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The exceptional performance of Chinese outward direct investment firms

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ABSTRACT

This paper finds that Chinese manufacturing firms that engage in outward foreign direct investment (ODI) have better economic performance than non-ODI manufacturing firms. Overall, ODI firms are more productive and have higher profitability than non-ODI firms. The sector analysis shows that the exceptional performance is significant for labor-intensive industries. Finally, the ODI activity can raise the productivity of other firms in an industry. The larger the ODI within an industry, the higher the productivity of all firms in that industry. The paper suggests that domestic firms set up their firm's global strategy and reallocate the firm's resources according to the changing investment environment, taking advantages of profit opportunities outside of domestic markets and invest abroad to get new markets and new technology.

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Introduction

China's outward foreign direct investment (ODI) has increased dramatically in the new century. With a 50% annual growth rate, China's outward foreign direct investment (FDI) has become economically significant to affect international investment (Huang and Wang 2011). China's non-financial outward FDI increased from $29.9 billion in 2002 to $326.5 billion in 2011, a nearly ten-fold increase during the period.[1] In 2014, China's outward FDI flow accounted for 7.6% of global FDI flow and ranked third in the world, following the United States and Japan, and first among developing countries (Tian and Yu 2015). As documented by Chen et al. (2016), there are more than 15,000 Chinese multinational corporations (MNC) now, which is almost equal to the number of MNCs of any developed economy in the world. In 2014, ODI flows from China were USD 140 billion, surpassing the amount of USD 119 billion of inward FDI flows to China.

The fast increase in Chinese outward direct investment (ODI) in recent years has also become a controversial topic in many countries, especially in the U.S. The China–

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U.S. bilateral investment treaties (BIT) is focused on market access of foreign investment, which will give Chinese firms more opportunities to invest overseas.

The present paper finds that Chinese manufacturing firms that engaged in ODI have better economic performance than non-ODI manufacturing firms. We present three interesting findings. First, ODI firms are more productive and have higher profitability than non-ODI firms. Second, the exceptional effect is more for light industries or labor-intensive industries. Finally, ODI activity can raise the productivity of other firms in an industry. The larger the ODI within an industry, the higher the productivity of all firms in that industry.

To fully understand the role of China–U.S. bilateral investment treaties, this paper seeks to understand whether outward investment activity is good for Chinese manufacturing firms. Put another way, whether Chinese ODI firms are exceptional in terms of economic indicators such as firm productivity and firm profitability. If so, it would be beneficial for Chinese firms to go aboard to invest to other countries. Correspondingly, it would be wise for the Chinese government to actively engage in the ongoing Sino–U.S. BIT negotiation given that the United State is one of the most important current ODI destinations for Chinese firms.

The rest of the paper will be organized as follows. The next section reviews the most important literature related to the current paper. Section 3 describes the data used in the paper, followed by the empirical specifications to explore the possible exceptional performance of Chinese ODI firms. Section 4 delivers some policy suggestions and, finally, the last section draws some conclusions.

Literature Review

The present study contributes to a small but growing literature on outward FDI and productivity, including the works by Head and Ries (2003), Helpman, Melitz, and Yeaple (2004), Eaton, Kortum, and Kramarz (2011), and Damijan, Polanec, and Prasnikar (2007). Moreover, the present paper further contributes to the literature from the following perspectives.

First, different from other related studies that use aggregate industry-level data, this paper aims to provide micro-level evidence of outward FDI for the largest developing country in the world. Previous works usually examine the industrial characteristics of outward FDI but abstract away the role of firm activity due, possible, to data restrictions. The effect of firm activity on outward FDI is still treated as a 'black-box.' In contrast, our firm-level analysis finds that outward FDI by Chinese firms also exhibits a positive correlation between firm productivity and outward FDI.

