Chinese Outwards Mercantilism – the Art and Practice of Bundling

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Abstract

The Global Financial Crisis (GFC) brought to the fore the limits of the Chinese export led-growth strategy and the need for Chinese rebalancing. The Chinese export-led growth strategy of the 2000s coincided with the country becoming one of the largest net global creditors. Intriguingly, the Chinese net income from its global creditor position was negative, reflecting the large share of its low-yielding assets (mostly international reserves), and its high share of high-yielding liabilities (mostly foreign direct investment in China). Our paper takes stock of what may be the next new chapter of Chinese outward-mercantilism, which aims at securing a higher rate of returns on its net foreign asset position, leveraging its success in becoming the global manufacturing hub and the supplier of swap-lines. The emerging new trend has been manifested by Chinese outward-oriented FDI in natural resources, commodities and mining, and providing a wide spectrum of infrastructure and construction services to developing countries. These activities are frequently bundled with access to finance and the export of Chinese capital products and labor services. We trace and analyze these trends, identifying the positive associations between Chinese trade, finance, and outward FDI (aggregate flows as well as greenfield capital investment). The positive association between Chinese outward FDI and commodities imports increases with the provision of RMB swap-lines to China's trading partners. The association between Chinese FDI outflows in the natural resources sector and commodities imports has become stronger since the GFC. The association of RMB swap-lines with the Chinese outward FDI in the natural resources sector is especially large, thus supporting the conjecture that in the aftermath of the GFC Chinese outward FDI is bundled with trade and financial linkages.

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1. **Introduction**

China has been a prime example of export-led growth that has benefited from learning by doing, and by adopting foreign know-how, supported by a complex industrial policy. Arguably, a modern version of mercantilism has been at work (Aizenman and Lee 2008). The rapid growth, growing trade, and current account/GDP surpluses in the 2000s had occurred in tandem with massive hoarding of international reserves (IR) combined with massive sterilization of expending trade surpluses and financial inflows. These policies were aimed at delaying and slowing the real appreciation associated with successful rapid growth. Following the Asian crisis of 1997-98, which mitigated Chinese competitiveness in the late 1990s, as well as Chinese accession to the World Trade Organization (WTO) in the early 2000s, the country intensified its drive toward export-led growth, racking up current-account surpluses and growing stockpiles of international reserves. On the eve of the financial crisis, China's real GDP growth had reached 14%, its current-account surplus had grown to 10% of GDP, and its international reserves had reached about 50% in 2010 [Aizenman, Jinjarak and Marion (2014)].

The global financial crisis (GFC) of the late 2000s put an abrupt end to the Chinese export-led, growth-cum-large current-account surplus trajectory. In the U.S., the private sector was forced to de-leverage and lower demands for imports. Other crisis-hit developed countries also cut back on imports. Consequently, the GFC and its aftermath induced rapid Chinese internal balancing, reducing the scope of future reserve hoarding. Since the crisis, China's current-account surplus fell from 10% of GDP (2007) to about 2% in 2013. A legacy cost of Chinese policies during the 2000s has been its skewed external balance — long on low-yielding foreign assets [mostly international reserves], and short on high-yielding assets [mostly large liabilities associated with past net FDI inflows to China]. While China's net external financial assets in 2013 was about 20% of China's GDP, the real net return on these assets was negative.[1] This reflects two fundamental factors -- the low real return on Chinese international reserves (two-third of its gross external assets), and the high return on past FDI inflows to China, which accounts for about 60% of Chinese external liabilities.[2] The low return on Chinese foreign

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[1] See http://rhg.com/notes/chinas-international-investment-position-2014-update
[2] According to the State Administration of Foreign Exchange (SAFE), China's external financial assets were about U.S.$ 6 trillion at the end of 2013, of which international reserves were about two-third (U.S. $3.9 trillion), the outbound direct investment about 10%, securities investment about 4%, and other

assets is bad news, especially considering the rapid aging of China's population. This is in contrast to Japan, where the sizable return on Japan's foreign asset position helps in buffering the future income of its rapidly graying population.

A way of mitigating the adverse consequences of Chinese legacy external balance sheet exposure is external rebalancing, that is "swapping" overtime some of its international reserves with higher yielding foreign equities and outward Chinese FDI. Indeed, China embarked on diversifying its holdings of dollar IR by channeling surpluses into a sovereign wealth fund (SWF), encouraging outward foreign direct investment in tangible assets, and offering much higher expected returns.[3] The outcome has been growing FDI in the global resource sectors and infrastructure services, especially in commodity and mineral exporting countries, which includes developing countries and emerging markets in Africa and Latin America. In a way, China has joined the trend of other Emerging Markets (EMs).[4]

After the financial crisis in 2008, China embarked on large bilateral currency-swap agreements with other countries. This was done in tandem with the unprecedented provisions of swap-lines among the Organization for Economic Co-operation and Development (OECD) countries and the more selective provision of four swap-lines by the U.S. Federal Reserve (FED) to selected emerging market economies (Table 1). Comparing the bilateral swap-lines offered by the U.S. FED and the People's Bank of China (PBOC) reveals key differences. Most of the swap-lines offered by China have been to commodity countries, developing and emerging market economies, whereas most of the bilateral swap-lines offered by the U.S. FED are between the OECD countries, and four emerging markets: Brazil, South Korea, Mexico, and Singapore. Aizenman and Pasricha (2010) pointed out that the selection criteria explaining the U.S. FED supply of bilateral swap-lines to emerging markets were close financial and trade ties, a high degree of financial openness, and a relatively good sovereign credit history. Chances are that similar factors account for the Chinese supply of Renminbi (RMB) bilateral swap-lines to a

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investment at about 20%. The country's external liability position was 4 trillion U.S. $, out of which FDI in China was $2.35 trillion, 60% of the total liability. The investment in securities and other aspects took up 10% and 30%, respectively.

[3] On December 19, 2013, the WSJ reported "Beijing will ease the approval process for all but the largest Chinese investments in overseas companies and projects, a major relaxation of regulatory oversight that analysts say is aimed at encouraging Chinese firms to expand abroad."

[4] Aizenman and Pasricha (2013) noted that EMs eased outflows of capital more in response to higher stock price appreciation, higher appreciation pressures in the exchange market, higher IR/GDP, and higher real exchange rate volatility.

growing list of developing and emerging markets, as has been vividly illustrated by Garcia-Herrero and Xia (2015).[5] This strategy blends very well with the trade internationalization of the RMB in the context of the broader outward FDI strategy of China, and is consistent with the channeling of China's net foreign-asset position into an outward FDI-cum-credit strategy.[6]

Against this background, our paper takes stock of what may be the new chapter of Chinese-outward mercantilism, which is aimed at securing a higher rate of returns on its net foreign asset position, leveraging its success in becoming the global manufacturing hub, and its large Net Foreign Asset position. We conjecture that in the aftermath of the GFC, China has bundled outward FDI with its finance dealing (lending, swap-lines, trade credit), its trade and foreign investment (including exports of Chinese capital products and labor services), and leveraging its growing market clout. This bundling strategy has been mostly applied to developing and emerging market economies, and to "commodity-countries." During the GFC and its aftermath, China increased rapidly and in tandem its outward FDI, swap-lines, imports and exports to the selected countries. Such a bundling strategy is consistent with Adams and Yellen (1976): bundling as a manifestation of market clout in which the bundling party leverages its market powers aimed at increasing its surplus. Accordingly, China may use its market power in the provision of "swap and lender of last resort," supplying capital goods, and infrastructure services to its trading partners.[7]

The shortness of the sample, and the lack of more detailed data do not allow us to evaluate the success of the bundling strategy in delivering higher returns to the Chinese net foreign asset position. The willingness of China to extend credit lines and invest in countries with histories of default [including Argentina, Venezuela, Zimbabwe] raises concerns about the growing exposure of China to sovereign defaults, and the risk of partial nationalization of its outward FDI assets. One should keep in mind, however, that some Chinese lending to commodity countries is secured by "in kind" long-run payment in the form of oil flows and other

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[5] Garcia-Herrero and Xia (2015) concluded the choice of countries signing an RMB-denominated bilateral swap agreement with China was predominantly by "gravity motifs"; that is, by country size and distance from China, as well the trade motif in terms of both exports to China and the existence of the Free Trade Agreement (FTA) with China. Institutional soundness also matters, since countries with better government and less corruption are more likely to sign an RMB-denominated bilateral swap agreement.
[6] The provision of RMB swap-lines may be also part of the Chinese agenda of upgrading the RMB into a global currency, competing with the US dollar and the euro [Fratzscher and Mehl (2014)].
[7] Such a bundling strategy may also act as a barrier to entry of late new comers in the destination countries (Nalebuff, 2004).

commodities to China.[8] Arguably, Chinese outside exposure may be also partially hedged by the growing dependence of some developing countries on Chinese infrastructure services needed to maintain their upgraded rail system, and the growing importance of China as the prime destination of their imports (and for some, their dependence on China as their only "lender of last resort").[9]

In the following sections we summarizes several regressions analyzing the association between trade, FDI, and finance. We find that Chinese exports of manufactures and imports of commodities to its trading partners are positively associated with the outflows of FDI to the recipient countries. The provision of the RMB swap-line is positively associated with the size of Chinese bilateral trade with the swap-line recipient countries. In addition, small countries tend to be the recipients of the RMB swap-line. Focusing on Chinese Greenfield FDI abroad and distinguishing between the FDI outflows into tradable sectors, nontradables sector, and natural resources we find that Chinese trade influences the natural resources sector FDI. Exports of manufactures are negatively associated with FDI outflows while the effects of commodities imports are positive. The association between Chinese FDI outflows in the natural-resources sector and commodities imports has become stronger since the GFC. The positive association between Chinese-outward FDI and commodities imports increases with the provision of RMB swap-lines to China's trading partners. The influence of RMB swap-lines is especially large on the Chinese-outward FDI in the natural resources sector. The overall findings are supportive to the conjecture that in the aftermath of the GFC, Chinese-outward FDI is bundled with trade and financial linkages, thereby increasing the country's influence in the international markets, and securing its long-run access to a stable supply of commodities.

