China's Outward Foreign Direct Investment and Economic Growth in Developing Countries

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Abstract: *The implementation of China's open development strategy has unveiled a wave of outward foreign direct investment (OFDI) by Chinese companies, with global implications. Based on panel data from 146 developing countries from 2003 to 2017, we investigate the growth effects of China's OFDI. We find that China's OFDI has promoted significant economic growth in developing countries. Not only could China's OFDI increase GDP per capita of a country in a short time but raise the country's long-run equilibrium value as well. In addition, the growth effects of China's OFDI were more significant for countries with weak governance, rich resource, and modest human capital, and were above the average level for Belt and Road Initiative (BRI) countries, African countries, and in the post-crisis era. Our research helps unravel the global significance of Chinese companies investing overseas and contributes to research on the growth effects of direct investment between developing countries.*

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1. Introduction

China's implementation of an all-round "opening up" policy, especially its Belt and Road Initiative (BRI), has led to a boom in China's outward foreign direct investment (OFDI). China's OFDI in 2019 totaled 136.91 billion US dollars, ranking second in the world, and its OFDI stock had amounted to 2,198.88 billion US dollars, ranking third globally. In addition, the share of China's OFDI has been rising steadily for BRI countries, African countries, and the developing world as a whole (see Figure 1).[1, 2] Hence, the overseas operations and direct investment of Chinese companies constitutes an economic phenomenon with global implications.

China's OFDI has brought much-needed capital and technology to numerous developing countries, but many Western scholars have raised concerns and skepticism about China's intension. Some consider that the inclination of Chinese multinational companies to invest in resource-rich developing countries makes these target countries more resource-dependent and vulnerable to the "resource curse" (Asongu and Ssozi, 2016; Busse *et al*., 2016), while others worry that multinational companies from developing countries may bypass government regulation and seize local market share by bribery and other means, thus thwarting the efforts of developed countries to improve institutional quality in those developing

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[1] "Share of China's OFDI" refers to the share of China's OFDI in the total amount of foreign direct investment received by a host country.
[2] The list of BRI countries can be obtained from *Statistical Bulletin of China's OFDI* compile by China's Ministry of Commerce.

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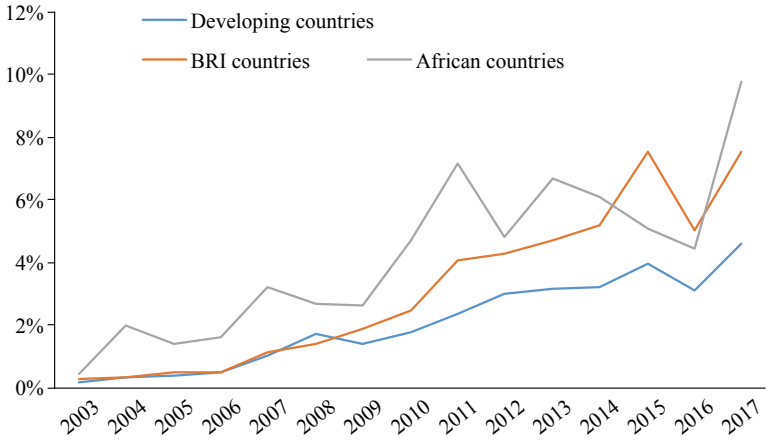


Figure 1: The Share of China's OFDI in the Total Amount of FDI in Host Countries (2003-2017)

Source: *Statistical Bulletin of China's OFDI* and the UNCATD database for relevant years.

countries (Rosen and Hanemann, 2009; Kolstad and Wiig, 2011; Demir, 2016).

In this context, a question to be answered is what effects China's OFDI has had on the economic growth of developing countries? Has China's OFDI induced or inhibited economic growth in developing countries? Answering to these important questions helps assess the global implications of Chinese companies operating overseas, as well as the new sources of economic growth for developing countries in the post-crisis era (2008-today), and this is precisely what this study sets out to do. This study also supplements research on the growth effects of direct investment between developing countries.

Numerous scholars have focused on exploring the determinants of the international distribution of China's OFDI, paying special attention to such factors as the market size, technological performance, institutional quality, and resource endowment of host countries (Wang *et al*., 2014; Yao *et al*., 2017). Other scholars have shifted their attention to the employment and investment effects of China's OFDI on its domestic enterprises (Li *et al*., 2016; Yang and Zhang, 2017; Yang and Zhang, 2019). Yet there has been a paucity of research on how China's OFDI affects economic development in host countries. Some existing examples, though, include Weisbrod and Whalley (2011), who employed the growth accounting method to estimate the positive contributions of China's OFDI to economic growth in African countries before the global financial crisis of 2008, and Busse *et al*. (2016), who found that China's OFDI had a weak positive effect on the economic growth of African countries based on an analysis of data from 1991 to 2010. However, China's OFDI has experienced rapid growth after the global financial crisis of 2008, making it worthwhile to revisit the above conclusions.

