Innovation and Internationalization

Evidence from Chinese Manufacturing Enterprises

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INNOVATION AND INTERNATIONALIZATION: EVIDENCE FROM CHINESE MANUFACTURING ENTERPRISES

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Guowei Dong

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Department of International Economics, Government and Business | **PhD Series 04.2023**

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Innovation and Internationalization: Evidence from Chinese Manufacturing Enterprises

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Abstract

Innovation plays a key competitive role in globalization. Despite China's rapid technological advances and the prominence of its internationalization strategy in the country's economic development, few studies have investigated the relationship between innovation and internationalization. Through three standalone studies investigating the impact of international technology learning channels on innovation performance, the impact of innovative capability on export performance, and the effect of innovative capability on outward FDI (OFDI) using data of China's manufacturing firms, this article-based dissertation contributes to a more granular and multifaceted understanding of innovation and internationalization in emerging market enterprises (EMEs). This dissertation is positioned at the intersection of international business and innovation research and is rooted in international economics. Drawing on the empirical cases of EMEs in China's manufacturing industries, the overarching research question guiding this thesis is: how do international technology learning channels affect the innovation performance in EMEs and in turn how does innovation capability impact EMEs' internationalization? To answer this research question, this dissertation uses several large datasets and various econometric methods to study the relationship between innovation and internationalization in emerging economies from three perspectives, resulting in three articles.

Article 1 (the first chapter) examines the impacts of international learning channels, namely imports, exports, inward FDI and outward FDI, on innovation performance of emerging market enterprises (EMEs). It contributes to the literature on internationalization and innovation by integrating insights from international trade and international investment to explain variations in EMEs' innovation performance. This integrative approach enables us to offer a more complete description of the international learning channels that shape a firm's innovation performance, specifically a better understanding of the role and relative contribution of each channel. Empirical results based on the whole sample of a large dataset of Chinese high-tech manufacturing firms show that imports, exports and outward FDI have a significantly positive effect on the innovation performance of EMEs, while inward FDI in the form of foreign ownership has a distinct and generally negative effect. This study further sheds light on the differences in innovation behavior between domestic firms and foreign-controlled firms by demonstrating that the relationship between international learning channels and innovation depends on the level of foreign ownership. These findings have important implications for how

policymakers and managers can advance innovation strategies to enhance EMES' global competitiveness. Strong performance in a series of robustness checks adds confidence to our results.

Article 2 (the second chapter) examines the role of ownership for the relationship between innovation and exports. Analyzing a large firm-level data set on Chinese manufacturing firms during 2000-2007, this paper finds that state ownership has a positive moderating effect on the innovation–export relationship. We ascribe this effect to state-owned firms' privileged access to complementary resources and networks that strengthen their ability to use innovation to generate exports. In contrast to many earlier studies, this paper also finds that foreign ownership has a negative moderating effect. One likely reason is that indicators of local innovation do not reflect the flows of knowledge between foreign-owned firms and their parent companies. This finding highlights the fact that innovation and production may be geographically separated within multinational enterprises. A policy implication of the analysis is that public support to innovation may have stronger effects on exports when it targets firms that carry out most of their activities in domestic market.

Article 3 (the third chapter) develops and tests the premise that the impact of innovative capabilities on OFDI commitment is not uniform but rather contingent upon the institutional setting in which a firm is embedded, by combining resource-based and institution-based views of OFDI. Using a sample of exchange-listed Chinese manufacturing firms during 2007–2019, this study demonstrates that innovative capabilities have a strong and independent impact on the OFDI propensity and intensity of EMEs. This impact, however, is negatively moderated by higher levels of state ownership, as well as by a location that is relatively well marketized. These results are robust in a variety of measurements of the key variables and the use of the number of Qing Dynasty Confucian academies as a novel instrumental variable. These findings provide new theoretical mechanisms for conceptualizing the internationalization implications of innovation.

To sum up, this dissertation systematically investigates the relationship between innovation and the internationalization of Chinese manufacturing firms. This dissertation confirms that internationalization activities can be regarded as international technology learning channels for EMEs and play important roles in improving their innovation performance. In addition, this dissertation finds that innovative capabilities, can in turn promote EMEs' export and OFDI, and

such effects are influenced by institutional factors including state ownership, foreign ownership and regional marketization. These results contribute to the existing literature on innovation and internationalization in EEs with new and compelling evidence by analyzing data in a unified theoretical framework. These research findings have important implications for practitioners, including policymakers and managers, on how EMEs can actively shape innovation strategies and globalization activities to enhance their global competitiveness and viability.

Keywords: Innovation, Internationalization, Import, Export, Inward FDI, Outward FDI, Institutional environment, EMEs, China

Resumé

Innovation spiller en vigtig konkurrencemæssig rolle i globaliseringen. På trods af Kinas hurtige teknologiske fremskridt og vigtigheden af internationalisering for landets økonomiske udvikling, har få studier belyst forholdet mellem innovation og internationalisering. Gennem tre selvstændige studier, bidrager denne artikelbaserede afhandling til en mere granulær og mangefacetteret forståelse af innovation og internationalisering af virksomheder i udviklingsøkonomier (”emerging market enterprises”, herefter: EME). Afhandlingen undersøger først effekten af internationale teknologilæringskanaler på innovationspræstationer, dernæst virkningen af innovativ kapacitet på eksportpræstationer, og afsluttende virkningen af innovativ kapacitet på udadgående direkte udenlandske investeringer (”foreign direct investments, herefter ”FDI”) gennem en analyse af data på Kinas produktionsvirksomheder. Afhandlingen er placeret i skæringspunktet mellem international business og innovationsforskning, og er forankret i international økonomi. Med udgangspunkt i de empiriske eksempler på EME'er i Kinas fremstillingsindustrier, er det overordnede forskningsspørgsmål, der styrer denne afhandling: hvordan påvirker internationale teknologilæringskanaler innovationspræstationen i EME'er, og hvordan påvirker innovationsevne EME'ers internationalisering? For at besvare dette forskningsspørgsmål anvender denne afhandling flere store datasæt og forskellige økonometriske metoder til at studere forholdet mellem innovation og internationalisering i vækstøkonomier fra tre perspektiver, hvilket resulterer i tre artikler.

Artikel 1 (første kapitel) undersøger effekten af internationale læringskanaler på EME'ers innovationspræstationer. Dets bidrag ligger i at integrere indsigt fra litteraturen om international handel og internationale investeringer, for at forklare variationerne i innovationspræstationer. Gennem denne tilgang kan vi opnå både en mere komplet beskrivelse af de internationale læringskanaler, der former en virksomheds innovationspræstation, men også en bedre forståelse af hver kanals rolle og relative bidrag. Den analytiske ramme blev testet mod et repræsentativt udvalg af kinesiske højteknologiske fremstillingsvirksomheder i perioden 2000-2007. Analysemodellen kunne forklare en stor del af variationerne i innovationspræstation. De empiriske resultater viser, at import, eksport og udgående FDI har en signifikant positiv effekt på EME'ers innovationspræstation, mens indgående FDI i form af udenlandsk ejerskab har en tydelig og generelt negativ effekt. Dette studie viser yderligere variationer i innovationsadfærd mellem indenlandske virksomheder og udenlandsk kontrollerede virksomheder ved at påvise, at forholdet mellem internationale læringskanaler og innovation afhænger af niveauet af

udenlandsk ejerskab. Resultaterne af denne undersøgelse har vigtige konsekvenser for, hvordan ledere og politiske beslutningstagere udvikler innovationsstrategi for at konkurrere på det globale marked. En række statistiske robusthedstjek understøtter og øger tilliden til resultaterne.

Artikel 2 (andet kapitel) undersøger ejerskabets rolle for forholdet mellem innovation og eksport. Ved at analysere et stort datasæt med kinesiske produktionsvirksomheder i perioden 2000-2007, finder vi, at statsejerskab har en positiv modererende effekt på innovation-eksportforholdet. Vi tilskriver denne effekt de statsejede virksomheders privilegerede adgang til komplementære ressourcer og netværk, der styrker deres evne til at bruge innovation til at generere eksport. I modsætning til mange tidligere undersøgelser finder vi også, at udenlandsk ejerskab har en negativ modererende effekt. En sandsynlig årsag er, at indikatorer for lokal innovation ikke afspejler videns-udveksling mellem udenlandsk ejede virksomheder og deres moderselskaber. Det viser, at innovation og produktion kan være geografisk adskilt i multinationale virksomheder. En politisk implikation af analysen er, at offentlig støtte til innovation kan have stærkere effekter på eksporten, når den retter sig mod virksomheder, der udfører de fleste af deres aktiviteter på hjemmemarkedet.

Artikel 3 (tredje kapitel) udvikler og tester forudsætningen om, at indvirkningen af innovative kapaciteter på udadgående direkte udenlandske investeringer (herefter: OFDI) ikke er ensartet, men snarere betinget af den institutionelle ramme, hvori en virksomhed er indlejret. Denne tilgang kombinerer det ressourcebaserede og institutionsbaserede syn på OFDI. Ved at bruge en stikprøve af børsnoterede kinesiske produktionsvirksomheder i perioden 2007-2019 viser denne undersøgelse, at innovationsressourcer har en stærk og uafhængig effekt på OFDI-tilbøjeligheden og intensiteten af EME'er. Denne påvirkning er dog negativt modereret af højere niveauer af statsejerskab, samt af graden af lokale understøttende markedsinstitutioner. Resultaterne er statistisk robuste ved anvendelse af alternative målinger af nøglevariablerne, og ved brugen af antallet af Qing-dynastiets konfucianske akademier som en ny instrumentel variabel. Resultaterne påpeger nye teoretiske mekanismer i konceptualiseringen af internationaliseringsimplikationer af innovation.

Sammenfattende undersøger afhandlingen systematisk forholdet mellem innovation og internationaliseringen af kinesiske produktionsvirksomheder. Afhandlingen finder, at internationaliseringsaktiviteter kan betragtes som internationale teknologilæringskanaler for EME'er, og spiller en vigtig rolle i at forbedre deres innovationspræstation. Derudover kan

innovative kapaciteter fremme EME'ers eksport og OFDI, og sådanne effekter er påvirket af institutionelle faktorer, herunder statsejerskab, udenlandsk ejerskab og regionale markedsunderstøttende institutioner. Resultaterne bidrager til den eksisterende litteratur om innovation og internationalisering i udviklingsøkonomier med ny dokumentation og en analyse af data i en samlet teoretisk ramme. Forskningsresultaterne har praktiske implikationer for politiske beslutningstagere og virksomhedsledere, da de viser hvordan kinesiske virksomheder kan drage fordel af og aktivt forme innovationsstrategier og globaliseringsaktiviteter, og derved øge deres globale konkurrenceevne og økonomisk levedygtighed.

Nøgleord: Innovation, Internationalisering, Import, Eksport, Indadgående FDI, Udadgående FDI, Institutionelt miljø, EMEs, Kina

摘要

创新在全球化中起着关键性的竞争作用。尽管中国的科学技术进步迅猛，国际化战略在中国国家经济发展中的重要性更是不言而喻，但少有研究调查创新与国际化之间的关系。本论文通过三个独立的研究，基于中国制造业企业的样本数据，分别探究了国际技术学习渠道对创新绩效的影响、创新能力对出口绩效的影响以及创新能力对对外投资的影响。本论文有助于加深对新兴市场企业的创新和国际化两者关系的具体和多方面的理解。本论文立足于国际商业研究与创新研究的交叉点，植根于国际经济学理论和方法。本论文的总体研究问题是：新兴市场企业的国际化活动是否以及如何影响创新绩效，同时企业的创新能力是否以及如何影响企业国际化决策和强度？为了回答此研究问题并加深对新兴市场企业创新与国际化关系的理解，本论文运用多个大型数据集和多种计量经济学方法，从三个角度分别建立起多维度实证模型，每个视角分别代表一篇实证文章。

论文一（第一章）考察了国际学习渠道对新兴市场经济体创新绩效的影响。它的贡献在于整合来自国际贸易和国际投资的理论依据来解释新兴市场企业创新绩效的变化。这种方法使我们不仅能够更完整地描述影响公司创新绩效的国际学习渠道，而且能够更好地理解每个渠道的整体作用机制和相对贡献价值。本文利用 2000-2007 年期间中国高科技制造企业的大样本数据进行了检验，实证结果表明，进口、出口和对外直接投资对企业的创新绩效具有显著的积极影响，而以外资所有权形式存在的对内直接投资对企业创新绩效具有明显且稳健的负面影响。本研究通过证明国际技术学习渠道与创新绩效之间的关系取决于外资所有权的水平，进一步揭示了国内企业和外资控股企业之间创新行为的差异。本研究的结果对管理者和决策者如何制定创新战略以增强其在全球市场中的竞争能力具有重要意义。一系列稳健性检验的结果强化了本研究的结论。

论文二（第二章）考察了所有权在创新与出口关系中的作用。通过实证分析 2000-2007 年中国制造业的大型企业级数据集，本论文发现国有资本所有权对创新与出口之间的关系具有正向的调节作用。本文将这种影响归因于国有企业具有获得互补资源的特权，这些资源增强了企业利用创新产生出口的能力。此外，与许多早期研究结论形成鲜明的相比，本论文还发现外资所有权具有负向的调节作用。对于此研究发现，一个可能的原因是本地创新指标不能完全反映外资公司与其母公司之间的知识流动。这一结论突出了这样一

个事实：创新和生产在跨国企业中可能在地理维度上是分开的。本论文的一个政策相关的涵义是当公共资源投入到针对在国内市场开展创新活动的公司时，其对出口可能产生更大的积极影响。

论文三（第三章）通过结合资源基础观和制度基础观来探究对新兴市场企业外直接投资的驱动原因。本研究通过对2007-2019 年中国制造业所有上市公司样本的实证分析，发现企业创新能力对企业对外直接投资的倾向和强度都具有强烈且独立的正向影响。然而，这种影响受到较高水平的国有所有权以及相对市场化程度较高地区的负向调节。这些研究结果在对关键变量的各种替代和使用清代儒家学院的数量作为工具变量时表现稳健。这些发现为概念化创新的国际化影响提供了新的理论机制。

综上所述，本论文系统地研究了新兴市场企业层面创新与国际化的关系。本论文认为，国际化活动可视为新兴市场企业的国际技术学习渠道，对提高其创新绩效具有重要的作用。此外，创新能力反过来又可以促进新兴市场企业的出口绩效和对外直接投资，而这种影响受到国家所有制、外资所有制和区域市场化等制度因素的调节影响。这些结果通过在统一的理论框架中分析，为现有的关于新兴经济体创新和国际化的理论文献提供了新颖的和令人信服的实证证据。这些实证研究结果对新兴经济体企业特别是中国企业（包括政策制定者和管理者在内）如何从创新战略和全球化活动中受益并积极参与创新战略和全球化活动，从而提高其全球竞争力和影响力，具有重要意义。

关键词：创新，国际化，进口，出口，外商直接投资，对外直接投资，制度环境，新兴市场企业，中国

Table of contents

List of abbreviations

EMEs	Emerging Market Enterprises
EEs	Emerging Markets
FDI	Foreign Direct Investment
IFDI	Inward Foreign Direct Investment
OFDI	Outward Foreign Direct Investment
GVCs	Global Value Chains
SO	State Ownership
FO	Foreign Ownership
SOEs	State-owned Enterprises
FOEs	Foreign-owned Enterprises
WSOEs	Wholly State-owned Enterprises
WFOEs	Wholly Foreign-owned Enterprises
MNEs	Multinational Enterprises
EMNEs	Emerging Market Multinationals
ASIFs	Annual Survey of Industrial Firms
CNIPA	China National Intellectual Property Administration
HMT	Hong Kong, Macau and Taiwan
TFP	Total Factor Productivity
IV	Instrument Variable
VIF	Variance Inflation Factor
RMB	Renminbi
NPS	New Products Sales
RBV	Resource-based View
IBV	Institution-based View
CSRC	China Securities Regulatory Commission
HHI	Herfindahl–Hirschman Index
MCC	Ministry of Commerce of China
EPO	European Patent Office
IPC	International Patent Classification
IPR	Intellectual Property Rights
M&A	Mergers and Acquisitions
NIS	National Innovation System
PRC	People's Republic of China
PATSTA	Worldwide Statistical Patent Database
S&T	Science and Technology
CNPC	China National Petroleum Corporation
COD	Central Organization Department of the Chinese Communist Party
CSMAR	China Stock Market Accounting Research
CSRC	China Securities Regulatory Commission
FAI	Fixed Assets Investment

FE	Fixed-effects Models
RE	Random-effects Models
2SLS	Two-stage Least Square
NBS	National Bureau of Statistics
NDRC	National Development and Reform Commission
NERI	National Economic Research Institute
R&D	Research and Development
WIPO	World Intellectual Property Organization
RG	Research Gap
RQ	Research Question

Introduction to dissertation

1. Background

Technological innovation plays a key competitive role in globalization and is a major determinant of sustained development and economic growth of emerging economies (EEs) (Fu & Gong, 2011; Lee, 2013; Lee & Kim, 2009). The past two decades have witnessed a remarkable rise in internationalization activities and rapid technological progress by emerging market enterprises (EMEs) (Hoskisson, et al., 2013; Luo, Sun & Wang, 2011). On the one hand, acquiring and integrating new technologies is becoming a crucial strategy for EEs to expedite technological upgrading. EMEs are increasingly engaged in various internationalization activities such as import, export, inward foreign direct investment (IFDI) and outward foreign direct investment (OFDI), and regard these activities as learning channels and opportunities to improve their innovation capabilities and performance (Dominguez Lacasa, et al., 2019; Ernst, 2008; Radosevic & Yoruk, 2014). On the other hand, as globalization and international competition intensify, policymakers in an increasing number of EEs are advocating technological innovation to improve their competitiveness in global markets (Li, 2012). This is largely driven by the belief that innovative firms are more likely to succeed in the international markets, as innovation often helps to reduce production costs or develop products with unique characteristics or higher quality (Yi, Wang & Kafouros, 2013). Both phenomena – the increasingly prominent innovation strategies and internationalization activities – provide opportunities for the development of EMEs, as the case of China clearly illustrates.

First, China has experienced remarkable economic growth in recent years and has become a highly competitive player in the global innovation race. This can be reflected by the country's increased investment in R&D. The R&D expenditures of China in 2012 totalled US$163 billion, ranking second in the world, accounting for 1.98% of GDP, which was almost the same as that of the total 28 EU countries, and narrowing the gap with the United States (Eurostat, 2015). This continues to be the case and the R&D investment in China will only increase in the following years in push for major technology breakthroughs.

Second, since entering the 21st century, China, as the largest emerging economy, has transformed itself from an opponent of globalization into an advocate. This is evidenced by its significant

integration in the global economy through international trade and investment. China has become the largest exporter of goods already in 2009 (WorldBank, 2010) and one of the world's top-three largest foreign investors in 2013 (WIR, 2014). China's outward-oriented development strategy and the subsequent dramatic growth in imports, exports, IFDI and OFDI have significantly contributed to China's major economic growth and innovation performance gain (Buckley, Clegg & Wang, 2002; Fu, 2011; Li & Liu, 2005; L. Tang, et al., 2020). Specifically, foreign trade has enabled a number of Chinese firms to improve their innovation capabilities and become global technology leaders in a short period of time by engaging in global value chains (GVCs). For example, China's Huawei has transformed from a 'copycat' into a global competitive innovator (Luo, Sun & Wang, 2011). According to China's State Intellectual Property Office (SIPO), in 2015, Huawei granted 769 invention patents to Apple, while in return Apple granted 98 to Huawei. Likewise, IFDI has also been shown to benefit EMEs through direct knowledge and technology transfer and indirect spillover effects (Buckley, Clegg & Wang, 2002; Fu, 2012; Kathuria, 2008; Lall, 2003). In addition, the "going out" strategy proposed by the Chinese government since the early 21st century and a series of policy instruments to intervene in cross-border business operations have enabled Chinse EMEs to not only expand into new markets, but also seek technological assets overseas (Li, Li & Shapiro, 2012; Piperopoulos, Wu & Wang, 2018; Yang, et al., 2009). Although sometimes constrained by weak internal R&D resources, EMEs are able to leverage their abilities to acquire, purchase and license key components and technologies in open markets, and learn from disassembling products into observable technological components of lower complexity (Malik & Kotabe, 2009), which can lead to the development of architectural innovations. In recent years, by engaging in internationalization activities, many Chinese firms including Huawei, ZTE, Lenovo, TCL and Haier have managed to climb up the ladder in the GVCs and become important competitors in the battle for global technological leadership (Fu, Hou & Liu, 2018; Piperopoulos, Wu & Wang, 2018).

The Chinese government plays a crucial role in shaping the process of internationalization and the innovation strategy for Chinese enterprises. The government may use its power to implement objectives, including globalization, through means such as the direct provision of critical resources and subsidies to support internationalization. For example, in 2006, the Chinese government started an ambitious 15-year plan to promote internationalization and indigenous innovation. Since the implementation of this plan, the innovation capabilities of Chinese

enterprises have significantly improved, fostering the accumulation of domestic innovation.[1] For example, in 2018, China's top 500 enterprises owned 955,500 patents, an increase of 29.6% over 2017, and a significant change compared with 40,196 patents owned by Chinese enterprises in 2005 (CNIPA, 2019).

Overall, the increased R&D expenditure, rapid economic development and institutional transformation have enabled China to play a crucial role in the global innovation race (Piperopoulos, Wu & Wang, 2018). At the firm level, EMEs are increasingly participating in global markets despite their early stages of innovation and internationalization. It is important to note that while China is considered an EE in almost all international business (IB) and innovation literature, this dissertation does not intend to treat China as a representative of all EEs. Instead, this dissertation acknowledges the considerable differences between China and other EEs in terms of institutions and regulations, which may affect the generalizability of the empirical results. However, given the increasing degree of globalization that China and other EEs face in common and the widely recognized importance of innovation for EEs in international competition, this dissertation expects that some of the theoretical and practical implications based on empirical results derived from Chinese firms will be of relevance to other EEs. In other words, the findings from this dissertation are expected to provide important managerial and policy implications for practitioners and policymakers not only in China but also in other EEs such as India and Brazil that have adopted a catch-up strategy similar to China's use of international trade and international investment as an external source of technological development. As most of the literature refereced and discussed below did not explicitly distinguish between Chinese firms and other EMEs, 'EMEs' and 'Chinese firms' are used interchangeably throughout the dissertation.

2. Motivation

Innovation and internationalization do not take place in silos but are closely interlinked. Despite innovation and internationalization are closely related, our understanding of how they interact is

[1] The most important and comprehensive strategic technology and innovation policy tool of the first decade of the 21 century was the "National Medium- and Long-Term Program for Scientific and Technological Development" (2006-2020), commonly known as the 15-year Plan for Science and Technology. It was launched in January 2006. The Plan's long-term goal was to allow China to become a pre-eminent global economic and technological power. (https://www.itu.int/en/ITU-D/Cybersecurity/Documents/National_Strategies_Repository/China_2006.pdf)

still at a very nascent stage (Bernardini Papalia, Bertarelli & Mancinelli, 2018; Fu, Hou & Liu, 2018; Papanastassiou, Pearce & Zanfei, 2020; Piperopoulos, Wu & Wang, 2018; Wu, Wei & Wang, 2021). On the one hand, although the consensus is that internationalization creates learning opportunities and channels for firms, the assumptions and findings that underly the theory are largely based on research on internationalized firms in developed economies where there are strong patent laws to effectively protect firms' intellectual property rights (IPR) (Howell, Lin & Worack, 2020; Li, et al., 2018; Piperopoulos, Wu & Wang, 2018; Sutherland, Anderson & Hu, 2020). However, it is plausible that the findings based on developed countries may not be applicable to the case of EEs as these economies differ from developed countries markedly in terms of institutions, levels of economic development and marketization (Genc, Dayan & Genc, 2019; Kafouros, et al., 2008; Wu, et al., 2016). In this context, some studies have examined the impact of international learning channels in the form of various internationalization activities on firm innovation specifically in EEs, such as China, the United Arab Emirates, India and Brazil, and found positive impacts in general (see Table 1). However, these studies only focus on a single learning channel while overlooking the fact that a firm's innovation performance may be affected by multiple learning channels simultaneously. As a result, there remains an incomplete understanding of whether and how EMEs, as latecomers, can successfully learn and absorb new knowledge from abroad (Chittoor, Aulakh & Ray, 2015; Piperopoulos, Wu & Wang, 2018). On the other hand, we know surprisingly little about the impact of firm-level innovative capabilities on EMEs' internationalization decisions. Innovation in EEs takes place in an uncertain environment where institutional factors including ownership, have a significant impact on firms' innovation performance (Wu, Wei & Wang, 2021; Yi, Wang & Kafouros, 2013). Although existing empirical literature largely supports the theoretical consensus on the positive impact of innovation on firm internationalization (Asmussen & Goerzen, 2013; Ayllón & Radicic, 2019; Cassiman & Golovko, 2011; Silva, Styles & Lages, 2017; Wakelin, 1998), most of them focus on advanced economies, where firms differ considerably from EMEs in terms of ownership advantages and the institutional frameworks they operate in (Mathews, 2006; Wang, et al., 2012a). Given the rapid growth of domestic technology and the prominence of internationalization strategies in EEs, the impact of innovative capabilities on internationalization in EMEs seems to be a topic that begs for attention.

Under this background, the objective of this thesis is to provide an updated perspective on the development of EMEs, focusing on the abovementioned phenomena and dissecting the

relationship between innovation and internationalization to address major research gaps. Specifically, this thesis aims to address three important theoretical gaps in the current literature on innovation and internationalization (as explained in detail in Chapters 1, 2 and 3). First, there is no unified perspective on the determinants of EMEs' innovation performance by integrating theoretical developments in the literature of international trade and international investment. While theories on international trade or investment has greatly helped scholars to improve the understanding of innovation and technological upgrading mechanisms, few studies have incorporated them into a unified analytical framework, limiting our interpretation of how differences in innovation performance among EMEs occur. As the conceptualization of this study rests upon the view that international technology learning channels are joint determinants of innovation performance, it differs from previous theoretical views that regarded innovation as the outcome of a single channel, allowing us to more fully consider the forces that shape a firm's innovation performance.

Table 1. Overview of selected firm-level empirical studies on the effects of international learning channels on EMEs' innovation performance*

	Study	Sample	International technology learning channels and measures	Innovation measures	Other channels if considered (controlled)	Key findings on the effects of global interaction on innovation
1	Lu and Ng (2012)	Chinese firms	IIS	IP_dummy	FO	•IIS: Positive •FO: Insignificant
2	Chen, Zhang and Zheng (2017)	Chinese firms	IIS, IIA	RDS; RDA; R&D_dummy	EIS, EIA	•IIS & IIA: Positive on RDS & RDA •IIS & IIA: Insignificant on R&D_dummy •EIS & EIA: Positive on RDS & RDA •EIS & EIA: Insignificant on R&D_dummy
3	Chittoor, Aulakh and Ray (2015)	Indian firms	ICDK	RDS	ES	•ICDK: Positive •ES: Positive
4	Xie and Li (2018)	Chinese firms	EI	NPS	FO	•EI: Positive •FO:Negative
5	Li, Chen and Shapiro (2010)	Chinese firms	EI_industry	NPS_share	FO_ industry	•EI_industry: Positive •FO_ industry: Positive
6	Genc, Dayan and Genc (2019)	United Arab Emirates firms	DoI	Patents granted	No	DoI: Insignificant
7	Pradhan (2011)	Indian firms	EI	RDS	FO_dummy; Import_industry	•EI: Positive •FO_dummy: Positive •Import_industry: Positive
8	Gong and Hanley (2021)	Chinese firms	EI	NPS_ dummy; R&D_dummy	No	EI: Positive on NPS_ dummy & R&D_dummy
9	Gorodnichenko, Svejnar and Terrell (2020)	Firms in eighteen emerging market economies	EI	Dummy variable based on a set of questions,	IIS; FO_dummy	•EI: Positive •IIS: Positive •FO_dummy: Positive
10	Fan and Hu (2007)	Chinese firms	FO	RD RDS RDE	No	•FO: Negative

11	Kathuria (2008)	India firms	FO			•FO: Negative
12	Girma, Gong and Görg (2008)	Chinese firms	FO	NPS_share; RDS	EIS	•FO: Positive
13	Choi, Lee and Williams (2011)	Chinese firms	FO	Patents granted	No	•FO: Positive
14	Choi, Park and Hong (2012)	Korean firms	FO	Patents granted	No	•FO: Positive
15	Howell, Lin and Worack (2020)	Chinese firms	OFDI_ dummy	RDS, Patents granted, Patents applications, Patents citations	No	OFDI_ dummy: Positive
16	Piperopoulos, Wu and Wang (2018)	Chinese firms	OFDI	PC	No	OFDI: Positive
17	Fu, Hou and Liu (2018)	Chinese firms	OFDI_ dummy	NPS_share	EIS	•OFDI_ dummy: Positive •EIS: Positive

*The detailed literature search procedure is presented in Appendix of Chapter 1

Notes on variable names:

- IP_dummy: Innovation propensity = 1 if a firm innovates in processes;
- NPS: New product sales = ln (1 + the value of new product output);
- NPS_share: The share of new product sales in total sales = (New production sales)/Sales;
- RD: R&D expenditure = ln(R&D expenditure);
- RDS: R&D intensity in terms of sales = (R&D expenditure)/Sales;
- RDA: R&D intensity in terms of assets = (R&D expenditure)/Assets;
- RDE: R&D intensity in terms of employment = R&D expenditure per employee;
- R&D_dummy = 1 if a firm has R&D expenditure;
- PC: The number of forward invention patent citations a subsidiary has received;
- IIS: Import intensity in terms of sales = Import/Sales;
- IIA: Import intensity in terms of assets = Import/Assets;
- Import_industry: Import competition = industry production + industry imports – industry exports;
- ICDK: Technology imports = ln(total annual foreign exchange spending on capital goods and know-how);
- DoI: Degree of Internationalization (subjective measures);
- EP_dummy: Export propensity = 1 if firm exports;
- EI_industry=the ratio of a firm's export value to its total output value normalized by the same ratio for the industry to which the firm belongs;
- EIS: Export intensity in terms of sales = Export/Sales ;
- EIA: Export intensity in terms of assets = Export/Assets;
- ES: Export sales = ln(export sales);
- FO: The share of foreign capital in total capital;
- FO_ industry: Foreign equity in an industry divided by the total equity in the industry;
- FO_ dummy: FO=1 if firm has foreign affiliation or foreign capital;
- OFDI: The ratio of total value of OFDI to total investment;
- OFDI_ dummy: international investors = 1 if a firm has OFDI investment.

Second, little is known on whether and how innovative capabilities affect EMEs' internationalization activities. Despite recent calls for more research on the internationalization motives/drivers of EEs, studies using the resource-based view (RBV) mainly focus on firm ownership (Hong, Wang & Kafouros, 2015; Hu & Cui, 2014), financial resources (Stoian & Mohr, 2016), international experience (Gaur, Ma & Ding, 2018), advertising resources (Asmussen & Goerzen, 2013; Gande, Schenzler & Senbet, 2009) and human resources (Wang, et al., 2012a). The effect of innovative capabilities in the form of proprietary technologies on internationalization has not been studied equally thoroughly (Chen, Patton & Kenney, 2016; İpek, 2018; Singh, 2009). Thus, this dissertation aims to investigate the role of innovation capability in EMEs' internationalization activities as proxied by OFDI or export through literature review and empirical testing.

Third, there is a lack of systematic studies on the moderating effects of the institutional environment on the relationship between innovation and EMEs' internationalization. The Chinese government has officially put forward the "going out" strategy since the early 21st century and has implemented significant interventions in firms' internationalization activities through a series of policy instruments. At the same time, both state ownership and foreign investment play a crucial role in the industrialization and internationalization of EEs (Yi, Wang & Kafouros, 2013). These actions and phenomenon have prompted a rising stream of research studying the relationship between home institutions and the internationalization of EMEs (e.g., Greve & Man Zhang, 2017; Liu, Lu & Chizema, 2014; Luo, Xue & Han, 2010; Peng, Wang & Jiang, 2008; Tang, 2021). However, excessive focus on direct institutional impacts not only distracts attention from the possibility that technological capabilities may directly shape internationalization (Tang, 2019; Wang, et al., 2012a), but also undertheorizes the interaction effects between institutional forces and innovative capabilities, which may indirectly affect EMEs' internationalization activities. By focusing on the interplay between innovation capability and domestic institutional environment in relation to internationalization, this thesis aims to provide new insights into how EMEs utilize their innovation capabilities and institutional environments to achieve their internationalization goals under fierce international market competition. Table 2 summarizes three research gaps in the current literature that form the starting point and underlying motivation for this dissertation.

Table 2. Research gaps addressed in this thesis

No.	Research gap (RG)
RG 1	There is no unified perspective on the determinants of EMEs' innovation performance by integrating theoretical developments in the literature of international trade and international investment.
RG 2	There is little understanding on whether and how innovative capabilities affect EMEs' internationalization activities.
RG 3	There is no systematic understanding on the moderating effects of institutional environment on the relationship between innovation and EMEs' internationalization.

3. Research objective and questions

The aim of this dissertation is to develop a framework to understand the relationship between internationalization and EMEs' innovation performance. It focuses on the effects of some international learning channels (i.e., import, export, IFDI and OFDI) on firm-level innovation performance, and whether and how innovation capability impacts EMEs' internationalization (i.e., export and OFDI). Based on the empirical case of Chinese manufacturing firms, the main question guiding this thesis is: what is the relationship between internationalization activities and innovation performance of EMEs? To specifically address the research gaps presented in the previous chapter, three sub-questions are formulated, as shown in Table 3.

Table 3. Main research questions

Level	Research question (RQ)
Main RQ	What is the relationship between internationalization activities and innovation performance of EMEs?
Sub-RQ1	How do international technology learning channels (namely, imports, exports, IFDI and OFDI) affect EMEs' innovation performance?
Sub-RQ2	How does innovative capability affect EMEs' export performance? What is the role of institutional environment in such relationship?
Sub-RQ3	How does innovative capability affect EMEs' OFDI commitment? What is the role of institutional environment in such relationship?

The first sub-RQ aims to bridge Research Gap 1 by investigating how international technology learning channels, namely imports, exports, IFDI and OFDI, jointly impact the innovation performance of EMEs. This investigation is important to gain an initial understanding of the determinants of EMEs' innovation performance. Early research on innovation tends to focus on firm-specific factors, including research and development (R&D) expenditure, firm size, age, ownership and managerial structure, and how these aspects affect innovation performance (Choi, Park & Hong, 2012; Cohen & Levinthal, 1990; Jefferson, et al., 2003; Oura, Zilber & Lopes, 2016; Wang & Kafouros, 2009). With the increasing prominence of internationalization

strategies in EEs and the intense international competition, the determinants of EMEs' innovation performance in globalization have attracted considerable research interest (e.g., Campbell & Mau, 2021; Genc, Dayan & Genc, 2019; Howell, Lin & Worack, 2020; Wang & Kafouros, 2009; Wu, et al., 2016). The quest for understanding which international technology learning channels lead to differences in innovation performance has led to two prevailing theoretical explanations that revolve around the role of international trade (Pla-Barber & Alegre, 2007; Rodríguez & Rodríguez, 2005; Salomon & Shaver, 2005) and international investment (Blomström & Kokko, 1998; Buckley, Clegg & Wang, 2007; Feinberg & Majumdar, 2001; Fu, Hou & Liu, 2018; Piperopoulos, Wu & Wang, 2018). Although these two research streams have played an important role in advancing theories about the determinants of innovation performance in EEs, the four international learning channels are rarely considered simultaneously, with inconsistent and sometimes conflicting results (see table 1). This study incorporates them into a unified analytical framework, thus providing a more complete description of the forces that shape a firm's innovation performance and a better understanding of the role and the relative contribution of each channel.

The second sub-RQ investigates how innovative capability affects EMEs' export performance. Another focus of this study is the moderating role of state ownership and foreign ownership in the relationship between innovative capability and export performance. Indeed, a growing body of literature examines the impact of innovation on export performance (Ayllón & Radicic, 2019; Cassiman & Golovko, 2011; Silva, Styles & Lages, 2017). However, extant empirical studies on the relationship between innovation and exports have yielded mixed results, ranging from positive effects (Yi, Wang & Kafouros, 2013) to negative effects (Tavassoli, 2018), or statistically insignificant relationships (Ayllón & Radicic, 2019; Faustino & Matos, 2015). This study develops and tests theory-driven hypotheses around the following general claim: the effects of innovation on export performance are not uniform; they vary by ownership category, specifically between state- and foreign-owned firms in China.

Finally, the third sub-RQ investigates the effects of innovative capability on EMEs' OFDI commitment. At the same time, this study focuses on the moderating role of institutional environment in the relationship between innovation and OFDI. It builds on a conceptual framework whereby the combination of RBV and institution-based view (IBV) can examine the relationship between an EME's innovation capability and its OFDI activities and can determine

the extent to which this relationship is contingent upon institutional environments. This study demonstrates that, under the influence of state ownership and regional institutional environment, innovative capabilities can be regarded as the internal driving force of EMEs' OFDI, supporting the notion that ownership advantages and institutional capital jointly influence firms' internationalization strategies (Qiao, Lv & Zeng, 2020; Xiao, Lew & Park, 2019). Combining these three sub-RQs allows this thesis to establish a multi-angle perspective and an in-depth understanding on the relationship between innovation and internationalization in EMEs.

4. Data and Methods

This dissertation consists of three quantitative articles that rely on a deductive research approach and assumptions related to positivism: I formulate hypotheses based on existing literature and theories, and test the hypotheses by analyzing numerical data to make causal inferences. The following section provides a brief overview of the data, selected measures of key variables and methodology.

The dissertation has made use of a very wide range of quantitative data at the provincial and firm levels. Province-level data were mainly collected from the China Statistical Yearbooks by the National Bureau of Statistics (NBS). In addition, the provincial institutional environment data were drawn from the Index of Marketization of China's Provinces compiled and released by the China's National Economic Research Institute (NERI) (Fan, Wang & Zhu, 2017). This data set contains annual reports on China's marketization progress since 2001. It includes five key aspects reflected in 26 indicators, namely (a) the role of the market relative to the government, (b) the development of private sector, (c) the development of commodity and factor markets, (d) the development of market intermediary organization, and (e) the development of free-market institutions. This comprehensive composite index evaluates the extent of market liberalization in subnational regions (provinces) and has been used by many studies (e.g., Hong, Wang & Kafouros, 2015; Tang, 2021; Wang, et al., 2012b; Xia, et al., 2014). The higher the marketization index value, the higher the level of the market-based system in a region.

Firm-level data were mainly collected from five databases, the Annual Survey of Industrial Firms (ASIFs) database, the China National Intellectual Property Administration (CNIPA) database, the Chinese Customs transaction-level database, the Ministry of Commerce of China (MCC) data set (for the firm-level OFDI data), and the China Stock Market Accounting Research (CSMAR)

database. The ASIFs database was compiled by the National Bureau of Statistics of China (NBS) and is the most comprehensive firm-level dataset edited by NBS. It provides detailed firm-level information of all non-SOEs with annual turnover above five million Renminbi (around $680,000) and all SOEs in all 30 two-digit manufacturing industries in all 31 provinces, autonomous regions and municipalities (henceforth ‘‘provinces’’) in China.[2] ASIFs account for around 90% of the total output in manufacturing industries and is frequently used for academic research (Xie & Li, 2018). The CNIPA database includes information on patent applications, patents granted, and patent assignees. The CNIPA dataset is considered to be the most detailed and systematic source of innovation output data in China (Choi, Lee & Williams, 2011). The Chinese Customs transaction-level data set contains the transaction information of Chinese firms participating in international trade, including basic firm information and the value of each transaction (in US dollars).[3] This data set is reliable and has been used in several recent studies (e.g., Bai, Krishna & Ma, 2017; Kee & Tang, 2016). The MCC data set includes the subsidiary and parent company names, host countries, and investment periods. It was used to systematically compile information on all OFDI projects registered with the Ministry. This dataset covers China’s OFDI projects more comprehensively than most datasets used in previous literature (Deng, Yan & Van Essen, 2018; Xia, et al., 2014). Finally, the CSMAR database holds financial information of all publicly listed companies on the Shanghai and Shenzhen Stock Exchange (all Mainland Chinese listed companies), which is reliable and frequently used to test IB theories (e.g., Lyles, Li & Yan, 2014; Piperopoulos, Wu & Wang, 2018; Q. Tang, et al., 2020).