Second, we use a panel of firm-level data to measure the effect of ODI on productivity, which is different from previous studies that only used cross-section data, such as Head and Ries (2003) and Helpman et al. (2004). By gauging outward FDI in the model of firm heterogeneity on productivity as described by Melitz (2003), Helpman, Melitz, and Yeaple (2004) predict that only highly productive American firms will engage in outward FDI, whereas low-productivity firms will serve in the domestic market only. Firms with intermediate productivity sell products domestically and export, but they cannot serve the foreign market through foreign affiliates. However, because of the data restriction, the previous study is not able to capture firms' dynamic response of outward

FDI to productivity growth. Such empirical pitfall is overcome in the present paper using a careful measure of total factor productivity (TFP) over the years.

The third related strand of the literature is research on China's ODI. Huang and Wang (2011) argue that Chinese ODI firms have different objectives for their investment. In echoing this, Kolstad and Wiig (2012) find that Chinese ODI is attracted to three destinations: countries with lower institutional quality, countries that are rich in natural resources, and large markets. Most recent related works tend to explore what determines the ODI of Chinese firms. Chen and Tang (2014) also found that firm productivity and the probability of firm ODI are positively correlated, yet, because of lack of data, they remain silent on the intensive margin of firms' ODI. Tian and Yu (2015) intensively explore the pattern of distribution-oriented ODI in China and its correlation between export and horizontal ODI.

Finally, our work is also related to the work of Liu et al. (2015) which also explored whether outward investment boosts firm productivity, though we also focus on the analysis of sectoral heterogeneity. Finally, Chen et al. (2016) examine how domestic input distortions provide an institutional arbitrage for Chinese private firms to invest abroad. Similarly, Wang et al. (2016) explore how the credit constraints faced by private firms affect their ODI behavior. Our present paper instead aims to explore whether or not the ODI firms have better economic performance.

Data and Empirics

This sections starts from a careful data description, followed by our empirical analysis.

Data

The data set we used included investment categories by the Ministry of Commerce of China and firm data set by the National Statistical Bureau of China.

Firm's ODI data are from the Ministry of Commerce. The data set includes the following variables: the firm's name, the names of the firm's foreign subsidiaries, the type of ownership (i.e. private firm or state-owned enterprise), the investment mode (e.g. trading-oriented affiliates, mining-oriented affiliates), and the amount of foreign investment (in U.S. dollars). The data set is on an annual base and can be traced back to 1980.

The second data set that we relied on was the firm-level production data compiled by China's National Bureau of Statistics in an annual survey of manufacturing enterprises. The data set covers around 162,885 firms in 2000 and 410,000 firms in 2008 and, on average, accounts for 95% of China's total annual output in all manufacturing sectors. The data set includes two types of manufacturing firms: universal SOEs and non-SOEs whose annual sales are more than RMB 5 million (or equivalently $830,000 under the current exchange rate). The data set is particularly useful for calculating measured TFP, since the data set provides more than 100 firm-level variables listed in the main accounting statements, such as sales, capital, labor, and intermediate inputs.

As highlighted by Feenstra et al. (2014) and Yu (2015), some samples in this firm-level production data set are noisy and somewhat misleading, largely because of misreporting by some firms. To guarantee that our estimation sample is reliable and accurate, we screened

Table 1. Summary statistics of data set, firm level.

Variable	Mean	Standard Deviation
Log(Labor)	4.71	1.12
Log(Asset)	9.73	1.45
Firm Productivity	1.88	0.57
Whether to Export	0.25	0.43
Whether SOE	0.10	0.30
Whether FIE	0.20	0.40

Notes: 2000–2008. Productivity is calculated using an augmented Olley-Pakes approach. FIE includes FIE from Hong Kong, Taiwan and Macao.

the sample and omitted outliers by adopting the following criteria. First, we eliminated a firm if its number of employees was less than eight workers, since otherwise such an entity would be identified as self-employed. Second, a firm was included only if its key financial variables (e.g. gross value of industrial output, sales, total assets, and net value of fixed assets) were present. Third, we included firms based on the requirements of the Generally Accepted Accounting Principles (GAAP).[2] After this rigorous filter, around half the observations are deleted from the sample. The first row in the upper module of Table 1 reports the number of manufacturing firms in 2000–08; the second row reports the number of ODI manufacturing firms after the filtering process.

Table 1 reports some key summary statistics of firms' characteristics for nationwide manufacturing firms.