Based on existing research, we explore the growth effects of China's OFDI and their heterogeneities for different countries with a model of economic growth using panel data from 146 developing countries from 2003 to 2017. Considering such endogeneity issues as the lag effect of explained variables and reverse causality, we employ the generalized method of moments (GMM) to mitigate estimation bias and obtain robust estimation results. The remainder of this paper is arranged as follows: Section 2 reviews the intrinsic mechanism by which China's OFDI influences economic growth in host countries; Section 3 explains the benchmark model and estimation method and introduces relevant variables; Section 4 offers a detailed analysis of the estimation results; and Section 5 provides concluding remarks and policy recommendations.

2. Analysis of the Theoretical Mechanisms

Foreign direct investment (FDI) refers to a category of cross-border investment in which an investor

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from a home country establishes a lasting interest in and a significant level of influence over an enterprise in a host country. This investment not only brings much-needed capital to host countries, especially developing countries, but also creates spillover effects that induce total factor productivity (TFP) improvement and economic growth in the host countries. Theoretically, FDI may create spillover effects through imitation, talent flow, competition, and backward and forward linkages. Multinational firms provide opportunities for local companies to observe and emulate advanced production technologies and management practices, and local companies may also employ a skilled workforce from multinational firms to boost efficiency. In addition, FDI inflows can intensify competition and force local companies to enhance R&D investment. In terms of forward and backward linkages, FDI inflows may not only increase demand for intermediate inputs and thus raise the efficiency of upstream suppliers ("backward linkage effect"), but benefit downstream customers by improving the quality of inputs as well ("forward linkage effect"). Although the above-mentioned theoretical mechanisms also apply to China's OFDI in developing countries, the growth effects of China's OFDI have been primarily manifested in the following four aspects.

First, there has been an infrastructure effect. China's experience with and technological prowess for infrastructure development have typically been much-needed in developing countries. This explains the considerable share of infrastructure investment in China's OFDI in developing countries in Asia, Africa, and Latin America (the Chinese Ministry of Commerce, 2018). The BRI also identifies infrastructure connectivity and the development of "six economic corridors" as key priorities.[3] Improvement to infrastructures such as transportation and telecommunication may effectively reduce trade costs and promote market integration, thereby inducing economic growth in host countries. Indeed, some BRI studies have suggested that China's OFDI has had positive effects on infrastructure and economic growth in BRI countries (Sui, *et al*., 2017; Jiang and Sun, 2018; Soyres *et al*., 2020).

Second, there have been effects from industrial capacity cooperation. China's excess capacities in such sectors as steel smelting, electrolytic aluminum, and cement, as well as its advanced equipment for high-speed railways, nuclear power, telecommunications, and electric power, are typically scarce resources for many developing countries. In comparing the resource endowments and industrial competitiveness of various countries, some studies have identified broad potential for industrial capacity cooperation between China and BRI countries. International industrial capacity cooperation in such forms as OFDI may be able to match supply with demand and help host countries to enhance their manufacturing capabilities and infrastructure and to develop their natural and energy resources. In addition, China's OFDI may bring applicable technologies to local companies and introduce decentralized operations, talent development, and technology transfer. International capacity cooperation may therefore allow host countries to benefit from China's manufacturing capabilities, equipment, and technologies, boosting their own economic growth.

Third, there has been an export platform effect. China's OFDI has had the tendency to seek export platforms. That is, Chinese export companies have been motivated to establish subsidiaries in developing countries in order to cope with the impact of tariff or nontariff barriers on exports and to use such export platforms to distribute products worldwide from host countries. In the context of rising trade protectionism and anti-globalization sentiment, the above motivations have become increasingly evident. In this sense, OFDI that seeks export platforms may induce economic growth by increasing exports from host countries.

Fourth, there have been regulatory effects from China as a home country. China's multinational companies and especially state-owned enterprises (SOEs) are subject to tight regulation and policy

[3] The "Six Economic Corridors" are China-Mongolia-Russia, the New Eurasian Continental Bridge, China-Central Asia-West Asia, China-Indo-China Peninsula, China-Pakistan, and Bangladesh-China-India-Myanmar.