This dissertation systematically applies different measures for the key variable innovation performance in each chapter (paper) to assess the robustness of results and aid interpretation. Using different surrogate metrics also can help to be broadly informative across a wide variety of settings. Specificly, innovation performance has been measured by a variety of metrics ranging from innovative inputs to outputs, including but not limited to R&D budget or expenditure, patent count data and NPS (new products to the firm, the domestic market and foreign markets) (Dziallas & Blind, 2019). Each of these different metrics has its strengths and limitations

[2] Since January 2011, the standard of ASIFs has increased from 5 million Renminbi in annual main business income to 20 million Renminbi. According to the classification of NBS (GB/T 4754-2011), there are 30 two-digit manufacturing sectors and 480 four-digit manufacturing sectors.

[3] The financial figures of import values and export were converted to RMB with the exchange rate on the date of the company’s fiscal year-end.

reflecting different aspects of firms' innovation at different stages of the innovation process. Despite the vast literature on innovation performance measurement, there is no widely agreed "catch all" metric, and new innovation performance measures are still being proposed (Ponta, Puliga & Manzini, 2021). Among these, innovation output data NPS and patents are the most widely used measures by researchers to capture firms' innovation performance. NPS is measured by NPS as a share of total sales. It is considered as one of the most appropriate indicators of innovation performance in EMEs as it incorporates both market acceptance and non-patentable innovations, and has been frequently used in previous studies (Kafouros, et al., 2015; Liu & Buck, 2007; Wang & Kafouros, 2009; Wu, Wei & Wang, 2021; Xie & Li, 2018). In addition, some argued that innovation facilitated by international knowledge flows and spillovers can be more directly assessed through a firm's efforts to launch new products (e.g., Fu, Hou & Liu, 2018; Liu & Buck, 2007). Patent data has been extensively used by researchers in the last three decades to measure a firm's innovation performance. It is commonly conceived as another accurate indicator of innovation as it captures the effectiveness of innovation efforts (including observable and unobservable inputs) and provides standardized information on innovation (Frietsch & Grupp, 2006; Genc, Dayan & Genc, 2019; Hurtado-Torres, Aragón-Correa & Ortiz-de-Mandojana, 2018). Numerous studies have shown that the number of patents granted is a solid measure of innovation performance, as it accurately embodies a firm's intellectual property (e.g., Adegbesan & Higgins, 2011; Deng, et al., 2014; Genc, Dayan & Genc, 2019; Rodríguez & Rodríguez, 2005; Wu, Wei & Wang, 2021), although it is insufficient to reflect the diversity of firms' innovation outputs, nor does it always reflect the technological importance or commercial value it embodies (Wang & Kafouros, 2009). Another shortcoming of patent data is that in an industry where technology is changing rapidly, many companies may choose not to file for patents. Innovation input such as R&D intensity, measured as annual R&D expenditure divided by total sales, is also a traditional proxy for innovation performance used by many scholars (Chen, et al., 2016; Xie & Li, 2018; Zahra & Hayton, 2008). However, it also has some limitations in that it can only capture specific (observable) innovation inputs, but may not reflect innovation outcomes and quality or a firm's intellectual property (Liu & Qiu, 2016; Tavassoli, 2018; Wu, et al., 2016; Wu, Wei & Wang, 2021). Some scholars argue that innovation output data is more accurate and objective than R&D expenditure data because they reflect the effectiveness of R&D investment. Besides, R&D expenditure data is often over-reported due to its tax benefits (e.g., Liu & Qiu, 2016). Based on the above discussion, this dissertation selected three measures (i.e., NPS, patent count data and R&D intensity) as the proxies of innovation performance in all three

articles (no NPS data in Article 3 due to data restrictions). Specifically, Chapter 1 used NPS as the main measure, while patent data and R&D intensity were used as additional measures. Chapter 2 used patent data as the main empirical measurement of innovation and used NPS and R&D intensity as additional innovation measures. Chapter 3 used patents as the primary measure of innovation and used R&D intensity as an addition (Table 4). Results based on all three measures are qualitatively the similar in all cases.

This dissertation also used different internationalization measures in different chapters. Chapter 1 applied the four international technology learning channels, namely import intensity, export intensity, IFDI and OFDI, to measure firms' internationalization activities. Specifically, this study used the ratio of exports to total sales to measure exports (Wu, Wei & Wang, 2021; Xie & Li, 2018; Yi, Wang & Kafouros, 2013), and imports as the ratio of imports to total sales (Chen, et al., 2014; Chen, Zhang & Zheng, 2017). For firm-level IFDI, this study used the foreign capital share from foreign affiliates (Choi, Park & Hong, 2012; Kathuria, 2008). Following Buckley, Clegg and Wang (2007)Buckley, Clegg and Wang (2007)Buckley, et al. (2007) and Deng, et al. (2014)Deng, et al. (2014)Deng, et al. (2014), this study does not treat capital from Hong Kong, Macau and Taiwan (HMT) as foreign capital. Firm-level OFDI was measured by the total number of OFDI projects that a firm has invested in each year (Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Xia, et al., 2014). OFDI projects in HMT and Caribbean were identified and excluded for the following reasons: (i) OFDI projects in Hong Kong and Macau are primarily for expanding financing channels (Tang, 2019); (ii) investment in Taiwan is subject to cross-strait political tensions (Deng, Yan & Van Essen, 2018), and (iii) OFDI projects in Caribbean are mainly used for tax avoidance purposes (Deng, Yan & Van Essen, 2018; Xia, et al., 2014). Chapter 2 used export performance to represent internationalization measured as the ratio of exports to employment (Wu, Wei & Wang, 2021). Chapter 3 used OFDI commitment to represent internationalization measured by two dimensions: the propensity to conduct OFDI and the intensity of OFDI. For each firm, a binary variable (OFDI dummy) was generated to indicate any new subsidiaries established overseas in a given year, with yes denoted as 1 and otherwise 0 (Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Liang, Ren & Sun, 2015; Xia, et al., 2014). Considering that certain firms may conduct multiple OFDI entries in one or more countries in the same year, this study used the annual total number of foreign subsidiaries established by a firm as a measure of OFDI intensity (Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Xia, et

al., 2014).[4]

This dissertation performed all analyses in the Stata 16 software using various econometric methods such as the fixed-effects (FE) models, instrumental variable two-stage least square (2SLS) estimations, Tobit models and Probit models. The different econometric models were chosen based on the type and scale of independent and dependent variables, and the data structure (explained in detail in each of the three chapters). Table 4 summarizes the data sources, variable measures and regression methods used in this dissertation.

Table 4. Main data source, variable measure and research method

Paper	Theoretical relationship	Innovation measure	Internationalization measure	Data source (firm level)	Method
1	Import, export, IFDI and OFDI → Innovation performance	NPS (main analysis); Patents granted; R&D intensity	Import intensity; Export intensity; Foreign ownership; Number of OFDI projects	ASIFs database; CNIPA database; the Chinese Customs transaction-level data set; MCC's OFDI database	OLS; OLS with fixed effects; Tobit models
2	Innovation capability → export performance	Patents granted (main analysis); NPS; R&D intensity	Export intensity	ASIFs database; CNIPA database	OLS; Tobit models; Instrumental variable
3	Innovation capability → OFDI commitment	Patents granted (main analysis); R&D intensity	OFDI propensity; OFDI intensity	CSMAR database; MCC's OFDI database	Probit modelsl; Tobit models; Instrumental variabel

5. Overview of research papers

After introducing the research gaps, research questions, data sources and methods, this section

[4] Given the possibility that a firm may open and close its foreign subsidiaries in the same year, this paper also used an alternative proxy of OFDI intensity measured by subtracting the annual exit number from the total number of foreign subsidiaries and got similar results. Although the continuous variable annual OFDI can accurately reflect the investment level of a firm, this study aims to capture the remarkable dynamism and the strategic choice of investment abroad exhibited by Chinese firms (Liang, Ren & Sun, 2015).

introduces the overall structure of the dissertation. This dissertation comprises this synopsis and three stand-alone papers that form the analytical groundwork of the inquiry. As shown in Table 5, the three research papers are guided by individual research questions covering different angles and collectively address the overarching research question. In other words, each chapter of this dissertation is an individual study, yet all of them seek to examine the relationship between innovation and internationalization in EMEs.

The first research paper integrates and tests different insights from international trade and international investment to explain variations in innovation performance of EMEs. The study found that imports, exports, IFDI and OFDI have different and significant effects on the innovation performance of EMEs. By demonstrating that the relationship between international learning channels and innovation is not uniform but depends on the level of foreign ownership, this paper further reveals the different innovation behaviors between domestic and foreign-controlled firms.

Building on the insights of the first paper, the second paper discusses the reverse relationship between internationalization and innovation. The core argument of this paper is that firms need innovation to leverage their resources and capabilities for export, but the value of firm-specific innovation depends in part on ownership. The empirical analysis shows that ownership is not only a direct determinant of export performance, but also affects how effectively firms use their own innovative outputs for export. Interestingly, the direct effects of state ownership and foreign ownership differ from their indirect or moderating effects. This suggests that research on the links between ownership and performance should not only focus on the direct effects of ownership, but also account for how ownership moderates the causal relationships between firm resources, capabilities, and performance.

The third paper develops and tests the premise that the impact of innovative capabilities on OFDI commitment is not uniform but rather contingent upon the institutional setting in which a firm is embedded. This paper demonstrates that innovative capabilities have a strong and independent impact on the OFDI propensity and intensity of EMEs. This impact, however, is negatively moderated by higher levels of state ownership, as well as by a location that is relatively well marketized. Taken together, the different focuses of the three analyses not only highly complement each other, but also play a key role in overcoming the blindness associated with single-unit perspectives.

Table 5. Overview of articles

	Paper I	Paper II	Paper III
Title	Channels of International Technology Learning and Innovation Performance in Emerging Economies: Evidence from China	Innovation and Export Performance of Emerging Market Enterprises: The Roles of State and Foreign Ownership	Innovative Capabilities and Outward FDI by Emerging Market Enterprises: The Moderating Effects of State Ownership and Marketization
Co-authors	None	Ari Kokko, Haoyong Zhou	None
Article RQs	How do international learning channels affect EMEs' innovation performance?	1. How does innovative capability affect EMEs' export performance? 2. What are the roles of state ownership and foreign ownership in the relationship between innovation and export performance?	1. How does innovative capability affect EMEs' OFDI commitment? 2. What are the roles of state ownership and regional marketization in the relationship between innovation and OFDI commitment?
Key findings	1. Imports, exports and outward FDI have a significantly positive effect on the innovation performance of EMEs 2. Inward FDI in the form of foreign ownership has a distinct and negative impact in general.	1. Innovation has a positive impact on firms' export performance 2. State ownership has a positive moderating effect on the innovation–export relationship 3. Foreign ownership has a negative moderating effect on the innovation–export relationship	1. Innovation has a positive impact on firm OFDI commitment 2. State ownership has a negative moderating effect on the innovation–OFDI commitment 3. Regional marketization has a negative moderating effect on the innovation–OFDI commitment
Unit of analysis	All Chinese high-tech manufacturing firms	All Chinese manufacturing firms	All listed Chinese manufacturing firm
Status	Under review (AJG:3)	Published in *International Business Review* (AJG:3)	First round "R&R" (AJG:3)

Note: In addition to these three papers included in my PhD dissertation, I also completed another paper titled "Technology Upgrading in Chinese Manufacturing – A cross-industry perspective", which has been accepted by the International Journal of Technological Learning, Innovation and Development (IJTLID). Since my PhD dissertation focuses on the relationship between innovation and internationalization at the firm level in EEs, this paper was not included in my dissertation. This paper aims to investigate the dynamics of technology upgrading in 23 manufacturing industries in China (1995–2015). We use transnational patent applications to proxy frontier technology and to measure the relative importance of foreign and Chinese actors in the commercialization of frontier technology. In addition, we explore the relationship between patent-based indicators of technology upgrading and several different channels for technology transfer and diffusion. The findings reveal not only industry-specific trends in technology upgrading but also variations in the relevance of global interaction.

6. Summary

This dissertation is the result of four years of work. As time went by, the project evolved from a focus on the role of global interactions in the development of technology at the industrial level,

inspired by my first PhD paper (not included in this dissertation) on Chinese industrial technology upgrading co-authored with my supervisors[5], to a focus on the relationship between innovation and internationalization at the firm level. Overall, the project examined the dynamic interplay between internationalization activities and innovation by Chinese firms. It deepens our understanding of how latecomer firms and EMEs respond to waves of globalization by effectively leveraging technological capabilities and internationalization strategies. This section summarizes the key findings of this dissertation related to the main research question, outlines the main contributions and highlights research avenues that could be explored in future studies. All of these are further expanded in each of the three chapters.

6.1 Key findings

The first sub-RQ, "how do international technology learning channels affect EMEs' innovation performance" was addressed in the first article (Chapter 1). The empirical results in Chapter 1 show that import, export and OFDI are prominent channels for improving EME's innovation performance, while IFDI has a significantly negative effect in general. Based on these findings, the study further investigated the effects in domestic- and foreign firms separately. The results show that for domestic firms, all four international learning channels have a significantly positive effect on innovation performance, but for FOEs, only IFDI and OFDI have statistically significant effects, which are negative and positive, respectively.

The second sub-RQ, "whether and how does innovative capability affect EMEs' export performance" was addressed in the second article (Chapter 2). The empirical results in Chapter 2 show that, in the context of China, both local innovation and foreign ownership have a positive direct effect on export performance, while state ownership has a negative effect. In addition, in the relationship between innovation and export, state ownership and foreign ownership play a significant moderating role. For firms with higher state ownership, the positive effect of innovation on their export performance is more pronounced, whereas for firms with higher levels of foreign ownership, the positive effect of innovation on exports seems to be diminished.

The third sub-RQ, "whether and how does innovative capability affect EMEs' OFDI

[5] This paper titled "Technology Upgrading in Chinese Manufacturing – A cross-industry perspective". Since my PhD dissertation focuses on the relationship between innovation and internationalization at the firm level in EEs, this paper was not included in my dissertation.

commitment" was addressed in the third article (Chapter 3). Using OFDI information from Chinese listed firms over a 13-year period, the empirical results show that innovative capability, as measured by patents and R&D intensity, has a positive impact on EMEs' OFDI. On this basis, the article further revealed the negative moderating effects of state ownership and regional marketization.

This leads us to the main research question that guides this thesis: "what is the relationship between internationalization activities and innovation performance of EMEs". The interplay between internationalization activities and innovative capabilities has proven to precipitate profound consequences on the technological upgrading and competitive advantage of EMEs in global markets. On the one hand, the first article found that EMEs can benefit significantly from direct or indirect technology and knowledge transfer through a variety of internationalization activities that embody technological progress. On the other hand, an important finding of the other two articles is that EMEs' internationalization decisions are not equally driven by innovative capabilities, but rather depend on the level of state ownership, foreign ownership and regional marketization.

6.2 Contribution of this dissertation

The dissertation draws on the power of a range of theoretical perspectives including resource-based view, institution-based view, innovation, international trade, international investment, and political economy, as well as various econometric methods and different firm-level datasets to examine the causal relationship between innovation and internationalization. Hence, the dissertation contributes to debates on the relationship between innovation and internationalization. Specifically, this dissertation mainly makes three important contributions to the literature on innovation and international business. First, the dissertation contributes to the important debates on the effect of international learning channels, namely imports, export, IFDI and OFDI, on the innovation performance of EMEs. It is the first study to consider four different major international learning channels in an integrated framework and study their impact on EMEs' innovation performance using a dataset at the firm level. In this regard, trade and investment are viewed as the main channels and influencing factors of EMEs' innovation performance, that is the direct or indirect transfer of technology and knowledge through various economic activities that embody technological progress. Evaluating the determinants of innovation performance in a more unified research framework has conceptual benefits, such as a

more complete description of the forces that shape a firm's innovation performance and a better understanding of the role and the relative contribution of each channel.

Second, this dissertation contributes to the literature on the innovation–export relationship by providing compelling evidence from a leading emerging economy, using a large sample covering a longer period than earlier studies have covered. As the largest exporter and nowadays also a leading R&D investor, China aims to enhance its international competitiveness via innovation (Wu, Wei & Wang, 2021). Surprisingly, however, few studies have examined the innovation-export linkages in China (see Appendix Table A1 of Chapter 2). This dissertation confirms that innovation is also an important economic prerequisite for export performance in EMEs. Based on this, this dissertation further adds to the debate on how ownership affects the relationship between innovation and exports by providing some new evidence that partly contradicts existing research findings (e.g., Yi, Wang & Kafouros, 2013). In light of the divergent theoretical predictions on the role of state ownership in innovation and internationalization (Cuervo-Cazurra & Li, 2021; Hong, Wang & Kafouros, 2015; Ramamurti, 2001; Yi, et al., 2017), this dissertation shows that state ownership has a positive moderating effect on the innovation–export relationship. At the same time, and more importantly, the dissertation finds that, in the Chinese context, foreign ownership has a negative moderating effect on the innovation-export relationship.

Third, this dissertation elucidates with convincing evidence how innovative capability, as measured by patents and R&D intensity, positively impacts EMEs' OFDI by using a relatively large and current sample. This finding supports the expectations of RBV-based theoretical perspectives and confirms that innovation is a source of competitive advantage in international markets (Boisot & Meyer, 2008; Cui & Jiang, 2010; Xiao, Lew & Park, 2019), thereby contributing to the ongoing theoretical dialogue on the innovation-internationalization dynamics in emerging markets (Qiao, Lv & Zeng, 2020; Wu, Wei & Wang, 2021). In addition, this dissertation provides a novel perspective for understanding the antecedents of OFDI in EMEs by combining RBV and IBV. Specifically, this dissertation enriches the debate on how multilevel institutional factors indirectly affect OFDI commitments through interactions with internal ownership advantages. In light of the divergent theoretical predictions on the effects of state ownership (e.g., Hu & Cui, 2014; Wang, et al., 2012b) and regional institutional environment on internationalization (e.g., Hong, Wang & Kafouros, 2015; Qiao, Lv & Zeng, 2020), this dissertation reveals that a higher proportion of state ownership in EMEs and their location in a

more market-oriented region constitute a critical context for EMEs: these conditions reduce the level of OFDI commitments that are otherwise expected of a firm having the same level of innovative capability. These findings provide new insights on OFDI commitment of EMEs by identifying the fundamental mechanisms underlying these moderating effects.

In addition to these specific theoretical contributions, this thesis speaks to the broader debates of economic development, technological progress, and industrial upgrading in EMEs and argues that there can be important synergies between innovation and internationalization in EMEs. While each of the three articles has its own contribution, I believe the dissertation as a whole enriches our understanding of the relationship between innovation and internationalization in EEs, and sheds lights on the strengths and limitations of various institutional factors in this relationship. In addition to its contribution to the academic literature, the conclusions of this thesis also have implications for practitioners including policymakers and managers, who want to understand how internationalization activities affect innovation performance and how ownership advantages and institutional factors contribute to the success of internationalization activities.

6.3 Future research directions

The underlying motivation for this dissertation is to understand how innovation and internationalization interact at the firm level. The findings deepen our understanding about the relationship between innovation and internationalization in EMEs. Some of its unique insights into this relationship may further stimulate future research. Specifically, I highlight three intriguing research directions that deserve additional attention: 1) the interplay between internationalization activities and innovation performance in other emerging economies, 2) the complexity of the effect of IFDI on innovation at different levels including at the firm, industrial and regional level, and 3) the moderating effect of institutional environment in the relationship between innovation and internationalization.

First, the sample studied in this thesis includes only Chinese manufacturing firms. Despite that China shares many characteristics with other emerging market economies, this may raise concerns about generalizability given the wide variation in institutions and regulations between EEs. Therefore, it will be interesting to examine whether the findings and conclusions of this thesis are applicable to other EEs. In other words, given that most of the empirical literature that this thesis refers to also discusses China, this dissertation hesitates to generalize our results to a

broader emerging market context. To increase the transferability of the findings, future studies can further extend the investigation to empirical contexts outside of China, such as India, Brazil, Russia and South Africa. This will allow us not only to compare whether the effectiveness of external knowledge learning channels is constrained by the local institutional and economic environment of the host country, but also study the impact of innovative capabilities on the internationalization of EMEs in other EEs.

Second, as discussed in Chapter 1, although IFDI theories have greatly helped us to advance the theory of innovation determinants, the empirical results of this thesis show that firm-level IFDI in the form of foreign ownership has a distinct and negative impact on the innovation performance of Chinese high-tech firms in general, which is contradictory to previous work (e.g., Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Gorodnichenko, Svejnar & Terrell, 2020). This does not necessarily mean that FDI is not important for innovation performance. In contrast, the presence of IFDI triggers innovation activities and this thesis demonstrates the positive spillover effects of IFDI on firms' innovation performance at the regional level. In the context of IFDI having different impacts on innovation at different levels, this thesis suggests that future research on the relationship between IFDI and innovation performance should consider and compare the different impacts of IFDI at firm, industry and regional levels. More importantly, it would be interesting to find and apply reasonable innovation measures to proxy and track the technology transfer between foreign MNEs and local partners/firms.

Third, as shown in Table A1 of Chapter 2, existing literature does not adequately cover and discuss the moderating effect of institutional factors such as state-owned capital in the relationship between innovation and internationalization. Although this thesis found a positive moderating effect of state ownership on the innovation-export relationship, and a negative moderating effect of state ownership and regional marketization on the innovation-OFDI relationship, examining the explanatory power of institutional factors external and internal to a firm is a potentially valuable way to expand theories on innovation, international business and political economy. For example, as an internal institutional factor and a new powerful form of state economic intervention, state capital is being increasingly strategically deployed in China, not only as an instrument for the ongoing market-oriented economic reform, but also as a means of responding to trade disputes, facilitating industrial upgrading, and most recently, as a tool to support economic recovery during the global COVID-19 pandemic.

Finally, it has been argued that conventional R&D and patent-based indicators do not reflect the full spectrum of innovation capabilities (Boeing & Mueller, 2019). In addition, there are many other international learning channels, such as research collaboration, study abroad, visits, business travel and media, which are not studied in this dissertation. However, purely quantitative research is limited in its ability to gain a deep understanding of influence processes and to offer a comprehensive discussion of influence mechanisms, especially across different sectors and organizations. Therefore, it could benefit from complementing qualitative (such as case studies) and quantitative methodological approaches in the future.

6.4 Other research outcomes by the author

The following work by the author does not form part of the dissertation but is the result of research collaborations with my supervisors and colleagues during my PhD. Thematically, they are closely related to the dissertation.

1. Guowei Dong, Björn Jindra and Ari Kokko (2022), Technology Upgrading in Chinese Manufacturing – A cross-industry perspective. Accepted by International Journal of Technological Learning, Innovation and Development (Forthcoming)

2. Guowei Dong, Inward FDI, Export, and Outward FDI: Implications for Innovation Performance. Work-in-progress

3. Guowei Dong and Ari Kokko, Labour Costs and Outward FDI of Foreign Firms in China: An Institutional Perspective. Work-in-progress

4. Co-authored with Karl Blom, Ari Kokko and Patrik Gustavsson Tingvall, Are FDI Spillovers in China Getting Weaker? Effects of Economic Growth and Institutional Development. Work-in-progress

References

1. Adegbesan, J. A., & Higgins, M. J. (2011). The intra-alliance division of value created through collaboration. Strategic Management Journal, 32, 187-211.
2. Asmussen, C. G., & Goerzen, A. (2013). Unpacking dimensions of foreignness: Firm-specific capabilities and international dispersion in regional, cultural, and institutional space. Global Strategy Journal, 3, 127-149.
3. Ayllón, S., & Radicic, D. (2019). Product innovation, process innovation and export propensity: persistence, complementarities and feedback effects in Spanish firms. Applied Economics, 51, 3650-3664.

4. Bai, X., Krishna, K., & Ma, H. (2017). How you export matters: Export mode, learning and productivity in China. Journal of International Economics, 104, 122-137.

5. Bernardini Papalia, R., Bertarelli, S., & Mancinelli, S. (2018). Innovation, complementarity, and exporting. Evidence from German manufacturing firms. International Review of Applied Economics, 32, 3-38.

6. Blomström, M., & Kokko, A. (1998). Multinational corporations and spillovers. Journal of Economic Surveys, 12, 247-277.

7. Boeing, P., & Mueller, E. (2019). Measuring China's patent quality: Development and validation of ISR indices. China Economic Review, 57, 101331.

8. Boisot, M., & Meyer, M. W. (2008). Which way through the open door? Reflections on the internationalization of Chinese firms. Management and Organization Review, 4, 349-365.

9. Buckley, P. J., Clegg, J., & Wang, C. (2002). The impact of inward FDI on the performance of Chinese manufacturing firms. Journal of International Business Studies, 33, 637-655.

10. Buckley, P. J., Clegg, J., & Wang, C. (2007). Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. Journal of International Business Studies, 38, 447-459.

11. Campbell, D. L., & Mau, K. (2021). On "Trade Induced Technical Change: The Impact of Chinese Imports on Innovation, IT, and Productivity". The Review of Economic Studies, 88, 2555-2559.

12. Cassiman, B., & Golovko, E. (2011). Innovation and internationalization through exports. Journal of International Business Studies, 42, 56-75.

13. Chen, A., Patton, D., & Kenney, M. (2016). University technology transfer in China: A literature review and taxonomy. The Journal of Technology Transfer, 41, 891-929.

14. Chen, C.-J., Lin, B.-W., Lin, Y.-H., & Hsiao, Y.-C. (2016). Ownership structure, independent board members and innovation performance: A contingency perspective. Journal of Business Research, 69, 3371-3379.

15. Chen, V. Z., Li, J., Shapiro, D. M., & Zhang, X. (2014). Ownership structure and innovation: An emerging market perspective. Asia Pacific Journal of Management, 31, 1-24.

16. Chen, Z., Zhang, J., & Zheng, W. (2017). Import and innovation: Evidence from Chinese firms. European Economic Review, 94, 205-220.

17. Chittoor, R., Aulakh, P. S., & Ray, S. (2015). Accumulative and assimilative learning, institutional infrastructure, and innovation orientation of developing economy firms. Global Strategy Journal, 5, 133-153.

18. Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. Research Policy, 40, 441-452.

19. Choi, S. B., Park, B. I., & Hong, P. (2012). Does ownership structure matter for firm technological innovation performance? The case of Korean firms. Corporate Governance: An International Review, 20, 267-288.

20. CNIPA. (2019). National intellectual property administration, PRC: http://english.cnipa.gov.cn/.

21. Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 128-152.

22. Cuervo-Cazurra, A., & Li, C. (2021). State ownership and internationalization: The advantage and disadvantage of stateness. Journal of World Business, 56, 101112.

23. Cui, L., & Jiang, F. (2010). Behind ownership decision of Chinese outward FDI: Resources and institutions. Asia Pacific Journal of Management, 27, 751-774.

24. Deng, Z., Guo, H., Zhang, W., & Wang, C. (2014). Innovation and survival of exporters: A contingency perspective. International Business Review, 23, 396-406.

25. Deng, Z., Yan, J., & Van Essen, M. (2018). Heterogeneity of political connections and outward foreign direct investment. International Business Review, 27, 893-903.

26. Dominguez Lacasa, I., Jindra, B., Radosevic, S., & Shubbak, M. (2019). Paths of technology upgrading in the BRICS economies. Research Policy, 48, 262-280.

27. Dziallas, M., & Blind, K. (2019). Innovation indicators throughout the innovation process: An extensive literature analysis. Technovation, 80, 3-29.

28. Ernst, D. (2008). Asia's' Upgrading Through Innovation'Strategies and Global Innovation Networks: An Extension of Sanjaya Lall's Research Agenda. Transnational Corporations, 17, 31-57.

29. Eurostat. (2015). R&D Expenditure. [Online]. (downloaded on 27 August 2015 from http:// ec.europa.eu/eurostat/statistics explained/index.php/R_%26_D_expenditure).

30. Fan, C. S., & Hu, Y. (2007). Foreign direct investment and indigenous technological efforts: Evidence from China. Economics Letters, 96, 253-258.

31. Fan, G., Wang, X., & Zhu, H. (2017). Marketization index of China's provinces: NERI report 2016 (In Chinese). Beijing: Social Science Literature Press.

32. Faustino, H. C., & Matos, P. V. (2015). Exports, productivity and innovation: new firm level empirical evidence. Applied Economics, 47, 4918-4933.

33. Feinberg, S. E., & Majumdar, S. K. (2001). Technology spillovers from foreign direct investment in the Indian pharmaceutical industry. Journal of International Business Studies, 32, 421-437.

34. Frietsch, R., & Grupp, H. (2006). There's a new man in town: the paradigm shift in optical technology. Technovation, 26, 13-29.

35. Fu, X. (2011). Processing Trade, FDI and the Exports of Indigenous Firms: Firm-Level Evidence from Technology-Intensive Industries in China. Oxford Bulletin of Economics and Statistics, 73, 792-817.

36. Fu, X. (2012). Foreign direct investment and managerial knowledge spillovers through the diffusion of management practices. Journal of Management Studies, 49, 970-999.

37. Fu, X., & Gong, Y. (2011). Indigenous and foreign innovation efforts and drivers of technological upgrading: evidence from China. World Development, 39, 1213-1225.

38. Fu, X., Hou, J., & Liu, X. (2018). Unpacking the relationship between outward direct investment and innovation performance: evidence from Chinese firms. World Development, 102, 111-123.

39. Gande, A., Schenzler, C., & Senbet, L. W. (2009). Valuation effects of global diversification. Journal of International Business Studies, 40, 1515-1532.

40. Gaur, A. S., Ma, X., & Ding, Z. (2018). Home country supportiveness/unfavorableness and outward foreign direct investment from China. Journal of International Business Studies, 49, 324-345.

41. Genc, E., Dayan, M., & Genc, O. F. (2019). The impact of SME internationalization on innovation: The mediating role of market and entrepreneurial orientation. Industrial Marketing Management, 82, 253-264.

42. Girma, S., Gong, Y., & Görg, H. (2008). Foreign direct investment, access to finance, and innovation activity in Chinese enterprises. The World Bank Economic Review, 22, 367-382.

43. Gong, Y., & Hanley, A. (2021). Exports and New Products in China–A Generalised Propensity Score Approach with Firm-to-Firm Spillovers. The Journal of Development Studies, 57, 2136-2155.

44. Gorodnichenko, Y., Svejnar, J., & Terrell, K. (2020). Do foreign investment and trade spur innovation? European Economic Review, 121, 103343.

45. Greve, H. R., & Man Zhang, C. (2017). Institutional logics and power sources: Merger and acquisition decisions. Academy of Management Journal, 60, 671-694.

46. Hong, J., Wang, C., & Kafouros, M. (2015). The role of the state in explaining the internationalization of emerging market enterprises. British Journal of Management, 26, 45-62.

47. Hoskisson, R. E., Wright, M., Filatotchev, I., & Peng, M. W. (2013). Emerging multinationals from mid-range economies: The influence of institutions and factor markets. Journal of Management Studies, 50, 1295-1321.

48. Howell, A., Lin, J., & Worack, S. (2020). Going out to innovate more at home: Impacts of outward direct investments on Chinese firms' domestic innovation performance. China Economic Review, 60, 101404.

49. Hu, H. W., & Cui, L. (2014). Outward foreign direct investment of publicly listed firms from China: A corporate governance perspective. International Business Review, 23, 750-760.

50. Hurtado-Torres, N. E., Aragón-Correa, J. A., & Ortiz-de-Mandojana, N. (2018). How does R&D internationalization in multinational firms affect their innovative performance? The moderating role of international collaboration in the energy industry. International Business Review, 27, 514-527.

51. İpek, İ. (2018). The resource-based view within the export context: An integrative review of empirical studies. Journal of Global Marketing, 31, 157-179.

52. Jefferson, G., Albert, G., Xiaojing, G., & Xiaoyun, Y. (2003). Ownership, performance, and innovation in China's large-and medium-size industrial enterprise sector. China Economic Review, 14, 89-113.

53. Kafouros, M., Wang, C., Piperopoulos, P., & Zhang, M. (2015). Academic collaborations and firm innovation performance in China: The role of region-specific institutions. Research Policy, 44, 803-817.

54. Kafouros, M. I., Buckley, P. J., Sharp, J. A., & Wang, C. (2008). The role of internationalization in explaining innovation performance. Technovation, 28, 63-74.

55. Kathuria, V. (2008). The impact of FDI inflows on R&D investment by medium-and high-tech firms in India in the post-reform period. Transnational Corporations, 17, 45.

56. Kee, H. L., & Tang, H. (2016). Domestic value added in exports: Theory and firm evidence from China. American Economic Review, 106, 1402-1436.

57. Lall, S. (2003). Foreign direct investment, technology development and competitiveness: Issues and evidence. Competitiveness, FDI and technological activity in East Asia, 12-56.

58. Lee, K. (2013). Schumpeterian analysis of economic catch-up: Knowledge, path-creation, and the middle-income trap: Cambridge University Press, UK.

59. Lee, K., & Kim, B.-Y. (2009). Both institutions and policies matter but differently for different income groups of countries: Determinants of long-run economic growth revisited. World Development, 37, 533-549.

60. Li, J. (2012). China to Promote Competitive Advantage. China Daily, 2012-2002.

61. Li, J., Chen, D., & Shapiro, D. M. (2010). Product innovations in emerging economies: The role of foreign knowledge access channels and internal efforts in Chinese firms. Management and Organization Review, 6, 243-266.

62. Li, J., Li, Y., & Shapiro, D. (2012). Knowledge seeking and outward FDI of emerging market firms: The moderating effect of inward FDI. Global Strategy Journal, 2, 277-295.

63. Li, X., & Liu, X. (2005). Foreign direct investment and economic growth: an increasingly endogenous relationship. World Development, 33, 393-407.

64. Li, X., Quan, R., Stoian, M.-C., & Azar, G. (2018). Do MNEs from developed and emerging economies differ in their location choice of FDI? A 36-year review. International Business Review, 27, 1089-1103.

65. Liang, H., Ren, B., & Sun, S. L. (2015). An anatomy of state control in the globalization of state-owned enterprises. Journal of International Business Studies, 46, 223-240.

66. Liu, Q., & Qiu, L. D. (2016). Intermediate input imports and innovations: Evidence from Chinese firms' patent filings. Journal of International Economics, 103, 166-183.

67. Liu, X., & Buck, T. (2007). Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. Research Policy, 36, 355-366.

68. Liu, X., Lu, J., & Chizema, A. (2014). Top executive compensation, regional institutions and Chinese OFDI. Journal of World Business, 49, 143-155.

69. Lu, Y., & Ng, T. (2012). Do imports spur incremental innovation in the South? China Economic Review, 23, 819-832.

70. Luo, Y., Sun, J., & Wang, S. L. (2011). Emerging economy copycats: Capability, environment, and strategy. Academy of Management Perspectives, 25, 37-56.

71. Luo, Y., Xue, Q., & Han, B. (2010). How emerging market governments promote outward FDI: Experience from China. Journal of World Business, 45, 68-79.

72. Lyles, M., Li, D., & Yan, H. (2014). Chinese outward foreign direct investment performance: The role of learning. Management and Organization Review, 10, 411-437.

73. Malik, O. R., & Kotabe, M. (2009). Dynamic capabilities, government policies, and performance in firms from emerging economies: Evidence from India and Pakistan. Journal of Management Studies, 46, 421-450.

74. Mathews, J. A. (2006). Dragon multinationals: New players in 21 st century globalization. Asia Pacific Journal of Management, 23, 5-27.

75. Oura, M. M., Zilber, S. N., & Lopes, E. L. (2016). Innovation capacity, international experience and export performance of SMEs in Brazil. International Business Review, 25, 921-932.

76. Papanastassiou, M., Pearce, R., & Zanfei, A. (2020). Changing perspectives on the internationalization of R&D and innovation by multinational enterprises: A review of the literature. Journal of International Business Studies, 51, 623-664.

77. Peng, M. W., Wang, D. Y., & Jiang, Y. (2008). An institution-based view of international business strategy: A focus on emerging economies. Journal of International Business Studies, 39, 920-936.

78. Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, location choices and innovation performance of emerging market enterprises. Research Policy, 47, 232-240.

79. Pla-Barber, J., & Alegre, J. (2007). Analysing the link between export intensity, innovation and firm size in a science-based industry. International Business Review, 16, 275-293.

80. Ponta, L., Puliga, G., & Manzini, R. (2021). A measure of innovation performance: the Innovation Patent Index. Management Decision.

81. Pradhan, J. P. (2011). R&D strategy of small and medium enterprises in India. Science, Technology and Society, 16, 373-395.

82. Qiao, P., Lv, M., & Zeng, Y. (2020). R&D Intensity, Domestic Institutional Environment, and SMEs' OFDI in Emerging Markets. Management International Review, 60, 939-973.

83. Radosevic, S., & Yoruk, E. (2014). Are there global shifts in the world science base? Analysing the catching up and falling behind of world regions. Scientometrics, 101, 1897-1924.

84. Ramamurti, R. (2001). The obsolescing 'bargaining model'? MNC-host developing country relations

revisited. Journal of International Business Studies, 32, 23-39.

85. Rodríguez, J. L., & Rodríguez, R. M. G. (2005). Technology and export behaviour: A resource-based view approach. International Business Review, 14, 539-557.

86. Salomon, R. M., & Shaver, J. M. (2005). Learning by exporting: new insights from examining firm innovation. Journal of Economics & Management Strategy, 14, 431-460.

87. Silva, G. M., Styles, C., & Lages, L. F. (2017). Breakthrough innovation in international business: The impact of tech-innovation and market-innovation on performance. International Business Review, 26, 391-404.

88. Singh, D. A. (2009). Export performance of emerging market firms. International Business Review, 18, 321-330.

89. Stoian, C., & Mohr, A. (2016). Outward foreign direct investment from emerging economies: Escaping home country regulative voids. International Business Review, 25, 1124-1135.

90. Sutherland, D., Anderson, J., & Hu, Z. (2020). A comparative analysis of location and non-location-bounded strategic asset seeking in emerging and developed market MNEs: An application of new internalization theory. International Business Review, 29, 101635.

91. Tang, L., Zhang, Y., Gao, J., & Wang, F. (2020). Technological upgrading in Chinese cities: the role of FDI and industrial structure. Emerging Markets Finance and Trade, 56, 1547-1563.

92. Tang, Q., Gu, F. F., Xie, E., & Wu, Z. (2020). Exploratory and exploitative OFDI from emerging markets: Impacts on firm performance. International Business Review, 29, 101661.

93. Tang, R. W. (2019). FDI expansion speed of state-owned enterprises and the moderating role of market capitalism: Evidence from China. International Business Review, 28, 101596.

94. Tang, R. W. (2021). Pro-market institutions and outward FDI of emerging market firms: An institutional arbitrage logic. International Business Review, 30, 101814.

95. Tavassoli, S. (2018). The role of product innovation on export behavior of firms: Is it innovation input or innovation output that matters? European Journal of Innovation Management, 21, 294-314.

96. Wakelin, K. (1998). Innovation and export behaviour at the firm level. Research Policy, 26, 829-841.

97. Wang, C., Hong, J., Kafouros, M., & Boateng, A. (2012a). What drives outward FDI of Chinese firms? Testing the explanatory power of three theoretical frameworks. International Business Review, 21, 425-438.