Although the firm-level production data set is useful to understand the firm's production behavior, the data set does not provide information on the firm's ODI behavior. We do not know whether the firms engage in ODI activity. Therefore, to understand a firm's ODI behavior, we need to merge the firm-level production database with the ODI data set.

However, the data merge is a non-trivial task. Although the two data sets share a common variable—the firm's identification number—their coding system is completely different. We thus use the following approaches to merge the data. First, we match these two data sets by using each firm's Chinese name and year. If a firm has an exact Chinese name in a particular year, it is considered an identical firm.

Still, this method could miss some firms since the Chinese name for an identical company may not have the exact Chinese characters in the two data sets, although they share some common strings.[3] Our second step is to decompose a firm name into several strings referring to its location, industry, business type, and specific name, respectively. If a company has all identical strings, such a firm in the two data sets is classified as an identical firm.[4] Finally, to avoid possible mistakes, all approximate string-matching procedures are double-checked by eye.

Empirical Results

To explore the performance of ODI firms, we first ran a regression model in which the dependent variable is the log of total factor productivity(TFP), and the key interest explanatory variable is the firm's ODI indicator, a dummy showing whether the firm engages in overseas direct investment. Note that the TFP measure is based on the augmented Olley and Pakes (1996) approach, which strictly follows the method proposed by Yu (2015).

Benchmark Estimates

Column (1) of Table 2 abstracts away other control variables but only includes the ODI dummy as the independent variable. The positive and statistically significant coefficient of the ODI dummy suggests that ODI firms tends to more productive. As our sample was spread over the period 2000–2008, we thus included both year-specific fixed effects and firm-specific fixed effects in the estimates of column (2) and still have similar findings.

Estimates in the remaining two columns of Table 2 include two additional sets of variables which are included in the regressions. The first set is related to the type of firm's ownership. The variable of foreign firm (FIE) is a dummy indicating whether a firm is foreign invested. The SOE dummy indicates whether a firm is state-owned enterprise. The second set of controlling variables is the firm's size. We thus include the number of firm's employees (*labor*) and firm's total asset (*asset*) to the regressions. In addition, previous works like Blonigen (2001) show that export and FDI are strongly related. Ignoring a firm's export behavior may generate some estimation bias, we thus also include the export indicator to the estimations.

With other controlling variables, the fixed-effects estimate in the last column of Table 2 presents the positive effect of OFDI on the productivity of the parent company, suggesting that ODI firms are more productive. Compared to non-ODI firms, ODI firms have 0.11 higher productivity. As the mean of the firm's Olley-Pakes TFP is around 1.88, ODI firms thus, on average, exhibit 6% greater productivity than non-ODI firms. In addition, we also find that SOEs are less productive whereas foreign firms are more productive. Larger firms, measured by both logarithm of the number of employees and the logarithm of firm assets, are more productive. Exporters are also more productive. Such findings are highly consistent with other related works such as Dai et al. (2016), Feenstra et al. (2014) and Yu (2015).

Table 2. Effects of ODI on firms' productivity.

Dependent Var. ln *TFP*	(1)	(2)	(3)	(4)
ODI	0.257***	0.013**	0.054***	0.011*
	(18.66)	(2.16)	(3.91)	(1.72)
FIE			0.086***	0.008*
			(73.15)	(1.93)
SOE			0.037***	−0.023***
			(26.46)	(−7.72)
Export			0.042***	0.024***
			(38.36)	(16.23)
Log(labor)			−0.050***	0.015***
			(−95.13)	(14.39)
Log(asset)			0.113***	0.017***
			(280.78)	(18.52)
FE Year	N	Y	N	Y
FE Firm	N	Y	N	Y
Number of Obs.	2,096,406	2,096,406	1,661,369	1,661,369
R-squared	0.00	0.06	0.07	0.05

Notes: TFP is calculated using an augmented OP approach, t statistics are reported in parentheses. ODI is the dummy indicating whether the firm engages in ODI; FIE is the dummy indicating whether a firm is foreign invested; Export shows whether a firm engages in export; SOE indicates whether a firm is state owned; Labor is the total number of employees in a firm; Asset is the total value of assets in a firm. ***, **, and * show significance at 1, 5, and 10%, respectively.