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guidance by the Chinese government (home country) when investing overseas. In recent years, the Chinese government has ramped up its reviews over the compliance of overseas investment by enterprises, and has encouraged OFDI to enter livelihood-related sectors in host countries, meanwhile, has prevented investment in real estate, sports, and entertainment (the Chinese Ministry of Commerce, 2018). These regulatory measures from the home country have effectively curbed overseas commercial bribery by multinational companies, established a favorable international image for Chinese companies, and helped transmit China's institutional strengths to developing countries through the vehicle of OFDI, thus improving the institutional quality of those countries. Some research has found that under the regulatory pressures of its own government, China's OFDI has helped to improve corruption control, regulatory quality, and the rule of law in host countries with worse institutional quality (Pan and Liao, 2018). Hence, China's OFDI may also improve the institutional quality of developing countries and promote their economic growth by virtue of the regulatory effects of the Chinese government itself.

Both the above theoretical analysis and existing empirical evidence suggest that China's OFDI is conducive to economic growth in developing countries. However, OFDI may have unintended effects as well. China's resource-seeking OFDI may cause host countries to depend on China's demand while making few efforts to develop their domestic market and institutional systems and may thus fall prey to the resource curse. China's OFDI may also increase market competition in host countries and crowd out local companies. In this sense, the economic growth effects of China's OFDI essentially become a question of empirical research, which we investigate in the remainder of this paper.

3. Empirical Research Strategy

3.1 Benchmark Model Specification

Based on the empirical model for neoclassical economic growth developed by Islam (1995) and Barro and Sala-i-Martin (2004), we constructed the following benchmark model to explore the effects of China's OFDI on the economic growth of developing countries:

$$\ln(y_{it}) = \alpha_0 + \alpha_1 \ln(y_{i,t-1}) + \alpha_2 \ln(CODS_{it}) + \gamma X_{it} + \mu_i + \varepsilon_{it},$$

Where, subscripts i and t denote host country and year, $\ln(y_{it})$ is the (natural) logarithm of real GDP per capita of host country i in year t (in thousands of US dollars; 2010 as the base year), and $\ln(CODS_{it})$ is the logarithm of the real per capita stock of direct investment from China in host country i (in thousands of US dollars) in year t. To mitigate the estimation bias from the omitted variables, this model also includes a set of control variables X depicting host country characteristics, including savings rate; the logarithm of population size; contribution of natural resources, measured by the "ratio of the difference between the market price of a country's natural resources and the cost of production to the country's GDP"; governance capacity, measured by the six Worldwide Governance Indicators (WGIs) (political stability and absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law, and control of corruption) (Kaufman *et al*., 2010); the logarithm of real per capita direct investment stock from countries other than China to a host country (in US dollars, $\ln(FODS)$); and a dummy variable for the post-crisis era, defined as 0 in 2008 or before and 1 after 2008. μ_i denotes host countries' fixed effects being constant over time, and ε_{it} is the stochastic error term.

3.2 Endogeneity and Identification Method

The specification of the benchmark model may have some endogeneity issues. Specifically, the existence of the lagged explained variables $\ln(y_{i,t-1})$ can lead to correlation between the difference $\ln(y_{i,t-1}) - \ln(y_{i,t-2})$ of the lagged variables and the difference $\varepsilon_{it} - \varepsilon_{i,t-1}$ of the stochastic error terms after differencing out the fixed effects, which would make the estimation of fixed effects inconsistent (Arellano and Bond, 1991). Additionally, there may be a problem of reverse causality. The GDP per

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Table 1: Descriptive Statistics

Variable	Observations	Mean	Standard deviation	Min.	Max.
ln(GDP per capita)	2,010	1.0642	1.2867	-1.6406	4.4402
ln(CODS)	1,745	-5.1499	2.3631	-13.8045	1.9583
Saving rate	1,807	0.1804	0.1936	-0.6814	0.9581
ln(population size)	2,182	15.5294	2.1808	9.1868	21.0500
Contribution of natural resources	1,903	0.1034	0.1287	0.0000	0.6411
Governance capacity	2,036	-0.4625	0.6740	-2.4494	1.6155
ln(FODS)	1,820	6.3945	1.9142	0.4321	12.9203

capita of host countries reflects the living standards of residents and market potential and may serve as an important factor for China's OFDI inflows; scholars have found that there are effects of GDP per capita of host countries on China's OFDI (Wang, *et al*., 2014). Furthermore, the model may be adversely affected by measurement errors. Considering the change of OFDI's statistical caliber and the different capital depreciation rates of host countries, China's real OFDI stock could be subject to measurement errors. Finally, the estimation of the model may suffer from omitted variable bias. There are numerous determinants of economic growth in host countries and China's OFDI, and for this reason, omitted variables may still exist although we have controlled for a series of variables that reflect host country characteristics and such fixed effects as geography, climate and culture, which are relatively stable during the sample period.

