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Relationship between Chinese firms' Internationalization and Environmental performance: An empirical evidence

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Abstract:
This research aims to empirically investigate the environmental performance of Chinese multinationals using various proxies of internationalization. This research among the first to empirically test the impact of multiple proxies of internationalization in a single manuscript. This research has also employed the largest panel data-set of 15362 firm-year observations to test the association empirically. The findings of the research reveal that the widely used proxy of internationalization (Intensity_1, which is total exports to total revenue) does not find significant support. On the other hand, Intensity_2 (foreign assets to total assets), Breadth_1, and Breadth_2 (measured as the number of foreign subsidiaries) find significant support. These findings are robust when we employed the GMM regression model.

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1   Introduction

The global climate change issue is one of the biggest challenges face by internationalized companies (Buckley et al., 2017). International performance enhances the strong exposure to global norms and legal actors around the world (Marano & Tashman, 2012), such as multinational organizations that supervise the sustainable impact of companies around the world (Marano & Kostova, 2016). In addition, companies operating in global markets face institutional pressure from external factors, such as government, regulatory agencies, markets, and the public (e.g., local units and industrial organizations), located in many countries where such firms operate. These pressures may vary from country to country and provide conflicting instructions for legal actions (Meyer et al., 2011). In this precarious situation, firms need to comply with institutional pressure to obtain authenticity and maintain their competitive positions in their locations of business operations (Suddaby et al., 2017). The extant literature has made contributions to understand the multinationals' social and environmental sustainability in response to international pressures from external stakeholders (e.g., Duque-Grisales et al., 2020; Gómez-Bolaños et al., 2020; Wang et al., 2019). However, these studies contribute to the association of firm internationalization and corporate social and environmental sustainability. These studies fall short of using various proxies for internationalization to test the long-term effect of sustainable activities of multinational corporations. This research tends to fill this literature gap by empirically investigates the impact of internationalization and the environmental performance of multinational corporations of china using various proxies of internationalization.

We have employed extensive data-set of 15362 firm-year observations of Chinese A-share listed companies for the period of 2010-2018. The HEXUN database has been used to obtained data for Chinese corporations' environmental ratings. While all financial data has been extracted from China stock market and accounting research (CSMAR) database. Based on the LSDV and GMM regression analysis, we found that internationalization is affirmatively associated with corporate environmental performance. This relationship is significantly positive using all proxies of internationalization except Intensity_1 (which is the rate of overseas revenue earned to total revenue of firm). The remainder of the paper is structures as follows. Section 2 discusses the theory and previous literature relating to the environmental performance of multinational corporations. Section 3 provides details on the methodology of the paper. Section 4 provides the empirical findings of the research. Lastly, section 5 discusses and concludes the paper.

2   Theory and Literature

Internationalized firms meet the institutional pressures of all existing countries (Marano & Kostova, 2016) as well as international norms and internationally accredited actors(Marano & Tashman, 2012). Therefore, companies need to put efforts intended at gaining legitimate and competitive position in the international markets (Suddaby et al., 2017). Companies may use other methods to obtain legal recognition in global context, for example strengthening their environmental disclosure (Aragón-Correa et al., 2016; Huang & Kung, 2010). Aragón-Correa et al. (2016) have shown that leading firms' higher environmental disclosures but lower environmental responsibility than their counterparts. Findings of their study reveals that internationalized companies want to be assured of their voluntary disclosure of environmental information, despite of their environmental sustainability. Huang and Kung (2010) conducted an anlaysis using data based on a sample of Taiwanese firms (759 companies). They found a significant correlation between stakeholder pressures and disclosure of environmental information. The results of their analysis reveals that firm's

