets if outflow restrictions were eased. Hooley (2013) suggests that, conditional on further capital account opening, China's gross international investment position could increase from about 5 to 30% of world GDP by 2025. Kruger and Pasricha (2016) provide various scenarios for the size and composition of capital flows that would ensue if China were to open its capital account and its gross international investment position were to begin converging to the G-20 average. Cunningham et al. (2018) argue that, if China had had no restrictions on portfolio outflows, its overseas portfolio assets in 2015 could have ranged from $1.5 trillion to $3.2 trillion in 2015, relative to the actual figure of $281 billion.

[10] See Miao and Deng (2019) for an overview of China's motivations for opening its capital account and the approach it has followed.

[11] According to Scissors (2018), BRI has had a relatively minor impact on China's FDI and, thus, its overall foreign investment. He notes that the set of countries involved in the BRI accounts for less than 25% of China's FDI since the program's inauguration in 2013, amounting to a total of about $150 billion. He argues that BRI partially amounts to a rebranding of projects that were already underway before the initiative was announced. The Belt and Road Tracker of the Council on Foreign Relations estimates that, from 2014 through 2017, loans totaling over $120 billion have backed BRI-related projects ranging from highways to railroads to power plants. See https://www.cfr.org/article/belt-and-road-tracker According to EIU (2017), Chinese SOEs are likely to remain the main participants in the BRI. Private companies are more aware of the risks associated with BRI investments and lack the insurance buffers that the government can provide to SOEs.

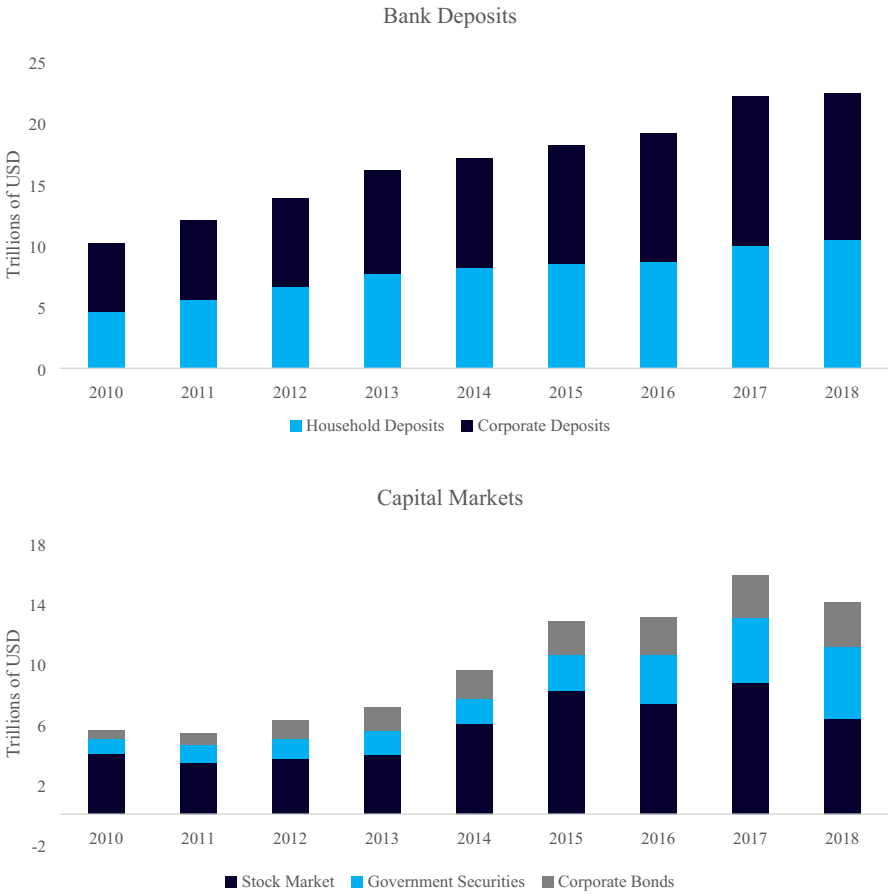

Fig. 2 Indicators of domestic financial wealth in China. This figure shows the evolution of bank deposits (top panel) and capitalization of stock and bond markets (bottom panel) in China, using data from CEIC and PBC. USD equivalent calculated using end of year exchange rate obtained from FRED. Stock market capitalization is based on Shanghai and Shenzhen stock exchanges. Bonds issued by financial corporations not included in this figure

4.1 Outflows

The Qualified Domestic Institutional Investor (QDII) scheme was launched in 2006. The scheme allows Chinese domestic financial institutions—commercial banks, securities companies, fund management companies, and insurance companies—to invest in offshore financial products such as securities and bonds. As of February 2019, a total quota of $103.2 billion had been granted to 152 financial institutions.

In 2013, the government proposed the Qualified Domestic Individual Investor (QDII2) Scheme, which would have permitted individual retail investors with at least RMB 1 million ($160,000) in assets to invest in offshore financial products

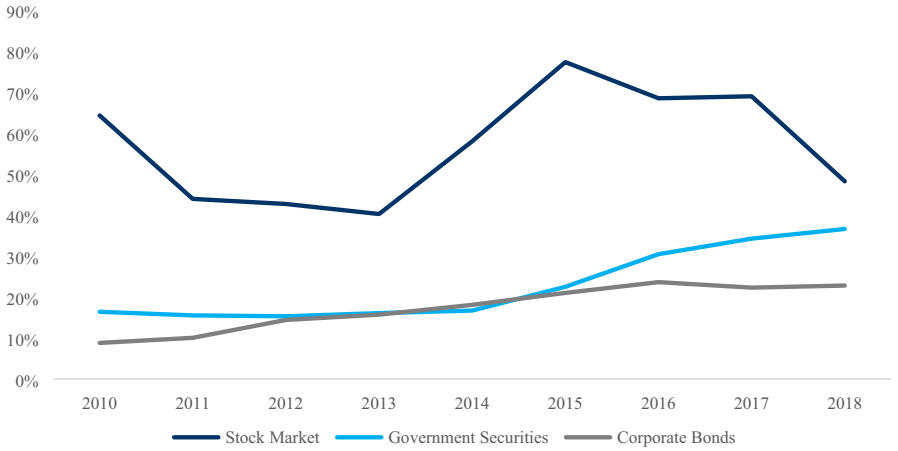

Fig. 3 Financial market wealth relative to GDP (in %). Data for GDP and capitalization of stock and bond markets are from the PBC and CEIC. Stock market capitalization is based on Shanghai and Shenzhen stock exchanges. Bonds issued by financial corporations not included in this figure

such as securities and bonds. However, with capital outflow pressures starting to build by mid-2014, this scheme never got off the ground.

4.2 Two-Way Flows

The government has tended to favor channels for capital flows in both directions. For instance, free trade zones (FTZs) are seen as a way of liberalizing the capital account but limiting such liberalization to specific geographic areas. The Shanghai FTZ was launched in September 2013, followed by the ones in Guangdong, Tianjin, and Fujian in April 2015. During 2016–2018, eight new FTZs were approved in Liaoning, Henan, Zhejiang, Hubei, Chongqing, Sichuan, Shanxi, and Hainan. The FTZs use a "negative list" approach to regulate foreign investment—there are few restrictions on foreign investment in industries not on the list. Cross-border capital transactions and establishment of financial institutions within the zones have been liberalized. In March 2019, the National People's Congress approved the new Foreign Investment Law, which will come into effect in 2020. The new law will replace three foreign capital laws: the Law on Sino-Foreign Equity Joint Ventures, the Law on Sino-Foreign Contractual Joint Ventures, and the Law on Foreign Capital Enterprises.

Some schemes carefully control both the source and destination of capital inflows and outflows, along with short-term and overall flows. The Shanghai–Hong Kong Stock Connect, launched in 2014, allows mainland Chinese investors to purchase shares of select Hong Kong and Chinese companies listed in Hong Kong, and lets foreigners buy Chinese A shares listed in Shanghai. When this scheme was launched, the authorities imposed an annual aggregate quota of RMB 300 billion ($47 billion) on HK-to-Shanghai (northbound) transactions and set the daily quota at RMB 13 billion ($2 billion). The Shanghai-to-HK (southbound) annual quota was set at RMB

250 billion ($39 billion), with a daily quota of RMB 10.5 billion ($1.6 billion). The annual quotas were scrapped in August 2016 when the Shenzhen–Hong Kong Stock Connect was launched, but daily quotas remained in place. In May 2018, the daily quotas for northbound and southbound transactions were raised to RMB 52 billion and RMB 42 billion, respectively.

To allow institutional investors to play a more prominent role in capital flows, the Mutual Fund Connect was launched in July 2015.[12] This scheme allows Mainland and Hong Kong funds to be distributed in each other's markets through a streamlined vetting process. The initial aggregate investment quota was set at RMB 300 billion ($47 billion) each for inward and outward fund flows.[13]

The Shenzhen–Hong Kong Stock Connect was launched in 2016. This scheme seeks to replicate the main elements of the Shanghai–Hong Kong Stock Connect. It allows mainland Chinese investors to purchase shares of select Hong Kong and Chinese companies listed in Hong Kong and lets foreigners buy Chinese A shares listed in Shenzhen. There is no aggregate trading quota, and the daily trading quotas were set identical to those of the Shanghai–Hong Kong Stock Connect: RMB 13 billion and RMB 10.5 billion for Northbound and Southbound transactions, respectively. In May 2018, the daily quotas for northbound and southbound transactions were raised to RMB 52 billion and RMB 42 billion, respectively.

The Shanghai–London Stock Connect was proposed in 2015 and launched in June 2019. In principle, it provides eligible companies listed in either of the two countries a platform to issue depository receipts, and to list and trade them on the other's market. In January 2019, the government proposed a Shanghai–Germany Stock Connect, which would be a replication of the Shanghai–London Stock Connect.

4.3 Capital Flow Restrictions

The government has often undertaken capital account tightening through administrative and other restrictions rather than directly changing capital controls. One specific example is related to changes in requirements for individuals to take money offshore. Since 2007, annual foreign exchange purchases and sales quota for individuals have been set at US$ 50,000 to meet their needs for holding and using foreign exchange. As the government faced rising outflow and currency depreciation pressures, administrative controls were tightened. While the annual quota for individual foreign exchange purchases was kept at the same level as before, individuals who wanted to buy foreign currencies at banks were required to fill out an application

[12] There is little literature studying the motives of Chinese IIs' foreign portfolio investments but there are a few studies examining the determinants and motives of their domestic equity investments. For instance, Chan et al. (2014) find that Chinese mutual funds can effectively monitor domestic corporate decisions and enhance Chinese firms' financial reporting quality, especially for privately owned enterprises. They conclude that Chinese mutual funds' investments appear to be return driven for the investors, rather than being driven by government strategic objectives.

[13] A related initiative, the ETF Connect, which would give Chinese investors exposure to overseas assets through exchange-traded funds (ETF) listed in Hong Kong, was proposed in 2016 but remains stalled for "technical reasons."

form specifying the purpose of the purchase, among other information. Starting in January 2018, it was stipulated that Chinese individuals traveling internationally were allowed to withdraw a maximum of RMB 100,000 ($15,000) a year from their domestic bank accounts.[14] Additional reviews were instituted on capital outflows for large mergers and acquisitions and large real estate purchases abroad (over $1 billion), but we are not aware of any new restrictions on portfolio equity outflows.[15] In fact, China's external portfolio equity assets nearly doubled from $162 billion in 2015 to $298 billion in 2017, before declining slightly to $270 billion in 2018. (Some of these changes could of course reflect mark-to-market valuation effects.)

A consistent theme across the capital outflow liberalization measures discussed in this section is that, rather than throwing open the doors to outflows, the government has proceeded in a cautious manner. It has stuck to its time-tested learning-by-doing approach, wherein a reform or liberalization is initially introduced in a limited way and then scaled up and fine-tuned based on experience with its operation. This has allowed the government to manage the risks associated with rapid capital account opening. However, it has also limited both the direct and collateral benefits of capital account opening. The possibility of outflow restrictions being re-imposed at times of exchange market pressure has resulted in relatively modest inflows into China's equity and bond markets. In addition, foreign non-official investors have remained wary of the durability of the Chinese government's commitment to allowing unfettered repatriation of capital invested in and earnings from financial and other assets in China.

5 Allocations of Foreign Portfolios

In the preceding sections, we have shown that the structure of China's capital outflows is shifting from official reserve accumulation to non-reserve (private) capital outflows.[16] These flows, while still constrained by capital account restrictions, are rising and have the potential to become substantial in the coming years. Capital market development could also provide opportunities for retail investors to diversify their portfolios beyond domestic investments. Institutional investors are likely to play a key role in intermediating the flows of domestic investors into external investments. In this section, we undertake a detailed examination of the external portfolio allocation patterns of Chinese institutional investors. We first examine patterns of country allocations and then examine sectoral allocations. This could provide some

[14] The relevant press releases can be found on the SAFE website: http://m.safe.gov.cn/safe/2007/0105/5320.html; https://www.safe.gov.cn/fujian/2017/0417/431.html; http://m.safe.gov.cn/safe/2017/1230/8129.html.

[15] See "Background Information: Overview of China's Major Foreign Exchange Policies Since 2015," *Reuters*, March 21, 2017.