For our econometric model that contains lagged explained variables, this paper employs the difference-GMM method introduced by Arellano and Bond (1991) for the treatment of the potential endogeneities. This method employs the lagged terms of endogenous variable in the model as an instrumental variable of its own difference to estimate coefficients, and consistent estimation results can be obtained under large samples with this method.

3.3 Data Sources

This study makes use of various data sources. The data of China's OFDI is taken from the *Statistical Bulletin of China's Outward Foreign Direct Investment* for various years, governance capacity is taken from the WGIs database, the total amount of FDI received by various countries is taken from the UNCTAD database, and other data are taken from the World Development Indicators (WDI) database.

Given the absence of an authoritative definition of a "developing country", this paper defines 146 countries as developing countries and excludes OECD countries and tax havens (referencing Hines's (2010) definition).[4] The above data thus form a panel data set consisting of 146 developing countries from 2003 to 2017. The descriptive statistics of the variables are shown in Table 1.

4. Analysis of Estimation Results

4.1 OLS Estimation Results for the Benchmark Model with Fixed Effects

Table 2 reports the estimation results with fixed effects under the full-sample benchmark model. Judging by the estimation results from Models (1) to (3), we see that the coefficients of the core

[4] Readers can obtain the full list of developing countries from the authors.

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explanatory variable ln(*CODS*) are positive and statistically significant. Following the estimation results of Model (3), an increase in China's per capita OFDI stock by 10% corresponded to a 0.043% increase in GDP per capita in the host country, which is equivalent to an increase in GDP per capita of only 2.85 US dollars. Although this figure is small in size, the short-term effects cannot be neglected considering the long-term and sustained inputs of China's OFDI in developing countries.

Additionally, the estimated coefficient for the lagged term for GDP per capita is positive and statistically significant. That is, economic growth in host countries in the "current" phase was significantly influenced by growth in the previous phase. Moreover, the lagged term coefficient is between 0 and 1 in Models (1) through (3), which is consistent with the "β-convergence hypothesis" of growth theory, which argues economic growth rates of developing countries tend to converge. More importantly, China's OFDI has significantly raised the long-term equilibrium value of GDP per capita in developing countries. According to Acemoglu *et al*. (2008), long-term equilibrium GDP per capita (denoted by y^e) can be expressed as $\ln(y^e) = \alpha_2/(1-\alpha_1)\cdot\ln(CODS)$. From Model (3) this implies that an increase in China's per capita OFDI stock by 10% will lead to a 0.33% increase in the long-term equilibrium GDP per capita in a host country, which we deem to be the long-term effect of China's OFDI on the economic growth of developing countries.

We now discuss the implications of the estimation results of control variables. First, the positive saving rate means that capital accumulation remains the material foundation for economic growth in developing countries with Chinese OFDI. Second, the contribution of natural resources is positive and statistically significant: Developing countries with relatively abundant natural resources tend to have higher levels of economic development. Indeed, not all developing countries have fallen prey to the

Table 2: OLS Estimation Results of the Benchmark Model with Fixed Effects

Explained variables	Model (1)	Model (2)	Model (3)
	ln(GDP per capita)		
ln(GDP per capita)(t-1)	0.8779*** (0.0266)	0.8687*** (0.0209)	0.8698*** (0.0234)
ln(CODS)	0.0029** (0.0014)	0.0040** (0.0019)	0.0043** (0.0018)
Saving rate	0.1677*** (0.0430)	0.1106*** (0.0329)	0.1312*** (0.0294)
ln(Total population)	-0.0259 (0.0259)	-0.0157 (0.0224)	-0.0122 (0.0228)
Contribution of natural resources		0.1587*** (0.0563)	0.1584*** (0.0565)
Governance capacity		0.0722*** (0.0188)	0.0709*** (0.0184)
ln(FODS)			0.0035 (0.0036)
Post-crisis era			-0.0059 (0.0054)
Observations	1558	1450	1410
Within-group R^2	0.9040	0.9211	0.9199
F value	560.7872	1058.8711	875.1996
p value	0.0000	0.0000	0.0000

Note: ***, ** and * respectively denote significance at 1%, 5%, and 10% levels. Numbers in parentheses are robust standard errors clustered in country level. The Hausmann test shows that fixed effects are more suitable than random effects. Estimated results of constant terms are omitted.