98. Wang, C., Hong, J., Kafouros, M., & Wright, M. (2012b). Exploring the role of government involvement in outward FDI from emerging economies. Journal of International Business Studies, 43, 655-676.

99. Wang, C., & Kafouros, M. I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. International Business Review, 18, 606-616.

100. WIR. (2014). World Investment Report: Investing in the SDGs: An Action Plan. (Downloaded on 12 November 2014 from: http://unctad.org/en/ PublicationsLibrary/wir2014_en.pdf).

101. WorldBank. (2010). World development indicators 2010: The World Bank.

102. Wu, J., Wang, C., Hong, J., Piperopoulos, P., & Zhuo, S. (2016). Internationalization and innovation performance of emerging market enterprises: The role of host-country institutional development. Journal of World Business, 51, 251-263.

103. Wu, L., Wei, Y., & Wang, C. (2021). Disentangling the effects of business groups in the innovation-export relationship. Research Policy, 50, 104093.

104. Xia, J., Ma, X., Lu, J. W., & Yiu, D. W. (2014). Outward foreign direct investment by emerging market firms: A resource dependence logic. Strategic Management Journal, 35, 1343-1363.

105. Xiao, S. S., Lew, Y. K., & Park, B. I. (2019). '2R-based view'on the internationalization of service MNEs from emerging economies: Evidence from China. Management International Review, 59, 643-673.

106. Xie, Z., & Li, J. (2018). Exporting and innovating among emerging market firms: The moderating role of institutional development. Journal of International Business Studies, 49, 222-245.

107. Yang, X., Jiang, Y., Kang, R., & Ke, Y. (2009). A comparative analysis of the internationalization of Chinese and Japanese firms. Asia Pacific Journal of Management, 26, 141-162.

108. Yi, J., Hong, J., chung Hsu, W., & Wang, C. (2017). The role of state ownership and institutions in the innovation performance of emerging market enterprises: Evidence from China. Technovation, 62, 4-13.

109. Yi, J., Wang, C., & Kafouros, M. (2013). The effects of innovative capabilities on exporting: Do institutional forces matter? International Business Review, 22, 392-406.

110. Zahra, S. A., & Hayton, J. C. (2008). The effect of international venturing on firm performance: The moderating influence of absorptive capacity. Journal of business venturing, 23, 195-220.

Chapter 1

Channels of international technology learning and innovation performance of emerging market enterprises

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Channels of international technology learning and innovation performance of emerging market enterprises

Abstract: This study examines the impacts of international learning channels, namely imports, exports, inward FDI and outward FDI, on innovation performance of emerging market enterprises (EMEs). It contributes to the literature on internationalization and innovation by integrating insights from international trade and international investment to explain variations in EMEs' innovation performance. This integrative approach enables us to offer a more complete description of the international learning channels that shape a firm's innovation performance, specifically a better understanding of the role and relative contribution of each channel. Empirical results based on the whole sample of a large dataset of Chinese high-tech manufacturing firms show that imports, exports and outward FDI have a significantly positive effect on the innovation performance of EMEs, while inward FDI in the form of foreign ownership has a distinct and generally negative effect. This study further sheds light on the differences in innovation behavior between domestic firms and foreign-controlled firms by demonstrating that the relationship between international learning channels and innovation depends on the level of foreign ownership. These findings have important implications for how policymakers and managers can advance innovation strategies to enhance EMES' global competitiveness. Strong performance in a series of robustness checks adds confidence to our results.

Keywords: Innovation performance, imports, exports, inward FDI, outward FDI, EMEs

1. Introduction

Innovation is an increasingly essential component of global competitiveness for emerging-market enterprises (EMEs) (Dominguez Lacasa, et al., 2019; Fu & Gong, 2011; Wang & Kafouros, 2009). Early research on the influencing factors of innovation tends to focus on firm-specific factors, including firm age, size, ownership, research and development (R&D) expenditure and managerial structure (e.g., Chen, et al., 2016; Chen, et al., 2014; Choi, Park & Hong, 2012; Kafouros, et al., 2015). With the increasing prominence of internationalization strategies in emerging economies (EEs) and the intensification of global competition, the impact of various international learning channels on emerging market enterprises' (EMEs) innovation performance have attracted considerable research interest (e.g., Campbell & Mau, 2021; Genc,

Dayan & Genc, 2019; Howell, Lin & Worack, 2020; Wang & Kafouros, 2009). The quest to understand which international technology learning channels effectively boost innovation performance has yielded two main theoretical formulations: one revolving around international trade (Chen, Zhang & Zheng, 2017; Salomon & Shaver, 2005; Wang & Kafouros, 2009), and the other emphasizing the role of international investment (Buckley, Clegg & Wang, 2007; Fu, Hou & Liu, 2018; Piperopoulos, Wu & Wang, 2018). These two research streams have significantly advanced theories about the determinants of innovation performance in EEs. However, few studies have sought to integrate them into a unified analytical framework, thereby limiting the understanding and interpretation of how variations in innovation performance occur.

To bridge the above-mentioned research gap, this paper examines how firm-level international technology learning channels – namely imports, exports, inward foreign direct investment (IFDI) and outward FDI (OFDI) – jointly impact the innovation performance of EMEs. Specifically, by subjecting the broad forces of international learning channels to an integrated analysis, this study seeks to enhance understanding of the dynamics and complexity of innovation in diverse social and economic environments, from a theoretically driven and policy-relevant perspective. Given the rapid growth of domestic technology and the increasing prominence of internationalization strategies, China is an ideal setting for investigating the relationship between international technology learning channels and innovation performance. As the world's largest transition economy, China has transformed itself from an opponent of globalization into an advocate. Although most Chinese firms are not viewed as technological leaders who can produce distinctive products or services with technology embedded (Fu, Hou & Liu, 2018; Yi, Wang & Kafouros, 2013), they have been achieving commercial success when competing in international markets.

Tested against a large sample of Chinese high-tech manufacturing firms between 2000 and 2007, our conceptual framework is found to have strong explanatory power for differences in EMEs' innovation performance. As one of the first studies to empirically assess the impact of import, export, IFDI and OFDI on firm-level innovation performance in an integrated framework, this paper advances previous work on international technology learning sources and innovation performance in three ways. First, we construct and empirically test a unified analytical framework integrating theoretical advances in the literature of international trade and international investment to investigate the multiple determinants of innovation. Under this

framework, trade and investment are collectively seen as the main learning channels and influencing factors of EMEs' innovation performance, i.e., technology transfer, directly or indirectly, through various internationalization activities that embody technological progress. Recent theorizing on innovation performance in EMEs mainly focuses on a single channel of international technology learning (Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Genc, Dayan & Genc, 2019; Piperopoulos, Wu & Wang, 2018) and overlooks the fact that an EME's innovation can be influenced simultaneously by multiple channels. These studies even yielded qualitatively mixed results for the same learning channel, not to mention the incomparable strengths of effects, making it hard to summarize the relative importance of innovation determinants to innovation based on the available cross-study evidence. Thus, examining the individual effects of innovation performance determinants simultaneously using a holistic approach allows for a more complete description of the forces that shape a firm's innovation performance and a better understanding of the roles and relative contributions of each channel. This paper aims to provide a reference for future studies on innovation determinants by identifying the relative contribution of each of the four international learning channels to innovation performance in EMEs.

Second, this study sheds light on existing inconsistent research results regarding the effects of IFDI on innovation performance by providing new empirical evidence. Some studies show that firm-level IFDI has positive effects (e.g., Buckley, Clegg & Wang, 2007; Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Li, Chen & Shapiro, 2010), while others find these effects to be insignificant (e.g., Lu & Ng, 2012) or even negative (e.g., Fan & Hu, 2007; Kathuria, 2008; Xie & Li, 2018). Our empirical results indicate that, when using the full sample of manufacturing firms in China, innovation performance is negatively related to IFDI in the form of foreign ownership. However, dividing the entire sample into domestic and foreign-owned firms (FOEs) enabled this study to identify different relationships between IFDI and innovation performance, namely a positive relationship for domestic firms and a negative relationship for FOEs. The main reason for the negative relationship in FOEs is that existing indicators of local innovation activities by FOEs do not sufficiently represent their innovation performance due to internal technology transfer during the observation period. Based on this explanation, we further enrich the extant literature by revealing that the transfer of innovation outputs from foreign affiliates to FOEs themselves contributes to the negative impact of firm-level IFDI on the innovation of these FOEs.

Third, our research findings have significant policy and managerial implications for policymakers and practitioners, not only in China, but also in other EEs such as India and Brazil that have adopted a catch-up strategy similar to China's use of international trade and international investment as an external source of technological development. Most previous studies on the international learning channels–innovation relationship focus on advanced economies, where firms differ markedly from EMEs in terms of firm-level ownership advantages and institutional environments (Chen, Zhang & Zheng, 2017; Fu, Hou & Liu, 2018; Howell, Lin & Worack, 2020). In contrast, there is little research on how various international technology learning channels can enable EMEs to enhance their innovation performance (see summary in Appendix Table A1). Although this study acknowledges that EEs differ from one another, the increasing degree of globalization they face in common leads us to expect that some implications from this study will also apply to other EEs.

2. Theoretical background and hypotheses

2.1 International technology learning channels and EMEs' innovation

Learning through internationalization is widely believed to be very important to EEs, as it improves a country's innovation capabilities and enables latecomers to quickly catch up (Grosse & Fonseca, 2012; Wang & Kafouros, 2009). Radosevic and Yoruk (2018) proposed a new conceptual framework for domestic technology development and upgrading and applied it to 42 emerging economies with lower-middle to upper-high income, including China, to explain how global interaction through international trade and investment strengthens knowledge transfer and technology cooperation. Dominguez Lacasa, et al. (2019) further developed this framework, which enabled them to elucidate differences in technological interactions between the global economy and the BRICS countries. Both studies focus mainly on innovation performance at the national level and do not explicitly investigate the international sources of technology flow. In EEs, it may be especially relevant to study the impact of international learning channels on innovation at the firm level, that is, whether and to what extent inflows of foreign technology have improved EMEs' innovation performance. Indeed, an increasing number of studies have investigated the role of different firm-level international learning channels in EMEs' innovation performance. This study systematically reviews relevant EME studies identified through the literature search method presented in the Appendix. Table A1 summarizes their main findings. Overall, a positive impact of international learning channels on EME innovation was documented

by a majority of the selected studies, despite using different sample sources and different international learning channels and innovation proxies. However, only a few studies have investigated the simultaneous effects of different learning channels on innovation performance. In addition, some studies yielded contrasting results based on data from the same country, which may be due to differences in handling potential confounders.[6] For example, Fan and Hu (2007) found that IFDI had a significant negative effect on innovation performance, while Girma, Gong, and Görg (2008) found a significant positive effect when export intensity was considered and controlled for in the model. In the context of this broad literature, our research on the relationship between IFDI, OFDI, import, export as a whole and innovation performance can be seen as an augmentation of extant innovation research: we examine whether the channels of international technology learning are also driving factors for firm-level innovation performance based on detailed data from China's high-tech manufacturing firms. This study formulates theory-driven hypotheses based on findings from the broader literature to establish the generality of conclusions.

2.2 Import and innovation

Previous theoretical developments indicate that imports may promote technology and innovation through import spillovers (Coe & Helpman, 1995; Grossman & Helpman, 1991), even though extant firm-level empirical literature focuses mainly on productivity rather than innovation (Halpern, Koren & Szeidl, 2015). Import spillovers occur when domestic firms mimic foreign technologies by reverse-engineering imported products (Grossman & Helpman, 1991). Indeed, many studies show that imports enable firms to analyze and absorb technologies embodied in imported commodities and materials, which can reduce firms' innovation costs (e.g., Chen, Zhang & Zheng, 2017). Linkages with sellers and suppliers can also be an important learning source for importers through cross-border diffusion of knowledge and technology (MacGarvie, 2006). Despite these known effects, the impact of technology spillovers of import on labor-intensive industries may be limited, as indigenous technology capabilities in populous developing countries such as China and India may be more efficient than imports of labor-saving technologies (De Marchi, Giuliani & Rabellotti, 2018; Fu & Gong, 2011). As one of the few studies examining the direct impact of firm-level import value on innovation in EEs (see Appendix Table A1), this study formulates the following hypothesis:

[6] We acknowledge that there are many factors that could lead to opposite results, such as the analysis sample, data period and estimation method.

H1. An EME's innovation performance is positively related to its imports.

2.3 Export and innovation

Existing theories on the impact of firms' participation in international trade on innovation mostly emphasize the prominent role of firms' export behavior (Chen, Zhang & Zheng, 2017; Melitz, 2003). Some studies conclude that through global value chain (GVC) participation, firms can better identify, assimilate and integrate the knowledge and innovation embodied in intermediate exports (e.g., Greenaway & Yu, 2004; Pietrobelli & Rabellotti, 2011). Specifically, exports can provide EMEs with access to a variety of knowledge and information that can be used as an effective learning channel. Export activities can also stimulate EMEs to explore and develop new technologies by analyzing competing innovative products and acquiring information about customer preferences in the foreign markets (MacGarvie, 2006; Salomon & Shaver, 2005; Wang & Kafouros, 2009). In addition, intense competition and high standards in foreign markets may force exporting EMEs to innovate continuously to maintain their vitality and competitiveness in global markets (Liu & Buck, 2007). At the same time, overseas customers may even actively shape the manufacturing process by sharing information on production techniques and design specifications (Blalock & Gertler, 2004), thereby further boosting their innovation performance. Hence, this study proposes a positive relationship between export and innovation.

H2. An EME's innovation performance is positively related to its exports.

2.4 Inward FDI and innovation

A large body of literature shows that IFDI is a crucial driving force of EMEs' innovation performance. Early studies focusing on the spillover effects of IFDI on domestic firms' innovation in EEs have documented the positive impact of IFDI on innovation at the industrial and regional levels (e.g., Fu, 2008; Hu & Jefferson, 2009; Wang & Kafouros, 2009). Although the findings are broadly consistent, the literature on the IFDI–innovation relationship at the firm level is not as extensive as that at the industry or regional level. Studies exploring the role of IFDI in the form of foreign ownership on EME innovation (see summary in Appendix Table A1) conclude that IFDI generally has positive effects on firm-level productivity and innovation performance (Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Girma, Gong & Görg, 2008; Teng, Li & Tanna, 2021). The main argument for this conclusion is that foreign investors (mainly foreign multinational enterprises, FMNEs) can bring EMEs the necessary innovation

elements and resources, such as managerial and technological knowledge and financial capital (Chen, et al., 2014; Teng, Li & Tanna, 2021). Specifically, foreign capital support, technical personnel mobility, component supply, technology transfer and cooperation, and managerial resource-sharing may strengthen the innovation efforts of EMEs (Douma, George & Kabir, 2006; Fu, 2008; Wang & Kafouros, 2009), thus improving their innovation outputs. In addition, FMNEs are usually from developed countries with good governance experience and valuable innovation networks among other resources that may benefit local partners' innovation performance (Douma, George & Kabir, 2006).

However, the link between firm-level IFDI and innovation performance is not straightforward. Although foreign investors can use their ownership shares to influence local partners to increase investment in R&D activities (Chang, Chung & Mahmood, 2006), holding equity shares in local firms may also enable FMNEs to devote less resources to innovation in host countries. This is because FMNEs have historically developed technical competencies and can leverage these pre-existing intangible assets to cost-effectively synchronize the knowledge bases between its internal networks and external technological clusters (Castellani, Jimenez & Zanfei, 2013; Un & Cuervo-Cazurra, 2008). Indeed, with the reduction or abolishment of restrictions on foreign ownership caps, more and more foreign investors are directly establishing wholly foreign-owned enterprises/subsidiaries (WFOEs) or converting their international joint ventures (IJVs) into WFOEs (Puck, Holtbrügge & Mohr, 2009). Choosing WFOEs as the operation mode enables foreign investors to better protect their intellectual property rights (IPR) and make full use of the WFOEs' advanced technology (Liu & Zou, 2008) through internal knowledge transfer, which might weaken the linkage between foreign ownership and innovation outputs by WFOEs. Furthermore, weak domestic IPR protection has led to the widespread piracy including patent infringement, which dampens foreign technology suppliers' interest in licensing their technology to local partners (Chen, et al., 2014). Nonetheless, these scenarios may not be impactful enough to reverse the positive effects of firm-level IFDI. Hence, we expect a positive relationship between foreign shares and innovation in the Chinese context.

H3. An EME's innovation performance is positively related to its level of foreign ownership.

2.5 Outward FDI and innovation

The scant research on the performance outcomes of OFDI in EMEs yields a consistent finding: OFDI can be seen as a strategic activity that responds to global technological interactions and

improves the innovation performance of EMEs. The rapid growth of China's OFDI is driven mainly by cross-border merges and acquisitions, which inevitably involve knowledge and technology flow in the transfer of intangible assets within firms, which may enable technology accumulation by EMEs (Deng, 2009). Furthermore, the strategic asset-seeking investment perspective has been advocated in explaining how technological laggards in EEs such as China and India employ OFDI as a key mechanism for seeking technological resources globally and thereby overcoming their competitive disadvantages (Gubbi & Elango, 2016; Mathews, 2006). Similarly, the springboard view, a new theoretic lens to analyze EMEs' OFDI activities, emphasizes that EMEs are adept at aggressively seeking strategic assets from OFDI to enhance their home technological capabilities, and employ the resulting enhanced capabilities to better compete in the global race (Luo & Tung, 2018). These perspectives stress that EME subsidiaries located in advanced economies can strengthen their innovation capabilities by partnering with highly advanced firms in the host country and integrating the technological knowledge of local customers, distributors, and suppliers (Piperopoulos, Wu & Wang, 2018). However, lack of experience in international competition may offset the beneficial outcomes of OFDI on the innovation performance of domestic firms (Contractor, Kumar & Kundu, 2007). In addition, EMEs' innovation performance enhancement may also depend on the ability of their subsidiaries to absorb external knowledge and integrate it into their innovation base, as well as the ability to commercialize it (Laursen & Salter, 2006). Nevertheless, this study hypothesizes that OFDI through international learning has a positive effect on the average innovation performance of EMEs.

H4. An EME's innovation performance is positively related to its OFDI activities.

3. Data and method

3.1. Data

This study used a large firm-level sample of China's manufacturing sector from 2000 to 2007. Due to the lack of detailed data on firms' earlier international trade transactions, we set 2000 as the pre-sample year Chen, Zhang and Zheng (2017). Considering the impact of the 2008-2010 global financial crisis on the production and innovation in many countries, including China, we chose 2007 as the cutoff year for the sample (Wu, Wei & Wang, 2021). We performed robustness checks on data from 2011 to 2014. Considering the significant differences in technological foundations between industries and industry-specific attributes (including industrial policies), we

chose high-tech manufacturing industries in China identified in previous research as the sample data for the following two reasons (e.g., Liu & Zou, 2008; Piperopoulos, Wu & Wang, 2018). First, the Chinese government defines these high-tech industries as "pillar" industries and formulates equal preferential policies to promote high-tech trade and motivate their long-term investment in innovation (Choi, Lee & Williams, 2011; Liu & Buck, 2007). Second, innovation is particularly important for high-tech industries, and many studies have shown that Chinese high-tech industries engage more in internationalization activities compared with other industries (Boeing, 2016; Liu & Zou, 2008; Wang, et al., 2012).

Collecting from four sources, this study created a unique dataset of China's high-tech manufacturing firms that are above certain designated size. First, we extracted detailed firm-level data including ownership and financial information from the database of Chinese Annual Survey of Industrial Firms (ASIFs). Collected and maintained by the National Bureau of Statistics of China (NBSC) with annual updates, the ASIFs dataset is considered the richest and the most authoritative source of information on Chinese firms, and is frequently used in academic research (Xie & Li, 2018). It documents detailed information on all manufacturing firms registered in China with an annual revenue of above five million RMB (approximately USD 680,000) in all manufacturing industries in the 31 mainland provinces, autonomous regions, and municipalities (hereinafter referred to as "provinces") in China. This study followed Cai and Liu (2009) to perform data cleaning including rigorously checking for mislabeled data (coding errors in unique identifiers, industries, and geographical regions), missing values and possible changes in the nature of ownership due to M&A. Second, we acquired patent data from China's official patent database by CNIPA (China National Intellectual Property Administration), which has been widely used in recent studies (Dong, Kokko & Zhou, 2022; Wu, Wei & Wang, 2021). The dataset compiled by CNIPA is the most systematic documentation of patents in China, containing detailed information on all applied- and granted patents (Choi, Lee & Williams, 2011). Third, we extracted the transaction information of Chinese firms participating in international trade from a data set recorded and maintained by Chinese Customs that has been frequently used in research (e.g., Bai, Krishna & Ma, 2017). Data extracted includes basic firm information and the value of each transaction (in US dollars).[7] Fourth, we systematically extracted data on all OFDI

[7] The financial figures of imports and exports were converted to RMB with the exchange rate on the date of the company's fiscal year-end.

projects that have been registered with the Ministry of Commerce of China (MCC) from the MCC OFDI database, which covers China's OFDI projects more extensively than most datasets analyzed in previous studies (Deng, Yan & Van Essen, 2018; Xia, et al., 2014). Information extracted includes the name of the subsidiaries and the parent companies, host countries, and investment periods. Merging these four databases and excluding outliers yielded an unbalanced panel dataset of 51,229 high-technology manufacturing firms comprising 131,222 observations. Even though the final dataset appeared to be clean, we eliminated the largest outliers by winsorizing all variables at the 1% and 99% levels.

3.2 Measures

3.2.1 Dependent variable

We used the innovation performance of EMEs as the dependent variable. We used new product sales (NPS), which is the share of sales from new products in total sales, as the primary measure of innovation performance (Kafouros, et al., 2015; Wang & Kafouros, 2009). NPS is considered the most appropriate innovation performance metric and is commonly used in previous research because it incorporates non-patentable innovation output and market acceptance (Liu & Buck, 2007; Wu, Wei & Wang, 2021; Xie & Li, 2018). Especially in the context of international knowledge flows and spillovers, some argue that innovation performance can be most effectively assessed by a firms' success in launching new products (e.g., Fu, Hou & Liu, 2018; Liu & Buck, 2007). We followed standard practices (e.g., Kafouros, et al., 2015) and applied a natural logarithmic transformation to this variable.

We used patent data as the secondary indicator of innovation performance. Patent registrations provide standardized information about innovation (Genc, Dayan & Genc, 2019), and therefore can capture the effectiveness of innovation activities (including measurable and unmeasurable innovation inputs). Numerous studies have noted that the number of patents granted is a reliable indicator of innovation performance because it accurately embodies a firm's intellectual property (Genc, Dayan & Genc, 2019; Wu, Wei & Wang, 2021). Therefore, we used the total number of

patents granted to each company each year as an alternative proxy of innovation performance.[8] To reduce the skewness in this variable, this study followed usual practices (e.g., Xie & Li, 2018) and performed a natural logarithmic transformation to normalize data. It should be noted that patents granted are not a perfect proxy of innovation performance, especially in China, where the quality and quantity of patents may be affected by patent subsidies (Boeing & Mueller, 2019). Also, success (or failure) in gaining patents might not reflect the diversity of a firm's innovation output or adequately represent a firm's commercial success (Wang & Kafouros, 2009).

Our third proxy for innovation performance is R&D intensity in the available period,[9] calculated as the share of annual R&D expenditures in total sales (Xie & Li, 2018; Zahra & Hayton, 2008). Although R&D expenditure may not represent the overall innovation quality and the intellectual property of a firm (Liu & Qiu, 2016; Wu, Wei & Wang, 2021), it still captures the observable innovation inputs. We believe that inclusion of this variable may provide additional evidence that strengthens our study.

3.2.2 Independent variables

Our independent variables include firm-level exports, imports, IFDI and OFDI. We used the share of exports in total sales to measure exports (Wu, Wei & Wang, 2021; Xie & Li, 2018), and the share of imports in total sales to measure imports (Chen, et al., 2014; Chen, Zhang & Zheng, 2017).[10] For firm-level IFDI, we used the foreign capital share from foreign affiliates (Choi, Park & Hong, 2012; Kathuria, 2008). Following Buckley, Clegg and Wang (2007) and Deng, et al. (2014), capital from Hong Kong, Macau and Taiwan (HMT) was excluded from foreign capital. We measured annual firm-level OFDI by the sum of OFDI projects invested by a firm (Deng, Yan & Van Essen, 2018; Xia, et al., 2014). OFDI projects in HMT and Caribbean were identified

[8] We chose domestic patent data instead of transnational patent data (such as US or European patent data) as a measure for EMEs' innovation output to avoid bias due to the high cost of the international registration process (Choi, Lee & Williams, 2011; Piperopoulos, Wu & Wang, 2018). In addition, China's transnational patents are dominated by a few information technology-related sectors and firms (Wunsch-Vincent, Kashcheeva & Zhou, 2015). Linking the transnational patent data to the ASIFs dataset is hardly possible due to lack of common identifiers (Liu & Qiu, 2016).

[9] R&D expenditure is only available in the dataset for three years, 2005–2007.

[10] It should be noted that the values of import and export are of direct transactions excluding those of domestic and foreign intermediaries (such as specialized trade companies). Due to limitations in data, we could not consider the transaction value of intermediates to further study the learning effects of exporting/importing through intermediaries.

and excluded for the following reasons: (i) investment in Hong Kong and Macau are mainly for expanding financing channels (Tang, 2019); (ii) OFDI projects in Taiwan is constrained by cross-strait political relationship (Deng, Yan & Van Essen, 2018), and (iii) OFDI located in the Caribbean are primarily used for tax avoidance purposes (Deng, Yan & Van Essen, 2018; Xia, et al., 2014). The logarithmic transformation was likewise applied to these variables to moderate potential issues of autocorrelation and outliers.[11]

3.2.3 Control variables

This study controlled for several variables. First, we controlled for firm size with each firm's fixed asset value as a proxy. Second, considering that innovation performance may be affected by firm age due to the accumulation of experience and knowledge, this study controlled for firm age, measured by the total number of years from firm establishment to the end of the observation period. Third, this study controlled for the potential impact of privileged resources owned by SOEs, such as public R&D outcomes. A value of 1 was used to represent SOEs whose ultimate controller is a local or central government agency, and 0 otherwise (Deng, Yan & Van Essen, 2018; Wu, Wei & Wang, 2021). Fourth, this study followed previous research (Coe & Helpman, 1995) to incorporate total factor productivity (TFP) as a control variable defined as $logY - \beta logK - (1-\beta)logL$, where Y is industrial added value; β is the share of capital in GDP; K represents total capital including tangible-, marketing- and technological assets; L is the total number of employees. TFP captures a firm's efficiency in combining multiple complementary resources and the firm's ability to generate more output from a given amount of input (Aharoni, 2018).[12] Fifth, in view of the apparent regional differences in China's technological and economic conditions, this study included a regional composite index of marketization for each year of the entire observation period as a control variable (Fan, Wang & Zhu, 2011). This marketization index is a measure of the extent to which market-based forces drive the business

[11] This study also performed the estimation with the natural count of the variable OFDI rather than its logarithmic transformation, and the results did not change significantly.

[12] We also used labour productivity as an alternative proxy of productivity. Key regression results are qualitatively similar to TFP-based results.

operating environment (Hong, Wang & Kafouros, 2015).[13] Finally, we controlled for region-, industry- and time effects in the models: (i) region-level dummy variables to control for potentially unconsidered effects due to regional idiosyncrasies in the country's 31 mainland provinces; (ii) two-digit industry-level dummy variables to control for industry-specific characteristics such as industrial policies that may have an impact on innovation performance; and (iii) year dummies to capture the temporal influence of time-varying factors on internationalization activities and innovation performance, such as aggregate exchange rate effects and any macroeconomic shifts. Table 1 describes the definition and measurement of all variables.

Table 1. Definition of variables

Variable	Measurement
Dependent variable	
NPS	Log (1+ New products sales/ total sales* 100)
Ln(Patent)	Log (1+ Number of patents granted)
R&D intensity	R&D expenditure / total sales
Independent variable	
Import intensity	Log (1+ imports value / total sales *100)
Export intensity	Log (1+ exports value / total sales *100)
IFDI	Foreign capital / total capital
OFDI	Log (1+ Number of OFDI projects)
Control variables	
Firm size	Log (total fixed assets)
Firm age	Log (number of years since establishment)
TFP	See Methods section for details
State ownership	State-owned enterprises (SOE) = 1 if state-owned; 0 otherwise
Marketization	Region-specific marketization index (Fan et al., 2010). See Methods section for details
Regional dummies	31 province dummy variables
Industry dummies	9 industry dummy variables
Time dummies	8 year dummy variables

Note: The unit is thousands of RMB for sales, new product sales, export sales, inventory, fixed assets, total assets, government subsidy, capital and wages

3.3 Estimation method

The base model for examining the relationship between international channels and innovation is

[13] Marketization index is calculated from a total of 26 indicators in five key areas including the role of the market relative to that of the government, the development of private sectors, the development of commodity and factor markets, and the development of free-market institutions. The higher the score, the higher level of marketization it reflects, and vice versa (Hong, Wang & Kafouros, 2015). The marketization values are extracted from the Wind database.

as follows:

$$Innovation_{it} = \alpha_0 + \alpha_1 Import_{it-1} + \alpha_2 Export_{it-1} + \alpha_3 FDI_{it-1} + \alpha_4 OFDI_{it-1} + \delta_0 C_{it-1} + \lambda_r + \lambda_t + \lambda_i + \varepsilon_{it}$$

where $\boldsymbol{Innovation_{it}}$ is innovation performance of a firm in year t. The four main explanatory variables are import, export, IFDI and OFDI. $\boldsymbol{C_{it-1}}$ are control variables, $\boldsymbol{\lambda_j}$ $\boldsymbol{\lambda_r}$ and $\boldsymbol{\lambda_t}$ are fixed effects of industry, region and year, respectively, and $\boldsymbol{\varepsilon_{it}}$ is the error term.

International technology learning channels can be endogenous as innovation performance can affect firms' international strategies and unobserved factors can also directly influence both these channels and innovation performance. To deal with such possible reverse causality problems, this study adopted a one-year lag structure for all explanatory variables. This treatment not only takes into account the time it takes for the innovation effects of international trade and investment to materialize, but also predetermines potential endogenous variables making them less likely to be correlated with the error term (Grosse & Fonseca, 2012; Liu & Buck, 2007).

To deal with potential unobserved firm heterogeneity, this study attempted to adopt a two-stage model with instrumental variables (IVs) that are highly correlated with international trade and investment but uncorrelated with innovation performance. However, due to data availability, we failed to find such a proper set of IVs, which is a common problem in previous studies. Instead, we followed previous research (e.g., Chen, et al., 2014; Wang & Kafouros, 2009) and adopted the Hausman test to examine the possibility of endogeneity. Specifically, we used each of the four channels (namely import, export, IFDI and OFDI) to regress all other independent variables that are regarded as exogenous to estimate the corresponding residual. We further separately regressed the base model while including the corresponding residual for each of the four international channels. An endogeneity problem is present if the corresponding residual statistically differs from zero (namely, if H0: g = 0 can be rejected). Results of the Hausman test suggest that at 1% significance level, the null hypothesis (H0: g = 0) was not rejected by any of the individual regressions. This indicates that endogeneity is not a major problem between each of the international channels and innovation performance. Therefore, OLS estimation was performed in all analyses. To deal with possible heteroskedasticity issues, estimations were conducted using the Huber–White's robust standard error (White, 1980).

4. Results

4.1 Main results

To aid data analysis and interpretation, Table 2 presents descriptive statistics for all relevant variables of the sample firms. Low correlation coefficients were observed in all cases, except for that between import and export (0.641). Although it is below the acceptable threshold of 0.8 (Judge, et al., 1982), this finding still reflects the theoretical consensus on the high correlation between imports and exports, which raises concerns about the deleterious effects of multicollinearity on the coefficient estimates. In fact, exports and imports are functionally co-dependent in the sense that successful exporters are almost always importers (Amiti, Itskhoki & Konings, 2014). Many studies have documented substantial overlap in firms' import and export activities (e.g., Feng, Li & Swenson, 2016). To address this possibility, we conducted extensional estimations by separately entering the import and export variables into two different models together with all other variables, thereby ensuring that import and export would not appear in the same regression. Finally, this study examined the variance inflation factor (VIF) for each explanatory variable. The highest VIF value is 1.79, indicating that multicollinearity does not influence the estimations (Ryan, 1997).

Table 2. Correlation coefficients and descriptive statistics (2000–2007).

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. NPS	0.520	1.282	1									
2. Patents granted	0.118	0.472	0.185	1								
3. Import	0.049	0.377	0.062	0.069	1							
4. Export	0.092	0.560	0.082	0.069	**0.641**	1						
5. IFDI	0.085	0.259	-0.002	0.015	0.174	0.114	1					
6. OFDI	0.001	0.025	0.032	0.039	0.013	0.012	0.003	1				
7. Firm size	8.478	1.755	0.231	0.247	0.197	0.195	0.173	0.031	1			
8. Firm age	1.891	0.946	0.085	0.061	0.050	0.061	-0.070	0.006	0.187	1		
9. SOEs	0.068	0.252	0.014	-0.021	-0.023	-0.017	-0.084	-0.005	0.033	0.313	1	
10. TFP	4.096	1.124	0.086	0.116	0.057	0.027	0.092	0.015	0.181	-0.119	-0.218	1
11. Marketization	7.788	1.942	-0.015	0.018	0.033	0.035	0.109	0.017	-0.103	-0.120	-0.265	0.123

Note 1: SD = standard deviation; Based on a sample of 131,222 firm-year observations during 2000–2007. All the correlation coefficients are statistically different from zero at the 1% significance level.

Note 2: The mean value of IFDI (0.085) and the correlation coefficients between IFDI and imports/exports are surprisingly low considering that foreign investors in China played a key role in China's international trade during the observation period (Fu, 2011). The observed low numbers may be due to the exclusion of HMT capital from the IFDI measure in the main analysis of the present study. Adding HMT capital resulted in a higher mean value of IFDI (0.162) and higher correlation coefficients between IFDI and imports/exports (0.182/0.129) than excluding HMT capital, supporting the notion that HMT capital was an important player in processing trade in the early stage of China's accession to the WTO (Fu & Gong, 2011).

Table 3. Determinants of innovation performance

Pooled OLS	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}
DV= NPS_{t+1}	Model 1	Model 2	Model 3	Model 4	Model 5	Model 5a	Model 5b
Import	0.040*				0.044**	0.065***	
	(1.82)				(1.98)	(2.94)	
Export		0.034***			0.046***		0.046***
		(10.94)			(13.79)		(14.02)
IFDI			-0.211***		-0.298***	-0.221***	-0.293***
			(-10.74)		(-14.25)	(-11.20)	(-14.03)
OFDI				1.083***	1.011***	1.069***	1.013***
				(4.95)	(4.61)	(4.86)	(4.62)
Firm size	0.163***	0.158***	0.172***	0.164***	0.163***	0.170***	0.165***
	(46.01)	(44.25)	(47.90)	(46.91)	(44.78)	(46.71)	(45.50)
Firm age	0.070***	0.071***	0.065***	0.070***	0.065***	0.064***	0.065***

	(12.08)	(12.42)	(11.32)	(12.17)	(11.19)	(11.14)	(11.28)
SOEs	-0.029	-0.016	-0.042*	-0.033	-0.022	-0.038	-0.023
	(-1.26)	(-0.69)	(-1.82)	(-1.42)	(-0.96)	(-1.64)	(-1.00)
TFP	0.068***	0.074***	0.072***	0.068***	0.079***	0.071***	0.080***
	(14.16)	(15.35)	(14.94)	(14.31)	(16.32)	(14.68)	(16.45)
Marketization	0.060***	0.057***	0.062***	0.060***	0.057***	0.062***	0.057***
	(3.62)	(3.41)	(3.76)	(3.64)	(3.44)	(3.72)	(3.46)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.926***	-1.915***	-1.980***	-1.931***	-1.940***	-1.956***	-1.952***
	(-15.51)	(-15.45)	(-15.92)	(-15.58)	(-15.59)	(-15.70)	(-15.70)
Observations	62,596	62,595	62,173	62,636	62,133	62,134	62,133
Adjusted R2	0.116	0.118	0.118	0.116	0.123	0.119	0.121
R2	0.116	0.118	0.118	0.117	0.123	0.119	0.122
F-statistic	136.0***	138.7***	137.1***	136.7***	133.4***	132.2***	136.1***

Robust t-statistics in parentheses. *, **, *** significance at 10%, 5% and 1%, respectively.

Table 3 shows the results of regressions on the entire sample. Each of the first four models included all control variables and only one international learning channel. All four channels were statistically significant, demonstrating their known roles in innovation. The fifth model in the table included all four learning channels and control variables. There is a significantly higher adjusted R-squared (R^2) value of Model 5 than any of those in other models (models 1–4), suggesting that this integrated research framework has a stronger explanatory power than any of the single-variable models. In other words, although the results of the fifth model do not qualitatively change compared with the first four models, it still implies that the unified model can capture the determinants of innovation performance in EMEs better. Most importantly, it shows that omission of key variables may result in biased findings.

Results from Model 5 in Table 3 show that the coefficients of import, export and OFDI are statistically significant and positive, which corroborates our theoretical predictions. These results indicate that import, export and OFDI contribute to increased innovation performance of the full firm-level sample in high-tech industries, confirming the results of earlier studies (see Appendix Table A1). Thus, Hypotheses 1, 2 and 4 are supported. In contrast, the coefficient of IFDI is statistically significant but negative, indicating that Hypothesis 3 is not supported. These results are in qualitative agreement with those reported in the individual estimations (models 5a and 5b), again indicating that the potential multicollinearity concern caused by the relatively high correlation between import and export is not an issue in the regression analyses performed here.

The unexpected IFDI result suggests that higher foreign ownership is associated with lower innovation performance of firms in China, which contradicts previous studies that indicate positive effects of foreign ownership on innovation performance (e.g., Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Gorodnichenko, Svejnar & Terrell, 2020). This intriguing

finding highlights the complex role of foreign ownership in innovation performance of Chinese firms. The observation may be partly due to the fact that the innovation behaviors of FOEs are different from those of domestic firms and much of the explanatory power of IFDI based on the entire sample may be taken away by the sub-sample of FOEs. Specifically, most of the IFDI in China during the observation period was in the form of WFOE greenfield investments, the dominating presence of which may be associated with our model's underestimation of the impact of foreign ownership on innovation, as WFOEs generally prefer to concentrate their innovation activities (such as R&D) in their home countries or developed countries (Dong, Kokko & Zhou, 2022; Liu & Zou, 2008). In addition, given the fact that in general FMNEs are better equipped with technology than domestic firms, firms with more foreign ownership tend to devote fewer resources to innovation activities since they are more likely to obtain technology via transfer from their foreign affiliates (Castellani, Jimenez & Zanfei, 2013; Un & Cuervo-Cazurra, 2008; Xie & Li, 2018), thereby reducing the need for their own local innovation efforts. In other words, the mobility of innovation outputs within FMNEs may weaken the direct link between foreign ownership and innovation. This is also in line with previous observations that during the underlying sample period of our analysis, most FMNEs viewed China as a labor-intensive assembly hub rather than a strategic R&D center for frontier technologies (Deng, et al., 2014; Fan & Hu, 2007).[14]

4.2 Extensions and robustness checks

To examine the above interpretations for the observed negative effect of IFDI on EME innovation performances, we conducted two additional estimates based on Chinese domestic

[14] Related research also documents that a large portion of China' IFDI is export oriented and most of China's export-oriented firms have a high level of foreign ownership (e.g., Wang & Kafouros, 2009).

firms and FOEs, respectively.[15] Table 4 shows the results.[16] In the group of domestic firms (Model 6), the coefficients of all independent variables (including IFDI) are statistically significant and positive, which is consistent with our theoretical prediction that international channels – as proxied by imports, exports, IFDI and OFDI – enhance the innovation performance of EMEs. By contrast, in the group of FOEs in China (Model 7), import and export have insignificant coefficients, which suggests that most of the innovation outputs that belong to FOEs in China are not related to their import and export activities. Interestingly, consistent with the findings based on the whole sample in table 3 (Model 5), the coefficient of IFDI is statistically significant and negative, and the coefficient of OFDI is significantly positive. These results further support the notion that FOEs' innovation behavior in China is more likely to obtain innovation results through technology transfer from their foreign affiliates (Castellani, Jimenez & Zanfei, 2013; Un & Cuervo-Cazurra, 2008; Xie & Li, 2018). This suggests that when FOEs tend to invest less in their innovation activities but they do produce new products and patents in China, knowledge gain and technology transfer from their foreign affiliates would be a plausible explanation.[17]

Table 4. Robustness analysis.