[16] Hatzvi et al. (2015) note that capital account liberalization will change the composition of China's external assets and highlight the potential financial stability risks for China. Other authors such as Hooley (2013) and Kruger and Pasricha (2016) also discuss these risks.

insights into the eventual global allocation of China's capital outflows across countries and sectors.

5.1 Data

We use FactSet Ownership data (LionShares v4) to analyze the determinants of foreign equity holdings of institutional investors domiciled in China. This dataset provides information on domestic and international equity holdings of institutional investors and mutual funds domiciled in developed countries as well as emerging markets. LionShares has two packages—the unadjusted 13F holdings and the unadjusted fund holdings. The unadjusted 13F holdings package reports aggregate holdings of institutional investors such as investment banks and insurance companies while the unadjusted fund holdings package reports equity holdings of fund investors such as mutual funds and pension funds.[17] Both packages contain data on active as well as terminated securities and funds/institutions to obviate survivorship bias. (The "adjusted" packages include only active securities, which is why we use the unadjusted ones.) We combine data from both packages for our analysis.[18]

We merge FactSet data with Worldscope data using ISIN/CUSIP/SEDOL of securities to get information on the country in which a firm issuing a given security is domiciled.[19] We classify a given holding position of a fund/institution as "foreign" if the country of domicile of the issuer firm is not China. Thus, we exclude holdings of Chinese firms' ADRs trading in international stock markets. Using this approach yields 42 destination countries in our sample, classified into 25 developed economies and 17 emerging markets based on the IMF World Economic Outlook 2018 country classification. See Table A1 in the online appendix for the full list of countries in our sample and their classification.

Even though FactSet data on Chinese institutional investors goes back to 2000, our sample starts from 2008 as the coverage of the dataset is limited before 2008. Table A2 in the online appendix shows the number of institutional investors each year over the 2000–2017 period, the top 5 institutional investors based on their foreign equity holdings, and the total value of their assets under management every year.[20] The coverage of institutional investors increases over time, from only one institutional investor in 2000 to over 100 institutional investors in 2017. Over the period 2008–2017, the average number of institutional investors per year is 71,

[17] Institutional holdings of US-traded securities are sourced from 13F filings with the Securities and Exchange Commission. For the USA, data on mutual funds' holdings come from regulatory filings (N-Q, N-CSR, and form 485BPOS), while for non-US funds, data on funds' holding positions are from a combination of regulatory filings, funds' annual reports, the regulatory authority or mutual funds association in the country.

[18] We use the terms *fund* and *institutional investor* interchangeably in this paper.

[19] For securities traded in the USA, we use CUSIP as the primary identifier to merge FactSet with Worldscope data. For international securities, we use ISIN or SEDOL as main identifiers.

[20] The assets under management include domestic as well as foreign investments.

which is about the same as the average number of institutional investors (73) in emerging markets documented in Karolyi et al. (2019).[21]

According to the China Securities Regulatory Commission (CSRC), there were 109 fund management companies in China in March 2017 with a total capital of about 3.4 trillion RMB.[22] We were able to match 95 fund management companies from the FactSet data with those on the CSRC list. These 95 fund management companies constitute 93.5% of the total capital of fund management companies in 2017. For our final sample, we retain only those institutional investors that have positive foreign investment in at least 1 year in the sample. This leaves us with 42 institutional investors over the entire sample period. They are mainly affiliated with either banks, securities companies, or trust companies. Of these 42, 27 are Sino-foreign joint venture fund management companies but the majority stake is owned by Chinese funds.[23] Table A3 in the online appendix lists these 42 funds, their Sino-foreign joint venture status, and their capital in 2017. It is worth noting that in our sample foreign shareholders tend not to hold the majority share, which is typically held by state (directly/indirectly) controlled enterprises.

The total foreign investment of Chinese institutional investors in 2017 in the FactSet database is about 8% of foreign portfolio equity investment of China reported in the CPIS database.[24] According to Karolyi et al. (2019), the median ratio of emerging market institutional investors' foreign investment to CPIS foreign investment is 0.11. Hence, the coverage of Chinese institutional investors' foreign investment is not too far from the median ratio for emerging market institutions in the FactSet data. While this does not necessarily mean that the coverage of the FactSet data is comprehensive, at least it indicates that the dataset's coverage of institutional investors in China is similar to that of its coverage in other emerging market economies.

To understand the role played by destination country characteristics in the foreign portfolio allocation decisions of Chinese funds, we collected data on the most frequently used variables in the literature on the determinants of foreign portfolio allocations. The four broad sets of destination country variables that we use are as follows: gravity variables, market depth measures, proxies for yield-seeking and diversification, and governance measures. Gravity variables include those such as distance between China and the destination country, whether China and the destination country share a common language, and whether they share a common border. Market depth variables include GDP per capita, number of listed firms per

[21] This number also includes those institutions for which we have information only on their generic positions (those that do not disclose the securities in which they invest).

[22] These numbers have been rising slowly but steadily. As of February 2019, there were 123 fund management companies registered with the CSRC with a total capital of 3.6 trillion RMB.

[23] Sino-foreign status is determined based on CSRC data for 2017. Hang Seng Qianhai Fund Management Co. Ltd acquired the Sino-fund joint venture status in 2019 so it is not classified as Sino-fund joint venture in our sample. The Chinese Securities Regulatory Commission requires foreign ownership in the Sino-foreign joint fund venture to be capped at 49%. This limit was relaxed to 51% in April 2018. See http://www.csrc.gov.cn/pub/zjhpublic/zjh/201804/t20180428_337509.htm for more details.

[24] This number includes funds' generic investment positions.

capita, and market turnover. Variables that measure yield-seeking and diversification include the difference in returns between Chinese and destination country stock markets in the previous year, the correlation of Chinese and destination country stock market returns in the previous year, and the volatility of Chinese stock returns relative to that of the destination country in the previous year. Measures of governance include the rule of law, government effectiveness, and regulatory burden.

In addition to these four categories, we also explore the role of information endowment variables, which have been the subject of a recent literature. Van Nieuwerburgh and Veldkamp (2009) propose a theoretical model of information immobility in which investors face a choice in deciding about which assets to acquire information when there are multiple risky assets in the investment opportunity set. Rather than relying on information asymmetries, which should in principle decline over time, their theoretical model implies that investors would prefer to invest in foreign countries where they had an initial information endowment. We use the trade share of a destination country in China's total trade as our proxy of information endowment, based on Karolyi et al. (2019).[25]

We also study determinants of funds' portfolio allocations at the destination country–sector level. We assign firms to sectors using the Fama–French 49 industry classification based on four-digit SIC codes of firms from the Worldscope database. The main variables for the sector–destination country-level analysis are as follows: sector returns, correlation in sector returns, revealed comparative advantage (RCA) and revealed comparative disadvantage (RCD) of each destination country–sector pair, share of a sector in China's inward foreign direct investment, share of a sector in China's outward foreign direct investment, and research and development intensity for each sector in China.

Using the universe of firms in Worldscope database for the period 2008–2017, we compute returns at the sector–destination country level as the market cap weighted average of returns of all firms in a given sector in a given destination country for each year in the sample. Correlation in sector returns is computed between each sector in China and destination country in the sample using monthly data on stock prices from the Worldscope database. The sectoral RCA (RCD) for each country is measured as a sector's export (import) share in a country's total exports (imports) divided by that sector's export (import) share in total world exports (imports). Data from RCA and RCD are from the WTO data portal and COMTRADE. See Table A4 in the online appendix for variable definitions and data sources for all variables used in the analysis.

5.2 Foreign Portfolio Allocations of Chinese Funds Across Countries

We begin with a descriptive analysis of China's outward investments using CPIS and CDIS data. As noted earlier, China does not report outward direct investment data to the IMF (for the CDIS) and started reporting data on outward portfolio

[25] Trade flows have also been shown to be an important factor influencing international equity investment in general (Lane and Milesi-Ferretti 2008).

investments (for the CPIS) only in 2015. However, since most countries that receive direct investment or portfolio investment from China do report data to the IMF for these two surveys, it is possible to construct measures of China's outflows.

Figure 4 shows the share of each destination country in China's outward equity investment in 2017 based on the CPIS sample. In terms of raw portfolio allocations, we see that a bulk of the equity investment from China is going to developed countries, with Hong Kong and the USA together accounting for about 70% of total equity investment. Countries like Japan, Switzerland, Luxembourg, and the UK are also important destinations.

The set of major destination countries for China's outward direct investment (ODI) appears to be slightly different (Fig. 5). We see some developing countries such as Kazakhstan, Pakistan, and Zambia that are in the top 20 list for ODI but are not major destination countries for Chinese equity investment. China's ODI also appears to be slightly less diversified across countries than its equity investment. More than three-quarters of the outward direct investment seems to be concentrated in Hong Kong in the beginning of the sample.[26] However, Hong Kong's share has fallen significantly over the last decade, from more than 80% in 2009 to less than 60% in 2017. Hence, China's ODI has become more diversified over time. The share of other advanced countries has been rising (Fig. 6). The USA was the third most important destination for Chinese ODI in 2017 after Hong Kong and Singapore.[27]

After a preliminary exploration of China's international portfolio allocation across countries using the CPIS and CDIS databases, we now turn to the FactSet database, which allows us to examine foreign equity investments of individual institutional investors. Figure 7 shows the portfolio allocations of Chinese institutional investors (IIs) for the top 20 destination countries over the entire sample period. Hong Kong and the USA together account for more than 50% of total foreign investment of Chinese IIs. The share of the USA in total foreign investment has increased from just over 10% in 2008 to more than 30% in 2017 (see Figure B1 in the online appendix).[28] In 2017, advanced economies accounted for 96% of China's total foreign equity investment.

[26] 2009 is the earliest year for which we have outward direct investment data for China in the CDIS database. Hong Kong was a key source of *inward* FDI for China due to "round-tripping" of funds in order to take advantage of the lower corporate income tax rate for foreign-financed versus domestically-financed firms (16% versus 33%). In 2008, this differential was removed and the corporate income tax rate was unified at 25%. We are not aware of such tax or other incentives that could account for the earlier concentration of China's *outward* direct investment.

[27] Casanova et al. (2015) contend that the reported allocations of Chinese outward direct investment flows in 2013 may have been distorted by flows to "stop-over destinations" such as Hong Kong and offshore financial centers. They conclude that, after correcting for these distortions, China's actual outward direct investment may be more diversified than suggested by official data, with developed markets such as Europe and North America featuring more prominently.

[28] Similar to what we see in the CPIS database, Hong Kong and the USA together account for about 70% of total portfolio allocation of Chinese IIs in 2017 and almost all the top 20 destination countries in 2017 based on the FactSet data also appear in the top 20 list based on the CPIS database. This gives us some reassurance about the coverage of the FactSet data. Even though the coverage may be limited in terms of absolute amounts, at least the patterns of investment seem to be consistent across the two databases.

To better understand the factors driving foreign portfolio allocations of institutional investors at the country level, we use the following regression specification based on Karolyi et al. (2019):

$$I_{i,j,t} = \alpha + \gamma_1 C^1_{j,t} + \cdots + \gamma_n C^n_{j,t} + \epsilon_{i,j,t}$$

The dependent variable is excess investment of institutional investor i in country j at time t. Excess investment of an institutional investor i in country j is defined as the share of total portfolio allocation of institutional investor i accounted for by country j relative to the share of country j in world stock market capitalization (where "world" excludes China). This is a conventional benchmark but we do not necessarily intend it to be interpreted as the optimal portfolio, especially for a country that is just gradually liberalizing outflows. The excess investment variable simply measures to what extent investors overinvest or underinvest in a given destination country relative to the market capitalization-weighted portfolio.

We use a large set of country-level variables $(C^1_{j,t}, \ldots, C^n_{j,t})$ that have been previously employed in the literature to study cross-border trade and financial flows. As noted above, these variables can be classified into the following categories: gravity, market depth, yield/diversification, governance, and information endowments.

Figure 8 shows the average excess investment of Chinese IIs by destination country over the entire sample period. Only the top 10 overweighted and top 10 underweighted countries are displayed. We first calculate the excess investment in each destination country and each year and then take a simple average across years. Hong Kong is the most overweighted country with an average excess investment of about 20%, while the USA is the most underweighted country with an average underinvestment of about 20%. However, the underinvestment in the USA has come down from more than 20% in the beginning of the sample to around 10% in 2017.[29] With the exception of South Africa, 9 out of the 10 most underweighted countries are developed countries. This descriptive analysis shows that Chinese investors are underinvesting in developed countries. Four of the countries in which Chinese IIs are overweight relative to domestic market capitalization are India, Indonesia, Thailand, and Russia.

Next, we formally explore the country-level factors that can potentially explain these patterns of portfolio allocations. Table 2 shows summary statistics for all variables used in the country-level analysis. The average (unweighted) excess investment for the sample is around 7% but there is wide variation in excess investment across destination countries, with a standard deviation of about 24%. Our baseline regression framework tests the importance of various country-level factors that have been discussed in the literature as potential drivers of cross-border investment.

Table 3 shows the results for the baseline specification, which we first estimate at the fund–country level. We work with an unbalanced sample in the baseline

[29] Figure B2 in the online appendix shows the top ten underweighted and overweighted countries in 2008 and 2017. The top ten underweighted countries include one emerging market country in 2008 (South Africa) and two in 2017 (India and South Africa).