encourage to make environmental disclosures in order to responds to their need for reassurance from stakeholders' perceptions about their sustainable actions. Following Suchman (1995), we argue that disclosure of environmental information can be incorporated into the search for pragmatic authenticity (depending on viewers 'interest). Some studies have found that firms may seek ethical legitimacy in terms of common acceptance in global markets (Suchman, 1995) by enhancing their environmental sustainability in global businesses (Babiak & Trendafilova, 2011; Chen et al., 2016; Strike et al., 2006; Suarez-Perales et al., 2017). Christmann and Taylor (2001) have revealed that multinational companies transcend environmental standards related to environmental management by shifting their green technologies to their operations, hence respond to the regulations of the locations in which business operate. In his study, Bansaal (2005) examined the environmental sustainability of minerals industry firms from Canada. The results of his research show that firms with international experience positively influence the environmental sustainability of Canadian firms. An interesting finding of the study reveal that time has no influence on the impact of foreign experience of companies on sustainable development. Babiak and Trendafilova (2011) investigated which participants believed that "tackling green management problems allows them to simultaneously become good citizens and contribute to the goals of their business" (p. 17). On the other hand, Chen et al. (2016) examined a data of 63 firms of construction sector and showed that better environmental strategies influence global expansion between strong and restrictive strategic groups. However, they have not found a common relationship with firms that use the environmental strategy. However, they pointed out that firms aimed at an effective environmental protection strategy are more inclined to develop new natural resources, which would create opportunities for managing their international portfolios and supervise their subsidiaries in locations where they have a right to use natural resource and have learning opportunities. In this manner, Suarez-Perales et al. (2017) asserted that foreign firms are gaining insight into how this permits them to use innovative green strategies in line with the required rules and regulations of the world.

Ecological management gives an extra ability to lessen waste and emissions produced through manufacturing processes and which helps to attain higher level of environmental sustainability (Hartmann & Vachon, 2018). In order to develop such capabilities and management environmental competencies may influence costs and benefits of environmental regulatory compliance. Berchicci et al. (2012) have shown that corporate environmental performance would be improved if firm use green technologies and develop environmental strategies. Consequently, developing environmental competencies can minimize the nedd to obtain advantage of certain natural levels of certain countries to deliver their highly polluting activities (Li & Zhou, 2017). Kennelly and Lewis (2003) have shown that factories with a high level of international production also show better environmental performance. Sharfman et al. (2004) examined extensive literature on this topic, showing that high-level international firms find it extremely difficult to respond to the wide range of demands and regulations to be followed in the host countries. Unusual regulations in countries with limited information include higher risk of litigation, as firms may be more likely to break the law by accident. They found that firms adopted international environmental standards such as the stricter laws of the countries in which they operate achieved better environmental performance. Internationalization places firms on detailed stakeholder testing, including that firms will be carefully evaluated for their environmental impacts, increase the risk of adverse testing (Marano et al., 2017), and increase the need for legitimacy (Suchman, 1995). Therefore, we expect that a high level of globalization is definitely related to environmental performance, as

globalization increases the risk that poor performance will be used by activists and stakeholder groups to tarnish the reputation of firms.

3 Methodology

3.1 Sample and data sources

The sample of the study comprises of all A-share Chinese non-financial companies listed in Shanghai and Shenzhen stock exchanges. The data window starts from 2010 to 2018. The data relating to corporate environmental performance has been obtained from HEXUN database. HEXUN ratings consist of sustainable, social and environmental indicators for Chinese firms on a yearly basis. It includes all those listed firms who issue sustainability reports in China. For data concerning financial variables has been extracted from China stock market and accounting research (CSMAR) database. CSMAR has sub-databases such as 'Outward Foreign Direct Investment' which is used in this research. All these databases have been widely employed in prior research (Lau et al., 2016; McGuinness et al., 2017; Xu et al., 2018). The data screening process starts from obtaining financial data from CSMAR for financial variables for the period of 2010 - 2018. After that data from both CSMAR and HEXUN databases has been combined and obtain 29437 firm-year observations. We have obtained final observations of 15362 after dropping missing values.