	Domestic firms	Foreign firms	Full sample	Full sample	Full sample	Full sample	Tobit model	OLS with fixed effects	All manufacturing firms	All manufacturing firms	All manufacturing firms
	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= $Ln(Patent)_{t+1}$	DV= R&D $intensity_{t+1}$	DV= NPS	DV= NPS_{t+2}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= NPS_{t+1}	DV= $Ln(Patent)_{t+1}$	DV= R&D $intensity_{t+1}$
	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Import	0.218***	0.023	0.009*	0.123**	0.061***	0.028***	0.072***	0.005**	0.016***	0.041***	0.036***
	(3.74)	(0.59)	(1.92)	(2.38)	(3.35)	(4.80)	(3.17)	(2.55)	(14.89)	(11.31)	(2.94)
Export	0.136***	0.032	0.013	0.107***	0.059***	0.037***	0.257***	0.011**	0.003***	0.039***	0.048***
	(6.38)	(1.35)	(1.34)	(3.27)	(22.97)	(8.77)	(10.48)	(2.15)	(19.88)	(55.69)	(6.84)

[15] Despite the theoretical consensus on the beneficial IFDI spillovers at the industry or region levels, empirical evidence on the regional IFDI spillovers on the innovation is scarce. We therefore performed a separate regression before subsampling to examine the various spillover effects of the region-level IFDI (such as demonstration effects) on firm-level innovation performance. The estimation results show that regional foreign capital positively impacts firms' innovation performance (measured by NPS and patents), which supports the notion that spillover effects from the presence of foreign firms make valuable contributions to local firms' innovation performance (Fu, 2008). In this separate analysis, provincial-level IFDI data for China's 31 mainland provinces over the sample period was collected from the *China Statistical Yearbook* (National Bureau of Statistics of China. http://www.stats.gov.cn), which has been frequently used in existing studies (e.g., Chen, et al., 2020; Fu, 2008).

[16] According to the official and standard classification criteria, FOEs are defined as firms in China with foreign ownership shares of 25% or above (Deng, et al., 2014).

[17] The results of separate estimations in models 8 and 9 below show that IFDI also has a significantly negative impact on the alternative measures of innovation, which are patents granted and R&D intensity respectively. It should be noted that we cannot trace whether FOEs' OFDI projects are located in their home countries.

IFDI	0.506***	-0.083***	-0.075***	-0.428***	-0.274***	-0.401***	-1.598***	0.013	-0.029***	-0.157***	-0.204***
	(2.95)	(-3.44)	(-11.34)	(-9.02)	(-17.26)	(-14.88)	(-9.42)	(1.10)	(-24.17)	(-35.76)	(-19.51)
OFDI	0.950***	1.663*	0.427***	1.143*	1.266***	0.468	2.070***	0.102*	0.312***	0.702***	1.525***
	(4.42)	(1.94)	(4.21)	(1.84)	(7.43)	(1.63)	(3.83)	(1.85)	(10.30)	(8.59)	(9.52)
Firm size	0.186***	0.094***	0.056***	0.349***	0.145***	0.167***	0.928***	0.012***	0.029***	0.110***	0.243***
	(44.13)	(11.87)	(44.92)	(40.11)	(53.91)	(34.38)	(35.30)	(4.21)	(115.51)	(120.54)	(102.79)
Firm age	0.060***	0.022	0.012***	0.153***	0.059***	0.049***	0.394***	-0.013***	0.005***	0.032***	0.080***
	(9.66)	(1.38)	(7.34)	(11.44)	(13.44)	(6.50)	(9.21)	(-3.15)	(16.67)	(25.86)	(26.49)
SOEs	-0.059**		-0.032***	0.086	0.021	-0.024	-0.082	0.000	-0.002*	0.080***	0.193***
	(-2.49)		(-5.34)	(1.01)	(1.18)	(-0.84)	(-0.48)	(0.02)	(-1.91)	(16.48)	(9.25)
TFP	0.072***	0.083***	0.024***	0.254***	0.067***	0.087***	0.365***	0.005*	0.013***	0.058***	0.182***
	(12.89)	(8.32)	(17.60)	(20.85)	(18.74)	(13.32)	(10.19)	(1.95)	(52.13)	(52.98)	(60.24)
Marketization	0.072***	0.006	0.000	-0.021	0.105***	0.020***	0.319***	0.004	0.002***	0.028***	-0.005
	(3.82)	(0.62)	(0.05)	(-0.30)	(9.16)	(4.22)	(3.37)	(0.82)	(3.17)	(8.95)	(-0.31)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,247	13,891	69,173	35,391	105,965	38,462	62,137	69,173	956,049	858,796	413,946
Adjusted R2	0.135	0.043	0.087	0.205	0.112	0.082		-0.731	0.063	0.092	0.131
R2	0.135	0.042	0.087	0.205	0.111	0.082		0.008	0.063	0.092	0.131
F-statistic	115.9***	28.69***	67.31***	157.5***	194.1***	151.2***	198.9***	15.73***	354.7***	698.5***	487.0***
Log likelihood							-45399.8				
Left-censored							51,670				

Robust t-statistics in parentheses.*, **, *** significance at 10%, 5% and 1%, respectively. Regressions with R&D intensity (namely, Model 9 and Model 16) are based on the available period of R&D expenditure data (2005-2007).

This study controlled for potential estimation biases in several ways. Frist, we used the number of patents granted (Model 8) and R&D intensity (Model 9) as additional innovation measures respectively. The results obtained in these two robustness checks show that all key results in models 8 and 9 remain qualitatively unchanged, except for the variable export, which is now not statistically significant when it is regressed together with the variable import in Model 8.[18] Second, use of a one-year lag structure mitigates potential endogeneity problems due to time effects. We also applied an initial-year structure (Model 10) and two-year lagged structure[19] (Model 11) to all explanatory variables to ensure robust interpretation of the results. All coefficient estimates were in agreement with those in Table 3, except for the statistically insignificant coefficient of OFDI in Model 11. Third, we used standard linear estimation techniques for the models' estimates. However, our dependent variable, innovation performance, is limited at zero, and a non-negligible proportion of the EMEs had no innovation outcomes during the observation period. We therefore used the Tobit model, which is a common approach to address potentially biased estimates caused by the left-censored data structure (Dong, Kokko & Zhou, 2022). Model 12 reports the Tobit regression results. The main results are similar to

[18] Similar to the treatments for Model 5, for Model 6 (patents) and Model 7 (R&D intensity), we also separately conducted the estimations by excluding export (6a and 7a) and import (6b and 7b) in the models to address potential multicollinearity issue caused by the correlation between import and export. These individual estimations yielded qualitatively similar results to those presented in Model 5.

[19] Adopting a two-year lag structure as one robustness check is under the consideration that the operationalization of using ratios for some main explanatory variables (e.g., NPS) may exhibit smaller time-dependent changes than absolute values.

those from the OLS estimation. For similar reasons, although this study addresses confounding by controlling for firm-level factors that are expected to affect both the international technology learning channels and innovation (such as TFP, an often neglected variable), we further applied the fixed-effects estimator (Model 13). This further addresses possible confounding of the focal relationships by accounting for unobserved heterogeneity among firms that is time-invariant, such as their organizational structure, which may be related to strategic innovation decisions (Wu, Wei & Wang, 2021). The key results concerning the four international learning channels are qualitatively the same as those reported in Model 5. The only exception is the coefficient of IFDI, which is now statistically insignificant. Finally, we expanded the analytical sample by adding all manufacturing firms to assess whether the main results are still valid. The key results (innovation performance measures NPS, patents and R&D intensity are shown in models 13–15, respectively) are qualitatively the same as those reported in Table 3.

A set of supplementary analyses were performed to further check the robustness of the results. First, in order to test whether the effects of variables vary significantly in different time periods, we re-estimated our models using 2011–2014 and 2003–2007 data separately.[20] Second, this study followed Chen, Zhang and Zheng (2017) and used the ratio of import (or export) value to total assets, rather than total sales, as the measure for import (or export) variable. Third, we reconstructed the foreign ownership variable, measured separately by the dummy variable (i.e. a value of 1 for foreign-controlled firms)[21] and by the foreign capital including HMT's capital.[22] Similarly, we re-tested the hypotheses by including the OFDI activities in the HMT or Caribbean tax havens. Fourth, as commonly practiced in econometric analysis, we applied logarithmic transformation to patent count to reduce the skew in this variable. However, this specification might be problematic, as it may create upward bias in patent growth for firms with fewer initial patents (Campbell & Mau, 2021). Accounting for this, we performed an additional estimation with the natural count of this variable. Fifth, considering that R&D intensity can reflect the

[20] Due to the lack of some key variables including NPS, R&D and TFP for the period 2011–2014, the robustness check can only repeat the estimations of Model 8 and Model 15 without TFP. The 2003-2007 data was used condisering the potential impact on innovation and international trade of China's WTO accession in 2001 and the following drastic tariff reduction in 2002 (Liu & Qiu, 2016).

[21] Firms are officially classified as FOEs if the foreign participation is at or above 25% (Deng, et al., 2014).

[22] This is under the consideration that foreign capital from the HMT regions may lead to a significant growth in the manufacturing exports of Mainland China (Anwar & Sun, 2018).

absorptive capacity of a firm and provide the basis for new knowledge generation and the subsequent exploitation (Zahra & Hayton, 2008), it was included in a robustness check as a control variable in Model 5.[23] Sixth, considering potential industry-level spillover effects, demonstration and competition effects, we controlled for the annual average of these four learning channels at the four-digit industry level based on the corresponding measures of each channel, defined as the annual average industrial import intensity, industrial export intensity, industrial IFDI and industrial OFDI, separately. In all cases, the main results obtained are qualitatively similar to those presented in Table 3.[24]

5. Discussion and conclusion

5.1. Theoretical contributions

By integrating the theoretical developments from two complementary literatures on international trade and investment, we investigated the individual and combined impacts of imports, exports, IFDI and OFDI on EMEs' innovation performance. The unified analytical framework thus fills a much-needed research gap in the literature on the spillover effects of different international learning channels on firm innovation. The large-scale dataset used in this study enabled us to distinguish between the effects of hypothesized innovation determinants and to demonstrate their relative contributions to innovation performance. Specifically, our results show that import, export and OFDI are prominent channels for improving EME's innovation performance, while IFDI typically plays a significantly negative role at the firm level. Intrigued by these findings, we further investigated the impact of these channels on the innovation performance of domestic and foreign firms, separately in the supplementary analyses. Our empirical results show that each of these four international learning channels has a significantly positive effect on the innovation performance of domestic firms overall, but for FOEs alone, only IFDI and OFDI have statistically significant effects, which are negative and positive, respectively. In showing that neither international trade nor international investment alone can fully explain variations in

[23] There has been controversy over the correlation between R&D inputs and innovation outputs. Some documented a weak relationship between R&D inputs and innovation outputs such as patents (e.g., Hu & Jefferson, 2009) and some found such relationship is positive (e.g., Liu & Qiu, 2016). Following this debate, this study tested the relationship between firm-level R&D intensity and innovation outputs (patents granted and NPS) and concluded that firms' R&D investment increases their innovation outputs.

[24] The results of all robustness checks are available from the authors upon request.

EMEs' innovation performance, the paper emphasizes the importance of analyzing the different firm-level learning channels in an integrated manner. These findings have several implications for theory development and empirical research pertaining to the determinants of EMEs' innovation performance.

First, by examining the impacts of the four international learning channels on innovation performance in a unified analysis framework, we provide firm-level empirical support for theories emphasizing the importance of integrating international trade and international investment in understanding the determinants of innovation performance (Fu, Hou & Liu, 2018; Gorodnichenko, Svejnar & Terrell, 2020; Liu & Buck, 2007). Instead of treating innovation performance as the result of a single channel as commonly done in previous research, this study combined two prevailing theoretical perspectives and performed integrative empirical testing on the determinants of EMEs' innovation performance, thereby extending prior research by providing a more comprehensive conceptual framework. Modelling innovation performance in this manner is particularly important, as the strategies of introducing and going out in the form of import/IFDI and export/OFDI may complement each other and enable the exploitation of competitive advantages (Howell, Lin & Worack, 2020; Li, Chen & Shapiro, 2010; Wang & Kafouros, 2009), thereby having a joint impact on EMEs' innovation performance.

Second, this paper examined the complex role of IFDI in the form of foreign ownership. Although IFDI-related theories have greatly helped us to advance our understanding of innovation determinants, our empirical results indicate that firm-level IFDI has a significantly negative impact on Chinese high-tech firms' innovation performance in general, which is contradictory to previous work (e.g., Choi, Lee & Williams, 2011; Choi, Park & Hong, 2012; Gorodnichenko, Svejnar & Terrell, 2020). However, this does not necessarily indicate that IFDI is not important for innovation performance. Indeed, the presence of IFDI triggers innovation activities, as evidenced by the positive spillover effects of IFDI on firms' innovation at the regional level. Furthermore, this study attributes the observed negative effect of firm-level IFDI on FOE innovation to market strategies: they mainly innovate in their parent companies or in R&D centers in advanced economies, rather than in China. On this basis, we further demonstrate that IFDI has a significantly positive impact on the subsample of domestic firms as opposed to its negative impact on the subsample of foreign firms. At the same time, we reveal that FOEs' innovation performance is positively related to the technology transfer from their foreign

affiliates. Thus, the analysis echoes the perspective that the traditional theoretical frameworks for investigating the impacts of IFDI on innovation performance can be enhanced by incorporating innovation strategies derived from the level of foreign ownership (Fan & Hu, 2007). This suggests that research on the innovation determinants should consider how foreign ownership affects the causal relationship between firm strategy and innovation performance. More specifically, the results of this study show that the innovation determinants only tend to play a stronger role in domestic firms. This analysis underscores the need for more careful consideration of strategies related to foreign ownership. While the focus here is on how IFDI contributes to innovation, strategic differences associated with IFDI may also lead to differences in performance in other areas of the firm.

Third, this paper adds to the debate on how international trade and OFDI impact innovation performance at the firm level by providing some new evidence that seems to contradict previous empirical results. Given the existing different theoretical predictions about the roles of imports (e.g., De Marchi, Giuliani & Rabellotti, 2018; Grossman & Helpman, 1991) and exports (e.g., Greenaway & Yu, 2004; Melitz, 2003) in innovation, this study shows that imports and exports generally increase innovation performance for both the sample of all EMEs and domestic firms only. At the same time, we find that imports and exports do not contribute to innovation performance gains by FOEs in China. These findings echo the prevailing theoretical view that Chinese firms facilitate technology integration and innovation performance by importing and exporting (Chen, Zhang & Zheng, 2017). More importantly, our findings enrich the debate on the role of foreign ownership in the relationship between international trade and innovation by demonstrating that the expected positive effects of international trade on innovation do not accrue in the subsample of FOEs in China. In addition, we find that OFDI has a significant positive impact on innovation for both domestic firms and FOEs in China, thus not only supporting the mainstream view that undertaking OFDI can boost EMEs' innovation performance (Fu, Hou & Liu, 2018), but also providing new empirical evidence for the notion that intra-MNE technology transfer is the main channel of improving innovation performance of FOEs in China (Xie & Li, 2018).

5.2. Management and policy implications

This study provides a number of implications for managers who want to understand how international technology learning channels can improve their company's innovation. Our

findings indicate that internationalization strategies are central to firms' innovation performance. Furthermore, this study suggests that to establish and maintain a competitive position in the global market, managers of EMEs should not only focus on facilitating existing international technology learning channels and continuously innovating by learning through foreign technologies, competitive products, and customer preferences, but also carefully consider how to successfully shape and utilize strategies and resources related to foreign participation. Although foreign ownership is a traditional international technology learning channel to improve innovation performance, our results shows that not all EMEs can benefit from changes in ownership structure. However, this does not imply that EMEs should pay less attention to IFDI. In fact, technology transfer and advanced managerial expertise are often reflected in foreign participation (Chen, et al., 2014), which is critical to innovation activities. The findings of this study also show that foreign involvement may lead to a further increase of ownership advantages in Chinese domestic firms on the one hand, but on the other, they may reduce the motivation of FOEs in China to improve their innovation performance through their own innovation and market strategies. At the same time, we confirm what seems already apparent to foreign managers: intangible assets and competitive advantages in technology may leak through various internationalization activities, which is true for even transitional-market countries like China.

This study's results generate several implications for policymakers. First, our findings generally show that domestic-owned firms in China have enhanced technological capabilities by attracting foreign capital and engaging in internationalization activities through imports, exports and OFDI. Our evidence supports current government policies that aim to drive technological progress through international sources of technology spillovers. At the same time, our analytical results show that the impact of these four international learning channels on innovation performance is not uniform for all firms in China but depends on the level of foreign presence. This suggests that policymakers should not rely on the simple assumption that international investment and trade are generally beneficial to EMEs; they should pay more attention to the different mechanisms of how different EMEs can benefit from these channels to the greatest extent in order to effectively improve a country's innovation capacity. This recommendation is supported by Li, Chen and Shapiro (2010) and Fu, Hou and Liu (2018) showing that international trade and investment have complementary effects on domestic firms, but not on foreign firms. Second, policymakers should notice the complexity of the effect of IFDI on innovation at different levels. At the regional level, this paper shows that the presence of foreign competitors and capital does

positively impact the host country's economy through regional knowledge spillovers. At the firm level, IFDI in the form of foreign ownership indeed positively impact the innovation performance of domestic firms overall, but not FOEs in China. This implies that FOEs in China may be inclined to choose their home country or other advanced economies instead of China for R&D activities. Therefore, the Chinese high-tech industry may respond to policies that encourage FMNCs to introduce cutting-edge technologies and establish more R&D centers in China. Third, in addition to IFDI, China's economic policymakers should also notice the different impacts of the other three channels on indigenous- and foreign-owned firms. In many EEs including China, sectors and firms with a higher level of foreign presence usually receive more R&D subsidies from government agencies (Wang & Kafouros, 2009). Although FOEs in China are clearly leading in many high-technology sectors, in most manufacturing industries, domestic firms were found to be driving industrial technology upgrading (Fu & Gong, 2011). In this regard, this paper suggests that policymakers should increase their support to domestic firms to carry out internationalization activities and to improve their technological capabilities. At the same time, policymakers should strengthen IPR protection, encourage FOEs to engage in R&D in China and commercialize their innovation outcomes to increase investment return in these firms.

5.3. Limitations and future research

Among the limitations to this study, some provide future research avenues. First, the sample used in this study is limited to firms located in China. It would be interesting to apply this unified analytical framework to other EEs, such as India and Brazil, to examine whether the findings and conclusions are still valid. This could shed light on whether the effectiveness of external technology learning channels is dependent on the host country's local institutional and economic environment. Second, in the absence of proper IV-based evidence, his paper does not make a strong statement about causal inference. It may be that the global technology search strategy (to a certain extent) motivates EMEs to conduct various internationalization activities, or it may be that EMEs with technological advantages are more inclined to internationalize and maximize their global returns (Deng, Yan & Van Essen, 2018), which in turn promote innovation. Besides, innovative firms may have inherently better quality in many aspects (such as management, routines and innovative culture) that may contribute to innovation, and international technology transfer may also occur through channels like scientific collaboration and migration. This indicates that this study may be affected by unconsidered variables, whose identification and operationalization may better help explain the differences in firms' internationalization strategies

and innovation performance. Under these circumstances, IV estimation would be a good way to address the endogeneity problem. Therefore, better identifying the precise direction of causality and the strength of each direction would be an interesting direction for future research.

Appendix

Table A1

Overview of selected firm-level empirical studies on the effects of international learning channels on EMEs' innovation performance

	Study	Sample	International technology learning channels and measures	Innovation measures	Other channels if considered (controlled)	Key findings on the effects of global interaction on innovation
1	Lu and Ng (2012)	Chinese firms	IIS	IP_dummy	FO	•IIS: Positive •FO: Insignificant
2	Chen, Zhang and Zheng (2017)	Chinese firms	IIS, IIA	RDS; RDA; R&D_dummy	EIS, EIA	•IIS & IIA: Positive on RDS & RDA •IIS & IIA: Insignificant on R&D_dummy •EIS & EIA: Positive on RDS & RDA •EIS & EIA: Insignificant on R&D_dummy
3	Chittoor, Aulakh and Ray (2015)	Indian firms	ICDK	RDS	ES	•ICDK: Positive •ES: Positive
4	Xie and Li (2018)	Chinese firms	EI	NPS	FO	•EI: Positive •FO:Negative
5	Li, Chen and Shapiro (2010)	Chinese firms	EI_industry	NPS_share	FO_ industry	•EI_industry: Positive •FO_ industry: Positive
6	Genc, Dayan and Genc (2019)	United Arab Emirates firms	DoI	Patents granted	No	DoI: Insignificant
7	Pradhan (2011)	Indian firms	EI	RDS	FO_dummy; Import_industry	•EI: Positive •FO_dummy: Positive •Import_industry: Positive
8	Gong and Hanley (2021)	Chinese firms	EI	NPS_ dummy; R&D_dummy	No	EI: Positive on NPS_ dummy & R&D_dummy
9	Gorodnichenko, Svejnar and Terrell (2020)	Firms in eighteen emerging market economies	EI	Dummy variable based on a set of questions,	IIS; FO_dummy	•EI: Positive •IIS: Positive •FO_dummy: Positive
10	Fan and Hu (2007)	Chinese firms	FO	RD RDS RDE	No	•FO: Negative
11	Kathuria (2008)	India firms	FO			•FO: Negative
12	Girma, Gong and Görg (2008)	Chinese firms	FO	NPS_share; RDS	EIS	•FO: Positive
13	Choi, Lee and Williams (2011)	Chinese firms	FO	Patents granted	No	•FO: Positive
14	Fu and Gong (2011)	Chinese firms	FO	Technical change	ES	•FO: Positive •ES: Insignificant
15	Choi, Park and Hong (2012)	Korean firms	FO	Patents granted	No	•FO: Positive
16	Howell, Lin and Worack (2020)	Chinese firms	OFDI_ dummy	RDS, Patents granted, Patents applications, Patents citations	No	OFDI_ dummy: Positive
17	Piperopoulos, Wu and Wang (2018)	Chinese firms	OFDI	PC	No	OFDI: Positive
18	Fu, Hou and Liu (2018)	Chinese firms	OFDI_ dummy	NPS_share	EIS	•OFDI_ dummy: Positive

	•EIS: Positive

Notes on variable names:
- IP_dummy: Innovation propensity = 1 if a firm innovates in processes;
- NPS: New product sales = ln (1 + the value of new product output);
- NPS_share: The share of new product sales in total sales = (New production sales)/Sales;
- RD: R&D expenditure = ln(R&D expenditure);
- RDS: R&D intensity in terms of sales = (R&D expenditure)/Sales;
- RDA: R&D intensity in terms of assets = (R&D expenditure)/Assets;
- RDE: R&D intensity in terms of employment = R&D expenditure per employee;
- R&D_dummy = 1 if a firm has R&D expenditure;
- PC: The number of forward invention patent citations a subsidiary has received;
- Technical change: Shift in technology between the two periods (Please refer to the paper for details on the concept of "technical change")
- IIS: Import intensity in terms of sales = Import/Sales;
- IIA: Import intensity in terms of assets = Import/Assets;
- Import_industry: Import competition = industry production + industry imports – industry exports;
- ICDK: Technology imports = ln(total annual foreign exchange spending on capital goods and know-how);
- DoI: Degree of Internationalization (subjective measures);
- EI_industry=the ratio of a firm's export value to its total output value normalized by the same ratio for the industry to which the firm belongs;
- EIS: Export intensity in terms of sales = Export/Sales;
- EIA: Export intensity in terms of assets = Export/Assets;
- ES: Export sales = ln(export sales);
- FO: The share of foreign capital in total capital;
- FO_ industry: Foreign equity in an industry divided by the total equity in the industry;
- FO_ dummy: FO=1 if firm has foreign affiliation or foreign capital;
- OFDI: The ratio of total value of OFDI to total investment;
- OFDI_ dummy: international investors = 1 if a firm has OFDI investment.

Systematic Literature Review Methodology

To comprehensively search for, evaluate and summarize the current literature on the relationship between international learning channels and innovation in developing countries, this study followed systematic literature review methodology (Tranfield, Denyer & Smart, 2003) and searched relevant articles through the widely used database Web of Science (WOS) (Wu, Wei & Wang, 2021). Specifically, this study performed a separate systematic literature search for the impact of each of the four international learning channels on innovation. For the import–innovation relationship, a combination of four topic terms “import”, “firm”, “innovation” and “emerging country” were used.[25] In addition, we only included search entries that are articles (document type) and have been published (open access type). The publication date was set to the period of 2000-01-01 to 2022-01-01. English language was also used as a filter. The same search strategy was applied to the other three channels by replacing the topic term of “import” with “export”, “outward foreign direct investment” and “inward foreign direct investment” for the export–, OFDI–, and IFDI–innovation relationships, respectively. This resulted in 9 articles related to the import-innovation relationship, 42 articles related to the export-innovation

[25] To retrieve as many relevant articles as possible, alternative terms were used for each topic term where applicable. For instance, for innovation, alternative terms of “innovation performance”, “patent”, “R&D” and “research and development” were used. For “emerging country”, alternative terms of “emerging economy” or “emerging market” or “developing country” were used. In addition, wildcards ***$*** and ***** were used to cover singular and plural forms (e.g. “import$” include both “import” and “imports”).

relationship, 43 articles related to the IFDI-innovation relationship and 16 articles related to the Outward OFDI-innovation relationship. We then manually filtered the articles by reading the abstract (or main text in some cases) to ensure that the articles meet all following criteria: (1) the sample analysed is primarily at firm-level and based on developing or emerging countries; (2) the study mainly analyses the impact of at least one of the four international learning channels (namely, import, export, IFDI or OFDI) on firm innovation; and (3) the study is quantitative and empirical in nature. Furthermore, we included articles based on prior knowledge or from the reference list that are legit but did not appear in the search results. This resulted in a total of 18 articles that have been published in reputable journals to be included in the final literature review process. Table A1 presents the overview of findings. Out of the 18 articles, 9 consider international trade and investment simultaneously as the explanatory variables or control variables. A total of 12 articles focus on China.

References

1. Aharoni, Y. (2018). The Evolution of State-Owned Multinational Enterprise Theory. In A. Cuervo-Cazurra (Ed.), State-Owned Multinationals: Governments in Global Business (pp. 9-44). Cham: Springer International Publishing.
2. Amiti, M., Itskhoki, O., & Konings, J. (2014). Importers, exporters, and exchange rate disconnect. American Economic Review, 104, 1942-1978.
3. Anwar, S., & Sun, S. (2018). Foreign direct investment and export quality upgrading in China's manufacturing sector. International Review of Economics & Finance, 54, 289-298.
4. Bai, X., Krishna, K., & Ma, H. (2017). How you export matters: Export mode, learning and productivity in China. Journal of International Economics, 104, 122-137.
5. Blalock, G., & Gertler, P. J. (2004). Learning from exporting revisited in a less developed setting. Journal of Development Economics, 75, 397-416.
6. Boeing, P. (2016). The allocation and effectiveness of China's R&D subsidies-Evidence from listed firms. Research Policy, 45, 1774-1789.
7. Boeing, P., & Mueller, E. (2019). Measuring China's patent quality: Development and validation of ISR indices. China Economic Review, 57, 101331.
8. Buckley, P. J., Clegg, J., & Wang, C. (2007). Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. Journal of International Business Studies, 38, 447-459.
9. Cai, H., & Liu, Q. (2009). Competition and corporate tax avoidance: Evidence from Chinese industrial firms. The Economic Journal, 119, 764-795.
10. Campbell, D. L., & Mau, K. (2021). On "Trade Induced Technical Change: The Impact of Chinese Imports on Innovation, IT, and Productivity". The Review of Economic Studies, 88, 2555-2559.
11. Castellani, D., Jimenez, A., & Zanfei, A. (2013). How remote are R&D labs? Distance factors and international innovative activities. Journal of International Business Studies, 44, 649-675.
12. Chang, S.-J., Chung, C.-N., & Mahmood, I. P. (2006). When and how does business group affiliation promote firm innovation? A tale of two emerging economies. Organization science, 17, 637-656.

13. Chen, C.-J., Lin, B.-W., Lin, Y.-H., & Hsiao, Y.-C. (2016). Ownership structure, independent board members and innovation performance: A contingency perspective. Journal of Business Research, 69, 3371-3379.

14. Chen, J., Zhan, W., Tong, Z., & Kumar, V. (2020). The effect of inward FDI on outward FDI over time in China: A contingent and dynamic perspective. International Business Review, 29, 101734.

15. Chen, V. Z., Li, J., Shapiro, D. M., & Zhang, X. (2014). Ownership structure and innovation: An emerging market perspective. Asia Pacific Journal of Management, 31, 1-24.

16. Chen, Z., Zhang, J., & Zheng, W. (2017). Import and innovation: Evidence from Chinese firms. European Economic Review, 94, 205-220.

17. Chittoor, R., Aulakh, P. S., & Ray, S. (2015). Accumulative and assimilative learning, institutional infrastructure, and innovation orientation of developing economy firms. Global Strategy Journal, 5, 133-153.

18. Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. Research Policy, 40, 441-452.

19. Choi, S. B., Park, B. I., & Hong, P. (2012). Does ownership structure matter for firm technological innovation performance? The case of Korean firms. Corporate Governance: An International Review, 20, 267-288.

20. Coe, D. T., & Helpman, E. (1995). International r&d spillovers. European Economic Review, 39, 859-887.

21. Contractor, F. J., Kumar, V., & Kundu, S. K. (2007). Nature of the relationship between international expansion and performance: The case of emerging market firms. Journal of World Business, 42, 401-417.

22. De Marchi, V., Giuliani, E., & Rabellotti, R. (2018). Do global value chains offer developing countries learning and innovation opportunities? The European Journal of Development Research, 30, 389-407.

23. Deng, P. (2009). Why do Chinese firms tend to acquire strategic assets in international expansion? Journal of World Business, 44, 74-84.

24. Deng, Z., Guo, H., Zhang, W., & Wang, C. (2014). Innovation and survival of exporters: A contingency perspective. International Business Review, 23, 396-406.

25. Deng, Z., Yan, J., & Van Essen, M. (2018). Heterogeneity of political connections and outward foreign direct investment. International Business Review, 27, 893-903.

26. Dominguez Lacasa, I., Jindra, B., Radosevic, S., & Shubbak, M. (2019). Paths of technology upgrading in the BRICS economies. Research Policy, 48, 262-280.

27. Dong, G., Kokko, A., & Zhou, H. (2022). Innovation and export performance of emerging market enterprises: The roles of state and foreign ownership in China. International Business Review, 102025.

28. Douma, S., George, R., & Kabir, R. (2006). Foreign and domestic ownership, business groups, and firm performance: Evidence from a large emerging market. Strategic Management Journal, 27, 637-657.

29. Fan, C. S., & Hu, Y. (2007). Foreign direct investment and indigenous technological efforts: Evidence from China. Economics Letters, 96, 253-258.

30. Fan, G., Wang, X., & Zhu, H. (2011). NERI index of marketization of China's provinces 2011 report. Beijing: National Economic Research Institute.

31. Feng, L., Li, Z., & Swenson, D. L. (2016). The connection between imported intermediate inputs and exports: Evidence from Chinese firms. Journal of International Economics, 101, 86-101.

32. Fu, X. (2008). Foreign direct investment, absorptive capacity and regional innovation capabilities: evidence from China. Oxford Development Studies, 36, 89-110.

33. Fu, X., & Gong, Y. (2011). Indigenous and foreign innovation efforts and drivers of technological upgrading: evidence from China. World Development, 39, 1213-1225.

34. Fu, X., Hou, J., & Liu, X. (2018). Unpacking the relationship between outward direct investment and innovation performance: evidence from Chinese firms. World Development, 102, 111-123.

35. Genc, E., Dayan, M., & Genc, O. F. (2019). The impact of SME internationalization on innovation: The mediating role of market and entrepreneurial orientation. Industrial Marketing Management, 82, 253-264.

36. Girma, S., Gong, Y., & Görg, H. (2008). Foreign direct investment, access to finance, and innovation activity in Chinese enterprises. The World Bank Economic Review, 22, 367-382.

37. Gong, Y., & Hanley, A. (2021). Exports and New Products in China–A Generalised Propensity Score Approach with Firm-to-Firm Spillovers. The Journal of Development Studies, 57, 2136-2155.

38. Gorodnichenko, Y., Svejnar, J., & Terrell, K. (2020). Do foreign investment and trade spur innovation? European Economic Review, 121, 103343.

39. Greenaway, D., & Yu, Z. (2004). Firm-level interactions between exporting and productivity: Industry-specific evidence. Review of World Economics, 140, 376.

40. Grosse, R., & Fonseca, A. (2012). Learning through imports in the internationalization process. Journal of International Management, 18, 366-378.

41. Grossman, G. M., & Helpman, E. (1991). Innovation and growth in the global economy: MIT press.

42. Gubbi, S. R., & Elango, B. (2016). Resource deepening vs. resource extension: Impact on asset-seeking acquisition performance. Management International Review, 56, 353-384.

43. Halpern, L., Koren, M., & Szeidl, A. (2015). Imported inputs and productivity. American Economic Review, 105, 3660-3703.

44. Hong, J., Wang, C., & Kafouros, M. (2015). The role of the state in explaining the internationalization of emerging market enterprises. British Journal of Management, 26, 45-62.

45. Howell, A., Lin, J., & Worack, S. (2020). Going out to innovate more at home: Impacts of outward direct investments on Chinese firms' domestic innovation performance. China Economic Review, 60, 101404.

46. Hu, A. G., & Jefferson, G. H. (2009). A great wall of patents: What is behind China's recent patent explosion? Journal of Development Economics, 90, 57-68.

47. Judge, G. G., Hill, R. C., Griffiths, W. E., Lutkepohl, H., & Lee, T.-C. (1982). Introduction to the Theory and Practice of Econometrics. In: New York: Wiley.

48. Kafouros, M., Wang, C., Piperopoulos, P., & Zhang, M. (2015). Academic collaborations and firm innovation performance in China: The role of region-specific institutions. Research Policy, 44, 803-817.

49. Kathuria, V. (2008). The impact of FDI inflows on R&D investment by medium-and high-tech firms in India in the post-reform period. Transnational Corporations, 17, 45.

50. Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. Strategic Management Journal, 27, 131-150.

51. Li, J., Chen, D., & Shapiro, D. M. (2010). Product innovations in emerging economies: The role of foreign knowledge access channels and internal efforts in Chinese firms. Management and Organization Review, 6, 243-266.

52. Liu, Q., & Qiu, L. D. (2016). Intermediate input imports and innovations: Evidence from Chinese

firms' patent filings. Journal of International Economics, 103, 166-183.

53. Liu, X., & Buck, T. (2007). Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. Research Policy, 36, 355-366.
54. Liu, X., & Zou, H. (2008). The impact of greenfield FDI and mergers and acquisitions on innovation in Chinese high-tech industries. Journal of World Business, 43, 352-364.
55. Lu, Y., & Ng, T. (2012). Do imports spur incremental innovation in the South? China Economic Review, 23, 819-832.
56. Luo, Y., & Tung, R. L. (2018). A general theory of springboard MNEs. Journal of International Business Studies, 49, 129-152.
57. MacGarvie, M. (2006). Do firms learn from international trade? Review of Economics and Statistics, 88, 46-60.
58. Mathews, J. A. (2006). Dragon multinationals: New players in 21 st century globalization. Asia Pacific Journal of Management, 23, 5-27.
59. Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica, 71, 1695-1725.
60. Pietrobelli, C., & Rabellotti, R. (2011). Global value chains meet innovation systems: are there learning opportunities for developing countries? World Development, 39, 1261-1269.
61. Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, location choices and innovation performance of emerging market enterprises. Research Policy, 47, 232-240.
62. Pradhan, J. P. (2011). R&D strategy of small and medium enterprises in India. Science, Technology and Society, 16, 373-395.
63. Puck, J. F., Holtbrügge, D., & Mohr, A. T. (2009). Beyond entry mode choice: Explaining the conversion of joint ventures into wholly owned subsidiaries in the People's Republic of China. Journal of International Business Studies, 40, 388-404.
64. Radosevic, S., & Yoruk, E. (2018). Technology upgrading of middle income economies: A new approach and results. Technological Forecasting and Social Change, 129, 56-75.
65. Ryan, T. (1997). Modern Regression Method, John Willey & Sons. Inc. New York.
66. Salomon, R. M., & Shaver, J. M. (2005). Learning by exporting: new insights from examining firm innovation. Journal of Economics & Management Strategy, 14, 431-460.
67. Tang, R. W. (2019). FDI expansion speed of state-owned enterprises and the moderating role of market capitalism: Evidence from China. International Business Review, 28, 101596.
68. Teng, D., Li, C., & Tanna, S. (2021). Foreign ownership and productivity in Chinese newly listed firms: the moderating roles of founder's human capital and social ties. Asia Pacific Journal of Management, 1-35.
69. Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. British Journal of Management, 14, 207-222.
70. Un, C. A., & Cuervo-Cazurra, A. (2008). Do subsidiaries of foreign MNEs invest more in R&D than domestic firms? Research Policy, 37, 1812-1828.
71. Wang, C., Hong, J., Kafouros, M., & Boateng, A. (2012). What drives outward FDI of Chinese firms? Testing the explanatory power of three theoretical frameworks. International Business Review, 21, 425-438.
72. Wang, C., & Kafouros, M. I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. International Business Review, 18, 606-616.

73. White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817-838.

74. Wu, L., Wei, Y., & Wang, C. (2021). Disentangling the effects of business groups in the innovation-export relationship. Research Policy, 50, 104093.

75. Wunsch-Vincent, S., Kashcheeva, M., & Zhou, H. (2015). International patenting by Chinese residents: Constructing a database of Chinese foreign-oriented patent families. China Economic Review, 36, 198-219.

76. Xia, J., Ma, X., Lu, J. W., & Yiu, D. W. (2014). Outward foreign direct investment by emerging market firms: A resource dependence logic. Strategic Management Journal, 35, 1343-1363.

77. Xie, Z., & Li, J. (2018). Exporting and innovating among emerging market firms: The moderating role of institutional development. Journal of International Business Studies, 49, 222-245.

78. Yi, J., Wang, C., & Kafouros, M. (2013). The effects of innovative capabilities on exporting: Do institutional forces matter? International Business Review, 22, 392-406.

79. Zahra, S. A., & Hayton, J. C. (2008). The effect of international venturing on firm performance: The moderating influence of absorptive capacity. Journal of business venturing, 23, 195-220.

Chapter 2

Innovation and export performance of emerging market enterprises: The roles of state and foreign ownership in China

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Innovation and export performance of emerging market enterprises: The roles of state and foreign ownership in China

Abstract: This paper examines the role of ownership for the relationship between innovation and exports. Analyzing a large firm-level data set on Chinese manufacturing firms during 2000-2007, we find that state ownership has a positive moderating effect on the innovation–export relationship. We ascribe this effect to state-owned firms' privileged access to complementary resources and networks that strengthen their ability to use innovation to generate exports. In contrast to many earlier studies, we also find that foreign ownership has a negative moderating effect. One likely reason is that indicators of local innovation do not reflect the flows of knowledge between foreign-owned firms and their parent companies. This finding highlights the fact that innovation and production may be geographically separated within multinational enterprises. A policy implication of the analysis is that public support to innovation is likely to have stronger effects on exports when it targets firms that carry out most of their activities in domestic market.