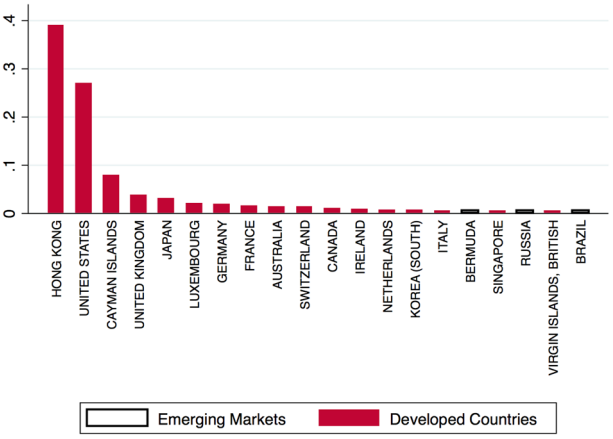

Fig. 4 Outward equity investment of China: 2017 (CPIS Sample). This figure plots the share of each destination country in China's foreign equity investment in 2017 based on CPIS data. Only the top 20 destination countries are displayed

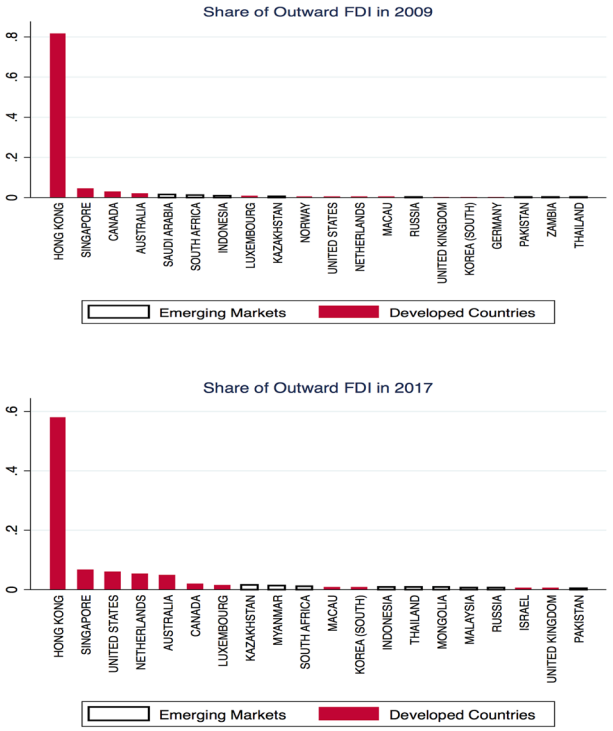

Fig. 5 Outward direct investment of China. The top and bottom panels of this figure show the share of each of the top 20 destination countries in outward direct investment of China in 2009 and 2017, respectively. Data on outward direct investment are from the CDIS dataset. Outward direct investment data for China are available 2009 onward in the CDIS dataset

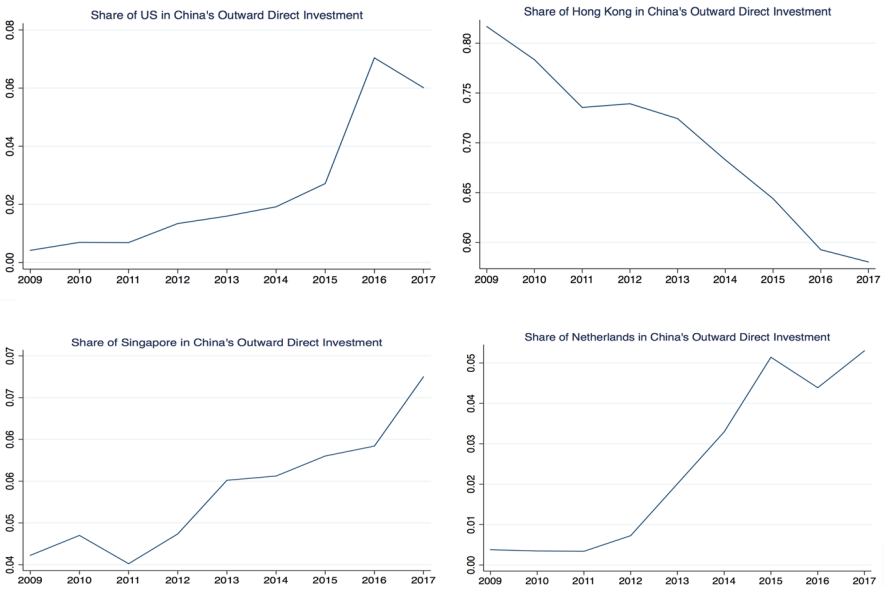

Fig. 6 Outward direct investment in major destination countries over time. This figure shows the evolution of shares of major destination countries in China's outward direct investment using CDIS database

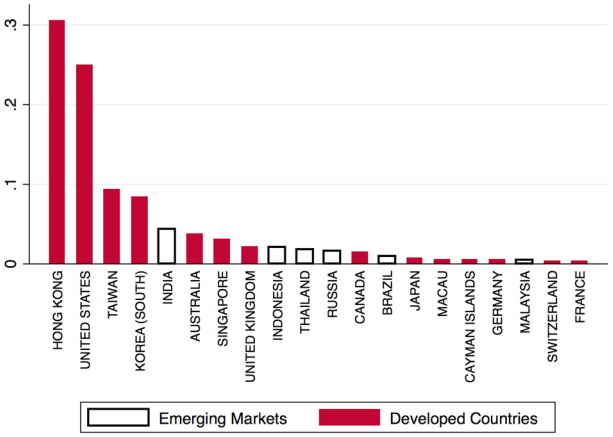

Fig. 7 Portfolio allocations of Chinese institutional investors by country. This figure shows the share of each of top 20 destination countries in Chinese institutional investors' international equity investment over the period 2008–2017 using the FactSet database. We aggregate Chinese funds' equity holdings of firms domiciled in each destination country over the entire sample period and divide the sum by the aggregate holdings of Chinese funds' in all destination countries over the sample period

specification—some fund–country pairs may be observed only once in the sample. Columns (1) through (6) in Table 3 show different model specifications. Column (1) includes gravity variables, Column (2) controls for market depth, Column (3)

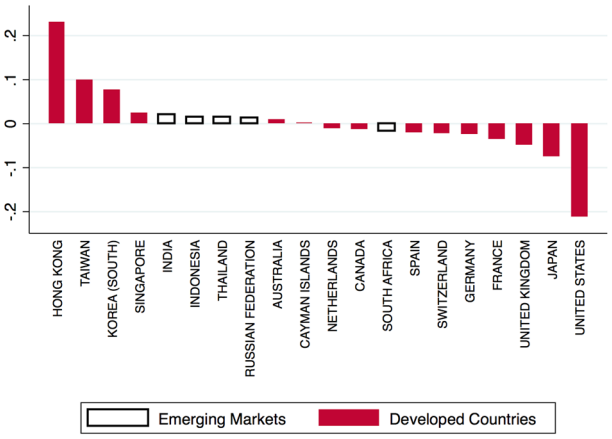

Fig. 8 Excess investment of Chinese institutional investors by destination country. This figure shows the average excess investment of Chinese institutional investors by destination country over the period 2008–2017 using the FactSet database. We first compute the excess investment in a given country in a given year as the share of total investment in a country in total international portfolio allocation of an institutional investor relative to the share of that country in the world stock market capitalization. Then, we compute a simple average of excess investment for each country across all years in the sample. The figure displays excess investment for only the top 10 overweighted and underweighted destination countries

has variables that reflect yield-seeking and diversification, Column (4) controls for country-level governance measures, and Column (5) controls for information endowments. Column (6) includes all controls listed in columns (1) through (5). The number of observations differs across columns depending upon data availability for control variables at the country level. All specifications include year fixed effects. Standard errors are clustered at the destination country–year level since variation in the control variables is at the country–year level.

Column (1) shows that gravity variables, which measure the extent of similarity between China and destination country, matter for institutional investors' international portfolio allocation decisions. In particular, we find that excess investment in a given country is positively correlated with the destination country sharing a common language with China. Countries that share a common language with China receive approximately 13% points of higher excess investment as compared to countries that do not share a common language with China. Sharing a border with China is also positively associated with excess investment in a destination country, while geographic distance is negatively associated with excess investment. These results are consistent with the results of previous studies on the role of gravity variables in explaining cross-border investment patterns of institutional investors (see, e.g., Portes and Rey 2005; Ferreira and Matos 2008; Karolyi et al. 2019).

Column (2) shows results for market size/depth variables. We find that level of development, measured by GDP per capita, is negatively associated with excess investment. This supports the discussion from our descriptive analysis that developed countries are underweighted by Chinese investors. Conditional on the level of development, market depth does seem to have a positive association with portfolio

Table 2 Summary statistics

Variable	Mean	SD	25th	Median	75th	N
Country-level analysis						
Excess investment	0.073	0.243	− 0.014	0.001	0.039	1188
Excess Investment, EM benchmark	0.082	0.249	− 0.002	0.007	0.053	1418
Trade	0.038	0.042	0.009	0.019	0.07	1375
Common language	0.286	0.452	0	0	1	1418
Distance	8.573	0.827	7.713	9.007	9.095	1418
Common border	0.194	0.396	0	0	0	1418
GDP per capita	10.555	0.634	10.456	10.704	10.899	1345
Market turnover	3.926	1.186	3.537	4.117	4.548	1052
Number of firms	3.184	1.495	2.079	3.326	4.457	899
Difference in returns	− 0.003	0.025	− 0.022	0.002	0.015	1189
Correlation in returns	0.282	0.327	0.063	0.327	0.538	1189
Return volatility ratio	0.551	0.218	0.386	0.501	0.667	1189
Rule of law	1.219	0.776	0.856	1.596	1.767	1349
Govt effectiveness	1.328	0.677	1.174	1.533	1.789	1349
Regulatory burden	1.322	0.733	0.989	1.628	1.817	1349
Country–sector-level analysis						
Excess investment (%)	15.086	27.279	− 0.119	2.908	17.149	5982
Excess investment, EM benchmark (%)	14.141	27.376	− 0.047	2.947	17.058	5555
Size, home	25.853	1.26	25.076	25.943	26.789	5955
ROE, home	11.506	9.032	8.884	12.091	15.393	5955
PB ratio, home	3.464	2.539	1.881	3.02	4.079	5955
Leverage, home	21.115	7.987	15.832	20.512	25.338	5955
Returns, home	24.581	47.068	− 4.056	14.793	45.153	5943
Size, foreign	25.255	1.69	24.037	25.382	26.588	5989
ROE, foreign	14.919	26.688	8.167	13.452	20.128	5986
PB ratio, foreign	3.063	8.474	1.244	2.094	3.62	5980
Leverage, foreign	24.951	13.46	15.915	23.924	31.98	5989
Returns, foreign	49.402	423.451	2.455	16.946	35.528	5986
Correlation in returns	0.309	0.339	0.081	0.346	0.587	5940
RCD for China	1.023	0.998	0.367	0.787	1.227	5078
RCA for China	0.974	1.091	0.275	0.391	1.406	4918

This table shows the summary statistics for the variables used in the analysis. The sample period is 2008–2017. See Table A4 for data sources and definitions of all variables used in the analysis

allocations. Excess investment is higher for destination countries with a larger number of listed firms. The extent of stock market turnover in destination countries does not affect excess investment.

Column (3) shows results for returns-based measures. If Chinese investors are seeking higher returns, then we would expect excess investment to be positively associated with difference in stock market returns of China and destination country. However, we find that differences in returns do not explain excess investment of

Table 3 Determinants of excess investment across destination countries

Controls	(1) Gravity	(2) Market depth	(3) Returns	(4) Governance	(5) Trade	(6) All
Common language	0.126***					0.018
	(0.026)					(0.025)
Distance	−0.046***					−0.039***
	(0.011)					(0.011)
Common border	0.208***					0.185***
	(0.041)					(0.029)
GDP per capita		−0.076***				−0.017
		(0.019)				(0.022)
Number of firms		0.085***				0.015**
		(0.019)				(0.006)
Market turnover		−0.003				−0.005
		(0.005)				(0.004)
Difference in returns			−1.590			0.807
			(1.270)			(0.643)
Correlation in returns			0.315***			0.054
			(0.108)			(0.037)
Return volatility ratio			0.246**			0.012
			(0.095)			(0.045)
Rule of law				−0.281***		−0.072**
				(0.078)		(0.035)
Govt effectiveness				−0.034		−0.129***
				(0.053)		(0.040)
Regulatory burden				0.385***		0.230***
				(0.092)		(0.034)
Trade					1.387**	0.399*
					(0.665)	(0.220)
Observations	1180	792	1092	1130	1183	789
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.352	0.174	0.121	0.169	0.0584	0.376

This table reports results for the regression in Sect. 5.2. The dependent variable is excess investment of fund *i* to a destination country *j* at time *t*. Excess investment is defined as the share of a given destination country in total portfolio allocation of a fund in a given year relative to a benchmark, where the benchmark is defined as the share of a destination country in world market capitalization in a given year. We exclude China to calculate world market capitalization. Column (1) includes gravity variables as controls. These variables measure the extent of similarity between China and the destination country. In particular, we include presence of common language, common border, and the geographic distance between China and destination country as our gravity variables. Column (2) includes variables that measure market size of the destination country. These variables are GDP per capita, number of listed firms in the destination country, and stock market turnover in the destination country. Column (3) controls for variables that measure differences in stock market returns between China and destination country. In particular, we control for past year differences in market returns between China and destination country, past year correlation in returns of China and destination country, and past year ratio of stock market return volatility of destination country and China. Column (4) includes destination country governance measures such as the rule of law, government effectiveness, and regulatory burden. Column (5) includes our

Table 3 (continued)

information endowment variable *Trade* is defined as the average share of a destination country's trade in China's total trade over the last 5 years. Column (6) includes all variables in column (1) through (5). All columns include year fixed effects. Standard errors are clustered at the destination country–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country-level control variables are from the Dynamic Gravity Dataset: 1948–2016, Tamara Gurevich and Peter Herman (2018), the World Development Indicators database, the World Economic Outlook database, the CEIC database, and the Direction of Trade Statistics database. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

Chinese institutional investors. Somewhat surprisingly, we find that past year correlation in stock market returns between China and destination country is positively correlated with excess investment. This suggests that the diversification motive may not explain foreign portfolio allocations of Chinese institutional investors, at least at the level of country allocations. Interestingly, we find that the stock market volatility of destination country relative to that of China is positively correlated with excess investment. In other words, riskiness of foreign equity markets does not appear to be a deterrent to Chinese IIs' portfolio allocation decisions.