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[8] The Financial Times commented on March 17, 2015 "Credit risks (of Venezuela) are soaring, with the economy set to shrink by as much as 7 per cent this year. The slump in crude prices is clobbering Caracas's ability to finance its debt. The markets are pricing in about a 90 per cent probability that Venezuela will default on its debt over the next five years. Chinese lending may, in effect, be senior to that of international bond holders, secured as it is against 450,000 barrels a day of oil." "Russia's financial arrangements with China are shrouded in mystery, which is reinforced by western sanctions imposed on Moscow since the Ukraine crisis began. However, several analysts put Chinese state-backed lending to Russian corporations at well over $30bn, much of it secured by oil shipments to China."

[9] Our conjecture is in line with recent case studies - three out of the largest five industry activities of China's-outward Greenfield FDI are in the natural resources sector, before and after the global financial crisis of 2008–09 [see Table A in the Appendix]. Seven out of ten largest capital investments abroad by Chinese companies have operated in host countries that receive RMB swap-lines in the aftermath of the GFC.

2. Data

We use two sources of Chinese-outward-oriented FDI data. The first is aggregate Chinese FDI flows abroad from the UNCTAD FDI/TNC database, which is based on data from the Chinese Ministry of Commerce. The aggregate outflows (in USD millions) sum together Brownfield FDI (mergers and acquisitions) and Greenfield FDI (new plants and production). The data are available up to 2012 on annual basis for 144 host/destination countries.

The second source of FDI data is Greenfield-type Chinese FDI projects invested abroad from fDi Intelligence of the Financial Times Ltd. This micro-level, project-based information reports not only capital investment (in USD millions) of new plants and production in a host country, but also employment created and targeted industry sector of the corresponding FDI projects. The data cover 137 host countries from 2003 to 2014. We classify the industry sectors into tradables, nontradables, and natural resources (see Appendix Table C for the list of sectors in each group).

The two FDI data sources have in common 118 host countries from 2003 to 2012 with 582 country-year observations. Given the overlaps, we combine the two FDI data with Chinese bilateral trade, RMB swap-lines, host-country GDP, and gravity controls of geographical variables and cultural similarities. Appendix Table B provides a list of countries included in the sample.

Chinese bilateral trade data are drawn from two sources. The first is aggregate imports and exports by country of origin/destination from the China Statistical Yearbook, National Bureau of Statistics of China. The aggregate data cover the period of 2003-2012.

The second source of bilateral trade data is sectoral trade flows between China and its trading partners, drawn from the UN Comtrade. The micro trade flows are reported on annual basis (USD millions) from 2003-2012. We follow the UN classification and group the tradable products into commodities and manufactures.[10]

The details on agreement date and amount of bilateral currency swap-line established by People's Bank of China (PBOC) with other central banks are drawn from Aizenman, Jinjarak

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[10] The category of commodities includes the primary commodities, precious stones, and non-monetary gold (STIC 0 +1+2+3+4+68+667+971). The manufactured goods include STIC 5-8 less 667, and 68.

and Park (2014), Garcia-Herrero and Xia (2015), and the PBOC's website. We convert the amount of swap-line denominated in RMB into US\$ using RMB/US\$ exchange rate from Bloomberg.

To account for geographical variables and cultural similarities in bilateral trade between China and its trading partners, we use the standard gravity controls on distance, common language, and legal origin from GeoDist of CEPII, as well as host-country (trading partner)'s GDP, geographic size, and transport intensity from World Development Indicators. Combing all the detailed information across datasets gives us a sample of 113 host countries, 563 country-year observations, covering 2003-2012 for the estimation.

For the robustness checks, we also add controls for host country's official exchange rate against US\$, international reserve in US\$, population in persons, business investment costs (number of start-up procedures to register a new business), and CPI from World Development Indicators; host-country skill of labor (measured by Barro-Lee's data on average years of total schooling of population above 25 years old, from Education Attainment database), and political stability (the percentile rank of political stability and absence of violence/terrorism) from Worldwide Governance Indicators.

As a summary of the estimation sample, Table 1 provides statistics of the included variables, while Table 2 presents details of RMB swap-lines as well as other swap arrangements in the aftermath of GFC. To illustrate the intensity of China's trade and investment, Figure 1 shows a heat map of average Chinese bilateral trade, outward FDI, and RMB swap-lines (all divided by a destination country's GDP). Figure 2 then overviews the relationship between Chinese FDI, trade, and swap-lines. The diamond chart plots, based on bilateral data, the relationship between Chinese FDI, exports, imports, and swap-lines (all divided by a destination country country's GDP, and weighted by the sample means). The dotted, dashed and solid lines plot, respectively, the statistics before, during, and after the 2008–09 Global Financial Crisis. The diamond charts indicate concurrent and significant surges in Chinese-outward FDI, swap-lines, imports and exports to the selected countries.

3. Empirical Analysis

We begin the analysis by studying the association between China's outward FDI and bilateral trade from the gravity model as follows[11]:

$$\log(FDI_{jt}) = \delta_1 + \gamma_1 \log(Trade_{jt}) + \theta_1 Gravity_{jt} + \kappa_1 year_t + \varepsilon_{1jt} \qquad (1)$$

where FDI_{jt} denotes China's outward FDI to host country j in year t ($t = 2003, 2004, \ldots, 2012$) $Trade_{jt}$ is bilateral trade (imports plus exports) between China and country j in year t. The gravity term includes log of host-country GDP_{jt}, log of $Distance_j$, Common $Language_j$, and Legal $Origin_j$. $Distance_j$ is measured by the population-weighted distance between China and country j in kilometers; Common $Language_j$ is a dummy variable that takes a value of one if a language is spoken by at least 9% of the population in both China and country j, and zero otherwise; Legal $Origin_j$ includes five dummy variable: Legal origin – FR, Legal origin – GR, Legal origin – SC, Legal origin – SO, and Legal origin – UK, which equals to one if the legal origin of country j is, respectively, French (FR), Germany (GR), Scandinavian (SC), Socialist (SO), and United Kingdom (UK). Year fixed effects are also included in the estimation.

This empirical specification allows us to focus on the pattern of China's outward FDI and trade with the rest of the world, and subsequently the association of RMB swap lines with China's FDI. We note that there are several important considerations beyond the scope of our study, including (i) China's inward FDI may come at the expense of other countries' FDI inflows (Eichengreen and Tong, 2007) to begin with; (ii) the competitive effects of China's exports and the exports of other developing countries (Hanson and Robertson, 2010) may influence China's bilateral trade patterns; and (iii) a possibility that China's outward FDI, bundled with access to finance and the export of Chinese capital products and labor services may be a barrier to entry of late new comers in the destination countries (e.g., Nalebuff, 2004).

Table 3 column 1 reports estimates from the baseline regressions of Eq. (1). We find that bilateral trade is positively and significantly associated with outward-oriented Chinese FDI. Increasing the level of China's bilateral trade from 50th percentile (million US$ 8,703) to 75th

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[11] Gravity equation has been the benchmark approach to study bilateral FDI; see Buch (2005); Kleinert and Toubal (2010); Loungani, Mody and Razin (2002); Portes and Rey (2005), and also Anderson (2010) for a review of theoretical foundation.

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percentile (million US\$ 31,383) raises the level of China's FDI by 60%.[12] The distance between China and the recipient country (trading partner) j, log (Distance$_j$), is negatively and significantly associated with FDI. The coefficient estimate of log (GDP$_{jt}$) is negative but insignificant.

Delving further into China's trade with bilateral exports and imports in Eq. (1), we estimate the gravity equation and report the results in column 2 of Table 3. We find that Chinese outward FDI is positively and significantly associated with both its exports and imports. Increasing the level of China's bilateral exports from 50th percentile (million US\$ 4,852) to 75th percentile (million US\$ 16,453) raises the level of FDI by 51%, while increasing the level of China's bilateral imports from 50th percentile (million US\$ 3,158) to 75th percentile (million US\$ 12,913) raises the level of FDI by 32%. The effect of distance, GDP, and the other standard control variables remains significant and consistent with the previous results.