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resource curse. Third, governance capacity is also positive and statistically significant. Governance capacity reflects a country's institutional quality and has been found to be a positive factor for a country's economic growth. Fourth, there is a small negative and statistically insignificant correlation between population size and economic growth. Population growth may have diluted capital stock, thus leaving no positive effect on economic growth. Fifth, the coefficient of ln(*FODS*) is positive but statistically insignificant. Generally, FDI helps promote a country's capital accumulation and technology progress, but there is heterogeneity in FDI among countries with different institutional backgrounds and growth effects for host countries; as a result, the aggregate growth effects of FDI form different countries become insignificant. Finally, the dummy variable for the post-crisis era is negative and statistically insignificant, which helps explain why economic recession in developing countries appears to be relatively mild after the eruption of the global financial crisis in 2008.

4.2 Difference-GMM Estimation Results

To mitigate the endogeneity problem that may exist in the benchmark model, Table 3 shows the estimation results from difference-GMM. To mitigate the problem of the weak instrumental variable that may arise from excessive GMM internal instrumental variables, we have limitedGMM instrumental variable to its 3rd-order lag. Our Arellano-Bond test shows that the difference of the error term is free from autocorrelation at the second order and above and satisfies the assumption of the uncorrelation of the disturbance term. Additionally, Sargan's over-identification test did not reject the assumption that

Table 3: Difference-GMM Estimation Results

Explained variables	(4)
	ln(GDP per capita)
ln(GDP per capita)(t-1)	0.5518*** (0.0678)
ln(CODS)	0.0318*** (0.0081)
Saving rate	0.2018*** (0.0489)
ln(Total population)	-0.1112 (0.0808)
Contribution of natural resources	0.0452 (0.0605)
Governance capacity	0.0620*** (0.0205)
ln(FODS)	0.0118 (0.0074)
Post-crisis era	-0.0141*** (0.0054)
Observations	1284
F value	666.5226
p value	0.0000
AR(1) p value	0.0046
AR(2) p value	0.1555
AR(3) p value	0.7589
Sargan test of p value	0.2136

Note: ***, ** and * respectively denote significance at 1%, 5%, and 10% levels. Numbers in parentheses are Windmeijer-corrected robust standard errors.

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"all instrumental variables are valid". Hence, we can proceed under the assumption that the model is free from serious over-identification problems.

The coefficient of the core explanatory variable ln(*CODS*) is positive and statistically significant. Following the estimation results of Model (4), a 10% increase in China's per capita OFDI stock corresponded to an increase in GDP per capita in the host country by 0.318%. Using the average GDP per capita of 6,630 US dollars in developing countries during the sample period (US dollar price from 2010), this increase is equivalent to GDP per capita rising by just 21 US dollars, which is small but not negligible. It also shows that the fixed effect results of the benchmark model obviously underestimated the growth effects of China's OFDI.

Next, the estimated coefficient of the lagged term of GDP per capita is positive and significantly significant and in the range between 0 and 1. Hence, the "β-convergence hypothesis" remains valid. In addition, based on Model (4), an increase in China's per capita OFDI stock by 10% corresponded to an increase in the long-term equilibrium GDP per capita of the host country by 0.71%.

4.3 Heterogeneity Analysis

The above empirical study shows the estimated average growth effects of China's OFDI in developing countries, which remained statistically significant after mitigating endogeneity. However, it is likely that such effects are subject to heterogeneity in various regions and periods of time. Moreover, discerning these heterogeneous attributes can help us gain an insight into the intrinsic mechanism by which China's OFDI affects economic growth in host countries.

Table 4: The Heterogeneity of the Growth Effects of China's OFDI: Countries in Different Groups