Alternative Measure of Firm Performance

The estimates in Table 2 use firm productivity as the measure of firm performance as it is a widely-accepted measure. We now turn to see whether our benchmark finding is still robust using other alternative measures.

The first alternative measure of firm performance is the profit-sales ratio which is defined as a firm's profit over sales. The economic intuition is that high productive firms are usually more profitable. Column (1) of Table 3 uses firm's profit-sales ratio as the regressand and controls both firm-specific and year-specific fixed effects. It turns out that the key coefficients of the ODI indicator is positive and statistically significant. Column (2) of Table 3 includes other control variables but still finds a positive, though insignificant, coefficient of the ODI indicator.

Previous works have recognized that exceptional firms usually export more products. To check this out, we used a firm's export intensity, defined as export value over total sales, as the regressand in the rest of Table 3. By abstracting away other control variables, the key coefficient of the ODI indicator in the fixed-effects estimates of column (3) is still positive and significant, indicating that ODI firms tend to have a higher export intensity. After including more controlling variables, the coefficient of the ODI dummy in column (4) is still positive but insignificant. We suspect that this is partly due to the inclusion of the export dummy as the regressand.

Robustness Checks

After 2004 it is generally believe that China has already passed the Lewis turning point in the sense that China's labor supply is no longer infinite. Studies like Cai (2010) also suggest that China's labor cost increased quickly in the first decade of the new century. If so, one would expect that China's comparative advantage in the labor-intensive industry will shrink over time. Accordingly, Chinese manufacturing firms in the

Table 3. Effects of ODI on firms' profitability and export propensity.

Dependent Var.	Profit-Sales Ratio	Profit-Sales Ratio	Export Propensity	Export Propensity
ODI	8.550**	1.890	1.473***	0.088
	(2.20)	(0.81)	(2.79)	(0.19)
FIE		−4.889**		0.105
		(-2.41)		(0.38)
SOE		-17.648***		−0.144
		(-4.10)		(−0.50)
Export		40.951		38.726***
		(1.42)		(58.57)
Log(Labor)		11.059		−0.084
		(0.65)		(−0.69)
Log(Assets)		16.150		−0.079
		(1.51)		(−0.57)
FE Year	Y	Y	Y	Y
FE Firm	Y	Y	Y	Y
Number of Obs.	2,251,355	1,684,364	2,195,895	1,654,682

Notes: t statistics are reported in parentheses. Sales profit rate = operating profit/sales × 100, Export propensity = export/sales × 100. ODI is the dummy indicating whether the firm engages in ODI; FIE is the dummy indicating whether a firm is foreign invested; Export shows whether a firm engages in export; SOE indicates whether a firm is state owned; Labor is the total number of employees in a firm; Asset is the total value of assets in a firm. ***, **, and * show significance at the 1, 5, and 10% level, respectively.

Table 4. Effects of ODI on firms' productivity in light and heavy industries.

	Labor-intensive Industry		Capital-intensive Industry	
Dependent Var. ln *TFP*	Textile	All Labor-intensive Industries	General Equipment Manufacturing	All Capital-intensive Industries
ODI	0.005	0.030**	0.015	0.008
	(0.49)	(2.49)	(1.18)	(0.81)
FIE	0.002	0.012*	0.016	0.010
	(0.15)	(1.85)	(1.10)	(1.15)
SOE	−0.019**	−0.012**	−0.029***	−0.019***
	(−2.33)	(−2.09)	(−3.10)	(−4.19)
Export	0.026***	0.031***	0.017***	0.019***
	(6.78)	(11.88)	(3.77)	(7.11)
Log(Labor)	0.008***	0.021***	0.009**	0.017***
	(3.04)	(12.33)	(2.26)	(8.22)
Log(Asset)	0.015***	0.018***	0.027***	0.019***
	0.008***	0.021***	(10.06)	(10.33)
FE Year	Y	Y	Y	Y
FE Firm	Y	Y	Y	Y
Ob	133,998	515,635	120,245	60,0781
R-squared	0.03	0.03	0.14	0.05

Notes: TFP calculated using an augmented OP approach, t statistics are reported in parentheses. ***, **, and * show significance at the 1, 5, and 10% level, respectively. The light and heavy industries are defined according to firms' registration.

labor-intensive industry will engage more in outward FDI. Estimates in Table 4 pick up the task of examining such an hypothesis.