Keywords: Innovation; export performance; state ownership; foreign ownership; China

1. Introduction

With increasing globalization and more intense international competition, analysts and policymakers across the world are advocating technological innovation to enhance the export competitiveness of their firms. The argument is that innovative exporters are more likely to succeed because innovation helps reduce production costs and raise productivity, or that it contributes to the development of new products and services with unique characteristics or higher quality (Yi, Wang & Kafouros, 2013). The empirical literature on the impact of innovation on export performance largely supports this view (Ayllón & Radicic, 2019; Cassiman & Golovko, 2011; Silva, Styles & Lages, 2017).

Most studies on the innovation-export nexus focus on developed economies, where many firms have accumulated strong innovative capabilities and intangible assets in the form of proprietary technologies and well recognized trademarks and brand names. The determinants of exports in developing and emerging markets, where fewer firms possess these types of valuable assets, have not been studied equally thoroughly (Chen, Patton & Kenney, 2016; İpek, 2018; Singh, 2009).

Yet, despite their relatively weak resource bases at home, emerging market enterprises (EMEs) have been remarkably successful in international markets in recent years, challenging "the conventional views on the weak competitiveness of EMEs" (Jormanainen & Koveshnikov, 2012; Wu, Wei & Wang, 2021).

Developing and emerging markets are also characterized by a higher degree of firm heterogeneity associated with differences in ownership and institutional settings. For example, foreign investors account for a large share of investment and trade in many export-oriented emerging economies. At the same time, governments play a more important role than in most developed economies through extensive state ownership of enterprises (Wang, et al., 2012; Yi, Wang & Kafouros, 2013). There is a growing body of literature studying the differences in innovation performance between state-owned enterprises (SOEs) and foreign-owned enterprises (FOEs) (Choi, Lee & Williams, 2011; Jiang, Waller & Cai, 2013; Walheer & He, 2020). Recent research on export performance in emerging countries, however, tends to focus on firm-specific characteristics, including innovation capability (Oura, Zilber & Lopes, 2016; Véganzonès-Varoudakis & Plane, 2019), largely neglecting the role of ownership differences (e.g., Chakrabarti & Mondal, 2017; Rialp-Criado & Komochkova, 2017; Wu, Wei & Wang, 2021). We contend that the findings from this literature only provide a partial understanding of the relationship between innovation and export performance in emerging markets, as it is implicitly assumed that all exporters operate in the same ownership context. The purpose of this article is therefore to investigate whether and how state ownership and foreign ownership moderate the relationship between innovation and exports.

Using a detailed dataset of large Chinese manufacturing firms during the period 2000–2007, we develop and test theory-driven hypotheses regarding the impact of state ownership and foreign ownership on the link between innovation and export performance. After controlling for a series of firm, location, and industry-specific factors, we test the hypotheses using various econometric methods including instrumental variable two-stage least square (2SLS) estimations and Tobit models. We also re-estimate a version of the model on data for 2011-2014. Our analysis shows that ownership constitutes a key factor for understanding the role of innovation in shaping the export performance of Chinese firms.

The contributions of our research are threefold. First, we add to the debate on how ownership impacts the relationship between innovation and exports by providing some new evidence that

partly contradicts existing findings (e.g., Yi, Wang & Kafouros, 2013). In light of divergent theoretical predictions on the role of state ownership in innovation and internationalization (Cuervo-Cazurra & Li, 2021; Hong, Wang & Kafouros, 2015; Ramamurti, 2001; Yi, et al., 2017), we show that state ownership can have a positive moderating effect on the innovation–export relationship. At the same time, and more importantly, we find that foreign ownership has exerted a negative moderating impact on the innovation–export relationship in the Chinese context. The main reason for this seemingly puzzling finding is probably that existing indicators of local innovation in FOEs are not very useful proxies for the innovation capabilities available to these enterprises. It is also likely that technology transfer requirements have had a disproportionate effect on formal innovation activities in local market-oriented FOEs. Second, we contribute to the literature on the innovation–export relationship with evidence from a leading emerging economy, drawing on a larger sample covering a longer period than in earlier studies. As the largest exporter and nowadays also a leading R&D investor, China aims to enhance its international competitiveness via innovation (Wu, Wei & Wang, 2021). However, surprisingly few earlier studies have examined innovation–export linkages in China. Third, our research findings are of interest to policymakers and other practitioners who are concerned about innovation and export competitiveness. We find that firms with higher state ownership tend to be more efficient in using their innovative capabilities to generate exports success, presumably because of the various advantages of being part of the government network. At the same time, it seems that foreign ownership exerts a negative moderating effect on the innovation-export relationship. Taken together, this suggests that efforts to raise the innovative capabilities of SOEs may have stronger positive marginal effects than corresponding investments in FOEs. More broadly, in view of the prevalence of state ownership and foreign ownership across the world, we expect the findings for China to be of relevance also for other emerging economies. The rest of the article is organized as follows. Section 2 presents the theoretical framework and out hypotheses. Section 3 discusses data and methodology. Section 4 presents the econometric results and robustness checks. Section 5 discusses conclusions and policy implications.

2. Theoretical background and hypotheses

2.1. Innovation and exports

The internationalization and increasing outward orientation of emerging economies has opened up new growth opportunities for export-oriented enterprises – the size of the national economy

and the purchasing power of local consumers no longer restrict the growth potential of dynamic firms. However, exporting is a more difficult and demanding activity than selling to local customers in the home country. To successfully enter a foreign market, the exporter needs to learn about consumer preferences, rules and regulations (including product standards), distribution networks, competition, and other conditions in that specific market. It is costly to acquire the relevant information and to translate this knowledge into an export strategy for products and services that are tailored to the conditions in the destination market. In other words, there are various barriers to exporting that translate into higher transaction costs for firms that decide to become exporters (Kahiya, 2018).

A large share of these export costs is fixed and does not vary with the firm's export volume (Bernard & Jensen, 2004; Bernard & Wagner, 2001; Das, Roberts & Tybout, 2007; Roberts & Tybout, 1997). The successful exporters are therefore often found among the largest and strongest firms in the industry, and the observation that firm productivity and exports are highly correlated has become a stylized fact in the international trade literature (Aw, Chung & Roberts, 2000; Bernard & Jensen, 1999; Clerides, Lach & Tybout, 1998). Drawing on models of international trade under monopolistic competition (Krugman, 1979, 1980) and models of heterogeneous firms and industry dynamics (Hopenhayn, 1992a, 1992b), Melitz (2003) developed a productivity ladder model providing a consistent theoretical explanation for this link between productivity and exports. When trade possibilities are established, the most productive firms become exporters, since they are the only ones that can still generate positive profits from exports after covering all export-related costs. The least productive firms are forced to leave the market as competition from productive foreign firms increases, and firms with intermediate productivity self-select to serve only the domestic market.

In the international business field, the resource-based view (RBV) provides a framework that is consistent with the Melitz (2003) model. The RBV has identified many of the specific resources and capabilities that contribute to productivity and export success (İpek, 2018; Peng, 2001; Singh, 2009). In particular, it has been argued that differences in the export competitiveness of firms are partly explained by differences in their innovative capabilities and their ability to accumulate and combine resources (Chabowski, et al., 2018; Rodríguez & Rodríguez, 2005; Yi, Wang & Kafouros, 2013). Innovation does not only contribute to higher productivity, but innovative capabilities are also essential for adjusting products and services to the preferences and requirements of foreign customers (Deng, et al., 2014), and for responding to technological

changes and environmental uncertainty (Golovko & Valentini, 2011). Over time, more innovative firms will be able to take advantage of technological progress and improve their processes and products, climbing a "quality ladder" that shifts their export demand curve outwards (Roper & Love, 2002).

Empirical studies focusing on developed economies have documented the positive impact of innovation on exports (Azar & Ciabuschi, 2017; Caldera, 2010; Filipescu, et al., 2013; Golovko & Valentini, 2011). The literature on the relationship between innovation and exports in emerging and developing economies is not as extensive as that on developed countries, and the results are somewhat mixed. Some studies focusing on China conclude that firm-level R&D investment does not contribute to export success (Deng, et al., 2014; Rialp-Criado & Komochkova, 2017; Yuan, et al., 2015), but most authors find a positive impact of innovation on exports. Appendix Table A1 provides a summary of these and some other prominent contributions to this debate. One possible reason for the contradictory results regarding China could be that its comparative advantages during the first decades of economic reform and export growth were primarily found in the more labor-intensive and less sophisticated end of the product spectrum. Few exporters had high innovative capabilities – or rather, few exporters had registered any patent applications, R&D expenditures, or other measurable indicators of innovation. Over time, policy support has allowed many Chinese firms to upgrade their innovative capabilities and their positions in global value chains, and China had become the largest exporter of high-tech products already by 2006 (WorldBank, 2008). This catching-up process probably contributed to a stronger relationship between various measures of innovation and export performance. After the onset of the Global Financial Crisis in 2008, Chinese government policies – including innovation and R&D policies – began to shift from promoting exports to stimulating domestic demand and industrial technology upgrading (Yi, Wang & Kafouros, 2013). The policy shift has seemingly not affected China's export competitiveness, but the focus on domestic technology upgrading may have helped the leading local market-oriented enterprises become more similar to exporters in terms of innovative capabilities. Hence, the link between innovation and exports may have varied over time.

An alternative reason for the somewhat mixed picture for China is that few of the studies focusing on the innovation-export nexus control for how firm ownership may impact this relationship, as shown in Appendix Table A1. Yet, state ownership and foreign ownership are likely to have direct as well as indirect effects on the export behavior of firms. We suggest that the direct effects

are primarily related to the objectives of the owners (controlling for other firm-level export determinants). State ownership may be linked to various political objectives beyond profit maximization, which may either result in higher exports (if exporting is considered a desirable target) or lower exports (if domestic objectives, such as employment or technology upgrading, are stronger priorities). Similarly, FOEs may be more or less export-oriented depending on the strategies and investment motives of their foreign owners. The moderating effects of ownership are linked to the networks and complementary assets of the owner, as well as the effects of ownership on enterprise governance. In both cases, the question is to what extent ownership moderates the relationship between firm-level innovation and exports. Both SOEs and FOEs may have privileged access to information and support from their owners and other linked parties, which is likely to strengthen their possibilities to generate export success out of any given volume of innovation-related resources. In addition, if ownership has an influence on enterprise governance, it is likely to have an impact on how effectively the firm uses its resources. For example, a commonly held argument is that SOEs tend to be less efficient than privately-owned firms because of the lack of active owners who monitor the operations of the enterprise – this weakness could have an impact on the ability to use innovation for exports (Filatotchev, Stephan & Jindra, 2008; Liu, Xiao & Huang, 2008).

Although few of the references cited in Appendix Table A1 focus on the impact of ownership, other studies provide useful insights. The following sections draw on the literature on the effects of state and foreign ownership on exports to define our hypotheses for the empirical part of the paper.[26]

2.2. The role of state ownership

State ownership may have a direct impact on firms' export performance by encouraging or discouraging exports. The case of China, where government plays a leading role for economic development, provides many examples. The Chinese government's policy incentives for exporting (such as export tax rebates and export subsidies) illustrate clear public policy preferences that may translate into strong firm-level motives for exporting (Yi, Wang & Kafouros, 2013). Although these types of policy incentives also impact private firms, they may

[26] It should be noted that other ownership categories are also likely to have an impact on firm behavior. For example, Fang, et al. (2021) show that family ownership may have a negative moderating effect on the innovation-export relationship.

have a stronger effect on SOEs – the performance of SOE managers in countries like China is assessed not only against profit expectations, but also with reference to how well they have met policy-related targets (Brødsgaard, 2012; Hong, Wang & Kafouros, 2015). However, the government's primary interest is not always export success. In some sectors or geographical locations, priorities may be more political than commercial, such as maintaining employment levels or controlling strategic assets. As crucial executors of state policy and strategy, SOEs (and in particular wholly state-owned enterprises) are responsible for implementing bureaucratically mandated policies and plans that aim to achieve goals and objectives related to social concerns and needs (Ramamurti, 2001). These responsibilities and objectives may reduce both the inclination and the ability of SOEs to focus on exports.

It is difficult to predict on theoretical grounds what the balance between these contradictory forces will be, and it is likely that there are differences both between countries and industries, as well as over time (for a similar argument related to the internationalization of SOEs through FDI, see Cuervo-Cazurra & Li, 2021). Several empirical studies using different measures of export performance have recently examined the impact of state ownership in China and found a predominately negative direct effect on exports. For example, Wu and Zhao (2015) and Yi and Wang (2012) argue that although governments in general control critical resources, the excessive control of the state and its non-economic objectives tend to weaken the export performance of SOEs. Zhang, et al. (2018), by contrast, record a positive direct effect of state ownership but do not discuss this specific finding in detail.

The moderating effects of state ownership are related to how much a given amount of innovation inputs (or outputs) contributes to exports. These effects can be positive as well as negative. State ownership has often been associated with weak governance, resulting in soft budget constraints, poor financial performance and higher levels of corruption (Connelly, et al., 2010). If that is indeed the case, it will tend to harm the efficiency of investment in general and reduce the expected positive effect of innovation on exports. On the other hand, SOEs are likely to benefit from complementary assets and networks related to the public sector. Firms with state ownership often have preferential access to government-controlled intangible resources, including the R&D results of government-funded research institutes and imports of advanced technology from foreign countries (Choi, Lee & Williams, 2011). This access provides opportunities to add a range of new valuable complementary elements to the firm's own technological resource base,

thereby increasing the likelihood of commercial success in international markets. Similar advantages may apply to the services of various public institutions involved in trade promotion and export support, trade financing, insurance, and shipping. Hence, formal links to the government may help a firm secure legitimacy and privileged market access, obtain critical resources, and enhance innovative capabilities for increased export competitiveness. Given the strong emphasis on internationalization in China's economic development strategy (Fu, Hou & Sanfilippo, 2017), we believe that the positive effects outweigh the negative impact of weak governance. This is consistent with the findings from Yi, Wang and Kafouros (2013) , which, to our knowledge, is the first and only previous study to examine the moderating effect of state ownership on the innovation-export relationship using a large survey data set of Chinese firms between 2005-2007 (see summary in Table A2). This motivates our first hypothesis for the empirical part of the paper:

Hypothesis 1. The effects of innovative capabilities on export performance will be stronger for Chinese firms with a higher level of state ownership than for those with a lower level of state ownership.

2.3. The role of foreign ownership

Foreign investment has played an important role in the transition towards stronger outward-orientation in many emerging economies, and has been particularly important for export development. At the firm level, studies have often identified a direct link between inward foreign direct investment (FDI) and exports, as foreign investors have direct access to information about foreign markets and marketing networks as well as managerial, entrepreneurial, and financial resources to facilitate exports (Krammer, Strange & Lashitew, 2018; Luo & Tung, 2007; Wang, et al., 2007). However, it should be noted that not all FDI projects are intended to generate exports. Dunning and Lundan (2008) distinguish between resource-seeking, factor-seeking, market-seeking, and strategic asset-seeking motives for FDI – only the first two of these are obviously linked to exports. Market-seeking and strategic asset-seeking FOEs may exhibit a relatively low export propensity even if they have substantial innovative capabilities and other resources that would normally be linked to strong export performance. Most emerging markets, including China, are characterized by rapid growth and an emerging middle class with substantial purchasing power, which suggests that market-seeking investment motives are becoming more important over time. Yet, resource and factor-seeking motives remain important for many FOEs

in emerging economies, since they often entered in order to produce for exports. This is confirmed by several quantitative studies focusing on China and other transition economies, which all find a positive direct effect of foreign ownership on exports – Appendix Table A2 summarizes the results of some of the main contributions on this topic.

The links between foreign ownership and innovation have been analyzed in numerous studies, but the focus has rarely been on the innovation-export nexus. Instead, much attention has been paid to the spillover effects of FDI on local technology and productivity. As foreign MNEs enter a local market, they stimulate and promote domestic innovation and learning about foreign technologies and foreign markets through spillovers, demonstration effects, and competition (Blomström & Kokko, 1998; García, Jin & Salomon, 2013; Kafouros & Buckley, 2008; Zahra, Ireland & Hitt, 2000). The knowledge spillovers from export-oriented foreign-owned MNEs may also function as export catalysts and raise the likelihood that local firms successfully enter foreign markets (Kneller & Pisu, 2007; Wang, et al., 2014).

We are aware of only three earlier studies highlighting the moderating effects of foreign ownership on the innovation-export relationship in emerging economies.[27] Yi, Wang and Kafouros (2013), who also examine the moderating effect of state ownership, find that foreign ownership had a positive moderating effect on the innovation-export relationship in China during the period 2005-2008. Deng, et al. (2014) analyze Chinese exporters during the period 1998-2008 and record a positive moderating effect of foreign ownership on the relation between innovation and exporter survival. Ye, Zhang and Zhang (2021), who study a smaller sample of listed firms over the period 2003-2016, also find a positive moderating effect of foreign ownership when innovation is proxied with R&D (but mixed results when other innovation proxies are used). These results on the positive moderating effect of foreign ownership suggest that the resources and networks of their foreign owners and parent companies will strengthen the ability of FOEs to use local assets and capabilities to generate exports. More specifically, information about the characteristics of specific markets and technologies is in principle a semi-public good within the MNE's network of affiliates and can be shared at a relatively low cost (Markusen, 1995). This gives FOEs a competitive advantage in comparison with independent

[27] Note that Appendix Table A2 shows that innovation is rarely used as a moderator of the ownership-export relation, in the same way as Appendix Table A1 shows that few studies on the effects of innovation on exports include ownership as a moderator.

local firms that need to spend more resources to find the same information. However, there are also confounding factors. In the case of China, FDI policy has to some extent been based on the principle of "trading market for technology", where local-market-oriented foreign investors were required to transfer superior technology to their affiliates in China in return for market access (Mu & Lee, 2005). Although China's membership in WTO has contributed to significant import liberalization (Imbruno, 2016), complaints about "forced technology transfer" still constitute a problem in the bilateral relationship with the US and the EU (Qin, 2019). As a result, it is likely that the innovative capabilities of many market-seeking FOEs are relatively strong. It is also possible that costs related to the "liability of foreignness" influence the ability of FOEs to exploit their innovative capabilities and other resources efficiently (Chen, Griffith & Hu, 2006). FOEs tend to pay more for their labor, even controlling for worker quality (Almeida, 2007), and the recruitment and retention of qualified professionals and managers is a challenge for FOEs in many host countries (Björkman & Lu, 1999; Holtbrügge, Friedmann & Puck, 2010; Sheldon & Li, 2013). However, it is not likely that these problems are severe enough to reverse the positive impacts of foreign ownership. We therefore suggest that the link between innovation and exports will be stronger in FOEs than in independent private firms.

Hypothesis 2. The effects of innovative capabilities on export performance will be stronger for Chinese firms with a higher level of foreign ownership than for those with a lower level of foreign ownership.

3. Data and methods

3.1. Data and sampling

China has emerged as one of the leading economies in terms of patent output and exports over the past decades – together with its varied ownership landscape, this provides an ideal setting for testing our hypotheses regarding the links between ownership, innovation and exports. The data set we use covers the period 2000–2007, preceding the 2008–2010 global financial crisis, which had a significant impact on both innovation and trade in many Chinese firms (Wu, Wei & Wang, 2021). Data for the period 2011–2014 are used for robustness checks.

The analysis is limited to manufacturing firms, as many of them were active exporters and also more likely than firms in other sectors to generate measurable outputs from their innovative activities, such as patents or new products. We employ a panel dataset on Chinese manufacturing

firms above a designated size. The data were collected from three sources. First, we use financial and ownership information from the Annual Survey of Industrial Firms (ASIF) database compiled by the National Bureau of Statistics of China (NBS). The ASIF is the most comprehensive firm-level dataset provided by NBS. It includes detailed firm-level information for all non-SOEs with annual turnover above five million RMB (around USD 680,000) and all SOEs in all 30 two-digit manufacturing industries in all 31 mainland provinces, autonomous regions and municipalities (henceforth "provinces") in China.[28] Accounting for about 90 percent of the total output in the manufacturing sector, ASIF is used regularly for academic research (Xie & Li, 2018). Following Cai and Liu (2009), we cleaned the data by undertaking extensive and strict checks for coding errors (identifier code, industry code, and geographical code), missing values, and possible organizational changes (e.g., mergers and acquisitions). Second, we obtained patent data from the China National Intellectual Property Administration (CNIPA), including information on patent applications, patents granted, and patent assignees. The CNIPA dataset is regarded as the most detailed and systematic data source on innovation outputs in China (Choi, Lee & Williams, 2011). Third, we collected province-level data on regional economics and innovation from the CEIC database.[29] Earlier research has shown that CEIC data are reasonably accurate and reliable (Wu, Wei & Wang, 2021).

The final dataset used in the estimations includes 1,754,537 observations and 495,275 firms, covering all two-digit manufacturing sectors across China.[30] The number of observations in our different estimations is lower because of missing values. Although the assembled dataset appears to be relatively clean, the largest outliers were eliminated by winsorizing all dependent and independent variables at the 1 percent level.[31]

Tables 1 and 2 provide some descriptive statistics on the sample firms in 2000-2007. Although exports and indigenous innovation are regarded as key forces driving China's economic miracle, on average only 26 percent of the sample firms were exporters, only 3 percent of them owned

[28] In January 2011, the cut-off standard of ASIF increased from 5 million RMB in annual main business income to 20 million RMB. The classification of NBS (GB/T 4754-2011) includes 30 two-digit and 480 four-digit manufacturing sectors.

[29] https://www.ceicdata.com/en.

[30] The total number of matched firms and patents in the merged database for each year is largely consistent with the corresponding figure reported by NBS in the official Statistical Yearbook.

[31] See Tukey (1962) for details.

innovative patents, and only 7 percent of them recorded new products sales during the sample period. Table 1 also reveals that the average export ratio (export/total sales) was 0.17. The average number of patents granted per firm during the sample period was 0.2, while new products on average accounted for 3.5 percent of sales. Although Chinese export products tended to be low-cost, high volume products with relatively limited technological sophistication (Yi, Wang & Kafouros, 2013), there was an upward trend both for patents and new products over the sample period. Table 2 shows that foreign firms in China were, on average, more export-oriented than domestic firms, which is not surprising considering the role of China as a global export platform during this period. At the same time, foreign firms scored higher on patents and new products than domestic firms. Further, non-SOEs had higher export intensity and more patents than SOEs, but SOEs recorded slightly more new products.

Table 1. Summary statistics: Export and innovative patterns by Chinese firms

Year	No. of manufacturing firms	% of exporters	% of innovators with patents	% of innovators with NPS	Export / Sales	Patents granted	Patents granted / Employment	NPS
2000	148,227	24.88%	2.31%	7.48%	0.16	0.10	0.0004	3.10%
2001	156,757	25.82%	2.53%	7.48%	0.17	0.11	0.0005	3.22%
2002	166,816	26.97%	2.90%	7.08%	0.17	0.15	0.0006	2.92%
2003	181,137	27.92%	3.14%	6.56%	0.18	0.17	0.0006	2.84%
2004	259,355	19.75%	2.76%	--	0.20	0.15	0.0007	--
2005	250,037	29.73%	3.07%	10.03%	0.18	0.21	0.0008	3.84%
2006	279,230	28.00%	3.46%	10.35%	0.17	0.27	0.0010	4.23%
2007	312,978	25.17%	3.67%	9.02%	0.16	0.31	0.0013	4.16%
Average	219,317	26.03%	2.98%	7.25%	0.17	0.18	0.0008	3.47%

Note: (a) "Exporters" are firms that report positive export sales. (b) "Innovators with patents granted" are firms that report positive patents granted. (c) "Innovators with NPS" are firms that report positive new products sales. (d) Patents granted= Number of patents granted; Export = Export sales (in thousands of RMB); Employment = number of employees; NPS = (New products sales)/Sales. However, data for new product sales are unavailable for 2004.

Table 2. Descriptive statistics of export and innovation intensities

	Domestic firms	Non-state-owned domestic firms	State-owned domestic firms	Foreign- owned firms
Export/ Sales	0.14	0.15	0.04	0.43
Patents /Employment	0.0008	0.0008	0.0007	0.0013
Patents	0.19	0.19	0.15	0.29
NPS	3.49%	3.46%	3.77%	4.80%

Note: "Foreign-owned firms" refer to firms that are officially registered as "foreign enterprises" in China (with foreign ownership shares at 25 percent or more), while "State-owned domestic firms" refer to firms are officially registered as "state-owned enterprises" in China.

3.2 Variables for the regression analysis

3.2.1. Dependent variables and key explanatory variables

The dependent variable in our estimations is export performance measured as the ratio of exports

to total sales (Wu, Wei & Wang, 2021; Xie & Li, 2018; Yi, Wang & Kafouros, 2013).[32]

We measure the key explanatory variable, innovation outputs, using the number of patents granted to each firm each year during the sample period.[33] Furthermore, following Wu, Wei and Wang (2021), we employ a relative term defined as patents adjusted by firm size (measured by employment) in the main analysis. Patents have been widely used to measure innovation outputs because they measure something "above and beyond R&D inputs, a creation of an underlying knowledge stock" (Dutta, Narasimhan & Rajiv, 2005), and provide an observable indicator of the outcomes of the firm's technological efforts (Adegbesan & Higgins, 2011). We have chosen not to base our innovation measure on R&D expenditure, because the variable is only available in the dataset for three years, 2005-2007.[34] There are also several arguments favoring the use of alternative innovation proxies. First, innovation inputs in the form of R&D investment do not always produce useful outputs (Roper & Love, 2002; Tavassoli, 2018). Firms do not only rely on internal R&D activities for acquiring knowledge but they also absorb and utilize technologies embodied in equipment or acquired from other external resources (Wu, Wei & Wang, 2021). Actual innovation outputs may therefore provide a better measure of knowledge development, which is arguably more important for export performance (Roper & Love, 2002; Yi, Wang & Kafouros, 2013). Second, using R&D inputs could underestimate the impact of innovation on export performance, since relatively few Chinese firms in the sample have separate R&D departments or even R&D budgets. However, noting that patents are also imperfect proxies for innovation (e.g., because patent quality varies and patents do not reflect the commercial value of innovations), we follow Wu, Wei and Wang (2021) and Yi, Wang and Kafouros (2013), and use the share of new product sales in total sales (NPS) as an additional innovation measure. NPS has been seen as a good indicator of innovation as it incorporates both market acceptance and non-patentable innovations (Atuahene-Gima & Li, 2004; Liu & Buck, 2007; Wang & Kafouros, 2009).

To test our hypotheses regarding the impact of ownership, we include two moderators. State

[32] It should be noted that the values of export are of direct transactions excluding those of domestic and foreign intermediaries (such as specialized trade companies). Due to limitations in data, we did not distinguish the types of exports (e.g., processing versus final goods exports) to further study the effects of innovation on different types of exports.

[33] We have also experimented with a logarithmic transformation of this variable, without notable changes in results.

[34] Separate estimations including an R&D variable for the period when it is available (2005-2007) yielded results that are qualitatively similar to those presented below.

ownership is defined as the ratio of state-owned paid-in capital to the total paid-in capital of the firm (Genin, Tan & Song, 2021; Zhou, Gao & Zhao, 2017). Similarly, foreign ownership is operationalized as the ratio of paid-in capital owned by foreign investors to total paid-in capital (Hong, Wang & Kafouros, 2015). Following Buckley, Clegg and Wang (2007) and Deng, et al. (2014), we do not treat capital from Hong Kong, Macau and Taiwan (HMT) as foreign capital.[35]

3.2.2. Control variables

We control for a number of variables to address concerns about the potential endogeneity of the innovation performance measure and unobserved firm-level heterogeneity. Since differences in size may influence both innovation and exports, we use the logarithm of the number of employees to control for firm size and skew. Second, a firm's age can affect export performance as it contributes to the accumulation of knowledge and experience. Firm age is measured by the number of years since the firm was founded. Third, more productive firms are much more likely to be exporters as they are able to cover export costs and still break even (Melitz, 2003). Following earlier studies (Coe & Helpman, 1995; Wang, et al., 2012), we include total factor productivity (TFP) among our control variables, which is defined as $logY - \beta logK - (1 - \beta)logL$, where Y is value-added; β is the share of capital in output Y; K is capital, including tangible assets, technological assets and marketing assets; and L is the number of employees.[36] The use of TFP is appropriate because it captures how efficiently multiple complementary resources are combined in the production process. Fourth, we include the debt ratio (financial leverage), which reflects the firm's financial health and may therefore affect its exports (Deng, et al., 2014). This variable is measured as long-term debt divided by total assets. Fifth, marketing capability can influence export performance by enabling firms to reach foreign customers and boost bargaining power with suppliers and distributors (Kotabe, et al., 2007). Our proxy for marketing capabilities is the ratio of marketing expenses to sales revenue. Sixth, we operationalize tangible resources as fixed assets per employee.

[35] We also carried out estimations where HMT investments were included in the foreign capital category. The results remained qualitatively unchanged.

[36] A myriad of estimators have been developed to achieve continuous results of estimating TFP. However, a number of issues remain (Van Beveren, 2012). Considering the endogeneity issues associated with estimating TFP in this paper, we performed robustness checks by 1) excluding TFP from the model and 2) replacing TFP with labor productivity. Our key results in both cases are not affected.

Furthermore, region-specific international openness can strengthen a region's economy and accelerate technological catch-up and exports. We measure openness using the ratio of inward FDI to GDP in each region as a proxy. Similarly, the regional level of market development may influence internationalization. We therefore include a measure of region-specific marketization for each year from 2000 to 2007 (Fan, Wang & Zhu, 2011). This is a comprehensive composite index that evaluates the development level of market-based mechanisms in five key areas, including the role of the market relative to government, the development of the private sector, the development of commodity and factor markets, and the development of free-market institutions, using a total of 26 indicators. A larger score indicates a higher level of marketization (Hong, Wang & Kafouros, 2015). Given that China features significant regional differences in economic and technological development, we include regional dummy variables to control for other unobservable region-specific effects. Year dummies are included to capture time effects associated with exchange rates and other time-varying factors on export performance. For similar reasons, our model also includes two-digit industry dummies to control for industry-specific idiosyncrasies that may have an impact on variations in firm-level export performance.

Table 3 summarizes the variable definitions. Table 4 reports descriptive statistics and correlations for the variables used in the analysis. All correlation coefficients are fairly low (smaller than 0.5), the variance inflation factor (VIF) ranges from 1.01 to 1.64 and the average value is well below the acceptable level of 10 (Neter, Wasserman & Kutner, 1985), indicating that multicollinearity is not likely to influence the estimations.

Table 3. Definition of variables

Variables	Definition
Dependent variable	
Export performance	log(Export/Sales + 1)
Independent variable	
Patents granted /Employment	log(Number of patent granted/Employment + 1)
Patents granted	Number of patents granted
NPS	(New products sales)/Sales
Moderators	
State ownership (SO)	Ratio of state-owned capital to total capital
Foreign ownership (FO)	Ratio of capital owned by foreign investors to total capital
Control variables	
Firm size	Log (number of employees)
Firm age	Number of years since establishment

TFP	Total Factor Productivity, see Methods section for details
Debt ratio/ financial leverage	Ratio of long-term debt to total assets
Marketing capability	Ratio of marketing expenses to sales revenue
Tangible resources	Fixed assets/number of employees
International openness	Ratio of FDI stock to GDP in each region
Marketization	Region-specific marketization index by Fan et al., (2011). See Methods section for details
Regional dummies	31 province dummy variables
Industry dummies	30 industry dummy variables
Time dummies	8 year dummy variables

Table 4. Correlation coefficients and descriptive statistics (2000-2007).

Variable	Mean	SD	2	3	4	5	6	7	8	9	10	11	12	13
1.Export performance	0.1726	0.3411												
2.Patents	0.0632	0.3879												
3.Patents /Employment	0.0003	0.0020	0.842											
4.NPS	0.0344	0.1511	0.126	0.096										
5.SO	0.0864	0.2689	0.012	-0.012	0.018									
6.FO	0.0770	0.2473	0.008	0.007	0.016	-0.082								
7.Firm age	9.6719	10.7121	0.049	0.006	0.031	0.425	-0.092							
8.Firm size	4.7075	1.1462	0.151	0.044	0.094	0.063	0.094	0.208						
9.TFP	3.8889	1.1671	0.058	0.058	0.048	-0.238	0.077	-0.211	-0.212					
10.Debt ratio	0.0506	0.1204	0.003	-0.010	0.008	0.177	-0.049	0.163	0.096	-0.088				
11.Marketing capability	0.0337	0.0497	0.088	0.082	0.067	0.084	0.056	0.054	0.040	-0.056	0.041			
12.Tangible resources	80.5869	125.0454	0.052	0.038	0.054	0.068	0.127	-0.008	-0.060	0.305	0.124	0.049		
13.International openness	0.0416	0.0246	0.019	0.027	-0.007	-0.120	0.119	-0.063	-0.037	0.011	-0.110	-0.048	-0.009	
14.Marketization	7.5903	1.9362	0.034	0.042	0.036	-0.313	0.104	-0.215	-0.075	0.199	-0.204	-0.133	-0.003	0.484

Note: SD = standard deviation; All the correlation coefficients are statistically different from zero at the 1% significance level.

3.3 Model specification and estimation

We test our hypotheses by using the following regression specification.

$$\boldsymbol{Y_{it} = \alpha + C_{it-1}\alpha + M_{it-1}\beta + (C_{it-1} \times M_{it-1})\gamma + Z_{it-1}\delta + \lambda_j + \lambda_r + \lambda_t + \varepsilon_{it}} \quad (1)$$

The variable $\boldsymbol{Y_{it}}$ is export performance, $\boldsymbol{C_{it-1}}$ is innovation output; $\boldsymbol{M_{it-1}}$ denotes the two moderators – state ownership and foreign ownership; $\boldsymbol{C_{it-1} \times M_{it-1}}$ is the interaction term between innovation outputs and each of the two moderators. $\boldsymbol{Z_{it-1}}$ are the control variables, $\boldsymbol{\lambda_j}$, $\boldsymbol{\lambda_r}$ and $\boldsymbol{\lambda_t}$ are fixed effects for industry, region and time, respectively, and $\boldsymbol{\varepsilon_{it}}$ is the error term. While the coefficient of $\boldsymbol{C_{it-1}}$ captures the direct effect of innovation on export performance, we are more interested in the coefficients of the interaction terms used to test our two hypotheses. We use pooled OLS to estimate Eq. (1), while controlling for industry, region, and time effects.

Reverse causality problems are associated with the possibility that export performance may influence some firm characteristics, causing estimation biases. All explanatory variables are therefore lagged by one year. For the patent variables, the lag is also needed to enable the effects of patents to materialize and influence the firm's exports. More generally, the adoption of a lag

structure enables us to control for possible simultaneity bias and may help control for potential endogeneity (Aitken & Harrison, 1999). This treatment makes potentially endogenous variables predetermined and less likely to be correlated with the error term. Furthermore, even though multicollinearity appears not to be a concern in this study, we followed the usual practice (Aiken & West, 1991) and mean-centered variables in the interaction terms when we estimated the models. To deal with the possible threat of heteroskedasticity, we estimated the models using Huber–White's robust standard error (White, 1980). Finally, we used hierarchical moderated regression analysis (Yi, Wang & Kafouros, 2013) when estimating our models. Hierarchical multiple regressions were used when testing the interaction effects of innovation*SO and innovation*FO by entering each of these two variables separately before entering them simultaneously. This allowed us to test the interaction effects independent of each other.

4. Results

4.1. Main results

Table 5 provides the results from the estimation of Eq. (1). Specifications (1), (2), and (3) employ alternative measures of innovation, with (1) using the ratio of patents to employment, (2) the absolute number of patents granted, and (3) the ratio of new product sales to total sales (NPS). The coefficients of the innovation measures in Models 1-3 are consistently positive and statistically significant. This indicates that innovation contributes to higher export ratios for the full sample of enterprises and confirms the results from earlier studies (see Appendix Table A1).

Our proxies for state ownership (SO) and foreign ownership (FO) are also included in Models 1-3. Both are highly statistically significant in all models, highlighting the direct impact of ownership in shaping EMEs' export performance. In line with most earlier research results, foreign ownership has a positive direct effect on a firm's export performance. State ownership, by contrast, records a significant negative coefficient. We noted above that the direct effect of state ownership can either be positive or negative, depending on the state's policy preferences. The results suggest that the negative effects dominate, although it is known that SOEs in some industries are encouraged to engage in exports.

Given our key hypotheses, we are particularly interested in the interaction terms between ownership and innovation. The two interaction terms are added separately in Models 1 and 2. The coefficient of the interaction "Innovation*SO" is positively significant in Model 1, and it

remains so in all specifications. This indicates that Hypothesis 1 is supported. On average, state ownership has a significant positive effect on the firm's ability to use innovation to generate exports.