	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Country grouping	High economic development	Low economic development	High governance capacity	Low governance capacity	High natural resources	Low natural resources	High human capital	Low human capital
Explained variables	ln(GDP per capita)							
ln(GDP per capita) (t-1)	0.8710*** (0.0216)	0.8379*** (0.0401)	0.9271*** (0.0155)	0.8119*** (0.0381)	0.8553*** (0.0295)	0.9049*** (0.0272)	0.8856*** (0.0179)	0.8367*** (0.0482)
ln(CODS)	0.0037 (0.0024)	0.0072*** (0.0026)	0.0024 (0.0016)	0.0066** (0.0031)	0.0052* (0.0027)	0.0032 (0.0020)	0.0019 (0.0017)	0.0088** (0.0034)
Saving rate	0.1642*** (0.0432)	0.1246*** (0.0371)	0.0992** (0.0475)	0.1666*** (0.0397)	0.1174*** (0.0364)	0.1391*** (0.0383)	0.1695*** (0.0322)	0.0787 (0.0513)
ln(Population size)	-0.0284 (0.0281)	-0.0024 (0.0454)	-0.0011 (0.0162)	-0.0113 (0.0624)	-0.0388 (0.0294)	0.0108 (0.0506)	-0.0063 (0.0246)	-0.0589 (0.0607)
Contribution of natural resources	0.0665 (0.0510)	0.1803** (0.0839)	0.0316 (0.0557)	0.1867** (0.0707)	0.1763*** (0.0574)	-0.0016 (0.1732)	0.1043* (0.0529)	0.2073** (0.0872)
Governance capacity	0.0189 (0.0226)	0.0975*** (0.0229)	0.0321** (0.0122)	0.1082*** (0.0304)	0.0961*** (0.0238)	0.006 (0.0173)	0.0216 (0.0134)	0.1097*** (0.0251)
ln(FODS)	-0.0041 (0.0074)	0.0089*** (0.0034)	0.0017 (0.0059)	0.0035 (0.0039)	0.0025 (0.0052)	0.0091** (0.0038)	0.0110*** (0.0036)	0.0008 (0.0061)
Post-crisis era	-0.0099* (0.0056)	-0.0045 (0.0076)	-0.0137** (0.0053)	0.0023 (0.0088)	0.0033 (0.0073)	-0.0198*** (0.0059)	-0.0152*** (0.0054)	0.0076 (0.0086)
Observations	577	833	749	661	845	565	769	641
Within-group R^2	0.9218	0.9232	0.9486	0.9019	0.9048	0.9510	0.9404	0.9007
F value	534.4784	712.0821	1073.3257	465.8162	564.9041	905.3475	745.1577	753.0892
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: See the note in Table 2.

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We first explore the heterogeneity of the growth effects of China's OFDI for countries with disparate levels of economic development, governance capabilities, natural resource abundance, and human capital, and we employ GDP per capita, the average value of WGIs, the contribution of natural resources, and the human capital index from Penn World Tables to measure these four dimensions respectively. Based on the average values of China's relevant variables during the sample period, we divided countries above or below China's mean value into two groups with respect to each variable, and Table 4 shows the OLS estimation results with fixed effects.

In terms of the level of economic development, China's OFDI was more conducive to economic growth in less developed countries, but the effects were insignificant for countries more developed than China (though the coefficient is positive). The reason may be that China's multinational companies and OFDI brought much-needed capital, advanced production technologies, and managerial experience to less developed countries, thus enabling "spillover effects" from OFDI. Yet for more developed countries, China's multinational companies and OFDI have little advantage in terms of capital, technology, and managerial expertise, thus making growth effects smaller.

For governance capacity, China's OFDI induced economic growth in less well-governed developing countries, but the effects were negligible for better-governed countries (though the coefficient is positive). Some studies suggest that OFDI is a mechanism of institutional diffusion and allows countries with more advanced institutional systems to bring their institutional strengths to less developed countries. Pan and Liao (2018) found that under the regulatory pressures of the Chinese government, China's OFDI may improve the institutional quality countries with less governance capacities. For this reason, we infer that China's OFDI may improve the institutional quality and thus growth performance of less well-governed countries through "regulatory effects of home country's governance".

In addition, the growth effects of China's OFDI were more significant for resource-rich developing countries and insignificant for resource-poor ones. Through OFDI, China has extensively carried out industrial capacity cooperation with resource-rich countries and enterprises, and the quality of cooperation has been improving (the Chinese Ministry of Commerce, 2018). This has helped to create jobs, promote the export of resource-rich products, and spur economic growth in host countries, which is consistent with the "industrial cooperation effect".

Finally, China's OFDI did not significantly promote economic growth in countries with higher human capital (though the coefficient is positive) but may have induced economic growth in countries with inferior human capital, which is contradictory to the traditional view that higher human capital in host countries helps attract FDI (Borensztein, *et al*., 1998). An important reason for this may be that most Chinese multinational companies come from such sectors as labor-intensive manufacturing and infrastructure construction, and OFDI in those categories is more consistent with the needs and comparative advantages of developing countries that are poor in human capital but rich in labor resources, giving more credence to the "infrastructure effect" and "export platform effect", and contributing to employment and economic growth in host countries.

We now also explore the heterogeneity of the growth effects of China's OFDI in BRI countries, African countries, and before and after the global financial crisis. Table 5 shows the OLS estimation results with fixed effects, from which we obtain the following findings.

To begin, China's OFDI may have significantly promoted economic growth in BRI and African countries. Based on Models (13) and (14), an increase in China's per capita OFDI stock by 10% corresponded to increases in GDP per capita in BRI countries and African countries by 0.059% and 0.056%, respectively, and the above effects were both higher than the average effect on developing countries (0.043%, Model (3)).