Column (4) shows results for governance measures. We find that rule of law, a measure of the quality of contract enforcement, is negatively correlated with excess investment. Countries with higher regulatory burden are also overweighted by Chinese investors. These results appear contradictory to those in the prior literature, which has generally found that investors prefer countries with better governance. However, most of that literature has focused on the portfolio allocations of developed country investors. Dollar's (2016) analysis of China's outward direct investment patterns yields results similar to ours. In particular, Dollar (2016) suggests that China seems to be indifferent to the governance environment to the extent that it is making major investments in countries with weak governance environments where other investors fear to tread.[30]

Column (5) shows results using the information endowment variable. We find that the past trade share of a destination country in China's total trade is positively associated with excess investment in that country.[31] The magnitude of the coefficient is quite large. A 1% point increase in the trade share of a destination country is associated with a 1.4% point increase in excess investment in that country.[32]

[30] Ramaswamy et al. (2012) analyze the outward direct investment location decisions of Chinese firms and find that while local government-controlled firms are attracted to natural resource-rich countries which may have weak political systems, private Chinese firms are more risk averse and more likely to provide value added services rather than to exploit the resource itself.

[31] As an additional robustness test, we used the lagged share of a source country in China's total inward portfolio investment stocks in a given year as a proxy for information endowments. The results, reported in appendix Table B10, show that the coefficient on this variable is positive and statistically significant, notwithstanding the restrictions on inward portfolio investment over much of the sample period.

[32] Trade credits are not counted as part of external equity investments. Hence, the estimated impact of trade flows does not reflect their impact on trade financing, but, rather, the impact of information transmitted through trade-related activities.

Column (6) shows results for a composite specification that includes all variables used in the specifications reported in columns (1) through (5). Most of the variables retain their sign but some lose statistical significance in the joint estimation. Geographic distance and contiguous border still remain statistically significant. Level of development loses its statistical significance but market size, as measured by the number of listed firms, remains positive and statistically significant. Governance measures continue to play in important role. Government effectiveness and rule of law are negatively associated with excess investment while regulatory burden is positively associated with excess investment. The coefficient on the information endowment variable becomes smaller but remains statistically significant.

To summarize, the fund–country-level analysis suggests that Chinese institutional investors underinvest in developed countries and those that are farther away from China, while overinvesting in countries that have weak governance, that have a high level of market depth and that have had trade relationships with China in the past.[33] In the next section, we dig deeper into these patterns by exploring sector-level holdings of institutional investors.

In the online appendix, we conduct a battery of robustness tests to examine if our results are contingent on the choice of sample period, variable definitions, and/or regression specifications. We start by excluding the 2008–2010 period from the sample. This is useful for two reasons: (1) it allows us to look at the period when China opened up its capital account more substantially (i.e., after 2010); and (2) it mitigates concerns that our results may be influenced by the period during and right after the global financial crisis.

Table B1 shows the results. We estimate the same regression described in Sect. 5.2 but start the sample in 2011. Comparing columns (1) and (2) across Table 3 and Table B1, we see that there is almost no change in the significance, sign, and magnitude of gravity variables and market depth variables. For returns-based variables, the coefficient on difference in returns becomes negative and significant, suggesting that Chinese investors are overweighting countries whose stock markets generated lower returns than Chinese stock market in the previous year. The coefficients on the governance measures and information endowment variable (column (4) and (5)) also remain unchanged. In the joint estimation (column (6)), the coefficient on the information endowment proxy—strength of past trade relationship—becomes larger and more statistically significant.

[33] While the focus of our paper is on portfolio equity allocations, it is of interest to examine in parallel the determinants of the patterns of China's overall direct investment allocations. FactSet does not have information on direct investment flows, so we explore the determinants of outward direct investment from China using the IMF's Coordinated Direct Investment Survey (CDIS) database, which has data on bilateral FDI stocks. Country-level results are reported in Table B7. The dependent variable is excess outward direct investment from China, defined as the share of a destination country in China's outward direct investment relative to the share of the destination country in world direct investment. The country-level analysis of FDI allocations shows results similar to those for portfolio equity allocations for variables such as contiguity, the rule of law, regulatory burden, and trade. There are some differences—for instance, unlike in the case of equity allocations, FDI allocations are influenced by common language, GDP per capita, and financial market variables. We leave a more careful exploration for future research.

Next, we examine whether our results for different explanatory variables (models) differ because of differences in the number of observations for each group of control variables. To check this, we construct a restricted sample that contains only those observations that have non-missing values for all control variables as well as the dependent variable. Results based on this common sample for all specifications are shown in Table B2. Our main results remain robust to using a restricted sample.

While in the previous text we focus on excess investment of Chinese institutional investors, which is constructed relative to a market capitalization-based benchmark, it is also of interest to explore what drives the raw portfolio allocations of Chinese investors. Table B3 shows results for country-level regressions with the raw share of a destination country in total foreign investment of China, with no adjustment for size of the destination country or depth of its equity markets, as the dependent variable. A few interesting differences emerge.

Among the set of gravity variables, distance becomes insignificant, while common language and border continue to be positive and significant. For market depth variables, level of development, proxied by GDP per capita, becomes insignificant but market size variables (number of firms and market turnover) remain significant and positive. This suggests that market size matters for both raw investment and excess investment but level of development is negatively related to excess investment and does not matter for raw portfolio allocations. For returns-based measures, we see that correlation in stock returns between China and destination country continues to be positively associated with raw portfolio allocations. Unlike the result for excess investment, we find that volatility of stock market returns of the destination country does not matter for raw portfolio allocations. Governance measures affect excess investment and raw investment similarly—countries with weak governance measures receive more investment. The information endowment variable, measured as the trade share of a destination country in China's total trade, also affects raw portfolio allocations positively.

The results from the joint estimation with a full set of controls (column 6) are also consistent with our results for excess investment with two main differences—the coefficient on the distance variable becomes positive and significant and that on market turnover becomes negative and significant. We tested whether the positive coefficient on distance could be driven by China's investment in the USA since the USA is the second most important destination for Chinese IIs. If we exclude the USA from the sample, the coefficient on distance becomes insignificant, suggesting that this is indeed the case. The coefficient on turnover also becomes insignificant once we exclude the USA and the coefficient on home country–destination country correlation in stock market returns becomes positive and significant.

Next, we test whether our results are sensitive to the choice of the benchmark against which we compute excess investment. Instead of using the market capitalization-weighted world portfolio, we construct a benchmark based on investment by emerging markets in a given destination country. In particular, we define excess investment by a Chinese institutional investor i in country j as the share of total portfolio allocation of institutional investor i accounted for by country j relative to the share of country j in total investment from emerging market institutional investors(excluding those in China). This measure captures the extent to which

Chinese institutional investors are overinvesting in a given country relative to institutional investors from other emerging markets. We use FactSet data on institutional investment from other emerging markets to compute this alternative benchmark ratio.[34]

Results based on this alternative benchmark index are shown in Table B4. We find that our main results remain robust to the use of this alternative benchmark ratio, although there are a few minor differences. Gravity variables have the same effect on excess investment irrespective of which benchmark we use. Comparing column (2) across Table 3 and Table B4, we see that market turnover is an important factor for excess investment relative to other emerging markets while it does not matter for excess investment relative to the world portfolio. Governance measures are more significant for excess investment relative to the world portfolio as compared to the emerging market benchmark. Information endowments, proxied by bilateral trade, are more significant for investment relative to the emerging markets benchmark.

One residual question is whether our analysis accurately reflects global portfolio allocations of Chinese IIs if a significant portion of these allocations are intermediated by subsidiaries of Chinese funds in Hong Kong or other offshore centers. We do not have the data to answer this question directly but, as an indirect approach, replicate our baseline country-level results using FactSet data on foreign portfolio investments of funds domiciled in Hong Kong. If many mainland Chinese funds are investing abroad through Hong Kong and if there is little difference between direct investment and intermediated investment, then the country-level analysis using data on Hong Kong funds should produce results similar to our country-level analysis for Chinese funds. Table B6 replicates Table 3 using data on foreign portfolio investment of funds domiciled in Hong Kong. There are some important differences in results. For instance, governance variables do not matter for excess investment of funds domiciled in Hong Kong (column 6), but they play an important role for Chinese funds. These results are difficult to interpret. They might simply reflect differential allocation patterns of institutional investors in Hong Kong versus those in China rather than significant differences between the pattern of investments undertaken directly from China compared to Chinese II investments intermediated through Hong Kong. We cannot tell these apart given the lack of data on how much of Chinese II outflows to Hong Kong are then redirected to other equity markets.

5.3 Foreign Portfolio Allocations of Chinese Funds Across Sectors

We turn next to an analysis of the sectoral allocation patterns of Chinese funds' foreign investments. Figure 9 shows portfolio allocations of Chinese institutional investors across nine sectors, where each sector is defined on the basis of two-digit SIC

[34] We include institutional investors from the following emerging markets (based on the MSCI index) to compute the benchmark ratio: Argentina, Brazil, Chile, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, and the United Arab Emirates.

codes.[35] We merge the FactSet dataset with the Worldscope database to get information on the sector of the firms in which Chinese institutional investors invest. The top and bottom panels of Fig. 9 show the sectoral distributions of Chinese equity investments in developed countries and emerging markets, respectively. The white bars correspond to the share of a given sector in total foreign equity holdings, while the red bars correspond to the share of a given sector in total market capitalization. If we assume that portfolio allocation across sectors should follow the distribution of market capitalization across sectors, then we find certain sectors are underweighted while others are overweighted. Further, the extent of underinvestment or overinvestment differs across emerging markets and developed countries. For instance, the manufacturing sector is in general underweighted but the extent of underinvestment is higher in emerging markets as compared to developed countries. Similarly, mining is overweighted in emerging markets but it is underweighted in developed countries.

To formally examine sectoral investment patterns, we compute a measure of excess investment for each fund i in a given sector j and country k as follows:

$$I_{ijk} = \frac{\text{investment}_{ijk}}{\sum_j \text{investment}_{ijk}} - \frac{\text{mcap}_{jk}}{\sum_j \text{mcap}_{jk}}$$

We estimate the following specification:

$$I_{ijkt} = \alpha + \gamma_1 D_k + \gamma_2 \text{tech}_j + \gamma_3 D_k * \text{tech}_j + \phi C_{kt} + \epsilon_{ijkt}$$

where the dependent variable is excess investment of each fund at the sector–country level as defined above. D_k is a dummy variable that equals one for developed countries, tech_j is a dummy variable that equals one for high-technology stocks.[36] $\boldsymbol{C}_{kt}$ is a vector of country-level control variables. The main independent variable is the interaction between D_k and tech_j, which measures if there is a systematic difference in investment in high-tech stocks across developed countries versus emerging markets. The unit of observation for this regression is fund–sector–country–year, where sector is defined at the three-digit SIC code level.

Table 4 shows the results. Column (1) does not include country-level controls. Column (2) includes country-level controls such as geographic distance, past year correlation in returns between China and destination country, past year ratio of stock market volatility of returns in China and destination country, and a measure of the rule of law in the destination country. Column (3) shows the results only for the subset of investments in listed firms in the manufacturing sector. Columns (4) through (6) replicate the first three columns but with fund fixed effects included. All columns include year fixed effects. Standard errors are clustered at the SIC three-digit sector–year level.

[35] Firms with two-digit SIC codes in the range 01–09 are in the agriculture sector, range 10–14 corresponds to the mining sector, range 15–19 is for the construction sector, 20–39 corresponds to the manufacturing sector, 40–49 is for transport and communications sector, 50–59 is for trade and retail services, 60–67 is for finance and real estate, 70–89 is for services, and 90–99 is for public administration services.

[36] Stocks are classified as high-tech or low-tech based on Kwon (2002).