Table 5 also shows, somewhat surprisingly, that Hypothesis 2 is not supported. In fact, the coefficients of the interaction term "Innovation*FO" are consistently negative and significant whenever they are included in the estimations. At face value, these results suggest that higher foreign ownership will weaken the focal relationship. In other words, despite the fact that many foreign enterprises have carried out export-oriented FDI projects in China, it seems that foreign ownership does not improve the ability of firms to leverage local innovation for exports. This is intriguing and highlights the complexity of the links between foreign ownership, innovation, and trade in China. Extant literature offers at least two possible explanations for the findings. First, MNEs are typically based on intangible assets, such as product or process technologies, that are created through R&D and other innovative activities in the home country, and then transferred to and used by the MNEs' affiliates in foreign markets (Hymer, 1976; Markusen, 1995). Many MNEs prefer to concentrate their innovation and R&D in their home country or in advanced economies, although the resources may be used anywhere in the MNE's global network (Kathuria, 2008). This mobility of intangible assets within MNEs weakens the link between local innovation and export performance – the data on innovation outputs in FOEs are simply not good measures of the innovative assets and capabilities that they may be able to access. This observation is also consistent with the fact that a majority of foreign investors saw China as an assembly center rather than a strategically important R&D center for advanced proprietary technology during the period under analysis (Deng, et al., 2014). Second, it is possible that the foreign-owned firms that entered China to serve the local market were more prone to engage in the types of local innovation activities captured by our measure of Chinese local patents and NPS. They may be more responsive to pressure from local authorities to engage in innovation in China (Mu & Lee, 2005), and they may need local patents to protect the innovations that are commercialized in China. Moreover, the severe competition in the Chinese market, with rapid technological change and short product life cycles, might also result in higher NPS. These results challenge the findings of Yi, Wang and Kafouros (2013), who showed that foreign ownership had a positive moderating effect on the link between innovation (measured by NPS) and exports. It should be noted that our sample period is longer than that of Yi, Wang and Kafouros (2013), we employ several proxies for innovation (while they used NPS only), and we also include TFP

as a control for firm heterogeneity – productivity was not included in their estimation model.[37]

Table 5. Hierarchical moderated regression of export performance 2000–2007

Pooled OLS									
DV= Export performance $_{t+1}$	Innovation proxy								
	(1) Patents			(2) Patents /Employment			(3) NPS		
	Model 1	Model 2	Model 3	Model 1a	Model 2a	Model 3a	Model 1b	Model 2b	Model 3b
Innovation	0.034***	0.058***	0.052***	2.927***	5.494***	5.002***	0.358***	0.402***	0.393***
	(8.37)	(14.78)	(12.16)	(3.93)	(7.43)	(6.45)	(29.77)	(33.90)	(30.74)
State ownership (SO)	-0.268***	-0.263***	-0.266***	-0.264***	-0.262***	-0.264***	-0.274***	-0.269***	-0.273***
	(-53.77)	(-53.25)	(-53.50)	(-53.22)	(-53.03)	(-53.10)	(-52.12)	(-51.94)	(-51.93)
Foreign ownership (FO)	1.568***	1.580***	1.580***	1.566***	1.573***	1.573***	1.586***	1.597***	1.597***
	(213.94)	(212.36)	(212.33)	(213.80)	(212.04)	(212.03)	(202.88)	(199.41)	(199.40)
Innovation*SO	0.059***		0.043***	9.340***		7.737***	0.106***		0.079**
	(5.55)		(4.04)	(3.44)		(2.84)	(3.08)		(2.29)
Innovation*FO		-0.177***	-0.172***		-20.863***	-20.477***		-0.321***	-0.314***
		(-11.43)	(-11.04)		(-6.90)	(-6.75)		(-7.49)	(-7.28)
Firm age	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***
	(-31.73)	(-31.82)	(-31.84)	(-31.43)	(-31.44)	(-31.43)	(-30.29)	(-30.41)	(-30.41)
Firm size	0.361***	0.361***	0.361***	0.364***	0.364***	0.364***	0.357***	0.357***	0.357***
	(247.04)	(247.16)	(246.87)	(252.49)	(252.48)	(252.42)	(232.24)	(232.76)	(232.23)
TFP	0.055***	0.055***	0.055***	0.054***	0.054***	0.054***	0.055***	0.055***	0.055***
	(36.62)	(36.55)	(36.64)	(35.96)	(35.92)	(35.97)	(35.30)	(35.23)	(35.28)
Debt ratio	-0.385***	-0.385***	-0.385***	-0.386***	-0.386***	-0.386***	-0.374***	-0.375***	-0.375***
	(-34.88)	(-34.92)	(-34.88)	(-34.98)	(-35.00)	(-34.97)	(-32.15)	(-32.21)	(-32.21)
Marketing capability	-1.227***	-1.227***	-1.226***	-1.214***	-1.213***	-1.213***	-1.277***	-1.278***	-1.278***
	(-42.51)	(-42.53)	(-42.49)	(-42.05)	(-42.02)	(-42.03)	(-41.90)	(-41.95)	(-41.94)
Tangible resources	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***
	(-15.37)	(-15.46)	(-15.49)	(-15.10)	(-15.14)	(-15.16)	(-16.16)	(-16.07)	(-16.07)
International openness	1.435***	1.437***	1.432***	1.438***	1.438***	1.436***	1.401***	1.398***	1.398***
	(10.43)	(10.44)	(10.41)	(10.45)	(10.45)	(10.44)	(9.64)	(9.62)	(9.62)
Marketization	0.010**	0.010**	0.010**	0.010**	0.010**	0.010**	0.019***	0.019***	0.019***
	(2.18)	(2.15)	(2.20)	(2.19)	(2.19)	(2.20)	(3.88)	(3.85)	(3.87)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,106,219	1,106,219	1,106,219	1,106,219	1,106,219	1,106,219	975,833	975,833	975,833
Adjusted R2	0.301	0.302	0.302	0.301	0.301	0.301	0.304	0.304	0.304
R2	0.301	0.302	0.302	0.301	0.301	0.301	0.304	0.304	0.304
F-statistic	6529***	6529***	6449***	6524***	6524***	6441***	5848***	5844***	5773***

Robust t-statistics in parentheses. *, **, *** denote significance at 10%, 5% and 1%, respectively.

4.2 Extensions and robustness checks

Our dependent variable, firms' export performance, is limited to the range between zero and one, with more than half of firms not exporting at all (Tables 1 and 2). The usual approach to control for the potential selection bias caused by a left-censored dependent variable is to use Tobit models. The three first columns of Table 6 report Tobit regression results for our three innovation proxies. As shown by the first three columns of Table 6, all innovation measures were statistically significantly related to export performance in the Tobit regression models. In order to compare the Tobit estimates and the OLS estimates, we further obtained the marginal effects for the unconditional expected value of the dependent variable by computing the adjustment factor. This yielded a marginal effect of 0.033 for patents (0.112 and -0.110 for its interaction with SO and FO, respectively), 4.672 for Patents /Employment (18.386 and -10.539 for its interaction with SO and FO, respectively), and 0.293 for NPS (0.419 and -0.287 for its interaction

[37] We have also tried to replicate the results from Yi et al. (2013) by re-estimating a model almost identical to theirs (without the variable *Business Group*, which is missing from our data set), but failed to generate a positive coefficient for the interaction term "Innovation*FO".

with SO and FO, respectively). All these numbers fall in the same range as the OLS estimates, with the OLS estimates for interaction terms having slightly lower values than those in Tobit estimates. In short, the results of these interactions indicate that the marginal impact of innovation capability on a firm's export performance increases with increasing state ownership and decreasing foreign ownership.

To examine our explanations for the negative moderating effect of foreign ownership, we have conducted a set of separate estimations for subsamples of domestic firms and foreign-owned firms. The results are shown in the six last columns of Table 6. The subsample for domestic firms (columns 4-6) does not include any firms with foreign ownership above 25%, while the subsample for foreign firms (columns 7-9) only includes firms with foreign ownership shares equal to or higher than 25%.[38] In the subsample for domestic firms, it can be seen that the coefficients of innovation are positive and statistically significant for all three proxies of innovation, which is in line with the findings based on the full sample – innovation enhances the export performance of domestic firms. The moderating effect of state ownership is positive and significant, while that of (limited) foreign ownership is negative and significant when innovation is proxied with patents, but insignificant when NPS is used. In the subsample for foreign firms, the direct effect of innovation measured by patent variables is insignificant, and only NPS records a significant positive coefficient. This suggests that much of the patenting carried out by FOEs in China is unrelated to their export activities. The coefficients of the interaction terms with the two patent variables are similar to those in Table 5, but the interaction term with NPS is insignificant, which is contrary to Table 5. All other coefficient estimates are qualitatively consistent with those in Table 5, taking into account the differences between the two subsamples.[39]

Table 6. Hierarchical moderated regression of export performance 2000–2007.

DV=	**Tobit model**			**Domestic firms**			**Foreign firms**		
Export performance $_{t+1}$	Innovation measurement			Pooled OLS			Pooled OLS		
	(1) Patents	(2) Patents /Employment	(3) NPS	(1) Patents	(2) Patents /Employment	(3) NPS	(1) Patents	(2) Patents /Employment	(3) NPS
Innovation	0.106***	14.935***	0.954***	0.099***	11.039***	0.494***	-0.002	-4.497	0.147*
	(8.77)	(6.18)	(25.56)	(21.88)	(13.96)	(36.96)	(-0.09)	(-0.98)	(1.87)
State ownership (SO)	-0.962***	-0.927***	-1.052***	-0.156***	-0.153***	-0.168***	-0.606***	-0.606***	-0.559***
	(-29.69)	(-29.03)	(-31.40)	(-32.72)	(-32.07)	(-33.59)	(-12.56)	(-12.66)	(-10.53)
Foreign ownership (FO)	2.559***	2.541***	2.619***	1.548***	1.545***	1.533***	0.622***	0.617***	0.718***
	(129.04)	(128.40)	(129.95)	(30.90)	(31.10)	(29.06)	(22.51)	(22.44)	(23.34)
Innovation*SO	0.358***	58.772***	1.362***	0.032***	4.741*	0.129***	0.203***	48.278***	0.260
	(10.17)	(5.59)	(11.05)	(2.99)	(1.76)	(3.67)	(2.68)	(2.86)	(1.25)
Innovation*FO	-0.354***	-33.689***	-0.933***	-0.204**	-44.317**	-0.071	-0.159***	-24.645***	0.109
	(-10.69)	(-5.26)	(-10.40)	(-2.40)	(-2.13)	(-0.28)	(-3.47)	(-2.61)	(0.76)

[38] Firms are classified as a foreign-owned in China only if the foreign capital share is 25% or higher (Deng, et al., 2014).

[39] The results from Tobit estimations of these two separate subsamples are qualitatively similar.

Firm age	-0.007***	-0.007***	-0.008***	-0.001***	-0.001***	-0.001***	0.009***	0.009***	0.010***
	(-10.47)	(-10.13)	(-10.92)	(-9.19)	(-8.64)	(-8.93)	(6.15)	(6.18)	(6.42)
Firm size	0.862***	0.870***	0.864***	0.286***	0.292***	0.284***	0.277***	0.275***	0.265***
	(140.92)	(143.31)	(143.16)	(189.08)	(195.70)	(178.72)	(38.89)	(39.03)	(34.35)
TFP	0.084***	0.080***	0.091***	0.015***	0.013***	0.017***	0.151***	0.152***	0.152***
	(13.59)	(13.02)	(15.11)	(10.30)	(8.70)	(10.91)	(19.67)	(19.72)	(18.46)
Debt ratio	-0.972***	-0.976***	-0.972***	-0.150***	-0.153***	-0.150***	-0.443***	-0.440***	-0.410***
	(-17.74)	(-17.84)	(-17.68)	(-14.21)	(-14.48)	(-13.48)	(-5.78)	(-5.75)	(-4.97)
Marketing capability	-2.048***	-2.032***	-2.230***	-0.620***	-0.592***	-0.637***	-3.137***	-3.137***	-3.234***
	(-14.71)	(-14.61)	(-15.95)	(-22.44)	(-21.44)	(-21.87)	(-23.58)	(-23.58)	(-22.38)
Tangible resources	0.000	0.000	-0.000	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***
	(0.27)	(0.50)	(-0.46)	(-28.53)	(-27.54)	(-27.03)	(-12.27)	(-12.26)	(-12.56)
International openness	3.740***	3.779***	2.598***	0.759***	0.755***	0.536***	1.435**	1.452**	1.611**
	(13.01)	(13.15)	(8.43)	(5.28)	(5.25)	(3.55)	(2.27)	(2.29)	(2.39)
Marketization	-0.080***	-0.081***	-0.008	-0.019***	-0.018***	0.002	0.050**	0.050**	-0.025
	(-6.75)	(-6.87)	(-0.64)	(-3.96)	(-3.88)	(0.44)	(2.07)	(2.06)	(-0.95)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,106,219	1,106,219	975,833	859,363	859,363	760,925	118,059	118,059	102,098
F-statistic	2251	2248	2330	2263***	2252***	2028***	343.7***	343.9***	308.8***
Adjusted R2				0.208	0.208	0.211	0.148	0.148	0.151
R2				0.208	0.208	0.211	0.149	0.149	0.151
Log likelihood function	-1093231.8	-1093420.7	-950832.59						
Left or right censored	783,631	783,631	696,080						

Robust t-statistics in parentheses. *, **, *** denote significance at 10%, 5% and 1%, respectively.

Further, we have tried to control for possible estimation biases in several ways. We incorporated several control variables to account for firm characteristics as thoroughly as possible. The use of a lag structure was intended to reduce the potential endogeneity bias: it is not likely that exports in year t will affect the innovation outputs in year t-1. However, there may still be unobserved effects that influence both innovation and exports, and it is possible that a reverse causal relationship going from exports to innovation outputs exists (Caldera, 2010; Cassiman & Golovko, 2011). In other words, firms with higher export intensity may selectively conduct innovation activities, e.g. because they are exposed to stronger competition in international markets, which gives them an incentive to invest more in innovation (Wu, Wei & Wang, 2021). Moreover, exporting firms may "learn by exporting" as they gain access to new technical resources and expertise from their foreign buyers, which enables them to become more innovative (Golovko & Valentini, 2011). Failure to recognize and deal with endogeneity may lead to inconsistent estimates, inappropriate interpretations, or even misleading conclusions (Bascle, 2008). We have therefore carried out a two-stage instrumental variable estimation.[40] The instrument we use is the "innovation ability of universities", measured as the total number of patents granted to all universities in the specific province where the firm is located, divided by the number of researchers in these universities.[41] We used the innovation output of all the

[40] Few of the studies in this field pay much attention to the endogeneity problem and most choose to use lagged variables instead of an IV approach to address this issue (e.g., Huang, et al., 2008; Ito & Lechevalier, 2010; Tavassoli, 2018; Yi, Wang & Kafouros, 2013).

[41] The data on university researchers and patents were taken from the Compilation of Statistics on Science and Technology of Higher Education, Ministry of Education, China (http://www.moe.gov.cn/s78/A16/A16_tjdc/).

universities of a given region as an instrumental variable for innovation performance for the following reasons. First, the innovation output of universities has a positive effect on the innovation performance of local firms because firms can acquire new technological knowledge through formal and informal interactions with local universities, which can benefit their product or process innovations (Caloghirou, Kastelli & Tsakanikas, 2004). Second, universities' innovation outputs are not very likely to have any direct effect on the export performance of firms in the same region, but they can affect exporting through their effects on firm-level innovation only.

Column 1 of Table 7 shows the first-stage regression. The instrumental variable is positively and significantly associated with firm-level innovation outputs. Column 2 shows the second-stage regression. Instrumented innovation outputs show a significantly positive association with the dependent variable. The other results remain qualitatively the same as in Table 5, which confirms that our findings are robust also with instrumental variable estimation. In summary, by covering a rich set of control variables and employing a combination of an IV approach and lagged variables, we are able to make plausible causal inferences on the impact of innovation on exports.

Table 7. Robustness test: instrumental variable regression

	1st stage (1) Patents granted	2nd stage Export performance
Instrumented innovation Outputs (Patents granted)		3.151***
		(7.44)
Number of patents per capita in Universities	0.555***	
	(14.26)	
State ownership	0.034***	-0.321***
	(8.42)	(-12.61)
Foreign ownership	-0.036***	1.959***
	(-10.22)	(77.03)
Innovation ✕ State ownership		2.367***
		(6.07)
Innovation ✕ Foreign ownership		-4.134***
		(-31.37)
Controls	Yes	Yes
Observations	1,447,211	1,093,941
R2 (adj.)	0.066	
Wald Chi-square		218009.31***
F-statistic (first stage)	F=143.101, p= 0.0000	
Kleibergen-Paap rank LM statistic	121.019 (p=0.000)	
Cragg-Donald Wald F statistic	143.101	
Stock-Yogo weak ID test (10% maximal IV size)	16.38	
Anderson–Rubin wald test	F = 97.23, Chi-square = 97.24 (p= 0.0000)	

Notes: Robust t-statistics in parentheses. *, **, *** significance at 10%, 5% and 1%, respectively. Given concerns about the potential endogeneity of the two interactions involving the suspected endogenous variable innovation capabilities, the interaction terms of the second-stage regression consisted of the innovation-hat (^ or predicted) value calculated from the first-stage regression on the IV and its interactions with SO and FO, respectively.

Table 7 presents the results of two-stage least squares (2SLS) regression. The diagnostic statistics indicate that the "Number of patents per capita in Universities" is a valid instrument. Specifically, the F-statistics on the instrument in the first-stage regression ($F = 143.101$, $p < 0.01$) are all above the critical value of 10 as the rule of thumb (Arrata et al., 2020), which means that the endogenous variable (innovation) is significantly and strongly correlated with the IV; in terms of economics, this indicates that the IV has a strong explanatory power for the endogenous variable. In addition, the Kleibergen-Paap rank LM statistic for the identifiability test rejects the original hypothesis at the 1% significance level (i.e., the IV satisfies the identifiability). As shown by the results of the weak IV test, the Cragg–Donald Wald F statistic is greater than the critical value of the Stock–Yogo weak ID test critical values at the 10% significance level. Furthermore, the Anderson–Rubin Wald test rejects the null hypothesis indicating that the endogenous regressors are relevant (Baum, Schaffer, & Stillman, 2007). We did not report the Sargan test or Hansen J statistic for the over-identifying restrictions since we only have one IV for single endogenous independent variable.

We conducted six additional robustness tests. First, we reconstructed the export performance variable, measuring it separately by exports per employee and by the absolute value of exports. All regressions were re-estimated using these two new measures of the dependent variable (rather than export intensity). Second, we conducted a regression analysis using a measure of innovation outputs based on the number of patent applications (rather than patents granted). Third, we estimated the models with two-year lagged innovative outputs. Fourth, we used two dummy variables to replace the moderators SO and FO in the main analysis (Table 5). These new dummies register a value of 1 for SOEs and FOEs.[42] The results are qualitatively consistent with those reported in Table 5. Fifth, we re-estimated the models using data for 2011–2014.[43] The results are generally consistent, indicating that the effects of our key variables do not vary significantly between the two time periods 2000–2007 and 2011–2014. Finally, we also used OLS regressions with cluster-robust standard errors (Cameron & Miller, 2010) to estimate the models. In addition, given the potential correlation of the error terms across industries within a

[42] The dummies SOE and FOE identify those firms that were officially registered as SOEs and FOEs in China. We did not explore differences between SOEs depending on whether they are locally or centrally owned.

[43] The control variable TFP is missing for the period 2011-2014 and therefore not included in this robustness check. Estimating the model without TFP for all available years does not change the main conclusions (results available from the authors on request).

regional cluster or across regions within an industrial cluster, the standard errors are also clustered by cross region-industry cluster. All these robustness checks obtained qualitatively identical results to those in Table 5. Taken as a whole, our main results are robust to different models and sampling methods.

5. Discussion and conclusion

The research reported here has employed a large Chinese firm-level dataset to analyze the links between innovation and export performance, with a focus on the moderating effects of state and foreign ownership. Our results show that local innovation has a positive direct effect on export performance in the Chinese context. Foreign ownership has a positive direct effect on exports, while the direct effect of state ownership is negative. There are also significant moderating effects of state and foreign ownership. The positive effect of innovation on export performance is more pronounced for firms with higher state ownership. Somewhat surprisingly, foreign ownership appears to have a negative moderating impact on the innovation-export relationship. These results are robust to different model specifications and estimation methods.

Our findings have several implications for research pertaining to the effects of innovation on firm-level export performance and the sources of competitive advantages that enable EMEs to export. First, this study adds value to the relatively limited body of quantitative research on the relationship between innovation and export performance in EMEs (Véganzonès-Varoudakis & Plane, 2019; Wu, Wei & Wang, 2021). Developed country firms have built their innovation and export models around a set of mature and homogeneous institutions and cumulated substantial internationalization experience. EMEs, by contrast, are at an early stage of innovation and internationalization, innovation in emerging markets takes place in an uncertain environment, and institutional factors, including ownership, vary widely and may have a significant impact on performance (Wu, Wei & Wang, 2021). This study confirms that innovation is an economically significant antecedent of export performance also in EMEs.

Second, our empirical analysis shows that ownership is not only a direct determinant of export performance, but also affects how effectively firms use their own innovation outputs for export. Interestingly, the moderating effects of state ownership and foreign ownership on exports differ in nature from the direct effects. This challenges the premise in much of the earlier innovation-export literature, that innovation is of equal value to firms with different ownership structures (e.g., Fu, 2011; Ogasavara, Boehe & Cruz, 2016). Research on the links between ownership and

performance should not only pay attention to the direct effect of ownership, but also account for how ownership moderates the causal links between firms' resources, capabilities, and performance. Here, our focus has been on how innovation is utilized for exports, but it is likely that there are many other areas where ownership-related differences in behavior result in performance differences.

A third contribution concerns the role of foreign ownership. The empirical results show that foreign ownership has a distinct and positive impact on firm-level exports, as expected. However, contrary to previous studies (Deng, et al., 2014; Yi, Wang & Kafouros, 2013), we find that the expected positive impact of innovation on export performance does not hold for the group of foreign-owned firms in China. This unexpected result is probably explained by the foreign investors' innovation and market strategies in the sample under study. For many foreign-owned firms, it is likely that the innovation activities carried out in China only make up a small share of their total R&D investment and innovation output. In particular, export-oriented FOEs are likely to depend more on innovations generated in the parent company or in other R&D centers outside China. This observation suggests a simple caveat to studies of the innovation–export relationship in China as well as other countries: the hypothesized theoretical relationship holds mainly for firms that carry out most of their innovation activities and production in the geographical market under study. The geographical fragmentation of production and innovation within an individual MNE means that exports from one location can depend on innovation carried out elsewhere, just as well as innovation in any specific location can generate production and exports somewhere else. In fact, local-market-oriented foreign investors may be more motivated to locate R&D and innovation in the host country, not only because they need to adjust to local preferences and product standards but also because they face more intense competition from local domestic firms. These findings have implications for the current thinking about the balance between the development of internal innovative (and absorptive) capabilities and reliance on external sources of knowledge.

Our research provides several insights to a broad constituency of policymakers and business leaders in emerging markets wishing to inquire into whether and how innovation helps enhance export. First, the finding that innovation supports firms' export performance suggests that firms should be encouraged to strategically engage in innovation and leverage innovative outputs to improve export performance. Second, while state ownership is generally associated with lower export intensity, our results suggest that it has a positive moderating impact on the innovation–

export nexus. In other words, while relatively few SOEs choose to export, those that do so are better able to translate innovation into exports, presumably because they have access to critical resources related to government-controlled technology and R&D as well as preferential channels to foreign markets, e.g., through the network of institutions engaged in public trade promotion. Therefore, the impact of state ownership is complex. From a policy perspective, this finding highlights the need to promote the positive role of state ownership in the effective utilization of innovation for exporting. Finally, it should be borne in mind that the links between host country innovation and exports in FOEs are not likely to follow the patterns for domestic firms, because intangible assets – such as innovation – are mobile within MNEs. Hence, if public resources are used to promote innovation, it is likely that the marginal benefits (in terms of exports) are larger if the support targets firms that carry out most of their activities in the domestic market.

Although our study extends previous research, it has several limitations. First, it is necessary to be cautious when generalizing from our results, since China is not a "typical" emerging market economy, especially considering the balance between the state and the market. A large share of the analysis of emerging market exporters focuses on China, and most of the empirical studies discussed in this article analyze China. Empirical studies of other emerging markets are needed to determine if the positive moderating effect of state ownership is equally clear in economies where the state has a less dominant role. Second, our focus on the effects of ownership leaves less room for other institutional features that may influence the ability of firms to use innovation to generate exports. For example, the impact of state ownership may well be smaller in regions where markets and market institutions are more developed. Finally, although we have tried to address issues related to causality and endogeneity, it is impossible to fully control for all linkages between the resources, experiences, and strategic decisions of firms. For example, Melitz and Redding (2021) have recently argued that innovation is largely endogenous, at least at an aggregate level and over longer periods of time. Understanding how this macro-level endogeneity affects individual firms and their export decisions is left as a challenge for future research.

Appendix

Table A1

A summary of selected firm-level studies on the effects of innovation on EMEs' exports.

	Study	Sample	Innovation measures	Export measures	Endogeneity of innovation considered	SO considered as a moderator	FO considered as a moderator	Key findings on the effects of innovation on exports (including SO and FO when relevant)
1.	Huang, et al. (2008)	Chinese manufacturing firms	RDM R&D_dummy NPM PD_dummy	EIS	Yes	No	No	insignificant RDM + R&D_dummy with one-year lag + NPM + PD_dummy with one-year lag
2.	Singh (2009)	Indian manufacturing firms	R&D expenditure	Export sales	No	No	No	+ R&D
3.	Filatotchev, et al. (2009)	Chinese SMEs in high-tech industries	RDE	EP Export orientation (Export sales as a categorical variable) Subjective export performance	No	No	No	+ RDE on EP in returnee-owned firms + RDE on export orientation and subjective export performance
4.	Fu (2011)	Chinese firms	NPS	EP Export sales	Yes	No	No	+ NPS
5.	Yang and Chen (2012)	Indonesian manufacturing firms	R&D_dummy	EIO	Yes	No	No	+ R&D
6.	Yi, Wang and Kafouros (2013)	Chinese firms	NPS	EIS	Yes	Yes	Yes	+ NPS - SO + FO + for interaction NPS*SO in regions with high marketization + for interaction NPS*FO
7.	Wang, et al. (2013)	Chinese manufacturing firms	RDE NPS	EIS Export sales	No	No	No	+ RDE Insignificant NPS
8.	Gashi, Hashi and Pugh (2014)	SMEs in 31 transition economies	R&D expenditure	EP	Yes	No	No	Insignificant R&D
9.	Wang (2014)	Chinese manufacturing firms	R&D_dummy	EP	No	No	No	+ R&D
10.	Deng, et al. (2014)	Chinese manufacturing firms	NPS	ES	No	No	Yes	- NPS + FO + interaction NPS*FO
11.	Yuan, et al. (2015)	Chinese firms	R&D expenditure	EIS	Yes	No	No	- R&D
12.	Gubbi, Aulakh and Ray (2015)	Indian pharma-ceutical firms	RDI	EP EIS	No	No	No	Insignificant RDI on EP + RDI on EIS
13.	Ogasavara, Boehe and Cruz (2016)	Brazilian exporters	Subjective measure of innovation	Subjective measures of export performance	No	No	No	+ innovation
14.	Oura, Zilber and Lopes (2016)	Brazilian industrial SMEs	Subjective innovation capacity	Subjective export performance	No	No	No	+ innovation
15.	Zhang and Zhu	Chinese	Subjective	Subjective	No	No	No	+ innovation

	(2016)	manufacturing exporters	innovation performance	export performance				
16.	Chakrabarti and Mondal (2017)	Indian firms	RDI	EIS	No	No	No	+ RDI
17.	Rialp-Criado and Komochkova (2017)	Chinese SMEs	Internal RDI PD_dummy PS_dummy	EIS	Yes	No	No	- innovation dummies
18.	Véganzonès-Varoudakis and Plane (2019)	Indian firms	R&D_dummy	EIO	Yes	No	No	+ R&D
19.	Wu, Wei and Wang (2021)	Chinese manufacturing firms	Patents PE NPS	EIE EP EIS	Yes	No	No	+ Patents + PE + NPS

Notes on variable names:

- PD_dummy: Product innovation dummy = 1 if firm is innovating in products;
- PS_dummy: Process innovation dummy = 1 if firm is innovating in processes;
- R&D_dummy: R&D dummy = 1 if firm reported R&D activities;
- RDI: R&D intensity in terms of sales = (R&D expenditure)/Sales;
- RDE: R&D intensity in terms of employment = R&D expenditure per employee;
- RDM: R&D intensity as deviation from mean = Ratio of R&D expenditure to value added for the firm minus corresponding average for all firms;
- PE: Patents in terms of employment = Patents per employee;
- NPS: The share of new product sales in total sales = (New production sales)/Sales;
- NPM: New product intensity as deviation from mean = Ratio of new product sales to total sales minus corresponding average for all firms;
- EP: Export propensity = 1 if firm exports;
- EIE: Export intensity in terms of employment = Export per employee;
- EIO: Export intensity in terms of output = Export/Output;
- EIS: Export intensity in terms of sales = Export/Sales.
- ES: Export survival = the termination of exporting as an exit event

Table A2

A summary of selected firm-level studies on the effects of ownership on EMEs' exports

	Study	Sample	Ownership measures	Export measures	Innovation included as moderator	Key findings on the effects of ownership and innovation on exports
1.	Yi and Wang (2012)	Chinese manufacturing firms	SO	Export propensity	No	- SO
2.	Yi, Wang and Kafouros (2013)	Chinese manufacturing firms	FO,SO	Export intensity	NPS	+ FO + FO*NPS - SO + SO*NPS
3.	Gashi, Hashi and Pugh (2014)	Small and medium-sized enterprises in transition economies	FO	Export intensity	No	+ FO
4.	Deng, et al. (2014)	Chinese manufacturing firms	FO	Export survival	NPS	+ FO + FO*NPS
5.	Wu and Zhao (2015)	16 emerging economies (incl. China)	SO	Export intensity	No	Curvilinear relationship between export intensity and the level of SO: - SO + SO^2 - SO^3
6.	Wang and Wang (2015)	Chinese firms	FO	Export intensity	No	+ FO
7.	Zhang, et al. (2018)	Chinese listed firms	SO	Export volume	No	+ SO
8.	Carney, et al. (2019)	Firms from 57 understudied countries (incl. China)	FO_Dummy	Export intensity	No	+ FO
9.	Nuruzzaman,	Firms from 81 developing	SO	Export intensity	No	- SO

	Singh and Gaur (2020)	countries (incl. China)				
10.	Vinh and Duong (2020)	Vietnamese firms	DFO DWF	Export dummy Export intensity	No	+ DFO + DWF
11.	Ye, Zhang and Zhang (2021)	Chinese listed firms	FO	Export intensity	R&D, patents, inventions	+ FO + FO*R&D - FO*Inventions FO*Patents insignificant

Notes on variable names:

- SO = State ownership share
- FO = Foreign ownership share
- FO_Dummy = 1 if firms with foreign owner hold more than 50% of ownership and equals 0 otherwise
- DFO = 1 if the firm is a FDI enterprise (either a wholly foreign-owned enterprise or a foreign joint venture) and equals 0 otherwise
- DWF = 1 if the firm is a wholly foreign-owned enterprise and equals 0 otherwise
- R&D = Research and development
- NPS = New product sales

References

1. Adegbesan, J. A., & Higgins, M. J. (2011). The intra-alliance division of value created through collaboration. Strategic Management Journal, 32, 187-211.
2. Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions: Sage Publications, Newbury Park, CA.
3. Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. American Economic Review, 89, 605-618.
4. Almeida, R. (2007). The labor market effects of foreign owned firms. Journal of International Economics, 72, 75-96.
5. Atuahene-Gima, K., & Li, H. (2004). Strategic decision comprehensiveness and new product development outcomes in new technology ventures. Academy of Management Journal, 47, 583-597.
6. Aw, B. Y., Chung, S., & Roberts, M. J. (2000). Productivity and turnover in the export market: micro-level evidence from the Republic of Korea and Taiwan (China). The World Bank Economic Review, 14, 65-90.
7. Ayllón, S., & Radicic, D. (2019). Product innovation, process innovation and export propensity: persistence, complementarities and feedback effects in Spanish firms. Applied Economics, 51, 3650-3664.
8. Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. International Business Review, 26, 324-336.
9. Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. Strategic Organization, 6, 285-327.
10. Bernard, A. B., & Jensen, J. B. (1999). Exceptional exporter performance: cause, effect, or both? Journal of International Economics, 47, 1-25.
11. Bernard, A. B., & Jensen, J. B. (2004). Why some firms export. Review of Economics and Statistics, 86, 561-569.
12. Bernard, A. B., & Wagner, J. (2001). Export entry and exit by German firms. Weltwirtschaftliches Archiv, 137, 105-123.
13. Björkman, I., & Lu, Y. (1999). The management of human resources in Chinese-Western joint ventures. Journal of World Business, 34, 306-324.
14. Blomström, M., & Kokko, A. (1998). Multinational corporations and spillovers. Journal of Economic Surveys, 12, 247-277.

15. Brødsgaard, K. E. (2012). Politics and business group formation in China: the Party in control? The China Quarterly, 211, 624-648.

16. Buckley, P. J., Clegg, J., & Wang, C. (2007). Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. Journal of International Business Studies, 38, 447-459.

17. Cai, H., & Liu, Q. (2009). Competition and corporate tax avoidance: Evidence from Chinese industrial firms. The Economic Journal, 119, 764-795.

18. Caldera, A. (2010). Innovation and exporting: evidence from Spanish manufacturing firms. Review of World Economics, 146, 657-689.

19. Carney, M., Estrin, S., Liang, Z., & Shapiro, D. (2019). National institutional systems, foreign ownership and firm performance: The case of understudied countries. Journal of World Business, 54, 244-257.

20. Cassiman, B., & Golovko, E. (2011). Innovation and internationalization through exports. Journal of International Business Studies, 42, 56-75.

21. Chabowski, B., Kekec, P., Morgan, N. A., Hult, G. T. M., Walkowiak, T., & Runnalls, B. (2018). An assessment of the exporting literature: Using theory and data to identify future research directions. Journal of International Marketing, 26, 118-143.

22. Chakrabarti, A. B., & Mondal, A. (2017). Effect of business group affiliation on firm internationalization: the case of India under reforms. Journal of East-West Business, 23, 41-70.

23. Chen, A., Patton, D., & Kenney, M. (2016). University technology transfer in China: A literature review and taxonomy. The Journal of Technology Transfer, 41, 891-929.

24. Chen, H., Griffith, D. A., & Hu, M. Y. (2006). The influence of liability of foreignness on market entry strategies: An illustration of market entry in China. International Marketing Review, 23, 636-649.

25. Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. Research Policy, 40, 441-452.

26. Clerides, S. K., Lach, S., & Tybout, J. R. (1998). Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico, and Morocco. The Quarterly Journal of Economics, 113, 903-947.

27. Coe, D. T., & Helpman, E. (1995). International r&d spillovers. European Economic Review, 39, 859-887.

28. Connelly, B. L., Hoskisson, R. E., Tihanyi, L., & Certo, S. T. (2010). Ownership as a form of corporate governance. Journal of Management Studies, 47, 1561-1589.

29. Cuervo-Cazurra, A., & Li, C. (2021). State ownership and internationalization: The advantage and disadvantage of stateness. Journal of World Business, 56, 101112.

30. Das, S., Roberts, M. J., & Tybout, J. R. (2007). Market entry costs, producer heterogeneity, and export dynamics. Econometrica, 75, 837-873.

31. Deng, Z., Guo, H., Zhang, W., & Wang, C. (2014). Innovation and survival of exporters: A contingency perspective. International Business Review, 23, 396-406.

32. Dunning, J. H., & Lundan, S. M. (2008). Multinational enterprises and the global economy: Second ed., Edward Elgar: Cheltenham UK.

33. Dutta, S., Narasimhan, O., & Rajiv, S. (2005). Conceptualizing and measuring capabilities: Methodology and empirical application. Strategic Management Journal, 26, 277-285.

34. Fan, G., Wang, X., & Zhu, H. (2011). NERI index of marketization of China's provinces 2011 report. Beijing: National Economic Research Institute.

35. Fang, H. C., Memili, E., Chrisman, J. J., & Tang, L. (2021). Narrow-framing and risk preferences in family and non-family firms. Journal of Management Studies, 58, 201-235.

36. Filatotchev, I., Liu, X., Buck, T., & Wright, M. (2009). The export orientation and export performance of high-technology SMEs in emerging markets: The effects of knowledge transfer by returnee entrepreneurs. Journal of International Business Studies, 40, 1005-1021.

37. Filatotchev, I., Stephan, J., & Jindra, B. (2008). Ownership structure, strategic controls and export intensity of foreign-invested firms in transition economies. Journal of International Business Studies, 39, 1133-1148.

38. Filipescu, D. A., Prashantham, S., Rialp, A., & Rialp, J. (2013). Technological innovation and exports: Unpacking their reciprocal causality. Journal of International Marketing, 21, 23-38.

39. Fu, X. (2011). Processing Trade, FDI and the Exports of Indigenous Firms: Firm-Level Evidence from Technology-Intensive Industries in China. Oxford Bulletin of Economics and Statistics, 73, 792-817.

40. Fu, X., Hou, J., & Sanfilippo, M. (2017). Highly skilled returnees and the internationalization of EMNEs: Firm level evidence from China. International Business Review, 26, 579-591.

41. García, F., Jin, B., & Salomon, R. (2013). Does inward foreign direct investment improve the innovative performance of local firms? Research Policy, 42, 231-244.

42. Gashi, P., Hashi, I., & Pugh, G. (2014). Export behaviour of SMEs in transition countries. Small Business Economics, 42, 407-435.

43. Genin, A. L., Tan, J., & Song, J. (2021). State governance and technological innovation in emerging economies: State-owned enterprise restructuration and institutional logic dissonance in China's high-speed train sector. Journal of International Business Studies, 52, 621-645.

44. Golovko, E., & Valentini, G. (2011). Exploring the complementarity between innovation and export for SMEs' growth. Journal of International Business Studies, 42, 362-380.

45. Gubbi, S. R., Aulakh, P. S., & Ray, S. (2015). International search behavior of business group affiliated firms: Scope of institutional changes and intragroup heterogeneity. Organization science, 26, 1485-1501.

46. Holtbrügge, D., Friedmann, C. B., & Puck, J. F. (2010). Recruitment and retention in foreign firms in India: A resource-based view. Human Resource Management, 49, 439-455.

47. Hong, J., Wang, C., & Kafouros, M. (2015). The role of the state in explaining the internationalization of emerging market enterprises. British Journal of Management, 26, 45-62.

48. Hopenhayn, H. A. (1992a). Entry, exit, and firm dynamics in long run equilibrium. Econometrica: journal of the Econometric Society, 1127-1150.

49. Hopenhayn, H. A. (1992b). Exit, selection, and the value of firms. Journal of Economic Dynamics and Control, 16, 621-653.

50. Huang, C., Zhang, M., Zhao, Y., & Varum, C. A. (2008). Determinants of exports in China: a microeconometric analysis. The European Journal of Development Research, 20, 299-317.

51. Hymer, S. H. (1976). The International Operations of National Firms: A Study of Foreign Direct Investment (1960). In: MIT Press, Cambridge, MA.

52. Imbruno, M. (2016). China and WTO liberalization: Imports, tariffs and non-tariff barriers. China Economic Review, 38, 222-237.

53. İpek, İ. (2018). The resource-based view within the export context: An integrative review of empirical studies. Journal of Global Marketing, 31, 157-179.

54. Ito, K., & Lechevalier, S. (2010). Why some firms persistently out-perform others: Investigating the interactions between innovation and exporting strategies. Industrial and Corporate Change, 19, 1997-2039.

55. Jiang, L. A., Waller, D. S., & Cai, S. (2013). Does ownership type matter for innovation? Evidence from China. Journal of Business Research, 66, 2473-2478.

56. Jormanainen, I., & Koveshnikov, A. (2012). International activities of emerging market firms. Management International Review, 52, 691-725.

57. Kafouros, M. I., & Buckley, P. J. (2008). Under what conditions do firms benefit from the research efforts of other organizations? Research Policy, 37, 225-239.

58. Kahiya, E. T. (2018). Five decades of research on export barriers: Review and future directions. International Business Review, 27, 1172-1188.

59. Kathuria, V. (2008). The impact of FDI inflows on R&D investment by medium-and high-tech firms in India in the post-reform period. Transnational Corporations, 17, 45.

60. Kneller, R., & Pisu, M. (2007). Industrial linkages and export spillovers from FDI. World Economy, 30, 105-134.

61. Kotabe, M., Dunlap-Hinkler, D., Parente, R., & Mishra, H. A. (2007). Determinants of cross-national knowledge transfer and its effect on firm innovation. Journal of International Business Studies, 38, 259-282.

62. Krammer, S. M., Strange, R., & Lashitew, A. (2018). The export performance of emerging economy firms: The influence of firm capabilities and institutional environments. International Business Review, 27, 218-230.

63. Krugman, P. (1979). Increasing returns, monopolistic competition, and international trade. Journal of International Economics, 9, 469-479.

64. Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. The American Economic Review, 70, 950-959.

65. Liu, X., & Buck, T. (2007). Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. Research Policy, 36, 355-366.

66. Liu, X., Xiao, W., & Huang, X. (2008). Bounded entrepreneurship and internationalisation of indigenous Chinese private-owned firms. International Business Review, 17, 488-508.

67. Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: A springboard perspective. Journal of International Business Studies, 38, 481-498.

68. Markusen, J. R. (1995). The boundaries of multinational enterprises and the theory of international trade. Journal of Economic perspectives, 9, 169-189.

69. Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica, 71, 1695-1725.

70. Melitz, M. J., & Redding, S. J. (2021). Trade and Innovation (Working Paper No. 28945). In: National Bureau of Economic Research, Cambridge, MA. www.nber.org/papers/w28945.

71. Mu, Q., & Lee, K. (2005). Knowledge diffusion, market segmentation and technological catch-up: The case of the telecommunication industry in China. Research Policy, 34, 759-783.

72. Neter, J., Wasserman, W., & Kutner, M. H. (1985). Applied linear statistical models: Regression, analysis of variance, and experimental designs, Homewood, IL: Richard D. Irwin. Inc.[701].

73. Nuruzzaman, N., Singh, D., & Gaur, A. S. (2020). Institutional support, hazards, and internationalization of emerging market firms. Global Strategy Journal, 10, 361-385.