Table 4 first separates the entire sample to the group: labor-intensive sectors and capital-intensive sectors. In particular, all manufacturing sectors with Chinese-industrial classification (CIC) 2-digit level higher than 24 are classified as the capital-intensive industries, whereas the rest of the manufacturing sectors are classified as labor-intensive industries. Estimates in column (1) only include firms in the textile and garment industry. The key coefficient of the ODI indicator is positive but insignificant. We suspect that this is due to the fact that not many firms in the textile and garment industry engage in oversea investments. We thus include all labor-intensive industries in the estimates of column (2). It turns out that the coefficient of the ODI dummy now is positive and significant, suggesting that, overall, Chinese manufacturing ODI firms in labor-intensive industries tends to more productive compared to those non-ODI firms in labor-intensive industries. However, we do not see such a corresponding finding in the capital-intensive industries as shown in columns (3) and (4).

Our last empirical exercises in Table 5 are to examine whether our previous findings are still robust if we aggregate the firm-level data up to the CIC 2-digit industry level. We first calculate industrial ODI share as the number of ODI manufacturing firms dividing by the entire number of manufacturing firms within an industry.

Columns (1)–(4) regress firm productivity on industrial ODI share. It turns out that the key variable of industrial ODI share is positive and significant, suggesting that ODI behavior can raise the productivity of other firms in an industry. The larger the ODI within an industry, the higher the productivity of all firms in that industry. A possible explanation is that ODI raises the productivity of the parent firm, which in turn intensifies the competition in that industry and the technology spillovers, and raises the productivity of other firms in the industry.

Table 5. Indirect effect of ODI on firms' productivity.

Dependent Var. ln *TFP*	(1)	(2)	(3)	(4)
ODI share	1.301***	1.697***	1.083***	1.703***
	(137.68)	(32.61)	(99.70)	(28.16)
FIE			0.075***	0.007*
			(63.52)	(1.74)
SOE			0.054***	−0.023***
			(38.61)	(−7.70)
Export			0.022***	0.024***
			(20.17)	(16.22)
Log(Labor)			−0.054***	0.015***
			(−103.26)	(14.28)
Log(Asset)			0.115***	0.017***
			(288.00)	(18.28)
FE Year	N	Y	N	Y
FE Industry	N	Y	N	Y
Ob	2,096,406	2,096,406	1,661,369	1,661,369
R-squared	0.01	0.06	0.07	0.06

Notes: In this table, the division of industry is according to the 2-digit industrial code in 'Classification of national economic industries' (GB/T 4754—2002, 2nd edition). The division of industry before 2003 is according to the 'Classification of national economic industries and code' (GB/T4754) and is transferred to the second edition. TFP was calculated using an augmented OP approach, t statistics are reported in parentheses. ***, **, and * show significance at the 1, 5, and 10% level, respectively. ODI share = share of ODI in 2-digit industry × 100.

Policy Suggestions

Generally, the Sino–U.S. bilateral investment treaty (BIT) will be beneficial for Chinese firms to invest overseas and become global players, which will be beneficial to Chinese domestic firms (for a detailed discussion see Yu and Zhang, 2016). Current U.S. foreign investment review procedure is less transparent and limited the outward direct investment (ODI) from other countries, including investments by Chinese firms. Currently, the investment is investigated and approved by the Committee on Foreign Investment in the United States (CFIUS), which is an interagency group led by the Treasury Department to ensure acquisitions of U.S. firms do not harm U.S. national security. In certain industries foreign investment is explicitly limited and prohibited by the U.S. government. A number of Chinese investment deals in the U.S. are facing obstacles currently. A BIT is unlikely to change the CFIUS process but will increase the transparency of the process, which gives Chinese firms more opportunities to enter the U.S. market.