Although at the baseline we find a positive association between trade and FDI, the estimation results may be subject to endogeneity issue due to a two-way causality between asset flows and trade (Aviat and Coeurdacier, 2007). In the presence of reverse causality, the ordinary least square (OLS) estimations are bias and inconsistent. To address the endogeneity concern, we apply the instrumental variable (IV) approach. In particular, Chinese trade variables are instrumented with standard gravity variables relevant for bilateral trade (as in Eq. (1)) and also with the log of transport intensity of country j (measured as the number of domestic takeoffs and takeoffs abroad of air carriers registered in the host country j) as an additional instrument[13]

$$\log(\text{Trade}_{jt}) = \delta_2 + \alpha_2 \log(\text{Transport Intensity}_{jt}) + \theta_2 \text{Gravity}_{jt} + \kappa_2 \text{year}_t + \varepsilon_{2jt} \qquad (2)$$

We note that while the transport intensity variable has been useful in understanding trade flows, there is thus far no evidence that it should directly influence FDI. For example, Aviat and Coeurdacier (2007) use UPS shipping cost between two major cities of a country pair as an IV for trade and note that this instrument is independent of asset flows. We propose a use of similar IV based on the measure of transport intensity in our estimation.

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[12] Trade increases by log(31382.86)-log(8703.35) = 1.28. As the estimated coefficient is 0.47, this change increases FDI by 1.28*0.47*100% = 60%.

[13] Our instrumental variable approach is in line with the standard gravity models – i.e. Blonigen et al. (2007), in which a set of gravity variables covers host GDP, population, trade costs (e.g. inverse trade openness), human capital/skill, investment costs, surrounding-market potential, and distance.

Results from the two-stage least squares (2SLS) regression are reported in columns 3 and 4 of Table 3. The first-stage regression (column 3) based on Eq. (2) shows that China's bilateral trade is negatively associated with distance, and positively associated with the GDP of host countries and a common language variable. Transport Intensity is significantly and positively associated with bilateral trade, suggesting that this instrument is relevant. The second-stage regression (column 4) shows that bilateral trade has a positive and significant association with Chinese-outward FDI.[14]

The bottom of column 4 reports the C-statistics and p value for the corresponding endogeneity test. It rejects the null hypothesis that the trade (endogenous regressor) is exogenous in the FDI estimation at 1% significance level, which suggests that our IV approach is relevant. The excluded instrument Transport Intensity$_j$ passes the relevance test as the Lagrange multiplier statistic from the under identification test is 21.86 and significant at the 1% level. The Cragg-Donald Wald F statistic for weak identification is 21.86, which is higher than the Stock-Yogo weak ID test critical values for 10% maximal IV size 16.38. These statistics support our use of Transport Intensity$_j$ as the IV to purge out the endogeneity issue.

We re-estimate the 2SLS regression by instrumenting Chinese exports and imports with gravity variables, the log of Transport Intensity and the log of Geographic Size of host country j (measured in squared kilometers):

$$\log(\text{Exports}_{jt}) = \delta_3 + \alpha_3\log(\text{Transport Intensity}_{jt}) + \beta_3\log(\text{Geographic Size}_j)$$

$$+ \theta_3\text{Gravity}_{jt} + \kappa_3\text{year}_t + \varepsilon_{3jt} \qquad (3)$$

$$\log(\text{Imports}_{jt}) = \delta_4 + \alpha_4\log(\text{Transport Intensity}_{jt}) + \beta_4\log(\text{Geographic Size}_j)$$

$$+ \theta_4\text{Gravity}_{jt} + \kappa_4\text{year}_t + \varepsilon_{4jt} \qquad (4)$$

Note that we include also the host-country geographic size as an additional IV as geographic variables are found to be associated with trade (Frankel and Romer, 1999) but should

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[14] Ramasamy et al. (2012) found that during 2006–2008 Chinese state-controlled firms invested more in destination countries with natural resources regardless of political environments, whereas private firms were more market seekers. Kolstad and Wiig (2012) estimated a gravity model of outward Chinese FDI 2003–2006 on host country GDP, trade, inflation, distance, institutions, and natural resources; they found positive associations of Chinese FDI with GDP size and natural resources. We find a negative association between the aggregate Chinese FDI and GDP of the host country, but our sample covers 2003–2012, as well as before and after the GFC.

not directly influence FDI. Column 5-7 of Table 3 reports the 2SLS estimation results with instrumented Chinese exports and imports. The first-stage estimation results (columns 5 and 6) suggest that both Transport Intensity$_{jt}$ and Geographic Size$_j$ are significantly associated with Chinese exports and imports. Moreover, both under identification and weak identification tests support our choice of IVs (column 7). *The second-stage regression results (column 7) also indicate that, when disaggregating China's trade in the estimation into exports and imports, the positive association of imports with Chinese-outward FDI becomes larger while the association of exports with FDI outflows becomes statistically insignificant.*

We continue with additional tests, examining the effects of disaggregated trade, accounting for aggregate FDI flows and Greenfield FDI projects, and studying the association before and after the Global Financial Crisis of 2008–09. In the following, we include all gravity variables in the estimation as in Table 3, but report the coefficient estimates of log (Distance$_j$), log (GDP$_{jt}$), log(Tranport Intensity$_{jt}$), and log(Geographic Size$_j$) for brevity. Table 4 provides the gravity estimation of Chinese-outward FDI using as regressors the Chinese bilateral trade, disaggregated into exports and imports of commodities and manufactures. The OLS gravity estimation results (columns 1-4) suggest that Chinese exports of manufactures and imports of commodities with its trading partners are positively and significantly associated with the aggregate outflows of FDI to the recipient countries. The 2SLS regression with instrumented manufactures exports and commodities imports, as specified in Eq. (3) and (4), yields consistent findings (columns 5-7). Increasing the level of manufactures exports from 50th percentile (million US\$ 4,939) to 75th percentile (million US\$14,931) increases the Chinese-outward FDI by 68%. Additionally, increasing the level of commodities imports from 50th percentile (million US\$ 981) to 75th percentile (million US\$ 4,331) increases the Chinese-outward FDI by 82%.

The motives of Chinese-outward-oriented FDI become even more apparent when we examine further into the level of Greenfield FDI projects, disaggregating FDI outflows into tradable sector, nontradables sector, and natural resources sector. Table 5 reports coefficient estimates from the second-stage of 2SLS estimation for sectoral FDI, in terms of capital investment and employment creation, using instrumented manufactures exports and commodities imports (again, as specified in Eq.(3) and (4)). The estimation results suggest that disaggregated Chinese trade is associated with the patterns of tradable sector FDI and the natural resources sector FDI. Exports of manufactures are negatively associated with FDI outflows, while the

association of commodities imports with Chinese outward FDI is positive. *The positive association of commodities imports appears to be larger for Chinese outward FDI in the natural resources sector: increasing the level of commodities imports from 50th percentile (million US$ 981) to 75th percentile (million US$ 4,331) increases the Chinese-outward FDI to natural resources sector by 141%.* We also observe that the level of commodities imports is positively and significantly associated with the employment created by Chinese-outward FDI in the natural resource sector. Note that the negative association of China's manufactures exports and outward FDI could be the consequence of aggregation bias in the aggregate flows data as well as the outcome of proximity-concentration tradeoff that on the pattern of greenfield FDI.

Next we examine two subsamples of the data, the pre-crisis period that includes all observations from 2003 to 2007, and the post-crisis period that includes all observations from 2010 to 2012. Table 6 reports the coefficient estimates from the second-stage 2SLS regression for sectoral FDI capital investment in Greenfield projects. We find that the association between Chinese FDI outflows in natural-resources sector and commodities imports remains robust and becomes larger after the GFC (columns 5 and 6).

Turning to the hypothesis that Chinese-outward-oriented FDI is associated with both its trade and financial dealing with trading partners since the GFC, we add as a key determinant of Chinese FDI the provision of RMB swap-lines, together with its interactions with manufactures exports and commodities imports, to the estimation

$$\log(\text{FDI}_{jt}) = \delta_5 + \gamma_{51}\log(\text{Manufactures Exports}_{jt}) + \gamma_{52}\log(\text{Commodities Imports}_{jt})$$

$$+ \rho_{51}\log(\text{Manufactures Exports}_{jt})*\text{Swap}_{jt} + \rho_{52}\log(\text{Commodities Imports}_{jt})*\text{Swap}_{jt}$$

$$+ \phi_5\text{Swap}_{jt} + \theta_5\text{Gravity}_{jt} + \kappa_5\text{year}_t + \varepsilon_{5jt} \qquad (5)$$

where j denotes the recipient country (China's trading partner); Swap_{jt} is a dummy variable, equals to 1 if there is an established RMB swap-line between PBOC and the central bank of trading partner j in year t.[15] Both Manufactures Exports$_{jt}$, Commodities Imports$_{jt}$, as well as their

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[15] The swap indicator for a country-year is 1 if the PBOC swap line was established in the first three quarters of the year. If it is established in the last quarter, the swap indicator is coded as 1 for the next year.

interaction terms are considered endogenous regressors and instrumented by Transport Intensity$_{jt}$, Geographic Size$_j$, and the gravity variables.

Table 7 provides coefficient estimates from the 2SLS estimation based on Eq. (5). The first-stage estimation results of the 2SLS of Chinese-outward tradable sector FDI (estimates not reported for brevity) suggest that the excluded instruments, Host Transport Intensity and Host Geographic Size are significantly associated with manufactures exports, commodities imports, and their interaction terms. This suggests that the excluded instruments are relevant for estimating manufactures exports and commodities imports. The result are further supported by the under identification tests, rejecting the null hypothesis that the excluded instruments are not relevant at 1% significance level. The weak identification test suggests that the instruments are not weak, with the estimation bias of less than 10%.