Column (1) suggests that Chinese funds underinvest in developed countries. This is consistent with our country-level results from the previous section. However, it appears that Chinese funds overinvest in high-tech sectors in developed countries. After we include country-level controls in column (2), the coefficient on the high-tech sector becomes negative and significant. Hence, column (2) suggests that Chinese funds underinvest in developed countries as well as high-tech sectors, but high-tech sectors in developed countries are overweighted. The extent of overweighting of high-tech sectors in developed countries becomes stronger if we focus on the manufacturing sector (column (3)). Even if we include fund fixed effects, our main results do not change—the coefficient on the interaction term between the developed country dummy and high-tech sector remains positive and significant, although slightly smaller.

5.4 Foreign Portfolio Allocations of Chinese Funds Across Sectors and Countries

In the previous sections, we studied the patterns of foreign portfolio allocations of Chinese institutional investors by country and by sector, respectively, treating these as separate decisions. In this section, we examine the allocation patterns across sectors and countries jointly. We also extend the discrete high-tech/low-tech sectoral classification and developed/emerging country classification from the last section to a continuous measure of the competitiveness of a country in a sector, using the concept of revealed comparative advantage (RCA) and revealed comparative disadvantage (RCD). This way, we can take into account the destination country–sector competitiveness that are attributed to not only technology advantages but also other factors and study its impact on foreign portfolio allocations.

The sectoral RCA for each country is measured as a given sector's export share in a country's total exports divided by that sector's export share in total world exports. This variable captures the "excess" exports in a given sector by a country relative to world exports accounted for by that sector and reflects the extent to which a country is better at producing goods/services in a given sector relative to other countries (Balassa 1965). The idea is that if country i is better than country j at producing good x, then country i's exports of good x to the rest of the world will exceed country j's exports of good x to the rest of the world. The construction of this variable parallels our measurement of excess investment. To capture comparative disadvantage in trade, we construct RCD based on measures of sectoral import shares for a given country relative to corresponding sectoral shares in global imports. Thus, RCD reflects the extent to which a given country is worse than other countries at producing goods/services in a given sector.

The top panel of Figure B3 shows the top 10 sectors with highest RCA in China and the bottom panel shows the top 10 sectors with highest RCA for the USA in 2017. China has a high RCA value for sectors such as apparel, textiles, and computer hardware while the USA has a high RCA value for sectors that produce aircraft, computer software, measuring and control equipment, and medical equipment. China has a high RCD value for sectors such as mining, computer software, measuring and control equipment, and chemicals. These are the sectors in which China

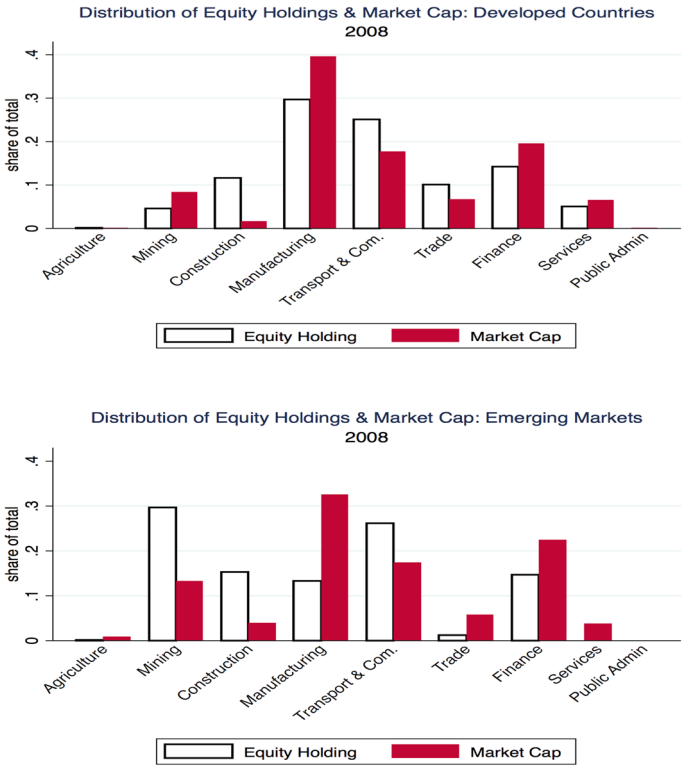

Fig. 9 Sectoral Portfolio allocation of Chinese IIs in 2008. This figure shows the sectoral distribution of Chinese institutional investors' equity holdings and market cap in 2008 using the FactSet database and the Worldscope database, respectively. The top panel is for developed countries and the bottom panel is for emerging markets. Each sector is defined on the basis of two-digit SIC codes: SIC codes in the range 01–09 correspond to the agriculture sector, range 10–14 corresponds to the mining sector, range 15–19 is for the construction sector, 20–39 corresponds to the manufacturing sector, 40–49 is for transport and communications sector, 50–59 is for trade and retail services, 60–67 is for finance and real estate, 70–89 is for services, and 90–99 is for public administration services

imports more goods/services relative to the rest of the world, suggesting that China is worse than other countries at producing goods/services in these sectors. Similarly, the US imports more goods/services relative to the rest of the world in sectors such as defense, automobiles, computer hardware, and apparel, to name a few.[37]

We start with the following specification, based on Schumacher (2017), to investigate the relationship between RCD of a sector in China and excess foreign investment in that sector

$$I_{ijkt} = \alpha + \gamma_1 \mathrm{RCD}_{jt} + \boldsymbol{\gamma_2 home_{jt}} + \boldsymbol{\gamma_3 foreign_{jkt}} + \epsilon_{ijkt}$$

[37] See Figure B4 for the top 10 RCD sectors for China and the USA in 2017.

Table 4 Foreign excess investment in high-tech versus low-tech sectors

	(1)	(2)	(3)	(4)	(5)	(6)
Sector	All	All	Manufacturing	All	All	Manufacturing
Developed	−0.240***	−0.305***	−0.294***	−0.245***	−0.232***	−0.242***
	(0.017)	(0.055)	(0.088)	(0.019)	(0.054)	(0.085)
High-tech	−0.059	−0.101**	−0.235***	−0.022	−0.083**	−0.184***
	(0.046)	(0.044)	(0.045)	(0.043)	(0.041)	(0.041)
Developed × high-tech	0.106**	0.143***	0.246***	0.077*	0.134***	0.203***
	(0.052)	(0.051)	(0.049)	(0.046)	(0.046)	(0.042)
Distance		−0.004	−0.006		0.030***	0.022
		(0.006)	(0.008)		(0.010)	(0.019)
Correlation in returns		−0.449***	−0.425***		−0.422***	−0.412***
		(0.052)	(0.052)		(0.050)	(0.051)
Return volatility ratio		0.210***	0.231***		0.107**	0.144**
		(0.052)	(0.062)		(0.054)	(0.064)
Rule of law		0.102***	0.118***		0.053*	0.092**
		(0.030)	(0.043)		(0.030)	(0.044)
Observations	9874	8996	3557	9862	8984	3538
Adjusted R-squared	0.0484	0.0998	0.0827	0.207	0.269	0.267
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	No	No	Yes	Yes	Yes
Country controls	No	Yes	Yes	No	Yes	Yes

This table reports results for the regression in Sect. 5.3. The dependent variable is excess investment of fund *i* in a sector j in destination country *k* at time *t*. Excess investment is defined as the share of a given sector in total portfolio allocation of a fund in a given year and a given country relative to a benchmark, where the benchmark is defined as the share of the sector in total market cap of the destination country in a given year. Column (1) does not include country-level controls. Column (2) includes country-level controls, such as geographic distance, past year correlation in returns between China and destination country, past year ratio of stock market volatility of returns in China and destination country, and the rule of law measure in the destination country. Column (3) shows the results only for the subset of manufacturing sector. Column (4) through (6) replicate results in columns (1) to (3) but add fund fixed effects. All columns include year fixed effects. Standard errors are clustered at the SIC three-digit sector–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country-level control variables are from the Dynamic Gravity Dataset: 1948–2016, Tamara Gurevich and Peter Herman, (2018), the CEIC database, and the World Development Indicators database. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

where I_{ijkt} is excess investment of a fund i in sector j in country k at time t, as described in Sect. 5.3.[38] RCD is the main independent variable that captures the extent to which China is worse than the rest of the world at producing good in sector j.[39] ***home*** is a set of control variables capturing sector-level characteristics in China including the size of the sector, its leverage ratio, price to book ratio, return on equity, and returns of the sector. Each variable at the sector level is created using a market capitalization-weighted average of that variable for individual firms in that sector. Similarly, ***foreign*** is a set of control variables that captures sector-level characteristics for each destination country in the sample. In addition to the corresponding sector-level variables for China such as size and leverage, ***foreign*** also includes a variable capturing correlations in sectoral returns between each destination country and China.

Table 5 shows the results. Column (1) includes the main independent variable and home sector controls. We find that RCD of a sector in China is positively associated with excess investment in that sector abroad. This suggests that Chinese investors overinvest in those sectors abroad for which China imports more goods/services relative to the rest of the World. This result could be driven by characteristics of a sector in destination countries that are correlated with RCD of a sector in China. For instance, it is plausible that sectors in which China imports a lot are also relatively large sectors in destination countries and excess foreign investment in high RCD sectors in China is driven by the size of the foreign sector. Hence, to control for all sector-level characteristics in the destination countries, we include foreign sector controls in column (2), including correlations in sector returns between China and each destination country. Column (3) includes both home and foreign sector controls. Columns (2) and (3) suggest that even after controlling for size, returns, and other sector-level characteristics at home and abroad, the coefficient on RCD remains positive and statistically significant. In terms of economic magnitude, a one standard deviation in the RCD measure is associated with about a 4.5% point increase in excess investment, which is roughly one-third of average sector excess investment.

Column (4) replaces the time-varying RCD variable in column (3) with a time invariant variable based on RCD values at the beginning of the sample. The coefficient on this time invariant variable is almost 80% of the coefficient on the time-varying RCD variable in column 3. This suggests that a large proportion of the positive relationship between RCD and excess foreign investment can be attributed to the cross-sectional difference in RCD across sectors rather than evolution of RCD over time.

[38] Table B5 in the online appendix estimates this equation using an alternative benchmark ratio based on investment from emerging markets. Similar to its definition in the country-level analysis, the alternative excess investment ratio at the sector-level is defined as the share of a given sector in total portfolio allocation of a Chinese fund in a given destination country relative to the share of that sector in total portfolio investment of all emerging markets in that country. We find that our results remain robust to this alternative benchmark ratio.

[39] When including both China's sectoral RCD and RCA variables in the same regression (see Table B11 in the online appendix), the coefficient on RCD remains significantly positive and the coefficient on RCA is significantly negative as in Table 8. Here, we investigate the relation with RCD variable first, and RCA in a latter section.

Columns (5) and (6) use alternative measures to identify high RCD sectors in China. Column (5) includes a dummy variable that takes a value 1 if a sector is among the 5 highest RCD sectors in China. The independent variable in column (6) is a dummy variable that takes a value 1 for sectors with RCD values higher than the 90th percentile of RCD every year. Results suggest that sectors in the top 5 RCD list receive an additional 9% point excess investment and those in the top decile of RCD distribution in China receive close to 10% point excess foreign investment.

So far, we have found robust evidence that Chinese IIs invest more abroad in sectors in which China is at a comparative disadvantage relative to other countries. But conditioning on their propensity to invest more in those sectors, in which countries do they invest more? Our hypothesis is that Chinese IIs invest relatively more in high RCD sectors in countries that are better than China at producing goods/services in those sectors. To formally test this proposition, we compare the revealed comparative advantage of each destination country and China for each sector. We classify countries that have a higher value of RCA than China for a given sector as the ones that are better at producing goods/services in that sector relative to China. Using this approach, for each sector, we construct a dummy variable that takes a value 1 for countries that have a higher RCA value than China. We allow for this set of countries to differ across years but note that there is strong persistence in the relative ranking of countries. For instance, the USA is better than China at producing measuring and control equipment for all years in the sample.

To test whether the positive coefficient on high RCD sectors in China is driven by countries that are better than China at producing goods/services in those sectors, we estimate the following regression:

$$I_{ijkt} = \alpha + \gamma_1 \mathbb{I}_{\text{hRCA}} RCD_{jt} + \gamma_2 \mathbb{I}_{\text{lRCA}} RCD_{jt} + \boldsymbol{\gamma_3 home_{jt}} + \boldsymbol{\gamma_4 foreign_{jkt}} + \epsilon_{ijkt}$$

where $\mathbb{I}_{\text{hRCA}}$ is an indicator variable for countries that are better than (or as good as) China at producing goods/services in sector j. $\mathbb{I}_{\text{lRCA}}$ is an indicator variable for countries that are worse than China at producing goods/services in sector j.

Column (7) of Table 5 shows the results for this specification. The coefficient on $\mathbb{I}_{\text{hRCA}}\text{RCD}_{jt}$ is positive and significant, implying that Chinese IIs disproportionately invest abroad in high RCD sectors and in countries that are better than China at producing goods/services in those sectors.