3.2 Variables measurement

The dependent variable of the study 'corporate environmental performance' is measured using the scores from HEXUN database. These scores ('0' lowest to '100' highest) represents the quality ratings of each firm's environmental performance. It takes into consideration environmentally friendly activities of Chinese companies during the year. While major independent variables of the study is internationalization. Based on the purpose of the research, we have employed various proxies of firm internationalization 'intensity' and 'breadth'. Firstly, to measure 'Intensity_1' we use the proportion of total overseas income to total revenue of firm (Wang et al., 2019; Xu et al., 2018). 'Intensity_2' is calculated by divided total assets of overseas subsidiaries to total assets of parent firm. On the other hand, we also used internationalization measures using 'breadth' of multinationality. 'Breadth_1' is measured as the natural logarithm of number of overseas subsidiaries each firm owns (Li et al., 2018). Lastly, 'Breadth_2' is denoted as the natural logarithm of number of countries each firm has subsidiaries (Duque-Grisales et al., 2020). The definitions of all control variables have been provided in table 1.

Table 1: Variables Definitions

Variable	Description
CEP	CEP measured by the environmental ratings of Chinese listed companies from HEXUN database (ranges from '0' lowest ratings to '100' highest ratings.
Intensity_1	A proxy for internationalization measured as the ratio revenue earned from outside China to total revenue from parent firm.
Intensity_2	A proxy for internationalization measured as the ratio of total assets of subsidiaries outside China to total assets from consolidated statement.
Breadth_1	A natural logarithm of number of subsidiaries each parent firm owns plus 1.
Breadth_2	It is measured by the natural logarithm of number of subsidiaries location (country) each firm owns.
Size	A natural logarithm of total employees plus 1.
Lev	It is measured as the total liabilities divided by total assets.
Age	A natural logarithm of years that the firm been established.
Growth	A change in operating revenue divided by the operating income of the previous year.
Cash	It is calculated as the operating cash flow divided by total assets.
ROE	A return on average equity, average equity is the average value of equity in this year and the previous year.
MTB	A market to book ratio is calculated by dividing the current closing price of the stock.

4 Empirical results

4.1 Descriptive results

Table 2 presents the descriptive details of the predictors and dependent variables of the research. The average CEP show that Chinese firms is low with 21.11 of mean value. The internationalization intensity_1 is 5.32 and intensity_2 is 0.03 which shows the percentage of foreign income to total income of parent company and total assets of foreign subsidiary to total assets owned by parent firm, respectively. While the Breadth shows the mean value of number of overseas subsidiaries owned by each firm outside China.

Table 2: Descriptive statistics

Variable	N	Mean	Std. Dev.	Min	Max
CEP	15,362	21.11	5.46	0	95
Intensity_1	15,362	5.32	33.67	0.00	32.31
Intensity_2	15,362	0.03	0.10	0.00	0.65
Breadth_1	15,362	0.80	0.82	0.00	3.33
Breadth_2	15,362	0.68	0.66	0.00	2.56
Size	15,362	7.76	1.27	4.45	11.24
Lev	15,362	0.45	0.21	0.05	0.94
Age	15,362	2.78	0.37	1.61	3.43
Growth	15,362	0.21	0.46	-0.54	3.07
ROE	15,362	0.07	0.14	-0.70	0.42

Source: Software output

Table 3: Regression analysis using various proxies of internationalization

VARIABLES	Model 1 CEP	Model 2 CEP	Model 3 CEP	Model 4 CEP	Model 5 CEP	Model 6 CEP
Intensity_1	0.002 (0.001)					
Intensity_2		0.804** (0.403)				
Breadth_1					0.440*** (0.060)	
Breadth_2						0.576*** (0.076)
Size	0.966*** (0.041)	0.967*** (0.041)	0.965*** (0.041)	0.978*** (0.041)	0.891*** (0.042)	0.888*** (0.041)
Lev	0.516** (0.243)	0.505** (0.242)	0.509** (0.243)	0.550** (0.244)	0.430* (0.242)	0.443* (0.242)
Age	0.642*** (0.126)	0.663*** (0.126)	0.648*** (0.126)	0.662*** (0.126)	0.724*** (0.127)	0.725*** (0.127)
Growth	-0.144* (0.079)	-0.144* (0.079)	-0.148* (0.079)	-0.137* (0.080)	-0.147* (0.079)	-0.141* (0.079)
ROE	1.743*** (0.278)	1.743*** (0.278)	1.738*** (0.278)	1.756*** (0.279)	1.667*** (0.276)	1.667*** (0.276)
Constant	-5.914*** (0.540)	-5.971*** (0.538)	-5.917*** (0.537)	-6.066*** (0.539)	-5.579*** (0.536)	-5.597*** (0.535)
Year	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Industry	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	15362	15362	15362	15362	15362	15362
R-squared	0.171	0.171	0.171	0.172	0.174	0.175