The estimates from second-stage results shown in Table 7 suggest that the importance of commodities imports for Chinese FDI in natural resources has become greater since the Global Financial Crisis. With the first RMB swap line established in 2008, we find that the positive association between commodities imports and Chinese FDI in the natural resources sector is particularly larger in the subsample of 2009-2012 (columns 2 and 4). In terms of economic significance, increasing the level of commodities imports from 50th percentile (million US$ 981) to 75th percentile (million US$ 4,331) increases the Chinese-outward FDI to natural resources sector by 121%; including the interaction effect of RMB swap line the economic significance on FDI is 315%. *These findings are supportive to the hypothesis that in the aftermath of the GFC, Chinese-outward FDI is bundled with trade and financial linkages, increasing thereby the economic role of China in developing countries and emerging markets.*

To evaluate the robustness of our main findings thus far, we re-estimate Eq. (5) using different econometric specifications. Table 8 reports coefficient estimates from the second-stage of IV Tobit estimation and of IV Poisson pseudo-maximum-likelihood (PPML) for Chinese-outward FDI in the tradable sector and the natural resources sector [for brevity, the first stage regression results are not reported; these estimates are available upon request].[16] The robustness checks indicate that the interaction effects of RMB swap-line with China's commodities imports

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[16] Silva and Tenreyro (2006) pointed out that PPML is able to account for potential heteroskedasticity and to generate efficient estimation.

remain statistically significant (columns 2 and 4). Hence, the significance of commodities imports and interaction with RMB swap lines prevail across estimation methodologies.

To further verify the robustness of RMB swap-line in accounting for the Chinese outward FDI in natural resources sector, we add more control variables to the estimation. First, we add the information about Free Trade Agreement (FTA) of China; these FTAs were agreed with bilateral investment treaty. China has established 10 FTAs between 2003 and 2012 with 20 trading partners, 17 of which are in our sample[17]. To avoid potential collinearity of PBOC's RMB swap-line and FTAs, we replace $Swap_{jt}$ in Eq.(5) with FTA_{jt}, where FTA_{jt} is 1 if there is FTA between China and host country j in year t, and then estimate 2SLS estimation with instrumented manufacture exports and commodities imports (endogenous regressors), as well as their interaction with the FTA. We then also horserace Swap and FTA in Eq. (5):

$$\log(FDI_{jt}) = \delta_6 + \gamma_{61}\log(\text{Manufactures Exports}_{jt}) + \gamma_{62}\log(\text{Commodities Imports}_{jt})$$
$$+ \rho_{61}\log(\text{Manufactures Exports}_{jt})*Swap_{jt} + \rho_{62}\log(\text{Commodities Imports}_{jt})*Swap_{jt}$$
$$+ \eta_{61}\log(\text{Manufactures Exports}_{jt})*FTA_{jt} + \eta_{62}\log(\text{Commodities Imports}_{jt})*FTA_{jt}$$
$$+ \phi_{61}Swap_{jt} + \phi_{62}FTA_{jt} + \theta_6 Gravity_{jt} + \kappa_6 year_t + \varepsilon_{6jt,} \qquad (6)$$

Note that we estimate Eq.(6) by instrumenting manufactures exports and commodities imports (endogenous regressors) as well as their interaction terms with the following variables: Transport Intensity$_{jt}$, Geographic Size$_j$, interactions with PBOC swap lines and FTAs, and the gravity variables. The second-stage estimation results are reported in Table 9.

As shown in column 1 of Table 9 the FTA variable that is not statistically significant. Column 2 of Table 9 reports the second-stage estimation results based on 2SLS with instrumented trade variables and their interaction terms based on Eq.(6). The positive association between RMB swap-lines and Chinese outward FDI in the natural resources sector remains statistically significant even after controlling for FTAs. Next we include host-country official exchange rate against US$, international reserve accumulation, population size, skill of labor force, business investment costs, commodity export share (host country j's total commodities exports to the world as a share of its total exports to the world), CPI, and political stability, as additional controls in the gravity model of China's outward FDI to the natural resources sector in Eq.(5). The coefficient estimates from second-stage estimation that control for these variables are

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[17] See Lee et al. for detailed description of these FTAs; note that Taiwan, Iceland and Costa Rica are not in our estimation sample.

reported in columns 3-5 of Table 9. *Overall, we find that China's commodities imports and its interaction with RMB swap lines are the most robust variables in understanding the pattern of Chinese outward FDI in the natural resources sector during the past decade.*

4.   Concluding remarks

The results of our paper are in line with the conjecture that China has bundled outward FDI with its finance dealing, trade and foreign investment, thus leveraging its growing market clout. This outward mercantilism has been mostly applied to developing and emerging market economies, and to "commodity countries." This conjecture is consistent with the increasingly tighter relationships of China's imports, FDI and swap-lines. While it is pre-mature to estimate the returns on this bundling strategy, the outcome has been increased access of emerging Africa, Asia and Latin America to improved infrastructure services, co-financed and constructed with the help of Chinese capital goods and knowhow, and co-paid by the growing exports of commodities and minerals to China. The proposed formation of the Asian Infrastructure Investment Bank, in which China would be the main shareholder may be viewed as a follow up of this bundling strategy.
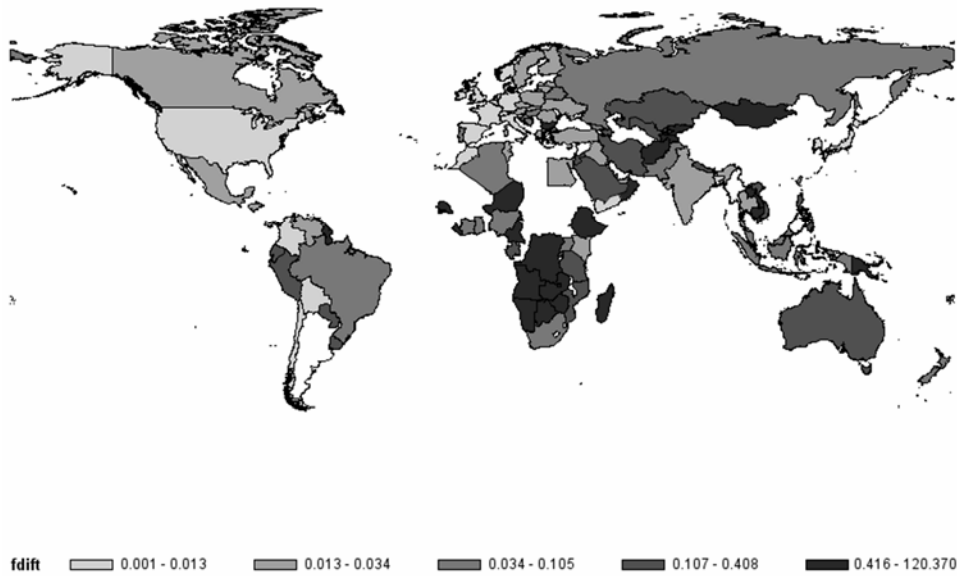
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Figure 1. Chinese Outward FDI, Bilateral Trade, and Renminbi Swap-lines.
The heat maps plot greenfield FDI, aggregate FDI, bilateral trade, and Renminbi (RMB) swap-lines, all as a ratio of recipient country (trading partner)'s GDP; darker colour corresponds to higher intensity (averaged over the sample period, from year 2003 to 2012).

A. China's Greenfield FDI

fdift ☐ 0.001 - 0.013 ☐ 0.013 - 0.034 ☐ 0.034 - 0.105 ☐ 0.107 - 0.408 ■ 0.416 - 120.370

B. China's Aggregate FDI

fdi ☐ -0.004 - 0.001 ☐ 0.001 - 0.006 ☐ 0.006 - 0.020 ☐ 0.022 - 0.069 ■ 0.096 - 7.218

C. China's Bilateral Trade

trade ☐ 0.002 - 0.011 ☐ 0.011 - 0.017 ☐ 0.017 - 0.029 ☐ 0.029 - 0.049 ■ 0.049 - 0.602