Additionally, the growth effects of China's OFDI were more substantial in the post-crisis era. According to Model (16), an increase in China's per capita OFDI by 10% corresponded to an increase in GDP per capita in developing countries by 0.102% after the global financial crisis of 2008, which was

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Table 5:. The Heterogeneous Growth Effects of China's OFDI: Key Regions, Before and After the Global Financial Crisis of 2008

Country grouping	(13)	(14)	(15)	(16)
	"Belt and Road"	Africa	Pre-crisis	Post-crisis
Explained variables	ln(GDP per capita)			
ln(GDP per capita)(t-1)	0.9097*** (0.0256)	0.7780*** (0.0423)	0.8750*** (0.0511)	0.7985*** (0.0501)
ln(CODS)	0.0059* (0.0032)	0.0056* (0.0031)	0.0055 (0.0035)	0.0102*** (0.0030)
Saving rate	0.1259** (0.0499)	0.1208** (0.0507)	0.1446** (0.0567)	0.1247*** (0.0430)
ln(Population size)	-0.0235 (0.0242)	0.0411 (0.0488)	-0.1000 (0.0667)	-0.0003 (0.0594)
Contribution of natural resources	0.1841* (0.0972)	0.1112* (0.0604)	-0.0021 (0.0725)	0.2115** (0.0966)
Governance capacity	0.0651** (0.0316)	0.0892*** (0.0179)	0.0039 (0.0198)	0.0999*** (0.0307)
ln(FODS)	-0.0017 (0.0065)	0.0060* (0.0032)	0.0025 (0.0036)	0.0181** (0.0079)
Post-crisis era	-0.0213*** (0.0060)	0.0035 (0.0083)		
Observations	638	577	554	856
Within-group R^2	0.9348	0.8874	0.8843	0.8027
F value	407.9177	742.8668	209.2243	143.0066
p value	0.0000	0.0000	0.0000	0.0000

Note: See the note in Table 2.

significantly higher than the overall average effect (0.043%, Model (3)). To some extent, this indicates that China's OFDI was a major source of economic growth in developing countries in the post-crisis era.

5. Concluding Remarks and Policy Recommendations

With the implementation of China's open development strategy, OFDI from Chinese companies has emerged as an economic phenomenon with global implications. Based on panel data from 146 developing countries from 2003 to 2017, we investigated the (heterogeneous) growth effects of China's OFDI and have reached the following three conclusions.

First, China's OFDI at least partly induced economic growth in developing countries. Not only was China's OFDI conducive to GDP per capita in developing countries but it may also have increased the long-run equilibrium value of host-country GDPs. Second, the growth effects of China's OFDI were more significant for developing countries with less economic development, poorer governance, richer resource endowment and less human capital. Third, the growth effects of China's OFDI were above the average level for BRI countries, African countries, and after the post-crisis era.

Our results show that China's OFDI has become a vehicle for economic growth in developing countries, and we now extend our analysis to policy recommendations for the Chinese government. To begin, we believe China should make its OFDI more technology-intensive; however, multinational Chinese companies must first possess advanced technologies and R&D capabilities in order to generate spillover effects for host countries. In deepening China's supply-side structural reforms, the Chinese government should not only grant more research and development subsidies to Chinese

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enterprises operating overseas but encourage high-tech enterprises to "go global", establish research and development centers in developing countries, and bring Chinese technologies there as well.

Moreover, we believe that China should step up international industrial capacity cooperation. With its current surplus industrial capacity, China is well-positioned to cooperate with resource-rich countries, and should export its equipment and manufacturing capabilities in sectors like high-speed railways, electric power, iron and steel, and cement, and proactively develop overseas industrial clusters to make up for infrastructure and industrial gaps in host countries in order to expedite their industrial development.

For the growth effects of OFDI to be realized fully, we also believe that Chinese companies should continue to improve their level of global operations and acclimatization to the regulatory environments of host countries. The Chinese government should promote cooperation and exchange with host countries in business areas and encourage enterprises to learn about the formal political and legal systems of host countries and to familiarize themselves with the informal institutions such as cultures and customs. The authors of this paper believe that the Chinese government should implement the principles laid out in the *Opinions on Regulating the Overseas Operations of Enterprises* and *Opinions on Improving Security Work for Enterprises Operating and Investing Overseas*, and should regulate overseas corporate investment and operations in order to establish a favorable image for Chinese enterprises. By enhancing their international operations, Chinese companies may be able to generate greater growth effects from OFDI than those found in this paper in the broader developing world.

References:

[1] Acemoglu, D., S. Johnson, J. A. Robinson and P. Yared. 2008. "Income and Democracy." *American Economic Review*, 98(3): 808-842.