One interesting question is whether there are systematic differences between the global equity investment allocations of state-owned versus private Chinese funds. It is possible that state versus private ownership could affect strategies and goals underlying investment decisions of Chinese IIs. We run two sets of regressions to examine this issue. First, we divide our sample into state-owned funds and non-state-owned funds. The former includes funds operated by centrally administered state-owned enterprises and local state-owned enterprises, and the latter includes those operated by privately owned enterprises, public companies, and Sino-foreign joint ventures. In Table B8, we replicate the baseline analysis at the country–sector level and include a dummy for state-owned funds. We continue to find a significant role of RCD sectors in investment allocations. The extent of excess investment is lower for state-owned funds as

Table 5 Foreign excess investment: the role of revealed comparative disadvantage

Controls	(1) Home	(2) Foreign	(3) All	(4) All	(5) All	(6) All	(7) All
RCD, China	4.135***	3.539***	4.466***				
	(0.897)	(0.821)	(0.871)				
RCD 2008, China				3.459***			
				(0.824)			
Top 5 RCD sectors					9.065***		
					(2.433)		
Top decile RCD sectors						9.772***	
						(2.592)	
$\mathbb{I}_{IRCA}$×RCD, China							2.911
							(2.566)
$\mathbb{I}_{hRCA}$×RCD, China							5.240***
							(1.495)
Size, home	2.102***		3.739***	3.296***	3.753***	3.650***	3.370***
	(0.586)		(0.637)	(0.629)	(0.650)	(0.646)	(0.633)
ROE, home	−0.099		−0.098	−0.106	−0.131**	−0.127*	−0.088
	(0.070)		(0.067)	(0.068)	(0.067)	(0.067)	(0.068)
PB ratio, home	−0.118		−0.064	0.098	−0.097	−0.032	−0.384
	(0.279)		(0.260)	(0.242)	(0.282)	(0.277)	(0.269)
Leverage, home	−0.088		−0.132	−0.065	−0.065	−0.041	−0.211***
	(0.086)		(0.082)	(0.085)	(0.085)	(0.084)	(0.080)
Returns, home	−0.003		−0.015	−0.006	−0.006	−0.008	−0.013
	(0.019)		(0.017)	(0.017)	(0.017)	(0.018)	(0.017)
Size, foreign		−2.042***	−3.066***	−2.950***	−2.994***	−2.980***	−2.904***
		(0.402)	(0.445)	(0.446)	(0.453)	(0.450)	(0.451)
ROE, foreign		−0.056**	−0.016	−0.020	−0.025	−0.024	−0.025
		(0.024)	(0.020)	(0.022)	(0.021)	(0.021)	(0.020)
PB ratio, foreign		0.101	0.099	0.090	0.113*	0.111*	0.054
		(0.067)	(0.060)	(0.060)	(0.058)	(0.059)	(0.059)
Leverage, foreign		−0.080	−0.012	0.001	−0.015	−0.008	−0.019
		(0.057)	(0.054)	(0.052)	(0.054)	(0.053)	(0.055)
Returns, foreign		−0.001*	−0.001***	−0.001***	−0.002***	−0.002***	−0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Correlation in returns		−3.565*	−5.468***	−5.577***	−4.990**	−5.164**	−7.673***
		(2.028)	(2.032)	(2.004)	(2.051)	(2.066)	(2.163)
Observations	5022	5009	5009	5009	5009	5009	4771
Fund and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0663	0.0807	0.101	0.0949	0.0904	0.0918	0.103

Table 5 (continued)

This table shows results for country–sector-level regressions from Sect. 5.4. The dependent variable is excess investment of fund *i* in a sector *j* in destination country *k* at time *t*. "RCD, China" is the revealed comparative advantage of a sector in China as defined in Sect. 5.4. "RCD, 2008" is the beginning of sample value of a sector's RCD. "Top 5 RCD Sectors" is a dummy variable that takes a value 1 if a sector is among the 5 highest RCD sectors in China. "Top Decile RCD Sectors" is a dummy variable that takes a value 1 for sectors with RCD values higher than the 90th percentile of RCD every year. $\mathbb{I}_{hRCA}$ and $\mathbb{I}_{lRCA}$ are indicator variables to identify countries that are better than and worse than China at producing goods for each sector in the sample.All columns include year and fund fixed effects. Standard errors are clustered at the country–sector–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope database. Data on RCD are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

compared to non-state-owned funds. However, there is no statistically significant difference between the sector–country investment allocations of state-owned funds and those of non-state-owned funds.

Second, we classify funds in our sample by their foreign ownership involvement, that is, we split the sample into Sino-foreign joint ventures and domestically owned funds. The latter includes centrally administered state-owned enterprises, local state-owned enterprises, privately owned enterprises, and public companies. In Table B9, we show that Sino-foreign joint venture funds invest relatively more in high RCD sectors. However, the concentration of investment in high RCA countries is not significantly different across Sino-foreign joint venture funds and domestically owned funds. These results imply that, relative do domestic funds, foreign-influenced funds allocate a larger share of their external portfolios to sectors in which China imports a lot. However, the two types of funds do not differ significantly in their country allocations. One caveat is that, since the ownership variable is a coarse one and always somewhat difficult to interpret in the Chinese context, these results should be interpreted with caution.

6 Possible Motives for Foreign Portfolio Allocations

Two facts emerged from the analysis in the previous section. First, Chinese investors overinvest in sectors abroad in which China has a revealed comparative disadvantage. Second, higher excess investment in high RCD sectors is driven by countries that are better than China at producing goods/services in that sector. These investment patterns can be consistent with a number of investment motives. In this section, we discuss four broad categories of possible motives that could explain the investment patterns of Chinese IIs: search for returns, diversification, information advantage, and learning.

6.1 Do High RCD Sectors Earn Higher Returns Abroad?

One possible reason for excess foreign investment in high RCD sectors is the prospect of earning higher returns in those sectors abroad. Also, conditional on foreign investment in a given sector, returns in a sector may be higher for countries that are better than China at producing goods/services in those sectors. If this is true, then search for returns could explain the investment patterns observed in the previous section.

To test for this motive, we regress risk-adjusted returns for each sector on the RCD of sectors in China using the following specification:

$$\text{Risk\_Adjusted\_Returns}_{ijt} = \alpha + \beta \text{RCD}_{it} + \boldsymbol{\gamma foreign}_{\boldsymbol{ijt}} + \epsilon_{ijt}$$

The dependent variable is risk-adjusted returns of sector i in destination country j at time t. The main independent variable is *RCD* of sector i in China at time t. ***foreign*** is a set of control variables that captures sector-specific characteristics, excluding returns, for each destination country as described in Sect. 5.4. The sample contains all destination countries in the FactSet database and all sectors. Table 6 presents the results.

We use two measures of risk-adjusted returns. In columns (1) through (3) in Table 6, risk-adjusted returns for each sector (in each destination country) are computed as returns of a sector divided by the sample standard deviation of returns for that sector. In columns (4) through (6), we use a weighted average of risk-adjusted returns. We first compute risk-adjusted returns for each firm in a sector as returns of the firm divided by the price volatility of the firm.[40] Then, a risk-adjusted measure for each sector is computed as the market capitalization-weighted average of risk-adjusted returns of all firms in that sector.

Columns (1) and (4) of Table 6 show the relationship between RCD of a sector in China and risk-adjusted returns of that sector abroad. We find that there is no significant relationship between RCD of a sector and its risk-adjusted returns. In columns (2) and (5), we add other foreign sector controls that could affect sector returns. We find that the insignificant relationship between RCD of a sector in China and returns in those sectors abroad remains unchanged even after controlling for other factors that could affect returns.

Finally, we check whether for high RCD sectors in China, foreign returns are positively associated with RCA of destination countries. In other words, conditional on investing in a given sector, are foreign returns higher for countries that are better at producing goods/services in those sectors, especially for high RCD sectors in China. To check this, in columns (3) and (6), we include sector fixed effects, so that for each sector, we focus on the variation across countries. We find that risk-adjusted returns are uncorrelated with RCA of destination countries using the weighted average

[40] Price volatility in the Worldscope database is a measure of a stock's average annual price movement to a high and low from a mean price for each year. For example, a stock's price volatility of 20% indicates that the stock's annual high and low price has shown a historical variation of +20% to −20% from its annual average price.

measure of risk-adjusted returns (column 6), while there is a small negative relationship between risk-adjusted returns and RCA of destination countries using the first measure of risk-adjusted returns (column 3). The sample is restricted to high RCD sectors, defined as sectors with RCD values higher than the median RCD value in China.

These results suggest that search for returns may not be a major driver of foreign investment allocation patterns documented in Sect. 5.4.

6.2 Diversification Motive

Chinese funds may view the opening up of the country's capital account as an opportunity to benefit from international diversification. Hence, they may overinvest abroad in sectors in which China is not as competitive (i.e., high RCD sectors) to diversify their portfolios, with the ultimate objective of lowering risk of their portfolios. Riskiness of a fund's portfolio will depend not only on the return volatility of home and foreign sectors, but also on correlation in returns of those sectors. Hence, to test whether diversification is a potential explanation for overinvestment abroad in high RCD sectors, we first need to look at funds' domestic portfolio allocations.

We begin by investigating the relationship between the revealed competitiveness of a sector and domestic excess investment in that sector in China. To do so, we estimate the following regression:$I_{ijt} = \alpha + \gamma_1 X_{jt} + \boldsymbol{\gamma_2 home_{jt}} + +\epsilon_{ijt}$.where the dependent variable is excess investment of fund i in sector j at time $t$in China, and is constructed as follows:

$$I_{ij} = \frac{\text{investment}_{ij}}{\sum_j \text{investment}_{ij}} - \frac{\text{mcap}_j}{\sum_j \text{mcap}_j}$$

Analogous to its foreign counterpart, excess investment in a given sector in China is measured as the share of investment in a given sector by a fund relative to the market cap share of that sector in China. X_{jt} in the above regression can be RCA or RCD of a sector j at time t in China. The variable $\boldsymbol{home_{jt}}$ includes sector-specific control variables as described in Sect. 5.4. This regression is estimated for the sample of Chinese funds that have positive foreign investment. Table 7 presents the results.

Columns (1) and (2) have RCA of sectors in China as the main independent variable and columns (3) and (4) have RCD of sectors in China as the main independent variable. Columns (1) and (3) don't include controls, while columns (2) and (4) include home sector controls. All columns include fund and year fixed effects. Standard errors are clustered at sector–year level since the independent variables and control variables vary at the sector–year level. We find that excess investment in China is positively associated with RCA of a sector in China (columns 1 and 2) and is not correlated with RCD of a sector in China. This suggests that Chinese funds overinvest in those sectors at home in which China has a revealed comparative advantage, such as textiles and computer hardware.

If Chinese IIs intend to diversify their portfolios, they would not invest in sectors abroad that are positively correlated with their Chinese investments. So now we test the return correlation between high RCA sectors in China and the same sectors

Table 6 Foreign excess investment and returns

Dep. variable: risk-adjusted return	(1)	(2)	(3)	(4)	(5)	(6)
	Risk-adjusted using					
	Sample standard deviation			Yearly price volatility		
RCD, China	−0.0122	−0.0113		0.0075	0.0212	
	(0.008)	(0.008)		(0.035)	(0.036)	
RCA			−0.0037***			−0.0098
			(0.001)			(0.006)
Size, foreign		−0.0014	−0.0012		0.0197**	−0.0113
		(0.003)	(0.005)		(0.009)	(0.018)
ROE, foreign		0.0000***	0.0000		0.0000	0.0002
		(0.000)	(0.000)		(0.000)	(0.000)
PB ratio, foreign		0.0011	0.0002		0.0032	0.0010
		(0.001)	(0.001)		(0.002)	(0.002)
Leverage, foreign		−0.0000	−0.0000		−0.0000	−0.0000
		(0.000)	(0.000)		(0.000)	(0.000)
Correlation in returns		−0.0125	0.0170		−0.0941	0.1484
		(0.033)	(0.049)		(0.219)	(0.296)
Observations	16,643	15,417	7487	15,999	15,003	7294
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	High RCD sectors	All	All	High RCD sectors
Adjusted R-squared	0.0464	0.0481	0.0644	0.0262	0.0258	0.0300

This table reports results for the regression in Sect. 6.1. The dependent variable is risk-adjusted returns earned by sector *i* in country *j* at time *t*. In columns (1), (2), and (3), risk-adjusted returns are computed as returns of a sector divided by the sample standard deviation of returns for that sector. In columns (4) through (6), we use a weighted average of risk-adjusted returns. We first compute risk-adjusted returns for each firm in a sector as returns of the firm divided by the price volatility of the firm. Then, a risk-adjusted measure for each sector is computed as the market-capitalization weighted average of risk-adjusted returns of all firms in that sector. "RCD, China" is the RCD of a sector in China and RCA is the revealed comparative advantage of a sector in China. All columns include year fixed effects. Standard errors are clustered at the country–sector–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope database. Data on RCD and RCA are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

abroad. Using monthly data, we find that the correlation between returns of high RCA sectors in China and those of their foreign counterparts is 0.13. This implies that Chinese funds would not invest abroad in sectors for which China has high RCA since they are already overinvesting in high RCA sectors at home and investing in the same sectors abroad could increase portfolio risk.