D. RMB Swap-lines

swap ☐ 0.001 - 0.001 ☐ 0.003 - 0.011 ☐ 0.012 - 0.021 ☐ 0.024 - 0.028 ■ 0.033 - 0.113
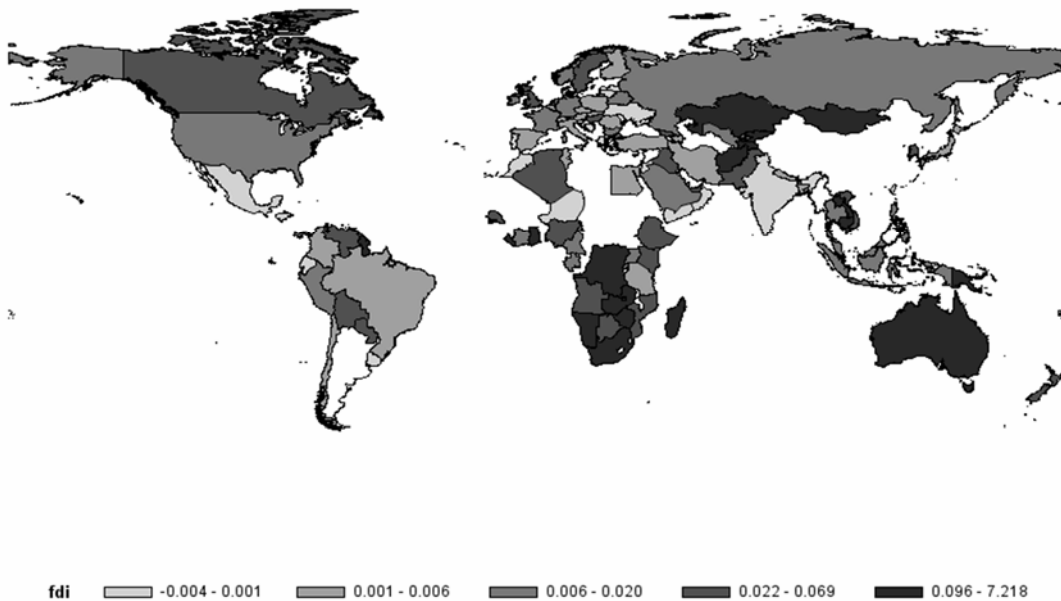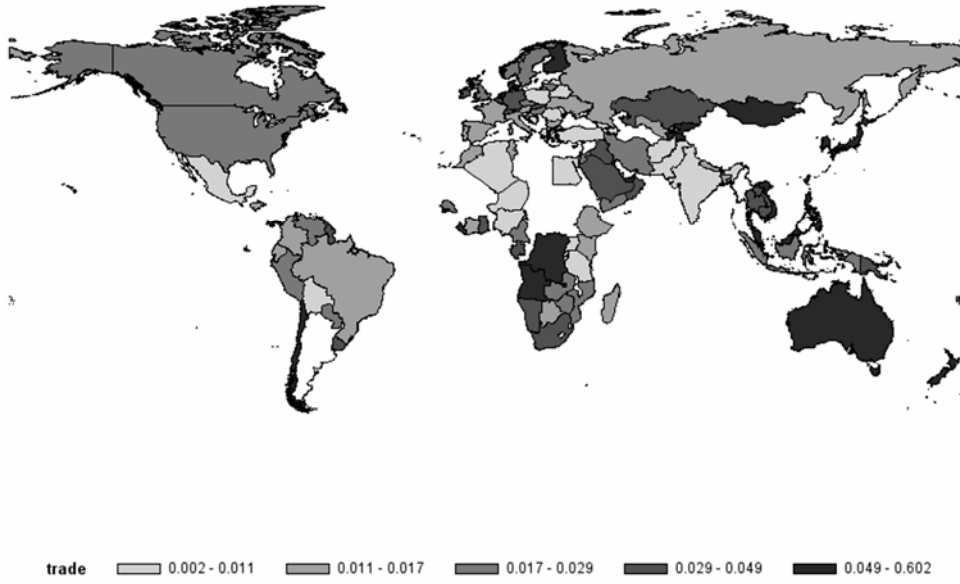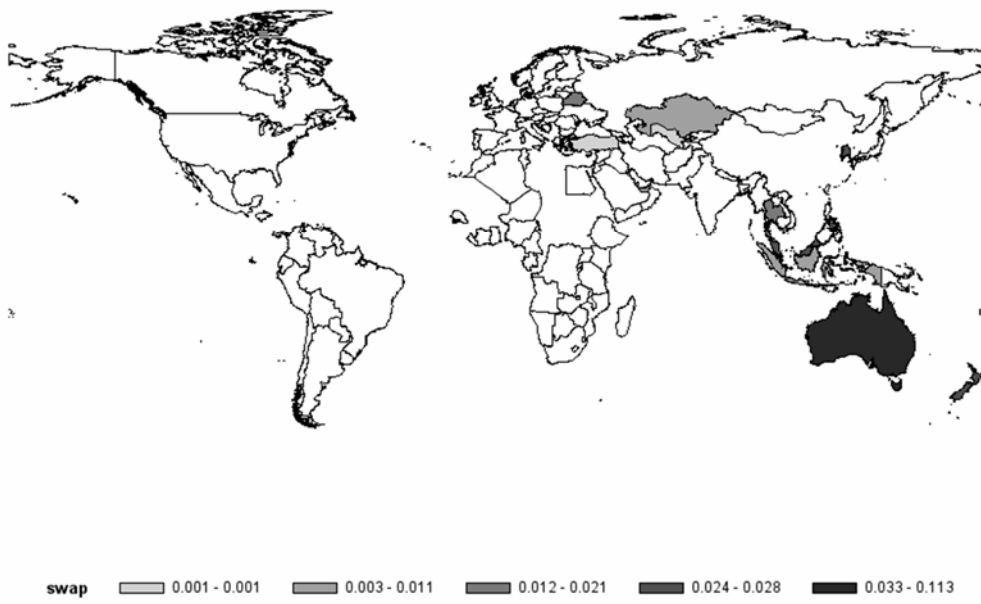
Figure 2. Relationship between Chinese FDI, Trade, and RMB Swap-lines.
The diamond chart plots, based on bilateral data, the relationship of Chinese FDI, exports, imports, and swap-lines, all measured as a ratio of recipient country (trading partner)'s GDP, weighted by the sample means. The dotted, dashed and solid lines plot, respectively, the relationships before, during, and after the Global Financial Crisis. The recipient countries (trading partners) are listed in Appendix Table B.

A. Chinese FDI: Greenfield
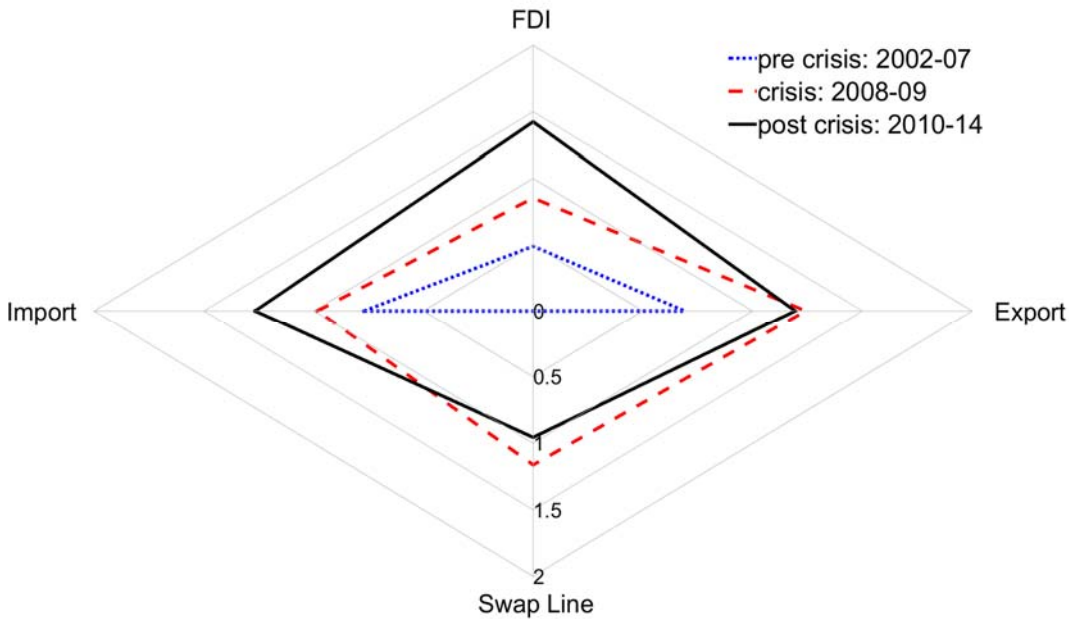
B. Chinese FDI: Aggregate
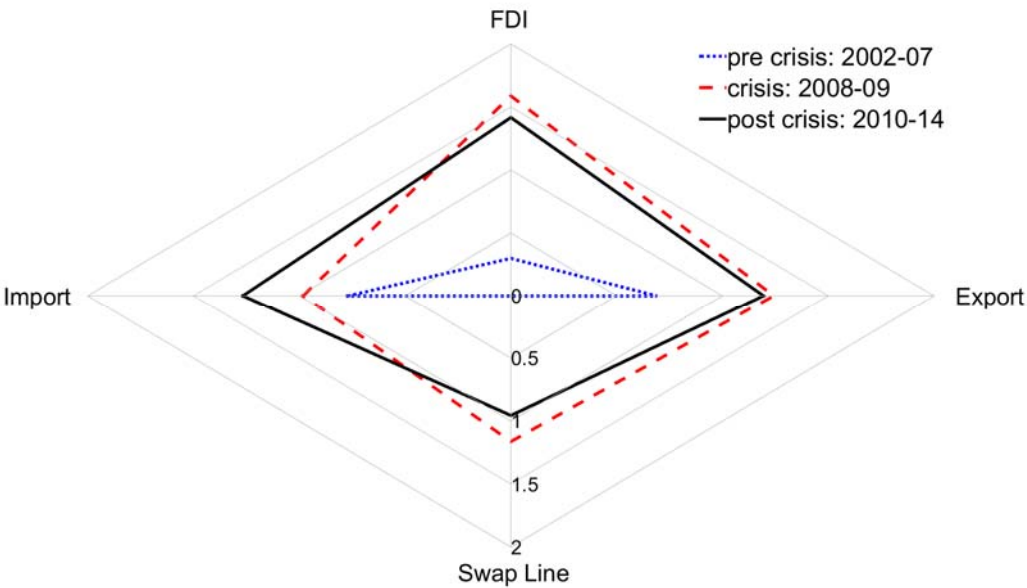
Table 1. Summary Statistics.
China's Outward Aggregate FDI is from the UNCTAD FDI/TNC database. China's Outward Greenfield FDI covers tradable sector FDI, nontradable sector FDI and natural resources FDI from fDi Intelligence. China's Total Trade is the sum of its bilateral exports and imports from China Statistical Year Book. RMB swap-line is the amount of currency swap between Peoples' Bank of China and the central bank of recipient country. Host GDP, Transport Intensity, Exchange Rate, International Reserve, Population, Business Investment Costs, Commodity Export Share, CPI are, respectively, gross domestic product, the number of takeoffs by air carriers registered in host country, exchange rate of host currency against USD, international reserve, total population, the number of start-up procedures to register a new business, total commodity export as a share of total export, consumer price index from World Development Indicators. Host Geographic Size is the land area of host country from CEPII. Host skill is measured by Barro-Lee average years of total schooling of population above 25 years old from Education Attainment database. Political stability is the percentile rank of political stability and absence of violence/terrorism from Worldwide Governance Indicators. Employment data is the number of jobs created by China's FDI drawn from fDi Intelligence. China's commodities exports/imports and manufactures exports/imports are from UN Comtrade. All statistics are reported in million US$ except for the Host Transport Intensity (in million takeoffs), Host Geographic Size (in million square kilometres), Host Exchange Rate (host currency against USD; higher value corresponds to host currency depreciation), Host Population (in million persons), Host Skills (in years), Host Business Investment Costs (number of procedure), Host Commodity Export Share (in percentage), Host CPI (index), Host Political Stability (in percentile rank), and employment (in persons).