74. Ogasavara, M. H., Boehe, D. M., & Cruz, L. B. (2016). Experience, resources and export market performance: The pivotal role of international business network ties. International Marketing Review, 33, 867–893.

75. Oura, M. M., Zilber, S. N., & Lopes, E. L. (2016). Innovation capacity, international experience and export performance of SMEs in Brazil. International Business Review, 25, 921-932.

76. Peng, M. W. (2001). The resource-based view and international business. Journal of Management, 27, 803-829.

77. Qin, J. Y. (2019). Forced technology transfer and the US–China trade war: Implications for international economic law. Journal of International Economic Law, 22, 743-762.

78. Ramamurti, R. (2001). The obsolescing 'bargaining model'? MNC-host developing country relations revisited. Journal of International Business Studies, 32, 23-39.

79. Rialp-Criado, A., & Komochkova, K. (2017). Innovation strategy and export intensity of Chinese SMEs: The moderating role of the home-country business environment. Asian Business & Management, 16, 158-186.

80. Roberts, M. J., & Tybout, J. R. (1997). The decision to export in Colombia: An empirical model of entry with sunk costs. The American Economic Review, 545-564.

81. Rodríguez, J. L., & Rodríguez, R. M. G. (2005). Technology and export behaviour: A resource-based view approach. International Business Review, 14, 539-557.

82. Roper, S., & Love, J. H. (2002). Innovation and export performance: evidence from the UK and German manufacturing plants. Research Policy, 31, 1087-1102.

83. Sheldon, P., & Li, Y. (2013). Localized poaching and skills shortages of manufacturing employees among MNEs in China. Journal of World Business, 48, 186-195.

84. Silva, G. M., Styles, C., & Lages, L. F. (2017). Breakthrough innovation in international business: The impact of tech-innovation and market-innovation on performance. International Business Review, 26, 391-404.

85. Singh, D. A. (2009). Export performance of emerging market firms. International Business Review, 18, 321-330.

86. Tavassoli, S. (2018). The role of product innovation on export behavior of firms: Is it innovation input or innovation output that matters? European Journal of Innovation Management, 21, 294-314.

87. Tukey, J. W. (1962). The future of data analysis. The annals of mathematical statistics, 33, 1-67.

88. Véganzonès-Varoudakis, M.-A., & Plane, P. (2019). Innovation, exports, productivity and investment climate; a study based on Indian manufacturing firm-level data. Applied Economics, 51, 4455-4476.

89. Vinh, N. T. T., & Duong, T. T. T. (2020). Firm export and the impact of foreign ownership in Vietnam: A micro-data analysis Journal of Economic Development, 45.

90. Walheer, B., & He, M. (2020). Technical efficiency and technology gap of the manufacturing industry in China: Does firm ownership matter? World Development, 127, 104769.

91. Wang, C., Buckley, P. J., Clegg, J., & Kafouros, M. (2007). The impact of foreign direct investment on Chinese export performance. Transnational Corporations, 16, 119-136.

92. Wang, C., Hong, J., Kafouros, M., & Wright, M. (2012). Exploring the role of government involvement in outward FDI from emerging economies. Journal of International Business Studies, 43, 655-676.

93. Wang, C., & Kafouros, M. I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. International Business Review, 18, 606-616.

94. Wang, F. (2014). Complementarities between R&D investment and exporting—Evidence from China. China Economic Review, 31, 217-227.

95. Wang, J., & Wang, X. (2015). Benefits of foreign ownership: Evidence from foreign direct investment in China. Journal of International Economics, 97, 325-338.

96. Wang, J., Wei, Y., Liu, X., Wang, C., & Lin, H. (2014). Simultaneous impact of the presence of foreign MNEs on indigenous firms' exports and domestic sales. Management International Review, 54, 195-223.

97. Wang, Y., Cao, W., Zhou, Z., & Ning, L. (2013). Does external technology acquisition determine export performance? Evidence from Chinese manufacturing firms. International Business Review, 22, 1079-1091.

98. White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817-838.

99. WorldBank. (2008). World development indicators 2008. In: New York, USA: World Bank.

100. Wu, J., & Zhao, H. (2015). The dual effects of state ownership on export activities of emerging market firms: An inducement–constraint perspective. Management International Review, 55, 421-451.

101. Wu, L., Wei, Y., & Wang, C. (2021). Disentangling the effects of business groups in the innovation-export relationship. Research Policy, 50, 104093.

102. Xie, Z., & Li, J. (2018). Exporting and innovating among emerging market firms: The moderating role of institutional development. Journal of International Business Studies, 49, 222-245.

103. Yang, C.-H., & Chen, Y.-H. (2012). R&D, productivity, and exports: Plant-level evidence from Indonesia. Economic Modelling, 29, 208-216.

104. Ye, Z., Zhang, F., & Zhang, S. (2021). Export effect and influence mechanism of foreign ownership. International Review of Economics & Finance, 76, 258-276.

105. Yi, J., Hong, J., chung Hsu, W., & Wang, C. (2017). The role of state ownership and institutions in the innovation performance of emerging market enterprises: Evidence from China. Technovation, 62, 4-13.

106. Yi, J., & Wang, C. (2012). The decision to export: Firm heterogeneity, sunk costs, and spatial concentration. International Business Review, 21, 766-781.

107. Yi, J., Wang, C., & Kafouros, M. (2013). The effects of innovative capabilities on exporting: Do institutional forces matter? International Business Review, 22, 392-406.

108. Yuan, X., Deng, Z., Jean, R.-J. B., & Kim, D. (2015). Hierarchical linear modeling in international marketing research: a review with an application on innovation and export in China. Frontiers of Business Research in China, 9, 135-160.

109. Zahra, S. A., Ireland, R. D., & Hitt, M. A. (2000). International expansion by new venture firms: International diversity, mode of market entry, technological learning, and performance. Academy of Management Journal, 43, 925-950.

110. Zhang, J., & Zhu, M. (2016). Market orientation, product innovation and export performance: evidence from Chinese manufacturers. Journal of Strategic Marketing, 24, 377-397.

111. Zhang, L., Cui, L., Li, S., & Lu, J. (2018). Who rides the tide of regionalization: Examining the effect of the China-ASEAN Free Trade Area on the exports of Chinese firms. International Business Review, 27, 501-513.

112. Zhou, K. Z., Gao, G. Y., & Zhao, H. (2017). State ownership and firm innovation in China: An integrated view of institutional and efficiency logics. Administrative Science Quarterly, 62, 375-404.

Chapter 3

Innovative capabilities and outward FDI by emerging market enterprises: The moderating effects of state ownership and marketization

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Innovative capabilities and outward FDI by emerging market enterprises: The moderating effects of state ownership and marketization

Abstract: This study develops and tests the premise that the impact of innovative capabilities on outward foreign direct investment (OFDI) commitment is not uniform but rather contingent upon the institutional setting in which a firm is embedded. Using a sample of Chinese listed manufacturing firms during 2007–2019, we demonstrate that innovative capabilities have a strong and independent impact on the OFDI propensity and intensity of emerging-market enterprises (EMEs). This impact, however, is negatively moderated by higher levels of state ownership, as well as by a location that is relatively well marketized. These results are robust in a variety of measurements of the key variables and the use of the number of Qing Dynasty Confucian academies as a novel instrumental variable. These findings provide new theoretical mechanisms for conceptualizing the internationalization implications of innovation.

Keywords: Innovative capabilities; OFDI; State ownership; Marketization; EMEs

1. Introduction

Innovation and internationalization are closely related strategic activities and considered as two major growth strategies for emerging-market enterprises (EMEs). A large body of research has shown a positive impact of innovation on firm internationalization in advanced economies based on the resource-based view (RBV) (Cassiman & Golovko, 2011; Rodríguez & Rodríguez, 2005; Saridakis, et al., 2019). Despite this theoretical consensus, however, few studies have examined the relationship in emerging economies (EEs), which differ substantially from advanced economies in terms of firm-level ownership advantages and institutional environment (Hong, Wang & Kafouros, 2015; Wang, et al., 2012a). Instead, much attention in the EME debate has focused on the inverse relationship, demonstrating a positive impact of outward foreign direct investment (OFDI) on the innovation performance of home economies (e.g., Fu, Hou & Liu, 2018; Li, et al., 2016; Piperopoulos, Wu & Wang, 2018). A prevailing view from this stream of research is that EMEs generally lack a strong technological competitive advantage due to their weak domestic resource base, leading them to seek OFDI as a source of innovation performance improvement (Child & Rodrigues, 2005; X. Li, et al., 2018; Tang, et al., 2020). Yet, EMEs have achieved remarkable success in international markets in recent years, challenging "the conventional views on the weak competitiveness of EMEs" (Jormanainen & Koveshnikov, 2012;

Wu, Wei & Wang, 2021). This, combined with the rapid growth of domestic technology in EEs, has prompted the need for a new explanation of the sources of competitive advantages that enable EMEs to internationalize. In this study, we ask the question whether there is innovation–led OFDI in EEs.

In addition to technological ownership advantages, a firm's internationalization decisions can also be influenced by the institutional environments in which it is embedded, even more so in EEs than in advanced economies, where firm characteristics tend to be more important (Peng, 2003; Peng, Wang & Jiang, 2008). This can be seen from the fact that EMEs' strategies, including internationalization, are greatly influenced by state interventions, piecemeal economic reforms, and gradual institutional changes (Hong, Wang & Kafouros, 2015; Qiao, Lv & Zeng, 2020). In large EEs such as China, the uneven pace of ongoing market-oriented economic reform across regions has led to substantial heterogeneity in the firm-level state ownership and regional institutional settings, potentially resulting in further divergent resource endowments and strategic orientations across firms (Hong, Wang & Kafouros, 2015; J. Li, et al., 2018; Peng, Wang & Jiang, 2008). These variations in institutional environment have been linked to the increasing pursuit of OFDI by Chinese firms, which has fueled a rising stream of empirical studies on the relationship between domestic institutional environments and the internationalization of EMEs (e.g., Greve & Man Zhang, 2017; Liu, Lu & Chizema, 2014; Sun, et al., 2015). These studies adopted an institution-based view (IBV) of OFDI, which presumes that institutional drivers, including government involvement and regional institution development, have a direct impact on OFDI activities (Deng, Yan & Van Essen, 2018; Luo, Xue & Han, 2010; Peng, Wang & Jiang, 2008; Tang, 2021; Wang, et al., 2012a). However, the findings from this stream of research offer only a partial understanding of the internationalization determinants in EEs, as they implicitly assume that all EMEs have similar levels of innovative capability. An excessive focus on direct institutional impacts not only overlooks the possibility that technological capabilities can directly shape internationalization (e.g., Tang, 2019; Wang, et al., 2012a), but also undertheorizes the interaction effects between institutional forces and innovative capabilities that may indirectly affect EMEs' OFDI. With this background, this study aims to integrate RBV- and IBV-based approaches to examine the impact of innovation capability on EMEs' OFDI, paying particular attention to the interplay between innovation capability and domestic institutional environment in relation to OFDI.

The study's core argument is that innovation capability is a prerequisite for EMEs to leverage their resources and capabilities toward OFDI; further, the impact of firm-specific innovation on OFDI partly depends on a critical institutional environment constituted by the internal state ownership and the external regional marketization. On this basis, analysis was conducted on data drawn from a sample of 1,617 publicly listed Chinese manufacturing firms from 2007 to 2019. This study employs the broad term 'OFDI commitment' to represent the propensity and intensity of OFDI (Deng, Yan & Van Essen, 2018). After controlling for a series of firm-, location- and industry-specific factors, this study tests its hypotheses using various econometric methods, including Probit models and Tobit models. These analyses show that innovative capabilities have a strong, independent and positive impact on the OFDI commitment of Chinese EMEs, while such impact is weaker for EMEs that have a higher degree of state ownership or locate in regions of higher degree of marketization. These results are economically meaningful, statistically significant, and robust to a wide variety of controls and alternative measures of key variables, as well as to the use of the number of Qing Confucian academies as an instrumental variable (IV).

This study makes several contributions. First, it enriches the theoretical debate on how multilevel institutional factors, through their interplay with innovation, indirectly affect OFDI commitment by providing new empirical evidence that contradicts existing findings (e.g., Hong, Wang & Kafouros, 2015; Qiao, Lv & Zeng, 2020). On the basis of the divergent theoretical predictions on the effects of state ownership on OFDI (e.g., Hu & Cui, 2014; Wang, et al., 2012b), this paper demonstrates a negative moderating effect of state ownership on the innovation–OFDI commitment nexus in China. This indicates that state ownership may hinder EMEs' ability to rely on their innovative capabilities to invest abroad. In addition, our empirical results consistently suggest that a high degree of local marketization may also reduce the level of OFDI commitment of firms who are expected to commit more based on their innovative capability. This finding challenges existing studies which document that local institutions exert a positive moderating effect on the innovation–internationalization relationship (e.g., Qiao, Lv & Zeng, 2020; Yi, Wang & Kafouros, 2013). One explanation for this seemingly puzzling observation is that firms in lowly marketized regions may view OFDI as an escape from weak local institutional conditions and competitive disadvantages, in which case innovation capability is particularly important for conducting OFDI, while firms in highly marketized regions may benefit from the institutional advantageous conditions in conducting OFDI, weakening the innovation-OFDI relationship. These findings provide novel theoretical insights into understanding the antecedents

of EMEs' OFDI by revealing how institutional factors indirectly affect OFDI. Second, using a relatively large and current sample, this study elucidates with convincing evidence how innovation capability, measured by patents and R&D intensity, positively impacts EMEs' OFDI. This finding supports the expectations of RBV-based theoretical perspectives and also confirms that innovation is a source of competitive advantage in international markets for EMEs (Cui & Jiang, 2010; Yi, Wang & Kafouros, 2013), thereby contributing to the ongoing theoretical conversations about innovation–internationalization dynamics in EEs (Purkayastha, Manolova & Edelman, 2018; Qiao, Lv & Zeng, 2020; Wu, Wei & Wang, 2021). Third, our research findings are of interest to policymakers and practitioners who are concerned with innovation and OFDI competitiveness. We put forward several recommendations that can help policymakers and managers in practice based on the findings from this study. More broadly, we expect that some of the China-based findings will be applicable to other countries, given the prevalence of state ownership and institutional reforms across EEs. The remainder of this paper is structured as follows. Section 2 introduces the research hypotheses and discusses their theoretical underpinnings. Section 3 presents the data and the empirical specifications. Section 4 presents the econometric results and discusses the robustness checks. Section 5 discusses the findings and implications.

2. Theoretical background and hypotheses

EMEs need unique competitive capabilities and advantages to expand into foreign markets (Dunning, 1993). According to the RBV, resources that are valuable, rare, imperfectly imitable or substitutable are an organization's main source of sustainable competitive advantages (Barney, 1991). Among these, innovation capability is one of the most irreplaceable resources that may generate a unique competitive advantage and has been identified as a crucial driver of international expansion (Cui & Jiang, 2010; Qiao, Lv & Zeng, 2020; Yi, Wang & Kafouros, 2013). In addition, the heterogeneity of firms' innovative capabilities and their ability to accumulate, combine and deploy resources has been recognized to contribute to the differences in firms' international competitiveness (Wu, Wei & Wang, 2021). While the RBV suggests that firm strategies (including internationalization) can be economically justified at the firm level, the IBV argues that EMEs' internationalization decisions are the result of various institutional pressures and political influences (Peng, Wang & Jiang, 2008). Specifically, both the setting of internal ownership and the external institutional environment shape an organization's behavior (J. Li, et al., 2018; Peng, Wang & Jiang, 2008). On the one hand, despite the national policy of

market-oriented economic reform in large EEs, the institutional environment in which a firm operates is often determined at the subnational level (Shi, Sun & Peng, 2012; Wang, et al., 2012b). On the other hand, while external factors such as macro-level institutional forces can uniformly affect all firms in a given region, internal institutional-level factors, such as government relationships (including the form of state ownership) are idiosyncratic at the firm level (Hong, Wang & Kafouros, 2015; Yi, Wang & Kafouros, 2013).[44] Therefore, the internationalization strategy of an EME is determined not only by its own resources and capabilities, but also by its internal ownership and external institutional factors (Qiao, Lv & Zeng, 2020; Wang, et al., 2012b). In other words, the RBV and IBV explanations of EMEs' internationalization are interdependent and complementary, as institutional forces can influence and interact with firm resources. Although we expect institutional factors to affect OFDI independently of innovation capabilities, we hypothesize that the effects of innovative capabilities on international expansion are not uniform across EMEs, but rather depend on an EME's state ownership and location-specific institutional idiosyncrasies. Hence, this study aims to investigate the direct impact of innovative capabilities on OFDI and to interpret the impact with reference to a firm's institutional context.

2.1 Innovation and Outward FDI

RBV-based studies have well documented that firms with higher levels of innovative capability in developed economies have stronger incentives to internationalize, as technology and innovation not only increase their managerial willingness to invest abroad, but also enable them

[44] This paper focuses on the moderating effect of state ownership in the innovation-OFDI nexus because state ownership is the most direct means of government control over firms and plays a key role in market reform. However, other types of political connections including government affiliation at different geographic levels (provincial, municipal, country and township) and various forms of political ties can also independently influence a firm' internationalization behavior and performance, For example, personal linkages to both firms and public authorities could enable firms, especially private firms, to acquire institutional support and government-controlled critical resources. An example of such personal linkage is when a firm's top-management team serves or has served as a deputy to the National People's Congress or other levels of public administration. Such links to the state might encourage the firm to work harder in order to achieve a certain objective (such as internationalization).

to overcome the liability of foreignness and help them with knowledge integration (Cassiman & Golovko, 2011; Dunning, 1993; Saridakis, et al., 2019). However, literature on the relationship between innovation and internationalization in EEs is not as extensive as that in developed countries, and findings based on existing empirical studies are inconclusive. Among these, a few have shown that technological resources and capabilities do not have a significant impact on EMEs' international investment (e.g., Wang, et al., 2012a; Wang, et al., 2012b; Yiu, Lau & Bruton, 2007), while others have found a significantly positive impact (e.g., Cui & Jiang, 2010; Purkayastha, Manolova & Edelman, 2018; Qiao, Lv & Zeng, 2020).

The inconsistent results may stem from differences in the sample period and sample size, especially given the rapid economic growth and technological development of EEs. Taking China as an example, the comparative advantages of EMEs in the first few decades of economic reform and the "going out" strategy were primarily reflected in the more labor-intensive and less sophisticated manufacturing industry, which implies few EMEs had high innovative capabilities. Related to this, the incentives of EMEs' internationalization decisions have been largely described as achieving "learning objective". Specifically, compared with multinational enterprises (MNEs) in advanced economies that had developed strong competitive advantages before internationalization, EMEs pursue OFDI to take advantage of resources that are not available in their home countries, including access to new technologies (Child & Rodrigues, 2005; X. Li, et al., 2018). This argument has led many scholars, until today, to pursue that the OFDI behavior of EMEs is not primarily driven by their unique resources and capabilities, but by the 'learning' objective: they enter markets where attractive technologies exist, and seek mutually beneficial relationships with firms in the new location (Fu, Hou & Liu, 2018; Piperopoulos, Wu & Wang, 2018). While this may be largely true for the early stages of an EE's economic growth, over time, a series of policies supporting innovation and cross-border business have enabled EMEs to improve their technological capabilities, thereby increasing their competitiveness in the global market. As a result, China has become one of the largest R&D investors and foreign investors today (Qiao, Lv & Zeng, 2020). Thus, this catching-up process may be accompanied by an evolving relationship between innovation and internationalization decisions in EMEs.

Despite the inconsistent results from existing empirical evidence, most theoretical insights indicate that innovation remains essential for the internationalization decisions of EMEs, and

that EMEs with a high level of innovative capabilities are more likely to engage in OFDI activities. The core argument for this prediction is that innovation helps reduce production costs and raise productivity, or that it allows EMEs to gain competitive advantages in foreign markets through the development of more specific innovative technologies and the creation of highly innovative products and services (Cui & Jiang, 2010; Purkayastha, Manolova & Edelman, 2018; Qiao, Lv & Zeng, 2020). In addition, higher levels of innovative capabilities enable EMEs to not only utilize international expansion as a springboard to acquire critical resources and enhance their core competitiveness (Luo & Tung, 2007), but also leverage their R&D returns in larger or more markets and seek better intellectual property rights (IPR) protection (Stoian & Mohr, 2016; Xia, et al., 2014). OFDI may bring an EME closer to valuable technologies, but without sufficient prior innovative efforts and capabilities, the EME may not be able to absorb new technologies and knowledge (Fu, Pietrobelli & Soete, 2011). For example, despite Geely's acquisition of Volvo Cars being an example of strategic asset-seeking investment (Elia & Santangelo, 2017), Geely still requires a sufficient level of technological resources and innovative capabilities to manage the new organization and to successfully integrate new technologies into its existing organizational routines. Furthermore, in parallel with the internationalization of regional IPR protection, EMEs must continue to innovate to maintain their competitiveness on the international market. Some studies have shown that Asian firms with higher levels of technological advantages are more likely to enter markets of developed countries (e.g., Tomiura, 2007), and MNEs from EEs use their technological advantages to move towards a higher level of internationalization, instead of relying on their intrinsic cost advantages (Child & Rodrigues, 2005; Yiu, Lau & Bruton, 2007). Therefore, the above theoretical discussions point to the following hypothesis:

Hypothesis 1 (H1): An EME's innovative capabilities have a positive impact on its OFDI commitment.

2.2 The moderating role of state ownership

As a unique form of government–firm interdependence, state ownership prevails in transitional economies (Peng, 2003). During the transitional period, state owners (i.e., the national government and its institutions) use their formal decision-making power to guide business practices in accordance with the institutional logic of state socialism and to achieve the goals set by the government (Greve & Man Zhang, 2017; Tang, 2019). Studies have shown that firm-level

state ownership has a direct positive impact on EMEs' OFDI, as firms with state ownership can obtain preferential policy support (e.g., tax rebates, foreign exchange assistance), financial support and privileged access to government-controlled strategically important resources to facilitate their overseas expansion (Hong, Wang & Kafouros, 2015; Wang, et al., 2012a). However, it should be noted that not all state-owned enterprises (SOEs) intend to invest overseas. Conversely, SOEs' homegrown advantages and their political priorities and social responsibilities (such as maintaining employment rates or accommodating social concerns and needs) may even reduce their incentives to seek new opportunities in foreign markets or to take risks in OFDI. This too, has supporting evidence from empirical studies that focus on China, showing that the relationship between state ownership and OFDI is insignificant (Hu & Cui, 2014; Tang, 2021) or even negative (J. Li, et al., 2018; Xia, et al., 2014).

Given these conflicting arguments and empirical results on the direct impact of state ownership on firms' OFDI, it is difficult to predict on theoretical grounds what the moderating role of state ownership in the innovation–OFDI relationship will be. On the one hand, state ownership may indirectly promote OFDI through its positive effects on innovation. According to previous RBV-based research, differences in firms' international expansion result from resource differences, and SOEs may possess more resources that could facilitate their OFDI activities than non-SOEs (e.g., Cuervo-Cazurra, et al., 2014; Wang, et al., 2012a). In this regard, state ownership allows firms to have easier and greater access to complementary assets and government-controlled intangible resources, such as publicly funded R&D results (Choi, Lee & Williams, 2011), which may strengthen their innovative capabilities, thereby increasing their propensity and ability to expand overseas.

On the other hand, state ownership may weaken the expected positive effect of innovation on OFDI, as the adverse side effects associated with state ownership may reduce the overall efficiency of overseas investment. Specifically, state ownership is often accompanied by high degrees of state involvement, resulting in inefficient corporate governance, poor financial performance, higher levels of corruption, and lower compatibility with host state institutions (Cui & Jiang, 2010; J. Li, et al., 2018; Wang, et al., 2012b). For example, SOEs are often required to report to multiple government agencies and may face lengthy and complex OFDI approval procedures (Cui & Jiang, 2010). Although state owners can subsidize SOEs' R&D-related OFDI and provide stronger protection of IPR in internationally competitive environments, especially

considering the rapidity of technological growth worldwide, internal inefficiency may hinder the international expansion of EMEs due to dysfunctional and tardy strategic reactions to foreign market changes (Tang, 2019). In addition, a cozy firm–state relationship at home often presents EMEs with challenges in establishing their institutional legitimacy in host governments, resulting in more obstacles for cross-border acquisitions, especially those involving high technology (Cui & Jiang, 2010; Hong, Wang & Kafouros, 2015). Taken together, the above arguments suggest that firms with state ownership may be more inclined to stay home than invest abroad, regardless of their privileged technology resources. This motivates us to predict that unfavorable aspects related to state ownership may hinder a firm's internationalization efforts in innovation:

Hypothesis 2 (H2): State ownership weakens the positive relationship between innovative capabilities and an EME's OFDI commitment.

2.3 The moderating role of regional marketization

Marketization can be defined as the degree to which a business environment is driven by market forces and firms rather than by the state (Hong, Wang & Kafouros, 2015; Shi, Sun & Peng, 2012). A high degree of marketization implies that market competition dominates and there is less government intervention in business activities (Hong, Wang & Kafouros, 2015; Liu, Lu & Chizema, 2014). As mentioned earlier, in large EEs like China, subnational regions exhibit significant market-relevant institutional variations including the pace and extent of market-oriented economic reforms, with higher levels of marketization in the eastern and coastal regions than in the inland regions (Fan, Wang & Zhu, 2017).

Many studies have identified a positive direct impact of regional marketization on local firms' internationalization activities (e.g., J. Li, et al., 2018). The main argument for this direct relationship is that regions dominated by market-based mechanisms provide EMEs with favorable conditions for internationalization, such as less coercive pressure from government agencies, better legal protections, and lower transaction- and agency costs. In such environments, EMEs rely on market economic principals and utilize market coordination factors to achieve internationalization. In addition, the high level of competition and homogenization pressure in these regions may also prompt firms to conduct OFDI activities[45] (Yiu, Lau & Bruton, 2007).

[45]At the same time, compared with cross-border investment (namely OFDI activities), firms in these regions may also tend to conduct cross-region investment.

Since this study specifically examines the impact of innovation capabilities on EMEs' OFDI commitment, we consider regional marketization as a key moderating factor in the relationship between innovation and OFDI commitment in EMEs.

Marketization may play a positive moderating role in the innovation-OFDI relationship through its indirect effects on firm innovation. Regions with a high degree of marketization can provide a market-oriented legal system and strong law enforcement mechanisms that can stimulate and protect firms' innovation outputs. In addition, these regions can provide local firms with the necessary innovation and production factors to increase productivity and reduce production- and innovation costs, thereby further incentivizing firms to develop new technologies and transform innovations into a source of competitive advantages in foreign markets (Yi, Wang & Kafouros, 2013). These theoretical arguments have been validated by several empirical studies that highlight the moderating effects of regional marketization on the innovation–OFDI relationship in EEs. For example, Qiao, Lv and Zeng (2020) find that regional marketization has a positive moderating effect on the relationship between R&D intensity and the OFDI frequency of small and medium-sized enterprises (SMEs) in China during the period 2010-2017. Besides, studies based on the "fostering" view of institutions show that advanced domestic institutions can help local firms enhance their competitive advantages and facilitate their outward internationalization (Sun, et al., 2015; Wan & Hoskisson, 2003).

However, highly marketized regions may also promote OFDI in an innovation-independent manner by providing direct favorable resources and elements for the internationalization of local firms, such as international networks and interactions with foreign MNEs, thereby reducing the contribution of innovation capability to OFDI in these regions. Besides, firms (especially privately owned firms) in regions with low marketization may be more inclined to conduct OFDI in order to escape weak local institutions characterized by prevailing government intervention, maximizing the use of their unique technological capabilities (Stoian & Mohr, 2016; Tang, 2021). Specifically, excessive protection of local SOEs through improper resource allocation in weakly marketized regions may cause unprivileged local firms to view internationalization in the form of OFDI as an escape from discrimination and competitive disadvantages (Cuervo-Cazurra & Genc, 2008; J. Li, et al., 2018). Thus, OFDI commitments in lowly marketized regions may be more driven by innovation than in highly marketized regions, where advantageous institutional conditions may also contribute to OFDI commitment, leading to a possible negative moderating

effect of higher marketization in the innovation-OFDI relationship. Nonetheless, given that existing empirical evidence points almost exclusively to the positive effect of marketization on the innovation-internationalization relationship, the possible negative effects associated with the above scenarios may be masked. Therefore, this study expects that the link between innovation and OFDI commitment will be stronger for EMEs in regions with a higher degree of marketization:

Hypothesis 3 (H3): The effects of innovative capabilities on an EME's OFDI commitment are stronger in subnational regions with a higher degree of marketization than in those with a lower degree of marketization.

3. Data and methods

3.1. Data and sampling

China has emerged as a major source of OFDI worldwide and a leading innovator in terms of patent output– together with its varied ownership landscape and regional institutional setting, which provides an ideal setting for examining contextual factors that might moderate the link between a firm's innovative capabilities and its OFDI commitments. The China Securities Regulatory Commission (CSRC) enacted new regulations in 2007 to ensure that the information disclosure of publicly listed firms is more accurate and complete. The panel data used in this study was submitted in accordance with the new CSRC regulations by Chinese manufacturing firms that have been publicly listed on the Shanghai and Shenzhen Stock Exchanges over 13 years (2007–2019, inclusive).[46] These data were collected from the China Stock Market & Accounting Research (CSMAR) database, which is reliable and has been used frequently to test IB theories (e.g., Lyles, Li & Yan, 2014; Piperopoulos, Wu & Wang, 2018; Tang, et al., 2020). Specifically, details on firm age, financial information, ownership structure, innovation activities (such as R&D investments and patents), OFDI activities, parent company location, name of overseas subsidiary and host-country locations were extracted from the CSMAR database.

[46] Another reason for choosing 2007 as the start year is that in 2007, the Chinese government issued the third version of the Guidance Catalogue of Countries and Industries for Overseas Investment (Guidance hereafter, http://www.gov.cn/gongbao/content/2008/content_1018951.htm) as a new set of guidelines for Chinese FDI to help inform firms' FDI decisions (Lu, et al., 2014). Prior to this, two versions of the Guidance had been established and were issued in 2003 and 2005, respectively.

The sample was screened in four steps. First, financial firms were excluded, due to their fundamental differences from manufacturing firms (Xia, et al., 2014). Second, firms that have been listed for less than three years or delisted before 2019 were excluded to avoid abnormal and incomplete information that they might provide (Tang, et al., 2020). Third, this study excluded OFDI projects that located in Hong Kong, Macau and Taiwan (HMT). The reason is that many OFDI projects in Hong Kong and Macau are primarily for expanding financing channels and planning future investments (Tang, 2019), while investment in Taiwan is subject to cross-strait political tensions (Deng, Yan & Van Essen, 2018). Finally, OFDI projects located in Caribbean tax havens such as the British Virgin Islands and Cayman Islands were excluded because of the high probability that these subsidiaries had been established for the purpose of tax avoidance (Xia, et al., 2014). The final sample contains 1,617 manufacturing firms and 14,717 firm-year observations, covering all two-digit manufacturing sectors in China. Although the assembled data looks relatively clean, the largest outliers were eliminated by winsorizing all dependent and independent variables at the 1% level.[47]

3.2 Variables for the regression analysis

Dependent variable. Following many OFDI studies, this research measured OFDI commitment in two dimensions: the propensity to conduct OFDI and the intensity of OFDI. For each firm, a binary variable (OFDI dummy) was generated to indicate any new subsidiaries established overseas in a given year, with yes denoted as 1 and otherwise 0 (Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Liang, Ren & Sun, 2015; Xia, et al., 2014). Considering that certain firms may conduct multiple OFDI entries in one or more countries in the same year, this study used the annual total number of foreign subsidiaries established by a firm as a measure of OFDI intensity (Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Xia, et al., 2014).[48] A logarithmic transformation was performed on this variable to reduce or circumvent problems pertaining to

[47] See Tukey (1962) for details.

[48] Given the possibility that a firm may open and close its foreign subsidiaries in the same year, this study also used an alternative proxy of OFDI intensity measured by subtracting the annual exit number from the total number of foreign subsidiaries and got similar results. Although the continuous variable annual OFDI can accurately reflect the investment level of a firm, this paper aims to capture the remarkable dynamism and the strategic choice of investment abroad exhibited by Chinese firms (Liang, Ren & Sun, 2015).

heteroscedasticity and outliers (Wang & Kafouros, 2009).[49]

Independent variable. This study measured the independent variable "innovation capabilities" using the number of patents granted to each firm each year during the sample period. To reduce the skew in this variable, a logarithmic specification was also applied.[49] Despite being widely used as a measure of innovation outputs and capabilities due to its accurate embodiment of a firm's IPR (Wu, Wei & Wang, 2021), patent data is associated with some shortcomings such as inconsistency in quality and the inability to represent commercial success(Choi, Lee & Williams, 2011). With this in mind, this study added a manually calculated variable, R&D intensity, which is the ratio of a firm's R&D expenditure to its total sales, as an additional measure of innovative capability (Piperopoulos, Wu & Wang, 2018). The two indicators here, respectively, represent the input and output aspects of an EME's innovative competence.

Moderating variables. This study included two institutional variables as moderators. As the proxy of a firm's internal institutional environment, state ownership is measured as the proportion of shares held by the state (Piperopoulos, Wu & Wang, 2018; Tang, 2019). In terms of the external institutional environment of a firm, this study incorporates a measure of region-specific marketization developed by Fan, Wang and Zhu (2017).[50] This comprehensive composite index evaluates the extent to which the market is liberalized in subnational regions (provinces), and has been adopted by many studies (e.g., Hong, Wang & Kafouros, 2015; Tang, 2021; Wang, et al., 2012b; Xia, et al., 2014). The higher the marketization index value, the higher the level of the market-based system in a region. Since the relative degrees of marketization among provinces have remained stable over the years, this study followed the method of J. Li, et al. (2018) and used the marketization index value of 2016 as a proxy for 2017 and 2018, the

[49] This study also experimented with the natural count of this variable, and the results did not change significantly.

[50] Fan et al. (2017) contains annual reports on China's marketization progress since 2001. The report includes five key aspects reflected in 26 indicators, namely (a) the role of the market relative to the government, (b) the development of private sector, (c) the development of commodity and factor markets, (d) the development of market intermediary organization, and (e) the development of free-market institutions. The higher the marketization score, the more developed the market-based system in a region. For the sample period 2007–2019, index values range from 2.95 to 11.11. The marketization values are from the Wind database.

reports of which are not available.[51]

Control variables. This study controlled for a series of variables at the levels of firm, industry, region and year, which may be determinants of OFDI activities. The firm-level variables are firm age, firm size, board size, operating leverage, financial leverage, return on assets, marketing capability, foreign ownership and OFDI experience. Specifically, firms may have different resources and strategic needs in their international operations, depending on their age and size. This study measured firm age as the number of years since the parent company was established (Deng, Yan & Van Essen, 2018) and the firm size as the logarithmic transformation of its total assets (J. Li, et al., 2018). This study also controlled for the impact of board members by adding the board size variable, which is measured as the natural logarithm of the total number of board members (Deng, Yan & Van Essen, 2018). Considering that creditor-imposed restrictions limit the investment opportunities for highly leveraged firms (Deng, Yan & Van Essen, 2018), this study included two variables on firm leverage: financial leverage, measured by the ratio of total debts to total assets; and operating leverage, measured by the ratio of net fixed assets to total assets. In addition, this study included the variable return on assets, which directly influences the firm's profitability and ability to invest abroad (Chang & Rhee, 2011). To control for a firm's financial status, this variable was operationalized by calculating the ratio of a firm's net income to its total assets. The ability to promote new products in foreign markets and achieve superior firm performance may also influence OFDI decisions. Therefore, this study included the variable marketing capability, which is defined as the ratio of marketing expenses (including advertising expenditures) to sales revenue. This study also included the variable foreign ownership, measured by foreign investors' share of equity, because equity ownership by foreign investors can be an important source of global market knowledge, which in turn can facilitate OFDI (Wang, et al., 2012b). Finally, as firms with experience in deploying assets internationally are more likely to commit additional resources to OFDI (Lyles, Li & Yan, 2014), this study included a dummy variable, denoted as OFDI experience, which equals 1 if a firm has two foreign subsidiaries or more during the sample period, and otherwise equals 0.

Industry-level variables include the Herfindahl–Hirschman index (HHI) and the industrial innovation capability index. The HHI was used to proxy the level of industry concentration,

[51] In an additional robustness check, this study only used the marketization values from 2007–2016 to re-test the estimations which obtained similar results.

which is the sum of the squared fractions of the market shares of all individual firms in an industry (Herfindahl, 1950). The HHI is a commonly used indicator of the competitiveness and degree of monopoly in an industry (J. Li, et al., 2018).[52] In general, the lower the industry concentration, the fiercer the competition among firms and the greater the incentive to go abroad for new opportunities. Furthermore, this study controlled for the yearly average innovation capability at the four-digit industry level, defined as the yearly average industry number of patents granted and the yearly average industry R&D intensity separately. Considering that institutional and economic development vary across sub-industries, this study included industry dummy variables to account for heterogeneity among firms within the same two-digit industrial category (Xia, et al., 2014).

At the regional level, although local governments rarely announce policies that incentivize or restrict OFDI, governments in the eastern region are more likely to support OFDI than those in the central and western regions (J. Li, et al., 2018). To capture the potential effects caused by differences in government policies, this study added the variable regional division to distinguish firms registered in the three geographic regions of China (J. Li, et al., 2018; Xia, et al., 2014). This variable is equal to 1 if a firm is located in the eastern region (Beijing, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin, Fujian, Zhejiang), 2 if located in the central region (Anhui, Heilongjiang, Hubei, Hunan, Jilin, Jiangxi, Henan, Shanxi) and 3 if located in the western region (remaining provinces). Finally, this study incorporated year dummy variables to capture the differences in OFDI activities associated with omitted variables that evolve over time (Xia, et al., 2014). Table 1 summarizes the variables and their expected effects on OFDI.

Table 1. Definition of variables

Variables	Definition
Dependent variable	
OFDI propensity	=1, if the focal firm had at least one new foreign subsidiary in a specific year; 0 otherwise
OFDI intensity	Log (1+number of foreign subsidiaries)
Independent variable	
Patents granted	Log (1+ number of patents granted)
R&D intensity	The ratio of a firm's R&D expenditure to total sales

[52] However, the HHI may not be applicable to emerging markets as the inequality of firms' market share caused by government intervention and leading SOEs may not reflect the intensity of competition (Luo, 2003). Thus, we also used the logarithm of the number of firms in the same industry in a given year as an additional proxy for the competitive intensity of domestic industry (Tang, et al., 2020). The key results obtained remain qualitatively consistent with those reported in the paper.