[2] Arellano, M., and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 58: 277-297.

[3] Asongu, S., and J. Ssozi. 2016. "Sino-African Relation: Some Solution and Strategies to the Policy Syndromes." *Journal of African Business*,17(1): 33-51.

[4] Barro, R., and X. Sala-i-Martin. 2004. *Economic Growth.* Commonwealth of Massachusetts: MIT Press.

[5] Borensztein, E., J. D. Gregorio, and J. W. Lee. 1998. "How Does Foreign Direct Investment Affect Economic Growth?" *Journal of International Economics*, 45(1): 115-135.

[6] Busse, M., C. Erdogan, and H. Mühlen. 2016. "China's Impact on Africa: The Role of Trade, FDI and Aid." *KYKLOS*, 69(2): 228-262.

[7] Busse, M., C. Hefeker. 2007. "Political Risk, Institutions and Foreign Direct Investment." *European Journal of Political Economy*, 23(2): 397-415.

[8] Demir, F. 2016. "Effects of FDI Flows on Institutional Development: Does It Matter Where the Investors Are from?" *World Development*, 78:341-359.

[9] Hines, J. R. 2010. "Treasure Islands." *Journal of Economic Perspectives*, 24(4): 103-125.

[10] Islam, N. 1995. "Growth Empirics: A Panel Data Approach." *Quarterly Journal of Economics*, 11:1127-1170.

[11] Kaufmann, D., A. Kraay and M. Mastruzzi. 2010. "The Worldwide Governance Indicators: Methodology and Analytical Issues." *World Bank Policy Research Working Paper*.

[12] Kolstad, I., and A. Wiig. 2011. "Better the Devil You Know? Chinese Foreign Direct Investment in Africa." *Journal of African Business*, 12(1): 31-50.

[13] Rosen, D. H., and T. Hanemann. 2009. "China's Changing Outbound Foreign Direct Investment Profile: Drivers and Policy Implications." *Peterson Institute for International Economics Policy Brief*, No. PB09-14.

[14] Soyres, F., A. Mulabdic and M. Ruta. 2020. "Common Transport Infrastructure: A Quantitative Model and Estimates from the Belt and Road Initiative." *Journal of Development Economics*, 143:1-22.

[15] Weisbrod, A., and J. Whalley. 2011. "The Contribution of Chinese FDI to Africa's Pre-Crisis Growth Surge." *NBER Working Papers*, No. 17544.

[16] Yao, S., F. Zhang, P. Wang and D. Luo. 2017. "Location Determinants of China's Outward Foreign Direct Investment." *China & World*

中国知网 https://www.cnki.net

Economy, 25 (6): 1-27.

[17] National Development and Reform Commission. 2017. *Report on China's Outward Investment*. Beijing: People's Publishing House.

[18] Jiang, Hui and Yuqin Sun. 2018. "China's OFDI, Host Country's Infrastructure Construction and Bilateral Economic Growth——From the Perspective of the "Belt and Road" Host country System." *Economic Theory and Business Management*, 12:84-97.

[19] Li, Lei, Daohuan Bai and Guoming Xian. 2016. "How Does Outward Foreign Direct Investment Affect Home-country Employment: Based on China's Micro-level Enterprises Database." *Economic Research Journal*, 8:144-158.

[20] Pan, Chunyang and Liao Jia. 2018. "Is There an Institutional Effect of China's OFDI?" *Economic Review*, 6:53-68.

[21] Ministry of Commerce.2018. *Report on Development of China's Outward Investment*.

[22] Sui, Guangjun, Liangxiong Huang, Xing Huang. 2017. "China's Foreign Direct Investment, Infrastructure Construction and the 'Belt and Road' National Economic Growth." *Journal of Guangdong University of Finance & Economics*, 1:32-43.

[23] Wang, Yongqin, Julan Du, Kai Wang. 2014. "The Determinants of Location Choices of China's ODI: Institutions, Taxations and Resources." *Economic Research Journal*, 12:126-142.

[24] Yang, Lianxing and Meilan Zhang. 2019. "China's Foreign Direct Investment and Domestic Investment: Extrusion or Squeeze?" *World Economy Studies*, 1:56-69.

[25] Yang, Pingli and Jianmin Zhang. 2017. "The Effect of Outward Foreign Direct Investment on Domestic Investment: Evidence Coming from Chinese Industrial Firms." *China Economic Studies*, 3:101-112.

[26] Yang, Yaping and Yue Gao. 2017. "Investment Site Selection in 'Belt and Road' Countries: the Perspective of Institutional Distance and Overseas Chinese Networks." *Economic Perspectives*, 4:41-52.

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