|	obs.	Mean	Std. Dev.	Min	Max
Country level data					
China's Outward Aggregate FDI	563	574.07	3856.66	-814.91	51238.44
China's Outward Greenfield FDI	563	380.22	781.34	0.20	5660.65
China's Exports	563	18461.81	42490.63	0.43	351776.80
China's Imports	559	13002.48	26319.86	0.03	194563.50
China's Total Trade	563	31371.91	62057.24	0.46	484674.30
RMB Swap Line	27	18090.51	16272.36	111.02	64188.97
Host GDP	563	1063091.00	2153602.00	2160.00	15900000.00
Host Transport Intensity	532	0.40	1.30	0.00	10.10
Host Geographic Size	563	1.46	3.05	0.00	17.08
Host Exchange Rate	461	1027.34	3290.38	0.28	25000.00
Host International Reserve	543	72502.17	148899.00	75.50	1260000.00
Host Population	558	68.93	160.23	0.39	1240.00
Host Skill	519	8.71	2.83	1.10	13.42
Host Business Investment Costs	550	8.11	3.55	1.00	18.00
Host Commoditity Export Share	512	29.53	28.05	0.00	98.50
Host CPI	548	92.73	17.81	37.30	244.00
Host Political Stability	558	47.42	29.13	0.47	99.04
Sectoral Data					
Tradable Sector FDI	376	179.00	377.03	0.37	3450.76
NonTradable Sector FDI	343	103.63	307.90	0.20	3542.00
Natural Resources FDI	210	529.62	918.46	0.10	4589.20
Employment Generated by Tradable Sector FDI	376	685.82	1160.17	5	8000
Employment Generated by NonTradable Sector FDI	343	325.15	849.61	1	9926
Employment Generated by Natural Resources FDI	210	643.39	1056.84	1	6008
China's Commodities Exports	563	1262.92	2718.33	0.03	17572.50
China's Manufactures Exports	563	17316.88	40190.52	10.12	341134.50
China's Commodities Imports	563	4541.55	9128.37	0.00	78861.91
China's Manufactures Imports	563	8183.49	22289.10	0.00	180135.20

Table 2. Swap-lines provided by US Federal Reserve (billion US$), European Central Bank (billion Euro), and People's Bank of China (billion Renminbi), December 2007 – October 2014. Source: Aizenman, Jinjarak and Park (2014) and Garcia-Herrero and Xia (2015).

Recipient Country	US Federal Reserve	European Central Bank	People's Bank of China
Albania			2
Argentina			70
Australia	30		200
Brazil	30		190
Belarus			20
Canada	30, standing	standing	
Denmark	15	15	
ECB	300, standing		350
Hong Kong			400
Hungary		5	10
Iceland		1.5	3.5
Indonesia			100
Japan	120, standing	standing	20
Kazakhstan			7
Korea	30		360
Mexico	30		
Malaysia			180
Mongolia			10
Norway	15		
New Zealand	15		25
Pakistan			10
Poland		10	
Russia			standing
Sweden	30		
Singapore	30		300
Switzerland	60, standing	standing	
Thailand			70
Turkey			1.6
Ukraine			15
United Arab Emirates			35
United Kingdom	100, standing	standing	200
Uzbekistan			0.7

Table 3. Baseline Results with Aggregate FDI Flows.

This table provides estimates from the gravity estimation of China's aggregate bilateral FDI and bilateral trade. All non-discrete variables are measured in logs. Total Trade is the sum of bilateral exports and imports between China and the host country (trading partner). Distance is the population-weighted distance between China and the host country in kilometres. Legal Origin-FR (GR, SC, or SO) is a dummy that equals to 1 if the legal origin of the host country is French (German, Scandinavian, or Socialist) and 0 otherwise. Common Language takes a value of 1 if at least 9% of the host country population speak the same language with that of China. Host Transport Intensity is the number of takeoffs by registered air carriers in host country. Host Size is the geographic area of host-country territory measured in square of kilometres. The under identification (Id.) test reports the Lagrange multiplier (LM) test of the null hypothesis that the excluded instruments are not relevant; the weak Id. test presents the Cragg-Donald Wald F statistic, the endogeneity test reports the C-statistics of the null hypothesis that the endogenous regressors are exogenous. All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level. The Stock-Yogo weak ID test critical value for 10% maximal IV size is 16.38 for 2SLS with instrumented total trade (endogenous regressor) equation, and 7.03 for instrumented exports and imports (endogenous regressor) equation.

Estimation Model with Aggregate FDI Data	Gravity Model		Gravity Models with Instrumented Trade Variables				
			1st Stage	2nd stage	1st Stage		2nd stage
	log(FDI)	log(FDI)	log(Total Trade)	log(FDI)	Log(Exports)	Log(Imports)	log(FDI)
log(Total Trade)	.47			1.15			
	(.09)***			(.42)***			
Log(Exports)		.42					.10
		(.10)***					(.35)
Log(Imports)		.23					1.11
		(.06)***					(.24)***
log(distance)	-.54	-.45	-.59	-.13	-.57	-.61	-.23
	(.16)***	(.16)***	(.08)***	(.28)	(.07)***	(.12)***	(.29)
log(Host GDP)	-.07	-.28	.70	-.69	.73	.71	-.90
	(.09)	(.11)**	(.05)***	(.39)*	(.05)***	(.08)***	(.42)**
Legal origin - FR	-.88	-.84	-.22	-.77	-.22	-.12	-.69
	(.18)***	(.18)***	(.10)**	(.22)***	(.08)***	(.14)	(.24)***
Legal origin - GE	-1.21	-1.24	.39	-1.49	-.20	1.47	-2.19
	(.34)***	(.34)***	(.17)**	(.39)***	(.15)	(.26)***	(.46)***
Legal origin - SC	-1.76	-2.14	-2.95	.35	.14	.51	-4.10
	(.42)***	(.42)***	(.49)***	(1.51)	(.50)	(.86)	(1.33)***
Legal origin - SO	-.80	-.82	-.32	-.52	-.06	-.27	-.52
	(.24)***	(.23)***	(.12)**	(.30)*	(.10)	(.18)	(.30)*
Common language	.86	.56	1.35	-.12	1.04	2.38	-.13
	(.36)**	(.37)	(.18)***	(.71)	(.19)***	(.33)***	(.76)
log(Host Transport Intensity)			.23		.26	.24	
			(.05)***		(.04)***	(.07)***	
log(Host Geographic Size)					-.08	.22	
					(.02)***	(.04)***	
Constant	4.53	5.34	3.25	4.27	2.68	-1.05	8.74
	(1.56)***	(1.56)***	(.82)***	(1.96)**	(.68)***	(1.18)	(1.97)***
Under Id. Test				21.86			34.76
p value of Under Id. Test				.00			.00
Weak Id. F Statistic				22.06			18.05
Endogeneity Test				7.53			14.07
p value of Endogeneity Test				.01			.00
R-sq.	.46	.47	.99	.86	.99	.98	.82
Observations	470	468	445	445	443	443	443

Table 4. China's Aggregate FDI and Disaggregated Trade: Exports and Imports of Commodities and Manufactures.