The Sino–U.S. BIT will also be beneficial to China's domestic reforms of ODI framework. China's regulatory framework has moved from restricting, to facilitating, to supporting, to encouraging ODI; but there are still strong elements of administrative control that do not give Chinese firms enough incentives to invest overseas. To allow domestic regulations to be consistent with the BIT, China has to make the domestic regulations on ODI more transparent and simplify the process. The reform of the domestic regulations will also increase the ODI by Chinese firms.

In the long-run, BIT and ODI are beneficial for Chinese firms to improve their productivity and profitability. Therefore, Chinese negotiators must make it firm and steadfast that China is serious in joining the BIT with the U.S. through negotiations. In the short run, however, joining BIT will hurt some of the Chinese firms or industries,

even though it is beneficial for Chinese firms to improve their productivity and profitability in general. Studies on industries show that firms in some of the manufacturing industries, especially those with large gaps in technology, will be harmed in the short-run. Therefore, it may need a gradual lifting of the protection in a small number of industries. The Chinese negotiators should insist that the U.S. side needs to make its national security investigation more transparent and the U.S. government should create a more favorable investment climate for foreign investments.

The Chinese government will use the requirement of BIT to reform domestic administration, the judicial system and the state owned enterprises, especially domestic regulations on ODI. To do that, domestic laws and regulations need to cooperate with the foreign economic policies. First, China needs to institute easier procedures for firms undertaking ODI, by granting firms greater independence in their decision making. Second, the Chinese government needs to clarify the ODI policies. Third, government services related to ODI should be strengthened.

Domestic firms need to make contingency plans to meet the challenges of BIT. They need to update their technology, reduce costs, and learn management skills from their foreign competitors. Domestic firms need to do researches on BIT and gain benefit from it, to learn how to use legal means, including the dispute settlement clauses in BIT, to protect their interests. Chinese investors also have to learn how to deal with public opinion.

Domestic firms need to set up their firm's global strategy and reallocate its resources according to the changing investment environment, taking advantage of profit opportunities outside of domestic markets. When the domestic competition becomes more intensive, they must go abroad to find new markets and new technology by outward investment. Like a country can do it on the macro level, firms can set up a global strategy on the micro level, which includes a wide range of activities such as overseas manufacturing, outward foreign investing, and importing. In the times of BIT, firms need to make much broader decisions about whether or not to engage in foreign trade and foreign investment, what specific foreign markets should be served, and how to participate in chosen markets.

The government should provide more detailed information to firms about the changes made by BIT and provide financial supports to assist firms to make their structural adjustments.

Conclusions

Using various econometric models and a large firm-level data set, we find the overall effect of ODI and thereby BIT on the Chinese manufacturing sector is positive for firms in their outward investment. As the evidence shows, the ODI raised the productivity and profitability of the firms significantly in the manufacturing sector.

Such findings have rich policy implications. Chinese domestic firms need to update their technology, reduce costs, and learn management skills from their foreign competitors. They need to learn to gain benefits from BIT, using the national treatment terms in BIT to enter the foreign markets. Also, Chinese domestic firms also need to set up firms' global strategies and reallocate their resources according to the changing investment environment, taking advantage of profit opportunities outside of domestic markets.

Notes

1. China's non-financial investment (i.e. 'green-field' investment) outweighs the financial investment (i.e. investment from mergers and acquisitions). In 2011, China's non-financial investment accounted for 91.8% of its entire foreign investment.
2. In particular, an observation is included in the sample only if the following observations hold: (1) total assets are higher than liquid assets; (2) total assets are larger than the total fixed assets and the net value of fixed assets; (3) the established time is valid (i.e. the opening month should be between January and December); and (4) the firm's sales must be higher than the required threshold of RMB 5 million.
3. For example, 'Ningbo Hangyuan communication equipment trading company' shown in the ODI data set and '(Zhejiang) Ningbo Hangyuan communication equipment trading company' shown in the National Bureau of Statistics of China production data set are the same company but do not have exactly the same Chinese characters.
4. In the example above, the location fragment is 'Ningbo,' the industry is 'communication equipment,' the business type is 'trading company,' and the specific name is 'Hangyuan.'

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No potential conflict of interest was reported by the authors.

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