We test this formally by looking at the relationship between excess foreign investment and RCA of a sector in China. We estimate the regression equation in Sect. 5.4 with RCA of a sector as the main independent variable instead of RCD. Table 8 replicates columns (1) through (6) of Table 6 replacing RCD with RCA. We find that

Table 7 Domestic excess investment in China and revealed comparative advantage

Dependent variable	(1)	(2)	(3)	(4)
	Excess investment in China			
RCA, China	0.452***	0.289***		
	(0.112)	(0.090)		
RCD, China			0.166	0.198
			(0.115)	(0.123)
Size, home		−0.503***		−0.576***
		(0.161)		(0.174)
ROE, home		0.002		0.003
		(0.012)		(0.012)
PB ratio, home		0.120**		0.111**
		(0.050)		(0.045)
Leverage, home		0.003		−0.000
		(0.003)		(0.002)
Returns, home		0.015***		0.015***
		(0.004)		(0.004)
Observations	13,139	13,139	13,289	13,289
Fund FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0214	0.0844	0.000842	0.0776

This table shows results for the regression in Sect. 6.2. The dependent variable is excess investment of a fund in a given sector in China. Excess investment of a sector in China is defined as the share of investment in a given sector by a fund relative to the share of the sector in China's total market capitalization. The main independent variable is RCA of a sector in China in column (1) and (2) and RCD of a sector in column (3) and (4). All columns include year and fund fixed effects. Standard errors are clustered at the country–sector–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope database. Data on RCD and RCA are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

there is a negative and statistically significant relationship between foreign excess investment in a sector and its RCA value in China. This negative relationship is robust to including just home sector controls (column 1), just foreign sector controls (column 2), including home and foreign sector controls (column 3), using different measures to capture high RCA sectors in China (columns 4, 5, and 6).

The negative relationship between China's sectoral RCA and foreign investment abroad combined with (1) higher domestic excess investment in high RCA sectors at home and (2) positive association in sector returns between high RCA sectors at home and corresponding sectors abroad, shows that Chinese IIs have reduced risk by investing less in foreign sectors that are positively correlated with their major domestic investments. This suggests that diversification could be a plausible motive for foreign investment patterns of Chinese funds.

Table 8 Foreign sectoral allocations and revealed comparative advantage

Controls	(1) Home	(2) Foreign	(3) All	(4) All	(5) All	(6) All
RCA, China	−1.678***	−2.788***	−2.353***			
	(0.550)	(0.511)	(0.564)			
RCA 2008, China				−2.122***		
				(0.507)		
Top 5 RCA sectors					−2.804*	
					(1.556)	
Top decile RCA sectors						−5.919***
						(1.586)
Size, home	1.311**		2.464***	2.258***	3.255***	3.046***
	(0.649)		(0.716)	(0.718)	(0.671)	(0.678)
ROE, home	−0.147**		−0.144**	−0.143**	−0.140**	−0.118*
	(0.071)		(0.068)	(0.069)	(0.068)	(0.068)
PB ratio, home	−0.016		0.085	0.053	0.303	0.257
	(0.292)		(0.276)	(0.278)	(0.259)	(0.259)
Leverage, home	−0.032		−0.030	−0.026	−0.009	−0.023
	(0.083)		(0.086)	(0.089)	(0.087)	(0.088)
Returns, home	0.025		0.020	0.019	0.010	0.012
	(0.020)		(0.018)	(0.019)	(0.018)	(0.018)
Size, foreign		−2.017***	−2.554***	−2.398***	−2.821***	−2.797***
		(0.412)	(0.475)	(0.489)	(0.470)	(0.471)
ROE, foreign		−0.064***	−0.041*	−0.043*	−0.036	−0.036
		(0.024)	(0.023)	(0.024)	(0.023)	(0.024)
PB ratio, foreign		0.051	0.064	0.062	0.101*	0.108*
		(0.065)	(0.060)	(0.061)	(0.060)	(0.059)
Leverage, foreign		−0.119*	−0.073	−0.091	−0.043	−0.044
		(0.062)	(0.062)	(0.066)	(0.058)	(0.058)
Returns, foreign		−0.002***	−0.002***	−0.002***	−0.002***	−0.002***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Correlation in returns		−6.366***	−7.355***	−7.791***	−5.680***	−5.721***
		(2.046)	(2.043)	(2.096)	(2.046)	(2.036)
Observations	4863	4851	4851	4756	5009	5009
Fund and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0513	0.0752	0.0836	0.0828	0.0802	0.0818

This table shows results for country–sector-level regressions from Sect. 5.4. with excess investment as the dependent variable and revealed comparative advantage of a sector in China as the main independent variable. "RCA, 2008" is the beginning of sample value of a sector's RCA. "Top 5 RCA Sectors" is a dummy variable that takes a value 1 if a sector is among the 5 highest RCA sectors in China. "Top Decile RCA Sectors" is a dummy variable that takes a value 1 for sectors with RCA values higher than the 90th percentile of RCA every year. All columns include year and fund fixed effects. Standard errors are clustered at the country–sector–year level. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope database. Data on RCA are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

Furthermore, can diversification motives justify Chinese IIs' overinvestment in certain destination country–sector pairs that we observe in Sect. 5.4, where the sectors are those in which China is not competitive (i.e., high RCD sectors) and the countries are those that are better than China in those high RCD sectors? An indirect way to test whether such investment patterns are driven by diversification motives is to see whether, conditional on investment in high RCD sectors, there is a negative (or low) correlation between sector returns in China and in countries with higher RCA values than China for those high RCD sectors. We use the following regression specification to test this formally:

$$\text{Corr}_{ijk} = \alpha + \gamma_1 \text{HRCD}_{jk} + \gamma_2 \text{HRCA}_{jk} + \gamma_3 \text{HRCD}_{jk} \times \text{HRCA}_{jk} + \epsilon_{ijk}$$

where the dependent variable is correlation in returns between sector i in China and sector j in destination country k. HRCD_{jk} is a dummy variable that takes a value of 1 for country k's sector j for which China has a high RCD value.[41] HRCA_{jk} is a dummy variable that takes a value of 1 for country k's sector j that have a higher RCA value than China's counterpart sector. The main variable of interest is the interaction between high RCD sectors and the dummy variable indicating the set of countries that are better than China at producing goods/services in a given sector. Results from this regression are presented in Table 9.

Column (1) shows the results for the full sample. The negative and significant coefficient on the interaction term suggests that foreign return correlation with China is lower for our observed destination country–sector pairs, where the foreign sectors are those in which China is not competitive (i.e., high RCD sectors) and the countries are those that are better than China in those high RCD sectors. This negative coefficient becomes even more pronounced if we restrict the sample of home sectors to high RCA sectors in China (column 2). This suggests that returns from those observed destination country–sector pairs have lower correlations with high RCA sectors in China. According to the diversification motive, this low-correlation result is consistent with our earlier result that Chinese funds overinvest in high RCA sectors at home and overinvest abroad in the observed destination country–sector pairs. As China gradually opens up its international capital flows, a low correlation with the returns of existing domestic investments could incentivize funds to overinvest in such destination country–sector pairs abroad.

6.3 Familiarity or Information Advantage

Prior studies have shown the importance of information endowment in cross-border investment flows. For instance, Karolyi et al. (2019) show that institutional investors

[41] High RCD sectors in China are those that have an average RCD value higher than the median RCD value for the sample.

in emerging markets overinvest in countries which have had stronger trade (or direct investment) relations with the host countries in the past. Similarly, in the context of foreign investment across sectors, Schumacher (2017) shows that institutional investors overinvest in sectors abroad that are large in their home country. While he largely attributes this foreign industry bias to specialized learning, he suggests that this relationship is partly driven by a familiarity or information advantage theory. In this section, we test whether information advantage or familiarity motives can explain the country–sector patterns of Chinese institutional investors.

In column 5 of Table 3, which uses past trade shares as a proxy for country-specific information advantage, we show that Chinese fund investment is strongly positively correlated with trade. For the analysis at the sector–destination country level in this section, we use three proxies to measure sectoral information advantage—domestic market capitalization share of a sector in China (based on Schumacher

Table 9 Correlation in sector returns and revealed comparative advantage

Dependent variable	(1)	(2)
	Correlation in sector returns	
HRCD	0.028***	0.037***
	(0.002)	(0.003)
HRCD × HRCA	−0.019***	−0.031***
	(0.002)	(0.005)
HRCA	0.014***	0.015***
	(0.001)	(0.002)
Observations	68,354	14,240
Home sector FE	Yes	Yes
Sample	All	Only high RCA sectors at home
Adjusted R-squared	0.105	0.0743

This table shows results for the correlation regression in Sect. 6.2. The dependent variable is correlation in returns between sector *i* in China and sector *j* in the destination country for each destination country *k*in the sample. HRCD is a dummy variable that takes a value 1 for country *k's* sector *j* for which China has a high RCD value. High RCD sectors in China are those that have an average RCD value greater than the median RCD value for the sample. HRCA is a dummy variable that takes a value 1 for country *k's* sector *j* that has a higher RCA value than China's counterpart sector. Column (1) includes all sectors and column (2) includes only those sectors for which China has a high RCA. Both columns include home sector fixed effects. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on control variables are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

2017), foreign direct investment share of a sector in China (based on Karolyi et al. 2019), and RCA of a sector in China. Chinese investors should know more about sectors in which China is a leading exporter, i.e., sectors for which China has a high RCA. We test whether excess foreign investment is positively related to any of these three variables that capture sectoral informational advantage. We present the results in Table 10.

Columns (1) through (3) do not include fund fixed effects while columns (4) through (6) include year as well as fund fixed effects. Standard errors are clustered at the sector–destination country–year level. There is no significant relationship between excess foreign investment and information advantage measured by domestic market cap share of a sector (column 1 and 4) and FDI share of a sector in China (column 2 and 5), while there is a negative relationship between RCA of a sector in China and foreign investment in that sector (column 3 and 6). The latter result indicates that Chinese IIs actually invest less abroad in sectors in which China has an information advantage.

These results suggest that sector-specific information does not play a role in explaining foreign portfolio allocations of Chinese funds. Moreover, had sector-specific information been important, we would have found excess investment to be higher in similar types of sectors at home and abroad; however, we observe that Chinese IIs invest more in high RCA sectors at home and high RCD sectors abroad, which are largely different sectors for China.

With the above results in mind, we conjecture that perhaps information about a sector *at home* does not necessarily translate into knowledge about that sector *abroad*. That is, it is not having information about or expertise on a sector that matters but having information about a sector of a foreign country. Hence, now we discuss country–sector-specific information advantage. In fact, our earlier findings in Sect. 5.4 that Chinese IIs invest more in foreign sectors in which China imports more (i.e., the high RCD sectors) and more in foreign countries that are best at such sectors (i.e., countries with high RCA) are consistent with such country–sector-specific information advantage theory.

In particular, investors can obtain information about a sector of a foreign country through using/examining its products coming from imports. Therefore, the more China imports in this sector, the more information Chinese investors have on the sector. Moreover, the more a foreign country exports in a sector, the more likely China imports its goods/services, and thus, the more information Chinese investors could have on that particular country and its sector. For instance, our trade data show that China imports a lot of foreign software, especially from the USA, a large exporter of software in the world. This import exposure to US software sector can allow Chinese investors to have information on US software companies and thus incentivizes them to overinvest in this particular sector in the USA, which we do find in our fund investment data.

Table 10 Information advantage and foreign excess investment

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Excess investment					
Market cap share, China	−0.189			−0.243		
	(0.175)			(0.167)		
FDI share, China		−0.133			−0.116	
		(0.086)			(0.078)	
RCA, China			−2.511***			−2.353***
			(0.579)			(0.564)
Size, home	3.922***	3.165***	2.294***	4.205***	2.864**	2.464***
	(0.868)	(1.187)	(0.722)	(0.834)	(1.140)	(0.716)
ROE, home	−0.123*	−0.236*	−0.137**	−0.127*	−0.231*	−0.144**
	(0.069)	(0.129)	(0.069)	(0.067)	(0.128)	(0.068)
PB ratio, home	0.274	0.201	0.012	0.351	0.283	0.085
	(0.256)	(0.347)	(0.272)	(0.257)	(0.339)	(0.276)
Leverage, home	0.041	−0.057	−0.016	0.016	0.009	−0.030
	(0.090)	(0.151)	(0.089)	(0.087)	(0.142)	(0.086)
Returns, home	0.001	0.049	0.019	0.000	0.046	0.020
	(0.019)	(0.034)	(0.019)	(0.018)	(0.032)	(0.018)
Size, foreign	−2.498***	−2.768***	−2.343***	−2.733***	−3.170***	−2.554***
	(0.453)	(0.559)	(0.455)	(0.470)	(0.569)	(0.475)
ROE, foreign	−0.042	−0.000	−0.049**	−0.034	0.001	−0.041*
	(0.026)	(0.024)	(0.024)	(0.024)	(0.022)	(0.023)
PB ratio, foreign	0.104*	0.527***	0.042	0.122**	0.488***	0.064
	(0.060)	(0.197)	(0.061)	(0.059)	(0.183)	(0.060)
Leverage, foreign	−0.046	0.059	−0.089	−0.033	0.036	−0.073
	(0.056)	(0.082)	(0.063)	(0.055)	(0.086)	(0.062)
Returns, foreign	−0.001***	−0.001*	−0.002***	−0.002***	−0.001***	−0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Correlation in returns	−4.858**	−3.124	−6.821***	−5.423***	−3.098	−7.355***
	(2.132)	(2.958)	(2.158)	(2.021)	(2.772)	(2.043)
Observations	5012	2522	4854	5009	2520	4851
Fund FE	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0357	0.0349	0.0405	0.0796	0.0903	0.0836

This table shows results for the information advantage hypothesis to explain investment patterns of Chinese funds. The dependent variable is excess investment of a fund in a given sector in a given country. In column (1), the share of a sector in the market capitalization of China is used a proxy for information advantage, in column (2) a sector's share in FDI is the proxy for information advantage, and in column (3) RCA of a sector in China measures investors' information advantage in that sector. Columns (1) through (3) include only year fixed effects while columns (4) through (6) include both year and fund fixed effects. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope and CEIC database. Data on RCD and RCA are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the FactSet Ownership (LionShares) database and the Worldscope database. See Table A4 for a detailed description of data sources and variable definitions

6.4 Learning by Investing

Our last hypothesis is that Chinese investors overinvest in high RCD sectors abroad because they want to learn more about those sectors. Compared to FDI, this motive might be less relevant for equity investments, although such outflows could be seen as initial investments that are then increased over time and, in effect, turn into FDI.[42] Under this hypothesis, foreign investment in such sectors will be disproportionately higher in countries that are better than China at producing goods/services in those sectors because this strategy will maximize learning.