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Software output

4.2 Regression analysis

Table 3 provide the regression results of the study based on least square dummy variable approach. The Intensity_1 shows the positive coefficient of 0.002 with insignificant

value. While Intensity_2 shows coefficient of 0.804 with significance at 5%. Similarly, Breadth_1 (0.440 at 1% significance) and Breadth_2 (0.576 at 1% significance) found to be positively associated with CEP. It implies that internationalization intensity is positively associated with CEP. These findings are consistent with Kennelly and Lewis (2003) and inconsistent with Gómez-Bolaños et al. (2020).

Table 4: GMM regression analysis

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
VARIABLES	CEP	CEP	CEP	CEP	CEP	CEP
Intensity_1	0.004					
	(0.002)					
Intensity_2		2.043***				
		(0.593)				
Breadth_1					0.534***	
					(0.072)	
Breadth_2						0.697***
						(0.093)
Size	0.947***	0.942***	0.946***	0.969***	0.851***	0.842***
	(0.044)	(0.044)	(0.044)	(0.044)	(0.045)	(0.045)
Lev	0.378	0.360	0.370	0.401	0.303	0.360
	(0.250)	(0.249)	(0.249)	(0.250)	(0.249)	(0.249)
Age	0.405***	0.464***	0.424***	0.451***	0.551***	0.570***
	(0.144)	(0.144)	(0.143)	(0.143)	(0.144)	(0.145)
Growth	-0.146	-0.149	-0.150*	-0.124	-0.159*	-0.150*
	(0.091)	(0.091)	(0.091)	(0.092)	(0.091)	(0.091)
ROE	1.434***	1.456***	1.431***	1.416***	1.341***	1.366***
	(0.308)	(0.308)	(0.308)	(0.308)	(0.306)	(0.306)
Constant	-8.784***	-8.981***	-8.849***	-9.198***	-9.042***	-9.105***
	(0.516)	(0.514)	(0.512)	(0.518)	(0.514)	(0.516)
Year	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	12448	12448	12448	12448	12448	12448
R-squared	0.162	0.162	0.162	0.163	0.166	0.166

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Software output

4.3 Endogeneity using GMM

We use GMM to control for the potential effect of endogeneity. The use of GMM enables researcher to account for the potential concern of endogeneity which can be caused due to reverse causality, simultaneity, omitted variable and firm specific heterogeneities in our regression results. Table 4 presents the robust regression results of the effect of internationalization on corporate environmental performance. Similarly, we found that Intensity_1 is not significant as in the main regression results. While Intensity_2, Breadth_1 and Breadth_2 all are significant and positive with CEP. These findings are robustly provide evidence that internationalized firms are more responsible in terms of their environmental activities.

5 Discussion and Conclusion

Existing documents have failed to find consensus on how firms' global manufacturing and environmental management and operations are intertwined. Our findings shed light on the details of the association by providing a new way of analyzing whether these relationships change as firms move their operations abroad to developing countries. Our results have shown that the firms' globalization and environmental performance are closely related even the use of various proxies of internationalization. The study supports the findings of previous

research on the linkages between firm internationalization and environmental sustainability (Duque-Grisales et al., 2020; Gómez-Bolaños et al., 2020; Xu et al., 2018). Internationalized corporations encounter with institutional pressures which drives them to seek actions to maintain their legitimacy in the global markets to show their environmentally responsible behavior.

Nevertheless, this research contributes to the rare stream of international business literature. This study has few limitations and suggestions for further research. First, our research does not examine any moderators to further strengthen or weaken the association between internationalization and corporate environmental performance. Second, this research is conducted under emerging market context. Future researcher tests all the proxies of internationalization in developed country context. Third, the role of home-country institutional quality or other institutional factors should be examined. Lastly, the role of ownership structures should be explored to identify the environmental strategies of various corporations when internationalize.

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