This table provides the estimates from gravity estimation of China's aggregate outward FDI. The first four columns report estimation based on OLS, while columns five to seven report the 2SLS estimation with instrumented manufactures exports and commodities imports (endogenous regressors). All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level. The Stock-Yogo weak ID test critical value for 10% maximal IV size is 7.03 for 2SLS with instrumented manufactures exports and commodities imports (endogenous regressors).

Estimation Model with	Gravity Model				Gravity Models with Instrumented Disaggregated Trade Variables		
					1st Stage		2nd stage
Aggregate FDI Data	log(FDI)	log(FDI)	log(FDI)	log(FDI)	log(Manufactures Exports)	log(Commodities Imports)	log(FDI)
log(Commodities Exports)	.21 (.07)***						
log(Manufactures Exports)		.54 (.10)***					.62 (.29)**
log(Commodities Imports)			.36 (.05)***				.55 (.10)***
log(Manufactures Imports)				-.13 (.04)***			
log(Distance)	-.51 (.18)***	-.51 (.16)***	-.64 (.15)***	-.90 (.16)***	-.49 (.07)***	-.81 (.14)***	-.22 (.22)
log(Host GDP)	.15 (.09)	-.15 (.11)	.03 (.07)	.59 (.09)***	.74 (.05)***	.42 (.09)***	-.74 (.32)**
log(Host Transport Intensity)					.27 (.04)***	.23 (.08)***	
log(Host Geographic Size)					-.09 (.02)***	.53 (.04)***	
Constant	4.41 (1.61)***	5.10 (1.56)***	5.71 (1.52)***	3.84 (1.64)**	1.83 (.68)***	-.34 (1.34)	6.91 (1.48)***
Under Id. Test							43.55
p value of Under Id. Test							.00
Weak Id. F Statistic							23.10
Endogeneity Test							14.18
p value of Endogeneity Test							.00
R-sq.	.43	.46	.49	.43	.99	.97	.89
Observations	470	470	470	470	445	445	445

Table 5. China's Trade and Sectoral Greenfield FDI: Capital Investment and Employment in Tradable, Nontradable, and Natural Resources Sectors.

This table provides estimates from the gravity estimation of China's sectoral Greenfield FDI. Capital Investment is the log of total amount of investment directed to the specified sector, while employment is the total number of jobs created by the FDI. All the other variables are as described in Table 3. All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level. Manufactures Exports and Commodities Imports are endogenous regressors. The Stock-Yogo weak ID test critical value for 10% maximal IV size is 7.03.

Estimation Model with Greenfield FDI Data	log(Tradable Sector FDI)		log(Nontradable Sector FDI)		log(Natural Resources FDI)	
	Capital Investment	Employment	Capital Investment	Employment	Capital Investment	Employment
log(Manufactures Exports)	-.62	-.97	.15	-.36	-1.95	-1.36
	(.28)**	(.26)***	(.33)	(.33)	(.60)***	(.48)***
log(Commodities Imports)	.38	.31	.11	.13	.95	.65
	(.14)***	(.13)**	(.12)	(.12)	(.25)***	(.20)***
log(Distance)	-.48	-.70	-.43	-.39	-1.41	-.96
	(.26)*	(.24)***	(.25)*	(.25)	(.45)***	(.36)***
log(Host GDP)	.46	.91	.06	.52	1.01	.76
	(.35)	(.33)***	(.39)	(.39)	(.63)	(.50)
Constant	5.21	6.50	4.19	3.23	14.60	12.05
	(2.00)***	(1.87)***	(1.74)**	(1.74)*	(3.32)***	(2.64)***
Under Id. Test	48.33	48.33	25.22	25.22	29.25	29.25
p value of Under Id. Test	.00	.00	.00	.00	.00	.00
Weak Id. F Statistic	26.43	26.43	12.87	12.87	15.60	15.60
Endogeneity Test	12.39	15.34	.48	1.75	9.53	7.23
p value of Endogeneity Test	.00	.00	.79	.42	.01	.03
R-sq.	.84	.92	.86	.91	.81	.90
Observations	362	362	327	327	198	198

Table 6. Before and After the Global Financial Crisis: Stronger Relationship between Chinese Natural Resources FDI and Commodities Imports After the Crisis.

This table provides the second-stage gravity estimation results from two-stage ordinary least square estimation of China's sectoral Greenfield FDI before and after the GFC of 2008-09. The pre-Crisis subsample includes all observations from year 2003 to 2007, while the post-crisis sample includes all observations from 2010 to 2012. Manufactures Exports and Commodities Imports (endogenous regressors) are instrumented with Transport Intensity, Geographic Size of host countries, and gravity variables (as included in Table 3). All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level.

Estimation Model with Greenfield FDI Data	log(Tradable Sector FDI)		log(Nontradable Sector FDI)		log(Natural Resources FDI)	
	Pre Crisis	Post Crisis	Pre Crisis	Post Crisis	Pre Crisis	Post Crisis
log(Manufactures Exports)	-.73	-.02	-.09	.63	-3.90	-.74
	(.35)**	(.67)	(.32)	(.62)	(1.74)**	(.67)
log(Commodities Imports)	.22	.43	.20	.08	.76	1.67
	(.20)	(.24)*	(.27)	(.18)	(.44)*	(.57)***
log(Distance)	-.69	-.45	-.87	-.13	-3.28	-.98
	(.37)*	(.45)	(.39)**	(.41)	(1.35)**	(.82)
log(Host GDP)	.62	-.07	.06	-.28	3.62	-1.05
	(.49)	(.81)	(.50)	(.66)	(1.92)*	(.80)
Constant	5.81	6.17	9.34	2.05	11.89	20.60
	(2.83)**	(3.71)*	(3.39)***	(2.50)	(6.17)*	(9.72)**
R-sq.	.81	.86	.83	.88	.66	.77
Observations	135	142	121	137	80	63

Table 7. PBOC's Renminbi Swap Lines, Trade, and Chinese Outward FDI: The Importance of Commodities Imports for Chinese FDI in Natural Resources Has Become Greater Since the Global Financial Crisis.

This table reports the second-stage estimation results from two-stage least square (2SLS) estimation. The first-stage estimation (coefficients not reported) are regressions of manufactures exports, commodities imports and their interactions with PBOC's Renminbi swap lines as a function of Transport Intensity (number of takeoffs by registered carriers in host country), Geographic Size (land area of host country), the interaction between Transport Intensity and PBOC swap lines, the interaction between Geographic Size and PBOC swap lines, and gravity variables. Swap is a dummy variable that takes a value of 1 if there is a central bank swap line with China, and 0 otherwise. The second-stage estimation uses the instrumented variables (endogenous regressors) as the controls in the gravity model of China's FDI to host country. Columns 1 and 2 reports the second-stage results using the whole sample, while column 3 and 4 reports the results based on a subsample that covers 2009 to 2012 (2009 is the first year that the PBOC swap line comes into effect). All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level.

Estimation Model with Greenfield FDI Data	Whole Sample		Swap Subsample (year 2009 to 2012)	
	log(Tradable Sector FDI)	log(Natural Resources FDI)	log(Tradable Sector FDI)	log(Natural Resources FDI)
log(Manufactures Exports)	-.68	-1.85	-.14	-.24
	(.29)**	(.65)***	(.51)	(.82)
log(Commodities Imports)	.35	.83	.47	1.43
	(.15)**	(.27)***	(.24)**	(.52)***
log(Manufactures Exports)*Swap	.63	-1.43	.01	-2.79
	(.40)	(.86)*	(.45)	(1.51)*
log(Commodities Imports)*Swap	-.10	1.29	.09	1.10
	(.31)	(.61)**	(.27)	(.65)*
Swap	-4.46	2.89	-.42	17.61
	(2.55)*	(6.75)	(3.15)	(10.97)
log(Distance)	-.41	-1.45	-.18	-1.01
	(.25)	(.46)***	(.34)	(.71)
log(Host GDP)	.53	1.00	.00	-1.11
	(.36)	(.68)	(.63)	(.98)
Impact of Manufactures Exports with swap	-.05	-3.28	-.13	-3.02
p-value	.92	.00	.73	.01
Impact of Commodities Imports with swap	.25	2.12	.56	2.53
p-value	.41	.00	.05	.00
Under Id. Test	45.78	26.51	8.54	5.58
p value of Under Id. Test	.00	.00	.00	.02
Weak Id. F Statistic	12.31	6.84	3.61	2.63
Endogeneity Test	16.75	15.45	12.86	13.84
p value of Endogeneity Test	.00	.00	.01	.01
R-sq.	.85	.81	.85	.79
Observations	362	198	183	88

Table 8. Alternative Specifications for China's Outward FDI and Instrumented Variables (Endogenous Regressors): The Significance of Commodities Imports-Swap Interaction Prevails across Estimation Methodologies.

This table reports results of the second-stage estimation of China's outward FDI in tradable sector and FDI in natural resources sector using Tobit regression in columns 1 and 2, and Poisson pseudo-maximum-likelihood (PPML) in columns 3 and 4, with instrumented manufactures exports, commodities imports, and their interactions with PBOC swap lines. Swap is a dummy variable that takes a value of 1 if there is a central bank swap line with China. All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level.