To test this proposition, we collect data on Research and Development intensity of all sectors in China and test whether or not sectors with a high share of outward foreign portfolio investment see a higher growth in R&D intensity and whether these gains are higher for high RCD sectors in China. We estimate the following regression:

$$\begin{aligned}\text{R\&D Growth}_{it} = \alpha + \gamma_1 \text{Excess Investment}_{ikt} + \gamma_2 \text{HRCD}_{it} + \gamma_3 \text{Excess Investment}_{ikt} \\ \times \text{HRCD}_{it} + \gamma_2 \text{FDI}_{it} + \boldsymbol{\gamma_3 home_{it}} + + \epsilon_{it}\end{aligned}$$

Results are shown in Table 11. Column (1) includes only year fixed effects, column (2) includes year and fund effects, and column (3) is the specification with the main interaction term. Results suggest that there is a weak positive relationship between excess foreign investment in a given sector and R&D growth in that sector, even after controlling for FDI share of a sector in China (columns 1 and 2). However, the interaction term between foreign excess investment and high RCD sectors (those in the top decile of the RCD distribution in China) is not significant, implying that there are no additional gains to learning from investment in high RCD sectors.

The results in this section provide weak evidence of a positive correlation between learning and foreign equity investment in high RCD sectors. Further, it is hard to distinguish between learning as an outcome of foreign portfolio investment versus a motive for overinvestment in high RCD sectors.

To sum up, we find diversification and country–sector information/familiarity to be the most important determinants of Chinese IIs' equity investment patterns that we document in Sect. 5.4. We find little evidence that the other motives—return-seeking and learning—matter much.

[42] FPI is seen as a passive form of investment while FDI provides managerial control. When a foreign investor's equity interest in a foreign firm exceeds 10% of the ownership interest, which usually confers some degree of managerial control, such investment is classified as FDI. Thus, FPI can eventually turn into FDI when it exceeds a certain threshold.

7 Implications and Concluding Remarks

This paper takes stock of China's efforts to liberalize capital outflows and documents new facts on capital outflows from China, both from a macro-perspective and from the perspective of institutional investors. We note that the composition of China's capital outflows has shifted from foreign exchange reserve accumulation by the

Table 11 Learning motive and foreign investment

Dependent variable	(1)	(2)	(3)
	Growth in R&D		
Foreign excess investment	0.0002*	0.0002*	−0.0000
	(0.000)	(0.000)	(0.000)
Top decile RCD sector			−0.2179**
			(0.094)
Top decile RCD sector × foreign excess investment			−0.0002
			(0.000)
FDI share, China	0.0347*	0.0374*	−0.0500
	(0.019)	(0.019)	(0.038)
Size, home	−0.0453	−0.0446	0.0268
	(0.033)	(0.032)	(0.043)
ROE, home	0.0017	0.0025	−0.0003
	(0.003)	(0.003)	(0.004)
Leverage, home	0.0014	0.0017	0.0203**
	(0.003)	(0.003)	(0.008)
PB ratio, home	0.0372	0.0415	0.0292
	(0.042)	(0.041)	(0.028)
Returns, home	−0.0033***	−0.0034***	−0.0020*
	(0.001)	(0.001)	(0.001)
Observations	654	650	516
Fund FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-squared	0.522	0.524	0.617

This table shows results for the learning motive hypothesis in Sect. 6.4. The dependent variable is growth in R&D intensity of a sector in China. "Foreign Excess Investment" is excess investment in a sector by Chinese funds. "Top Decile RCD Sector" is a dummy variable for sectors with RCD values higher than the 90th percentile of RCD values in China. Column (1) includes only fund fixed effects, while columns (2) and (3) include fund and year fixed effects. The superscripts *, **, and *** indicate that a coefficient is statistically significant at the 10%, 5%, and 1% level, respectively. Data on country–sector-level control variables are from the Worldscope database and the CEIC database. Data on RCD are from the BACI International Trade Database, WTO trade portal, and COMTRADE. The dependent variable is constructed using data from the CEIC database. See Table A4 for a detailed description of data sources and variable definitions

central bank to non-official outflows. Low returns on external assets, a vast majority of which have been in the form of foreign exchange reserves, combined with a vast pool of domestic savings with a potential to earn higher returns abroad, may have incentivized China to liberalize capital outflows. As the world's second largest economy continues to open up its capital account and domestic investors look abroad for returns and diversification, capital outflows from China can have a significant impact on global financial markets.

To understand the potential impact of capital outflows from China on global financial markets, we analyze the foreign portfolio allocations of Chinese institutional investors, which constitute the main channels of portfolio investment outflows. Using micro-data on foreign portfolio allocations of Chinese funds from the FactSet database, we find that Chinese funds underweight developed countries in their foreign portfolio allocations but overinvest in high-tech sectors in developed countries. At the country level, foreign portfolio allocation decisions seem to be driven by (1) gravity variables such as geographic distance between China and the destination country, (2) market depth variables such as the number of listed firms in the destination market, (3) governance variables such as rule of law and regulatory burden, and (4) information endowment variable such as a destination country's trade share in China's total trade.

We further investigate Chinese funds' foreign portfolio allocations at the destination country–sector level and find evidence of overweighting of sectors in which China has a comparative disadvantage. Moreover, Chinese IIs concentrate such investments in countries that have higher relative comparative advantage in those sectors.

We explore four broad sets of investment motives that could explain the investment patterns of Chinese IIs: search for returns, diversification, information advantage, and learning. We find that higher returns cannot explain why Chinese funds overinvest in sectors in which China has a comparative disadvantage since high RCD sectors in China do not earn higher risk-adjusted returns abroad. Diversification motives and destination country–sector-specific information advantages seem to be the most important drivers of Chinese funds' foreign portfolio allocations. In particular, we show that foreign investment decisions of Chinese funds entail a joint decision about investment in a destination country and in a sector. This joint decision is guided not only by funds' familiarity with a destination country or with a given sector but also by their knowledge about the sector–destination country pair. Hence, the information content from imports guides Chinese funds' investments abroad, while the information content from exports guides their investment decisions at home. Further, we find limited evidence for learning as a possible motive for excess investment in sectors in which China has a high RCD.

China has become an important provider of foreign direct investment and portfolio capital for many developing countries and for various sectors. For instance, China accounts for more than 40% of the total FDI received by Tajikistan. More than one-third of total FDI received by countries like Niger and Myanmar is from China. China accounts for almost a quarter of total FDI received by Kyrgyz Republic, Mongolia, and Hong Kong. While the share of these countries in China's outward direct investment may not be significant, the absolute amounts are large, especially relative

to the size of the recipient economies. For instance, the ratio of FDI received from China to nominal GDP of recipient countries is as high is 40% for Mongolia and close to 30% for Niger. Similarly, China is a major source of portfolio equity investments for countries like Cuba, Mongolia, Hong Kong, and Macao. As China continues to open up its capital account and liberalize portfolio outflows, it will over time increase its impact on both fixed-income and equity markets worldwide.

Acknowledgements We are grateful to Gian Maria Milesi-Ferretti and participants at a Banco Central de Chile-IMF conference for helpful comments. We thank Thomas Bowen, Brandon Lang, Michael Wenye Li, and Kaiwen Wang for research assistance.

References

Balassa, Bela. 1965. Trade Liberalisation and 'Revealed' Comparative Advantage. *The Manchester School* 33: 99–123.

Bayoumi, Tamim, and Franziska Ohnsorge. 2013. Do Inflows or Outflows Dominate? Global Implications of Capital Account Liberalization in China. IMF Working Paper No. 13-189.

Casanova, Carlos, Alicia Garcia-Herrero, and Le Xia. 2015. Chinese Outbound Foreign Direct Investment: How Much Goes Where After Round-Tripping and Offshoring? BBVA Working Paper No. 15/17.

Chan, Ann Ling-Ching, Rong Ding, and Wenxuan Hou. 2014. Does Mutual Fund Ownership Affect Financial Reporting Quality for Chinese Privately-Owned Enterprises? *International Review of Financial Analysis* 36: 131–140.

Cunningham, Rose, Eden Hatzvi, and Kun Mo. 2018. *The Size and Destination of China's Portfolio Outflows*. Ottawa: Manuscript, Bank of Canada.

Dollar, David. 2016. China as a Global Investor. In *China's New Sources of Economic Growth: Reform, Resources, and Climate Change*, vol. 1, ed. Ligang Song, Ross Garnaut, Cai Fang, and Lauren Johnston, 197–214. Canberra: ANU Press.

Economist Intelligence Unit. 2017. *China Going Global Investment Index 2017*. London: Economist Intelligence Unit.

Ferreira, Miguel A., and Pedro Matos. 2008. The Colors of Investors' Money: The Role of Institutional Investors Around the World. *Journal of Financial Economics* 88: 499–533.

Hatzvi, Eden, Jessica Meredith and William Nixon. 2015. *Chinese Capital Flows and Capital Account Liberalisation*. Reserve Bank of Australia Bulletin, December Quarter.

He, Dong, Lillian Cheung, Wenlang Zhang, and Tommy Wu. 2012. How Would Capital Account Liberalisation Affect China's Capital Flows and the Renminbi Exchange Rate? Working Paper No. 09/2012, Hong Kong Institute for Monetary Research.

Hooley, John. 2013. *Bringing Down the Great Wall? Global Implications of Capital Account Liberalisation in China*. Bank of England Quarterly Bulletin Q4.

Horn, Sebastian, Carmen M. Reinhart, and Christoph Trebesch. 2019. China's Overseas Lending. NBER Working Paper No. 26050.

Karolyi, Andrew, David Ng, and Eswar Prasad. 2019. The Coming Wave: Where Do Emerging Market Investors Put Their Money. *Journal of Financial and Quantitative Analysis* (forthcoming).

Kruger, Mark, and Gurnain Kaur Pasricha. 2016. What to Expect When China Liberalizes its Capital Account. Bank of Canada Staff Discussion Papers No. 2016-10.

Kwon, Sung S. 2002. Financial Analysts' Forecast Accuracy and Dispersion: High-Tech Versus Low-Tech Stocks. *Review of Quantitative Finance and Accounting* 19 (1): 65–91.

Lane, Philip, and Gian Maria Milesi-Ferretti. 2008. International Investment Patterns. *The Review of Economics and Statistics* 90 (3): 538–549.

Miao, Yanliang, and Deng Tuo. 2019. China's Capital Account Liberalization: A Ruby Jubilee and Beyond. In *Handbook of China's Financial System*, ed. Marlene Amstad and Wei Xiong (forthcoming).

Portes, Richard, and Helene Rey. 2005. The Determinants of Cross-Border Equity Flows. *Journal of International Economics* 65: 269–296.
Prasad, Eswar. 2019. Has the Dollar Lost Ground as the Dominant International Currency. NBER Working Paper (forthcoming)
Ramasamy, Bala, Matthew Yeung, and Sylvie Laforet. 2012. China's Outward Foreign Direct Investment: Location Choice and Firm Ownership. *Journal of World Business* 47 (1): 17–25.
Schumacher, David. 2017. Home Bias Abroad: Domestic Industries and Foreign Portfolio Choice. *The Review of Financial Studies* 31 (5): 1654–1706.
Scissors, Derek. 2018. *China's Global Investment: Neither the US nor Belt and Road*. Washington: American Enterprise Institute.
van Nieuwerburgh, Stijn, and Laura Veldkamp. 2009. Information Immobility and the Home Bias Puzzle. *The Journal of Finance* 64 (3): 1187–1215.

Affiliations

Isha Agarwal[1] · Grace Weishi Gu[2] · Eswar Prasad[3,4,5]

Isha Agarwal
isha.agarwal@sauder.ubc.ca

Grace Weishi Gu
grace.gu@ucsc.edu

[1] University of British Columbia, Vancouver, Canada

[2] University of California, Santa Cruz, Santa Cruz, USA

[3] Cornell University, Ithaca, USA

[4] Brookings Institution, Washington, USA

[5] NBER, Cambridge, USA