Estimation Model with Greenfield FDI Data	2nd Stage Tobit Estimation with Instrumented Variables		2nd Stage Poisson Estimation with Instrumented Variables	
	log(Tradable Sector FDI)	log(Natural Resources FDI)	Tradable Sector FDI	Natural Resources FDI
log(Manufactures Exports)	-.68	-1.84	-.59	-.99
	(.29)**	(.66)***	(.20)***	(.72)
log(Commodities Imports)	.35	.82	.17	.04
	(.15)**	(.27)***	(.14)	(.28)
log(Manufactures Exports)*Swap	.63	-1.44	.74	-.54
	(.40)	(.87)*	(.47)	(1.01)
log(Commodities Imports)*Swap	-.10	1.29	.21	1.89
	(.31)	(.62)**	(.44)	(.71)***
Swap	-4.46	2.89	-8.21	-11.98
	(2.56)*	(6.87)	(6.58)	(8.91)
Impact of Manufactures Exports with swap	-.05	-3.28	.15	-1.52
p-value	.92	.00	.74	.09
Impact of Commodities Imports with swap	.25	2.12	.38	1.93
p-value	.41	.00	.31	.01
Observations	362	198	362	198

Table 9. Robustness with Additional Control Variables for Explaining Chinese Natural Resources FDI: Commodities Imports and Its Interaction with Swap Lines are the Most Robust Variables.

This table reports results of the second-stage least square estimation with additional variables. Column 1 reports the regression of China's outward FDI to natural resources sector as a function of standard gravity variables (coefficients not reported), Free Trade Agreement (FTA) dummy variable, and four instrumented variables (endogenous regressors) that include manufactures exports, commodities imports, and their interactions with FTAs. Column 2 reports the results with swap dummy variable, and two additional instrumented variables that include the interaction between manufactures export and commodity import with swap lines. Column 3-5 reports the regressions of China's outward FDI to natural resources sector as a function of standard gravity variables (coefficient not reported), swap dummy variable, and four instrumented variables that include manufactures exports, commodities imports, their interactions with swap lines, controlling for host-country official exchange rates, international reserves, population, skill, business investment costs, CPI, political stability, and commodities exports share. All regressions control for year fixed effect. Standard errors in parentheses, with *** (**, *) signifies statistical significance at 1 (5, 10) % level.

Estimation Model with Greenfield FDI Data	2nd-Stage OLS Estimation of log(Natural Resources FDI)				
log(Manufactures Exports)	-1.99	-1.96	-1.20	-1.22	-.81
	(.67)***	(.70)***	(.68)*	(.95)	(1.00)
log(Commodities Imports)	.97	.98	.64	.89	.79
	(.23)***	(.24)***	(.27)**	(.27)***	(.37)**
log(Manufactures Exports)*Swap		-1.93	-1.31	.15	-1.88
		(.94)**	(.82)	(1.45)	(.85)**
log(Commodities Imports)*Swap		1.59	1.21	3.24	1.27
		(.73)**	(.59)**	(1.92)*	(.57)**
log(Manufactures Exports)*FTA	-.00	1.11			
	(1.09)	(1.23)			
log(Commodities Imports)*FTA	-.11	-1.06			
	(.82)	(.98)			
Swap		5.73	2.80	-31.44	7.90
		(6.52)	(6.22)	(30.18)	(6.74)
FTA	1.33	-1.14			
	(4.34)	(4.48)			
log(Host Exchange Rate)			.03		
			(.07)		
log(Host International Reserve)			-.27		
			(.25)		
log(Host Population)				.25	
				(.30)	
log(Host Skill)				.77	
				(1.04)	
log(Host Business Investment Costs)				.44	
				(.41)	
log(Host CPI)					-.21
					(1.33)
log(Host Political Stability)					-.48
					(.29)
log(Host Commoditity Export Share)					.13
					(.55)
Impact of Manufactures Exports with swap		-3.90	-2.51	-1.07	-2.69
p-value		.00	.00	.44	.01
Impact of Commodities Imports with swap		2.57	1.85	4.13	2.06
p-value		.00	.00	.02	.00
R-sq.	.81	.81	.85	.83	.82
Observations	198	198	168	185	179

Appendix Table A. Top China's Direct Foreign Investment Activities and Investing Companies (Outward Greenfield FDI) Before and After the Global Financial Crisis.

This table reports the largest capital investments by China in host countries from January 2003 to January 2015, based on fDi Intelligence database.

Top Industries

January 2003 - January 2015

Industry Activity	Capital Investment (million US$)	Employment (persons)	Projects (number)	Companies (number)
Metals	67,972	109,750	240	145
Coal, Oil and Natural Gas	66,794	22,734	101	51
Real Estate	30,523	87,217	61	41
Automotive	29,072	164,061	209	64
Renewable Energy	22,354	5,345	89	59

January 2010 - January 2015 (After the Global Financial Crisis)

Industry Activity	Capital Investment (million US$)	Employment (persons)	Projects (number)	Companies (number)
Metals	25,412	41,166	114	85
Real Estate	23,264	58,499	38	20
Coal, Oil and Natural Gas	20,258	8,837	39	26
Automotive	18,185	101,019	121	45
Renewable energy	16,927	3,748	65	46

Top Companies

January 2010 - January 2015 (After the Global Financial Crisis)

Investing Company	Capital Investment	Project Date	Industry Activity	Host Country	RMB Swap Line
Zhejiang Hengyi Group	4,300	Jul-2011	Petroleum refineries	Brunei	No
China Gezhouba (CGGC)	3,500	Mar-2014	Fossil fuel electric power	Pakistan	Yes
Shanghai Greenland Group	3,250	Mar-2014	Real Estate	Malaysia	Yes
Shanghai Greenland Group	3,200	Dec-2014	Commercial & institutional building construction	South Korea	Yes
MMG	3,000	Apr-2014	Copper, nickel, lead, & zinc mining	Peru	No
China Triumph International Engineering	3,000	Aug-2014	All other industrial machinery	Russia	Yes
China Petroleum and Chemical (Sinopec)	2,617	Mar-2011	Petroleum refineries	Saudi Arabia	No
Chongqing Grain Group	2,536	Apr-2011	Grains & oilseed	Brazil	Yes
Jinchuan	2,000	Sep-2010	Support Activities for Mining	Indonesia	Yes
Anshan Iron and Steel Group (Angang)	2,000	Oct-2011	Iron & steel mills & ferroalloy	India	No

Appendix Table B. Country List.
Countries that appear in both (Greenfield) fDi Intelligence (FT) and (Aggregate) UNCTAD FDI database. Countries marked by * are not included in the estimation sample due to the missing observations in the control variables.

Afghanistan	Ethiopia	Luxembourg	Senegal
Algeria	Fiji	Macau	Singapore
Angola	Finland	Madagascar	Slovakia
Argentina*	France	Malaysia	South Africa
Australia	Gabon	Mexico	South Korea
Austria	Georgia	Mongolia	Spain
Azerbaijan	Germany	Morocco	Sudan
Bangladesh	Ghana	Mozambique	Sweden
Belarus	Greece	Myanmar (Burma)*	Switzerland
Belgium	Guyana	Namibia	Syria*
Bolivia	Honduras	Nepal	Taiwan*
Bosnia-Herzegovina	Hong Kong	Netherlands	Tajikistan
Botswana	Hungary	New Zealand	Tanzania
Brazil	India	Niger	Thailand
Brunei	Indonesia	Nigeria	Tunisia
Bulgaria	Iran	Norway	Turkey
Cambodia	Iraq	Oman	UAE
Cameroon	Ireland	Pakistan	United Kingdom
Canada	Israel	Panama	Uganda
Cayman Islands*	Italy	Papua New Guinea	Ukraine
Chile	Japan	Paraguay	United States
Colombia	Jordan	Peru	Uruguay
Congo (DRC)	Kazakhstan	Philippines	Uzbekistan
d'Ivoire (Ivory Coast)	Kenya	Poland	Venezuela
Croatia	Kuwait	Portugal	Vietnam
Cyprus	Kyrgyzstan	Qatar	Yemen
Czech Republic	Laos	Romania	Zambia
Denmark	Latvia	Russia	Zimbabwe
Ecuador	Liberia	Rwanda	
Egypt	Lithuania	Saudi Arabia	

Appendix Table C. Classifications of FDI Sectors in the Estimation based on Industry Groups in fDi Intelligence (Financial Times) database.

Tradables		Nontradables	Natural Resources
Aerospace	Electronic Components	Business Services	Coal, Oil and Natural Gas
Alternative/Renewable energy	Engines & Turbines	Communications	Ceramics & Glass
Automotive Components	Food & Tobacco	Financial Services	Metals
Automotive OEM	Industrial Machinery, Equipment & Tools	Healthcare	Plastics
Beverages	Medical Devices	Hotels & Tourism	Rubber
Biotechnology	Non-Automotive Transport OEM	Leisure & Entertainment	Minerals
Building & Construction Materials	Paper, Printing & Packaging	Real Estate	Wood Products
Business Machines & Equipment	Pharmaceuticals	Software & IT services	
Chemicals	Semiconductors	Transportation	
Consumer Electronics	Textiles	Warehousing & Storage	
Consumer Products			