Moderators	
State ownership	The percentage of shares held by the government and its institutes
Marketization	The NERI index of marketization of China's Provinces 2017
Control variables	
Firm age	The number of years since the establishment of the parent company
Firm size	Log (total assets)
Board size	Log (total number of board members)
Financial leverage	The ratio of total debts to total assets
Operating leverage	The ratio of net fixed assets to total assets
Return on asset	The ratio of net income to total assets
Marketing capability	The ratio of marketing expenses to sales revenue
Foreign ownership	The percentage of shares held by foreign investors or institutes
OFDI experience	=1, if the focal firm had more than one foreign subsidiary during the sample period; 0 otherwise
HHI	The sum of the squares of the market shares of all firms in an industry
Industrial innovation level	The average number of patents granted per year at the 4-digit level industry; The average R&D intensity per year at the 4-digit level industry
Regional division	Coded as 1 for firms located in Eastern regions in China, 2 in central regions and 3 in western regions
Industry dummies	30 industrial dummy variables
Time dummies	12 year dummy variables

3.3 Statistical models

This study used several regression models to test the hypotheses. First, to test the determinants of the propensity to invest overseas, Probit models were adopted to cater for the dichotomous outcome variable (OFDI dummy):

$$\boldsymbol{Prob}(\textbf{OFDI dummy}_{\mathbf{it+1}} = \mathbf{1}) = \mathbf{C_{it}}\boldsymbol{\alpha} + \mathbf{M_{it}}\boldsymbol{\beta} + (\mathbf{C_{it}} \times \mathbf{M_{it}})\boldsymbol{\gamma} + \mathbf{Z_{it}}\boldsymbol{\delta} + \boldsymbol{\lambda}_{\mathbf{j}} + \boldsymbol{\lambda}_{\mathbf{t}} + \boldsymbol{\varepsilon}_{\mathbf{it}} \quad (1)$$

where $\mathbf{C_{it}}$ is the innovation capabilities (namely patents granted and R&D intensity); $\mathbf{M_{it}}$ denotes the two moderators – state ownership and marketization; $\mathbf{C_{it}} \times \mathbf{M_{it}}$ gets at the interaction between innovation capabilities and each of the two moderators; $\mathbf{Z_{it}}$ is the control variable, $\boldsymbol{\lambda}_{\mathbf{j}}$ and $\boldsymbol{\lambda}_{\mathbf{t}}$ are fixed effects for industry and time, respectively; and $\boldsymbol{\varepsilon}_{\mathbf{it}}$ is the error term. While the coefficient of $\mathbf{C_{it}}$ explains the effect of innovation on OFDI propensity, this study is more interested in the coefficients of the two interaction terms, which are used to test the hypotheses.

Second, this study used Tobit regression models that defined the dependent variable as the number of overseas subsidiaries established by a firm in a given year. This variable has a large number of zero observations because parent firms do not conduct OFDI annually. An ordinary least squares regression estimator of such values would produce biased estimates of the slope coefficient and intercept. A maximum likelihood estimator of the nonlinear Tobit models can solve the problem:

$$\mathbf{Y}^{*} = \mathbf{C_{it}}\boldsymbol{\alpha} + \mathbf{M_{it}}\boldsymbol{\beta} + (\mathbf{C_{it}} \times \mathbf{M_{it}})\boldsymbol{\gamma} + \mathbf{Z_{it}}\boldsymbol{\delta} + \boldsymbol{\lambda}_{\mathbf{j}} + \boldsymbol{\lambda}_{\mathbf{t}} + \boldsymbol{\varepsilon}_{\mathbf{it}} \quad (2)$$

$$\mathbf{Y} = \mathbf{max}(\mathbf{0}, \mathbf{Y}^{*})$$

where $\mathbf{Y}$ denotes the number of foreign subsidiaries. Latent variable $\mathbf{Y}^{*}$ has a normal homoskedastic distribution (Wooldridge, 2002). This study obtained robust estimates after controlling for the clustering of each firm to account for hidden firm-specific factors, such as the characteristics of the CEO, which might affect innovative and OFDI activities simultaneously.

The problem of reverse causality is related to the possibility that OFDI may impact innovative capabilities, causing estimation biases. This study lagged all explanatory variables by one year to account for the time required for innovation inputs and outputs to have an impact on OFDI.[53] This time lag structure allows this study to control for simultaneity bias and help control for potential endogeneity (Aitken & Harrison, 1999). Under this treatment, endogenous variables are predetermined and thus unlikely to be correlated with the error term. Furthermore, although multicollinearity does not seem to be a concern, this study followed the usual practice (Aiken & West, 1991) of mean-centering variables in the interaction terms. To deal with the threat of heteroskedasticity, this study used Huber–White robust standard errors to estimate the models (White, 1980). Finally, this study used hierarchical moderated regression analyses to estimate the above models. Hierarchical multiple regressions can help determine the order in which variables enter the regression equation in order to test the independent effects of certain predictors (Fang & Zou, 2009).

4. Findings

4.1. Main results

Table 2 shows the descriptive statistics of innovation and OFDI in our sample, stratified into non-SOE, SOE, lowly marketized regions and highly marketized regions. Of all Chinese listed firms during the sample period, 30% conducted OFDI with an average of one foreign subsidiary per firm, 22% owned innovative patents with an average of 12 patents granted per firm, 82% engaged in R&D activities with an average R&D expenditure ratio of 0.04 per firm. Reflected in

[53] On top of the one-year lag structure used to mitigate potential endogeneity bias, an additional robustness check applied a two-year lag structure on the same models and yielded similar results. This clearly demonstrates that the OFDI commitment in year t+1 and t+2 are unlikely to affect the innovation capabilities in year t.

a higher proportion of international investors and more foreign subsidiaries, Table 2 in addition shows that non-SOEs in China are more international-oriented than SOEs. In terms of innovation capabilities, non-SOEs had a higher proportion of innovators (based on both patents and R&D expenditures) and recorded slightly higher R&D intensity than SOEs over the whole sample period, but SOEs scored higher on patents granted. At the same time, regions with a high level of marketization scored much higher on all key indicators related to innovation and internationalization than lowly marketized regions, consistent with our argument that market-based mechanisms and local favorable conditions stimulate Chinese firms' innovation and internationalization. Table 2.1 shows that provinces with a higher level of marketization (such as Shanghai, Beijing and Zhejiang) tend to carry out more OFDI activities, while provinces with less developed market-based mechanism have lower levels of OFDI activities. This observation is consistent with our argument that market-based reforms motivate Chinese firms' internationalization through OFDI.

Table 2. Descriptive statistics of innovation and OFDI

	Non-SOE	SOE	Lowly marketized regions	Highly marketized regions	Total/Average
Share of total firms/observations	62.88%	37.12%	19.93%	80.07%	100%
Proportion of international investors	20.32%	9.07%	3.61%	25.78%	29.39%
Proportion of innovators with patents granted	13.21%	8.35%	3.51%	18.05%	21.56%
Proportion of innovators with R&D expenditures	55.41%	27.01%	14.62%	67.81%	82.43%
Number of foreign subsidiaries	1.21	0.87	0.49	1.23	1.08
Number of patents granted	9.90	16.10	7.02	13.49	12.20
R&D intensity	0.04	0.03	0.02	0.04	0.04

Note: (a) "International investors" = number of firms that have at least one new foreign subsidiary. (b) "Innovators with patents granted" are firms that report positive patents granted. (c) "Innovators with R&D expenditures" are firms that report positive R&D expenditures (d) "SOEs" refer to firms are officially registered as "state-owned enterprises" in China. (e) "Lowly-marketized regions" and "Highly-marketized regions" were classified based on the average level of marketization in all provinces during the whole sample period. For example, there are 15 provinces above the average, namely Shanghai, Beijing, Sichuan, Tianjin, Anhui, Shandong, Guangdong, Jiangsu, Hebei, Henan, Zhejiang, Hubei, Fujian, Liaoning and Chongqing.

Table 2.1: Average OFDI activities and Marketization of each province from 2007 to 2019

Province	No. of OFDI projects	Marketization	Province	No. of OFDI projects	Marketization
Shanghai	2.037	9.749	Hebei	1.262	6.166
Yunnan	0.748	4.936	Henan	0.905	6.985
Neimenggu	0.833	5.143	Zhejiang	2.148	9.87
Beijing	2.308	9.12	Hainan	0.546	5.989
Jilin	0.315	6.374	Hubei	1.432	7.172
Sichuan	1.155	6.619	Hunan	1.244	6.692
Tianjin	1.078	9.016	Gansu	0.555	4.207
Ningxia	1.035	5.091	Fujian	1.464	8.039
Anhui	1.551	7.331	Tibet	0.644	1.027
Shangdong	1.805	7.883	Guizhou	0.201	4.756
Shanxi	0.346	5.268	Liaoning	0.799	7.111
Guangdong	2.889	9.381	Chongqing	1.597	7.686
Guangxi	1.177	6.353	Shaanxi	0.576	6.156
Xinjiang	1.000	3.531	Qinghai	0.366	2.667
Jiangsu	1.707	9.492	Heilongjiang	0.415	6.196
Jiangxi	0.741	6.685	Average	1.683	8.049

Table 3 reports descriptive statistics and the correlation matrix of the variables used in this study. The highest correlation coefficient among the independent variables is between the R&D intensity and the Industry R&D average (0.582 < 0.7). The absence of high correlation between the variables of interest implies that multicollinearity is not an issue. This study also checked the variance inflation factors (VIFs). All VIF values are below 3 and have a mean value of 1.39, which indicates that the possibility of serious multicollinearity in the estimation is relatively low.

Table 3. Correlation coefficients and descriptive statistics (2007-2019)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.OFDI propensity	1																		
2.OFDI intensity	0.843	1																	
3.Patents granted	0.125	0.122	1																
4.R&D intensity	0.155	0.139	0.15	1															
5.State ownership	0.018	0.005	0.034	-0.109	1														
6.Marketization	0.212	0.211	0.083	0.256	-0.096	1													
7.Firm age	0.082	0.095	0.028	0.001	-0.057	0.169	1												
8.Firm size	0.319	0.369	0.136	-0.085	0.163	0.052	0.223	1											
9.Board size	-0.008	-0.002	0.024	-0.151	0.161	-0.148	-0.015	0.219	1										
10.Financial leverage	0.064	0.102	-0.005	-0.292	0.145	-0.132	0.148	0.385	0.156	1									
11.Operating leverage	-0.087	-0.091	-0.03	-0.239	0.041	-0.142	0.009	0.104	0.091	0.216	1								
12.Return on asset	0.044	0.036	0.049	0.006	-0.005	0.042	-0.117	0.028	0.036	-0.394	-0.158	1							
13.Marketing capability	-0.017	-0.024	-0.006	0.166	-0.084	-0.01	0.047	-0.112	-0.036	-0.216	-0.189	0.098	1						
14.Foreign ownership	0.019	0.009	-0.012	-0.011	0.011	0.014	-0.125	-0.052	0.028	-0.058	-0.014	0.067	-0.015	1					
15.OFDI experience	0.625	0.785	0.106	0.13	0.005	0.189	0.113	0.328	-0.004	0.111	-0.055	-0.017	-0.021	0	1				
16.HHI	-0.012	0.001	-0.062	-0.146	-0.009	0.02	0.07	0.101	0.036	0.09	0.02	-0.037	-0.128	0.02	0.007	1			
17.Industry patents average	0.145	0.158	0.127	0.276	-0.053	0.239	0.169	0.163	-0.058	0.046	-0.158	-0.068	-0.115	-0.028	0.144	0.021	1		
18.Industry R&D average	0.215	0.216	0.137	0.582	-0.139	0.338	0.205	0.041	-0.177	-0.134	-0.293	-0.039	0.075	-0.039	0.196	-0.25	0.455	1	
19.Regional division	-0.126	-0.11	-0.045	-0.146	0.039	-0.714	0.046	0.042	0.101	0.127	0.095	-0.075	0.032	-0.061	-0.084	-0.008	-0.074	-0.143	1
Mean	0.312	0.390	0.640	0.033	0.046	8.049	15.519	21.914	2.143	0.448	0.243	0.031	0.078	0.008	0.172	0.089	11.919	0.035	1.505
S.D	0.463	0.686	1.343	0.033	0.137	1.951	5.817	1.221	0.192	1.172	0.145	0.506	0.086	0.050	0.377	0.077	14.289	0.022	0.750

Note. All correlation coefficients more than 0.014 or less than -0.014 are significant at the 5 percent level or higher

Table 4 describes the effects of innovation on OFDI commitments, including the results of all models. The first half shows the effect of innovation and its interaction with institutional factors on the OFDI dummy derived from the Probit models. Specifications (1) and (2) employ different innovation measures, with (1) using the absolute number of granted patents and (2) the R&D intensity. Models 1 and 1a, which contain all independent variables, serve as the baseline models

for Models 2 through 4 and Models 2a through 4a, which include the interaction terms. Models 2, 3, 2a and 3a tested the interactive effects between the two institutional variables and the innovative capabilities: patents granted (Models 2 and 3) and R&D intensity (Models 2a and 3a). Models 4 and 4a are complete models.

Hypothesis 1 states that EMEs with higher innovation capabilities are more likely to invest abroad. The results of Models 1 and 1a reveal a significant positive coefficient of innovation capabilities on firms' OFDI propensity (Model 1: $\beta = 0.038$, $p < 0.01$; Model 1a: $\beta = 2.408$, $p < 0.01$), indicating that innovation capabilities have a positive effect on the propensity for OFDI by EMEs. An important economic implication that can be drawn from these empirical results is that a one-standard-deviation-increase in granted patents raises the propensity for OFDI activities by 1.07% (=1.343×0.008) and a one-standard-deviation-increase in R&D intensity raises the propensity for OFDI activities by 1.76% (= 0.033×0.534). Thus, H1 is supported. In terms of the direct effects of the two moderating variables of OFDI, the results show that during the sample period, the impact of state ownership on OFDI commitment in the context of Chinese manufacturing is insignificant, while marketization has a direct and positive impact on the OFDI commitment of firms as expected.

Since the focus of this paper is the joint effect of innovative capabilities and institutional environment on OFDI, the coefficients of the interaction terms are of particular interest. Following the usual practice in moderated regression analysis, two-way interactions are applied in these models. Hypotheses 2 and 3 posit that state ownership and regional marketization weaken and strengthen, respectively, the positive effects of an EME's innovative capabilities on its OFDI. As shown in Table 4, the coefficient of the interaction "Innovation * State ownership" is negative and significant in Model 2 ($\beta = -0.210$, $p < 0.01$) and remains so in Model 2a ($\beta = -5.219$, $p < 0.10$), so H2 is corroborated. This indicates that state ownership has a negative moderating effect on the relationship between innovation and OFDI, regardless of whether innovation is measured by patents granted or R&D intensity. However, the estimated coefficient of the interaction term between innovation and marketization is negatively significant in both Model 3 ($\beta = -0.018$, $p < 0.01$) and Model 3a ($\beta = -0.603$, $p < 0.01$), therefore H3 is not supported. As elaborated above, the moderating effects of marketization can be positive or negative. The results show that the negative effects of marketization predominate, suggesting that higher marketization generally weakens the focal relationship. This study also estimated the complete

models (Models 4 and 4a), which include the individual effects of innovative capabilities as well as all interaction terms simultaneously, the results of which remain largely consistent with those estimated separately.

In line with existing literature (e.g., Deng, Yan & Van Essen, 2018; Hu & Cui, 2014; Xia, et al., 2014), this study used the number of subsidiaries abroad during a given year as an alternative measure of OFDI commitment. The results based on the Tobit models, which are qualitatively the same as those using OFDI propensity as the dependent variable, are presented in the second half of Table 4. The only exception is the coefficient of the interaction between innovative capabilities and state ownership in specification (2) which is not statistically significant in Model 2a ($\beta = -4.458$, $p = 0.104$) but is negatively significant in Model 4a ($\beta = -5.167$, $p < 0.10$).

Table 4. Effects of innovation on OFDI commitments.

(A) Probit models								
	Innovation proxy							
DV=OFDI Propensity$_{t+1}$	(1) Patents granted				(2) R&D intensity			
	Model 1	Model 2	Model 3	Model 4	Model 1a	Model 2a	Model 3a	Model 4a
Innovative capabilities	0.038***	0.052***	0.190***	0.225***	2.408***	2.614***	7.372***	7.720***
	(3.66)	(4.72)	(3.97)	(4.71)	(4.68)	(4.94)	(3.78)	(3.95)
State ownership	0.066	0.256**	0.062	0.274**	0.154	0.262*	0.156	0.273**
	(0.61)	(2.10)	(0.57)	(2.24)	(1.43)	(1.95)	(1.45)	(2.03)
Marketization	0.061***	0.059***	0.073***	0.073***	0.068***	0.068***	0.088***	0.088***
	(4.49)	(4.38)	(5.17)	(5.15)	(5.15)	(5.14)	(5.76)	(5.78)
Innovative capabilities* State ownership		-0.210***		-0.233***		-5.219*		-6.115**
		(-3.11)		(-3.53)		(-1.76)		(-2.05)
Innovative capabilities* Marketization			-0.018***	-0.021***			-0.603***	-0.618***
			(-3.21)	(-3.65)			(-2.58)	(-2.65)
Firm age	-0.011***	-0.011***	-0.011***	-0.011***	-0.009***	-0.009***	-0.009***	-0.009***
	(-3.58)	(-3.59)	(-3.63)	(-3.65)	(-3.11)	(-3.08)	(-3.12)	(-3.09)
Firm size	0.290***	0.292***	0.290***	0.292***	0.267***	0.267***	0.268***	0.268***
	(17.90)	(18.00)	(17.87)	(17.98)	(17.71)	(17.72)	(17.73)	(17.74)
Board size	-0.159**	-0.159**	-0.162**	-0.163**	-0.170**	-0.166**	-0.167**	-0.163**
	(-2.11)	(-2.11)	(-2.16)	(-2.16)	(-2.29)	(-2.24)	(-2.26)	(-2.20)
Financial leverage	-0.027	-0.028	-0.021	-0.022	0.103	0.105	0.110	0.112
	(-0.31)	(-0.33)	(-0.25)	(-0.27)	(1.23)	(1.25)	(1.31)	(1.33)
Operating leverage	-0.309***	-0.314***	-0.302***	-0.306***	-0.496***	-0.494***	-0.487***	-0.484***
	(-2.74)	(-2.78)	(-2.67)	(-2.70)	(-4.84)	(-4.82)	(-4.73)	(-4.71)
Return on asset	1.367***	1.364***	1.380***	1.379***	1.466***	1.474***	1.443***	1.451***
	(5.05)	(5.03)	(5.09)	(5.07)	(5.61)	(5.64)	(5.50)	(5.52)
Marketing capability	-0.289	-0.289	-0.282	-0.281	-0.115	-0.127	-0.106	-0.119
	(-1.37)	(-1.37)	(-1.34)	(-1.33)	(-0.70)	(-0.77)	(-0.65)	(-0.72)
Foreign ownership	0.878***	0.879***	0.868***	0.869***	0.879***	0.892***	0.872***	0.886***
	(2.63)	(2.62)	(2.60)	(2.59)	(2.65)	(2.68)	(2.63)	(2.66)
OFDI experience	2.787***	2.786***	2.788***	2.787***	2.779***	2.778***	2.779***	2.777***
	(38.55)	(38.46)	(38.60)	(38.52)	(39.93)	(39.90)	(40.01)	(39.98)
HHI	1.170**	1.176**	1.135**	1.135**	-0.405**	-0.400**	-0.412**	-0.407**
	(2.37)	(2.38)	(2.29)	(2.28)	(-2.05)	(-2.03)	(-2.09)	(-2.07)
Industrial innovation level	-0.002	-0.002	-0.002	-0.002	3.490***	3.482***	3.563***	3.558***
	(-1.25)	(-1.28)	(-1.20)	(-1.23)	(3.65)	(3.64)	(3.73)	(3.72)
Regional division	-0.095***	-0.098***	-0.094***	-0.098***	-0.078**	-0.078***	-0.074**	-0.075**
	(-3.05)	(-3.16)	(-3.01)	(-3.14)	(-2.57)	(-2.58)	(-2.45)	(-2.46)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.121***	-1.140***	-1.109***	-1.129***	-1.011***	-1.022***	-1.030***	-1.043***
	(-7.46)	(-7.59)	(-7.37)	(-7.49)	(-10.70)	(-10.77)	(-10.90)	(-10.98)
Observations	14,670	14,670	14,670	14,670	14,717	14,717	14,717	14,717
(B) Tobit models								
	Innovation proxy							
DV=OFDI Intensity$_{t+1}$	(1) Patents granted				(2) R&D intensity			
	Model 1	Model 2	Model 3	Model 4	Model 1a	Model 2a	Model 3a	Model 4a
Innovative capabilities	0.021**	0.028***	0.135***	0.153***	1.540**	1.734***	6.506***	7.006***
	(2.14)	(2.67)	(2.96)	(3.32)	(2.48)	(2.75)	(2.63)	(2.79)
State ownership	-0.076	0.029	-0.078	0.043	-0.017	0.103	-0.020	0.119

	(-0.65)	(0.23)	(-0.67)	(0.35)	(-0.15)	(0.71)	(-0.17)	(0.82)
Marketization	0.054***	0.054***	0.064***	0.064***	0.060***	0.059***	0.080***	0.081***
	(2.87)	(2.85)	(3.33)	(3.34)	(3.13)	(3.11)	(3.56)	(3.59)
Innovative capabilities* State ownership		-0.109**		-0.125**		-4.458		-5.167*
		(-1.98)		(-2.34)		(-1.61)		(-1.84)
Innovative capabilities* Marketization			-0.013**	-0.015***			-0.589**	-0.622**
			(-2.51)	(-2.73)			(-2.06)	(-2.15)
Firm age	-0.009**	-0.009**	-0.009**	-0.009**	-0.009**	-0.009**	-0.009**	-0.009**
	(-2.22)	(-2.22)	(-2.24)	(-2.24)	(-2.04)	(-2.03)	(-2.04)	(-2.02)
Firm size	0.251***	0.251***	0.250***	0.251***	0.233***	0.233***	0.234***	0.234***
	(12.39)	(12.44)	(12.38)	(12.43)	(11.86)	(11.86)	(11.86)	(11.87)
Board size	-0.078	-0.077	-0.081	-0.080	-0.105	-0.101	-0.106	-0.101
	(-0.83)	(-0.82)	(-0.86)	(-0.85)	(-1.12)	(-1.08)	(-1.12)	(-1.07)
Financial leverage	0.056	0.054	0.059	0.058	0.136	0.136	0.143	0.143
	(0.50)	(0.49)	(0.54)	(0.52)	(1.20)	(1.20)	(1.26)	(1.26)
Operating leverage	-0.352**	-0.355**	-0.347**	-0.351**	-0.553***	-0.553***	-0.546***	-0.545***
	(-2.51)	(-2.54)	(-2.48)	(-2.50)	(-3.99)	(-3.98)	(-3.93)	(-3.91)
Return on asset	1.269***	1.265***	1.273***	1.269***	1.321***	1.330***	1.298***	1.307***
	(4.58)	(4.57)	(4.59)	(4.58)	(4.76)	(4.79)	(4.65)	(4.68)
Marketing capability	-0.071	-0.071	-0.068	-0.068	-0.095	-0.109	-0.083	-0.097
	(-0.24)	(-0.24)	(-0.23)	(-0.23)	(-0.39)	(-0.45)	(-0.34)	(-0.40)
Foreign ownership	0.721**	0.724**	0.714**	0.717**	0.765**	0.774**	0.758**	0.768**
	(2.29)	(2.29)	(2.27)	(2.27)	(2.40)	(2.41)	(2.37)	(2.39)
OFDI experience	1.970***	1.968***	1.969***	1.968***	2.010***	2.010***	2.010***	2.009***
	(40.39)	(40.47)	(40.41)	(40.49)	(40.40)	(40.40)	(40.43)	(40.43)
HHI	0.774*	0.768*	0.741*	0.732*	-0.287	-0.282	-0.296	-0.291
	(1.76)	(1.75)	(1.68)	(1.67)	(-1.09)	(-1.08)	(-1.13)	(-1.11)
Industrial innovation level	-0.001	-0.001	-0.001	-0.001	2.554**	2.557**	2.593**	2.600**
	(-1.62)	(-1.61)	(-1.58)	(-1.56)	(2.10)	(2.10)	(2.13)	(2.14)
Regional division	-0.066	-0.068	-0.065	-0.067	-0.057	-0.058	-0.053	-0.053
	(-1.44)	(-1.48)	(-1.43)	(-1.48)	(-1.25)	(-1.26)	(-1.14)	(-1.15)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.899***	-0.908***	-0.888***	-0.897***	-0.857***	-0.869***	-0.874***	-0.890***
	(-4.91)	(-4.96)	(-4.84)	(-4.89)	(-7.60)	(-7.67)	(-7.73)	(-7.82)
Observations	14,717	14,717	14,717	14,717	14,717	14,717	14,717	14,717
F-statistic	55.00***	53.98***	54.71***	53.68***	92.59***	89.19***	89.10***	85.95***
Log likelihood function	-9729.81	-9726.50	-9723.78	-9719.45	-9837.72	-9835.89	-9832.17	-9829.75
Left or right censored	10,112	10,112	10,112	10,112	10,112	10,112	10,112	10,112

Notes: Robust standard errors in parentheses. Industry and year dummies included
*** p<0.01, ** p<0.05, * p<0.1

The result of the negative moderating effects of higher marketization is intriguing and highlights the complexity of the relationship between regional marketization, firms' innovation capabilities and OFDI. We attribute two possible explanations for this observation. First, as theorized above, some important resources and elements that can directly benefit internationalization provided by highly marketized regions may reduce the contribution of innovation capabilities to OFDI. In other words, innovation capabilities are not indispensable for firms' international investment in regions dominated by market mechanisms. Second, the market-driven expansion approach for local firms may be to deploy their extant technological advantages and outcomes to explore low-marketization regions in the home country rather than choosing typically more risky and costly overseas options. Specifically, firms with strong innovation capabilities that are located in regions of high marketization may choose to invest and operate in weaker domestic institutional regions rather than overseas. This is because local firms have a better understanding of the domestic environments and challenges, and they can also rely on their extant resources such as technologies, talents, brands and nearby access to raw materials to reduce transportation and operating costs (Cuervo-Cazurra & Genc, 2008).

To examine our explanations for the observed negative moderating effect of marketization, we further conducted a set of Probit and Tobit estimations for the subsamples of firms with and without innovative capabilities, respectively. Table 5 shows the results. In the group of firms without any innovative capability (measured by patents granted and R&D intensity), the coefficients of marketization in all specifications (Models 1, 3, 1a and 3a) are positive and statistically significant, which is in line with the findings based on the full sample (Table 4). This indicates that firms in highly marketized regions, even with no innovative capabilities, are more inclined to conduct OFDI activities due to the favorable local conditions for internationalization than those located in lowly marketized regions. In other words, OFDI commitments carried out by firms in high marketization regions are not entirely driven by innovative capabilities. By contrast, the effect of marketization on OFDI for firms with innovation capabilities appears to be inconsistent when different indicators of innovation were used (Models 2, 4, 2a and 4a), which reflects that innovative firms that are located in highly marketized regions do not necessarily have a higher tendency to invest abroad than those located in lowly marketized regions.

Table 5. Effects of marketization on OFDI commitments based on innovative firms and non-innovative firms separately.

	Probit models (DV=OFDI Propensityt+1)				Tobit models (DV=OFDI Intensityt+1)			
	Firms without Patents granted	Firms with Patents granted	Firms without R&D expenditures	Firms with R&D expenditures	Firms without Patents granted	Firms with Patents granted	Firms without R&D expenditures	Firms with R&D expenditures
	Model 1	Model 2	Model 3	Model 4	Model 1a	Model 2a	Model 3a	Model 4a
Marketization	0.065***	0.029	0.123***	0.052***	0.061***	0.023	0.111*	0.047**
	(4.26)	(0.99)	(2.96)	(3.63)	(2.93)	(0.79)	(1.90)	(2.57)
State ownership	0.285**	-0.428*	0.346*	0.019	0.040	-0.334*	0.209	-0.143
	(2.27)	(-1.96)	(1.68)	(0.14)	(0.31)	(-1.80)	(0.99)	(-1.13)
Firm age	-0.008**	-0.021***	-0.004	-0.010***	-0.008*	-0.014**	-0.017	-0.008*
	(-2.49)	(-3.24)	(-0.44)	(-3.22)	(-1.82)	(-2.04)	(-1.33)	(-1.86)
Firm size	0.305***	0.271***	0.326***	0.292***	0.259***	0.244***	0.322***	0.244***
	(16.95)	(6.89)	(8.43)	(15.58)	(11.83)	(7.11)	(7.12)	(11.47)
Board size	-0.118	-0.308*	-0.010	-0.163**	-0.054	-0.126	-0.021	-0.084
	(-1.38)	(-1.85)	(-0.05)	(-1.97)	(-0.51)	(-0.85)	(-0.10)	(-0.87)
Financial leverage	-0.056	0.156	-0.262	0.045	0.060	0.043	-0.075	0.114
	(-0.59)	(0.80)	(-1.27)	(0.47)	(0.49)	(0.23)	(-0.28)	(0.97)
Operating leverage	-0.247*	-0.601**	-0.270	-0.276**	-0.309**	-0.463**	-0.309	-0.338**
	(-1.91)	(-2.47)	(-0.92)	(-2.19)	(-1.98)	(-1.97)	(-0.88)	(-2.32)
Return on asset	1.379***	1.410**	0.823	1.513***	1.348***	0.904*	1.039	1.333***
	(4.67)	(2.08)	(1.15)	(5.06)	(4.40)	(1.84)	(1.38)	(4.66)
Marketing capability	-0.391*	0.285	0.231	-0.296	-0.208	0.445	0.036	-0.027
	(-1.65)	(0.60)	(0.41)	(-1.31)	(-0.64)	(0.94)	(0.04)	(-0.10)
Foreign ownership	0.958**	0.690	1.594**	0.724*	0.742**	0.670	1.490**	0.606*
	(2.50)	(1.00)	(2.21)	(1.91)	(2.07)	(1.19)	(1.97)	(1.83)
OFDI experience	2.742***	3.008***	2.734***	2.835***	1.998***	1.875***	2.319***	1.948***
	(34.67)	(15.55)	(14.49)	(34.23)	(37.05)	(25.71)	(17.85)	(39.54)
HHI	1.205**	0.826	0.210	1.087*	0.814	0.757	0.123	0.585
	(2.25)	(0.60)	(0.16)	(1.74)	(1.64)	(0.87)	(0.10)	(1.28)
Industrial innovation level	-0.003*	0.001	3.282	-0.096	-0.002**	0.001	-0.086	-0.989
	(-1.74)	(0.50)	(0.49)	(-0.03)	(-2.09)	(0.80)	(-0.01)	(-0.39)
Regional division	-0.105***	-0.074	-0.056	-0.097***	-0.067	-0.080	-0.058	-0.063
	(-2.99)	(-1.10)	(-0.65)	(-2.88)	(-1.31)	(-1.22)	(-0.50)	(-1.39)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.200***	-0.715*	-0.697	-1.034***	-0.970***	-0.645**	-0.824	-0.837***
	(-7.36)	(-1.75)	(-1.54)	(-4.20)	(-4.83)	(-2.02)	(-1.55)	(-3.23)
Observations	11,534	3,134	2,717	11,898	11,571	3,146	2,780	11,937
F-statistic					53.06	27.10	15.03	53.48

Log likelihood function	-7339.76	-2346.09	-1121.85	-8549.20
Left or right censored	8,172	1,940	2,343	7,769

Notes: Robust standard errors in parentheses. Industry and year dummies included
*** p<0.01, ** p<0.05, * p<0.1

4.2 Robustness tests

In the analyses above, we have controlled for possible estimation biases by using different estimation techniques (Probit models and Tobit models) and different innovation and OFDI measures while incorporating various variables that account for firm characteristics as thoroughly as possible. We have also estimated a full model (models 4 and 4a in Table 4) including all the interaction terms simultaneously, which did not show any large effects on the main results. However, there may still be unconsidered factors that affect innovation and OFDI, such as the CEO's international experience and personality (Fu, Hou & Sanfilippo, 2017; Li, et al., 2016). In addition, although this study used the one-year lag structure (and a two-year lag structure in an additional test) to control for simultaneity bias, a bi-directional causal relationship between innovation and OFDI may exist. For instance, high innovative capabilities may lead to OFDI behavior, and at the same time, firms engaged in OFDI face the greater competition of international markets, prompting their parent firms to innovate. Likewise, EMEs may bring innovation benefits to their home country through strategic acquisitions of overseas assets (Li, et al., 2016; Piperopoulos, Wu & Wang, 2018; Xia, et al., 2014). Inadequacies in recognizing and addressing potential endogeneity may lead to inconsistent estimates or even misleading conclusions (Bascle, 2008). Hence, we address endogeneity concern by re-estimating Eq. (1) and Eq. (2) using both Probit and Tobit IV approaches.

Similar to Gu (2015) and Du (2016), this study employed the geographic-proximity-based Confucian academies as the IV, which is measured by the natural logarithm of the total number of Confucian academies in the Qing Dynasty (1644–1911) located in the province of a firm's registered address.[54] The choice of this IV is based on the following reasoning. First, Confucian

[54] This study collected the names and addresses of 3,796 Qing Dynasty Confucian academies (including 1,792 official education academies) across 29 contemporary provinces based on records from the 'Chinese Academy Dictionary' (Ji, 1996) and public sources such as the sinology website (http://www.chinaguoxue.net/) and the Confucian Temple website (http://www.chinakongmiao.org/). Considering the differences in provincial borders between the New China and the Qing Dynasty, we also conducted a robustness test based on the number of Confucian academies within a 100-kilometer radius of a firm's registered address (please refer to Du (2016) for detailed procedures of this variable) rather than within a province, and all key findings remain robust.

culture may promote the emphasis and value on education. The Chinese society is fundamentally rooted in the Confucian philosophy. Despite the changes in society after the founding of New China, Confucian culture and education have greatly shaped the moral values of Chinese society, and their influence varies across regions in modern China (Ralston, et al., 1999). Second, Confucian culture may foster innovation. Confucian culture emphasizes the value that school education provides to society and respects knowledge and talent. Such a Confucian atmosphere may inspire more knowledge and talents needed for local technological innovation. Supporting this, prior studies have recognized that education and culture with a high degree of Confucian dynamism are positively associated with technological progress and innovative capabilities (e.g., Jones & Davis, 2000). Third, the influence of Confucianism may lead to better protection of IPR, which is an important factor in enhancing a firm's innovation incentives (Fang, Lerner & Wu, 2017). The concepts of justice and honesty advocated by Confucianism may help reduce the risk of patented technologies being imitated or plagiarized by competitors and stimulate the enthusiasm for innovation. Hence, the more Confucian academies around the registered address of a listed firm, the greater the influence of the Confucian atmosphere on the firm and the greater possibility of innovation.

While the influence of Confucian academies on modern education and talent is usually reflected in the creativity of employees, OFDI decisions are usually made at the level of management and entrepreneurs. Although location factors may be considered in the initial stage of setting up a firm, overseas investment decisions are usually made later and are independent of the initial location selection (Fu, Hou & Sanfilippo, 2017). Therefore, the traditional Confucian education reflected by historical Confucian academies have no opportunity to directly affect the OFDI decisions of the sample firms, satisfying the exclusion restriction – IV is orthogonal to the error term. This study also used the residual obtained from the first-stage estimations to regress this IV, which produced statistically insignificant results (all $p > 0.1$), again indicating that the IV is uncorrelated with the error term. Both Models 1 and 3 in Table 6, first-stage regressions of IV Probit, show that the IV (namely presence of "Confucian academies") is positively associated with firm-level innovation capabilities measured by patents granted and R&D intensity (all $p < 0.1$). This relationship remains valid in the IV Tobit (all $p < 0.1$ in Models 5 and 7). Models 2, 4, 6 and 8 present the results of the second-stage of IV regression. The instrumented innovation

capability is significantly positively correlated with the dependent variable (all $p < 0.1$).[55] The main results of the interaction terms of interest also remain qualitatively unchanged. Overall, the main findings are robust to IV regressions.

Table 6. IV Probit and Tobit estimations.

	IV Probit (OFDI propensity)				IV Tobit (OFDI intensity)			
	Patents granted		R&D intensity		Patents granted		R&D intensity	
	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Instrumented innovation capability		4.309***		8.381***		0.309***		0.697***
		(4.05)		(3.71)		(4.15)		(3.61)
Confucian academies	0.019***		0.015***		0.058***		0.012***	
	(8.72)		(9.52)		(4.43)		(2.93)	
State ownership	-0.129***	0.468**	-0.119***	-0.549**	-0.387***	-0.011	-0.287**	-0.083
	(-9.82)	(2.46)	(-6.15)	(-2.02)	(-3.15)	(-0.05)	(-2.38)	(-0.39)
Marketization	-0.071***	0.336***	-0.110***	0.006	-0.283***	0.143***	-0.181***	0.147***
	(-24.35)	(5.08)	(-53.38)	(0.17)	(-16.27)	(3.82)	(-31.62)	(3.84)
Innovation* State ownership		-0.833***		-1.219***		-0.172**		-0.263
		(-4.62)		(-3.54)		(-2.49)		(-1.50)
Innovation* Marketization		-0.446***		-0.834***		-0.028***		-0.059***
		(-4.01)		(-3.66)		(-3.52)		(-2.88)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,078	14,410	16,078	14,457	16,078	14,457	16,078	14,457
R-squared	0.959		0.962					
F	2211***		5018***		376.0***	33.28***	581.1***	33.79***
Wald test of exogeneity		43.58***		58.87***				

Notes: The variables of interest are the instrumented innovation capabilities and the interaction terms; T-statistics are reported in brackets; *** p<0.01, ** p<0.05, * p<0.1

4.3 Additional Analysis

We conducted siven additional tests to ensure the robustness and validity of the empirical findings. First, given that our dependent variable is measured by the number of OFDI projects a Chinese firm conducted in a year, many scholars suggest using a count model (Huang et al., 2017; Piperopoulos et al., 2018). We therefore adopted the zero-inflated Poisson regression (ZIP) as one of the robustness checks. The results are shown in Appendix Table A1. Second, we followed Xia, et al. (2014) and converted the dependent variable OFDI at time t into an independent variable, which was used to regress on innovative capabilities at time t+1. The results of this causality test show that the coefficients of OFDI are not significant, regardless of proxies and estimations used, again suggesting that reverse causality is unlikely in this study.[56] Third, we re-estimated our models using data from 2007–2013 and 2014–2019, respectively. We chose these

[55] As an attempt to separate Confucian education from Chinese modern education in general, we used the number of universities in a province as a control variable to reflect the level and resources of modern education in the region. The results are qualitatively the same when the number of universities in a province is included in the control variables.

[56] This result echoes some studies (e.g., Zhou & Wu, 2014), which find that internationalization does not contribute to firm innovation and profitability based on Chinese manufacturing firm data.

two sample periods taking into account the impact of the 'One Belt, One Road' initiative officially launched by the Chinese government in 2013 on firms' OFDI (Haiyue & Manzoor, 2020). The key results based on these two different periods are qualitatively the same as those reported in Table 4. Fourth, to ensure the reliability and validity of the OFDI variables, we extracted data on OFDI projects related to all firms used in this study from the OFDI dataset collected and compiled by the Ministry of Commerce of China (MCC).[57] This independent set of data yielded qualitatively consistent results with those based on the CSMAR database. Fifth, given that EMEs have different motives for investment in developed and developing countries (Piperopoulos, Wu & Wang, 2018), we tested the effect of innovative capabilities on EMEs' OFDI in developed countries separately from OFDI in developing countries, according to the United Nations' classification of countries. The results show that innovative capabilities have a significant, positive impact on OFDI commitment (OFDI propensity and intensity) destined to both economies, which suggests that regardless of the characteristics of OFDI host countries, the effect of innovation dominates in driving EMEs to invest overseas. Sixth, we re-tested the hypotheses by adding data from companies with OFDI projects in HMT or Caribbean tax havens. The addition of these companies yielded the same qualitative results. Finally, this study conducted a set of tests, replacing key variables with alternative measures, to assess the robustness of the results. Such alternative measures included the number of patent applications as a proxy for innovation capabilities, and the proportion of state entities listed among a firm's top ten shareholders as a proxy for state ownership (Xia, et al., 2014). Considering that the continuous variable of state ownership used in this study cannot reflect the ownership nature of a firm, this study reconstructed the state ownership variable, with a value of 1 denoting SOEs, that is, the ultimate controller of the SOEs is a central or local government agency, and 0 otherwise. Similarly, a binary dummy variable differentiating between regions of high and low marketization was used to replace the moderator "marketization".[58] In all cases, the key results

[57] The OFDI database maintained by MCC, which has been frequently used in prior literature, includes the name of the parent company and its subsidiaries, host country and the length of investment (Deng et al., 2018; Xia et al., 2014). As the MCC's OFDI database is not available after 2014, robustness analysis for this step was done for the period of 2007–2014.

[58] By calculating the average level of marketization in all provinces, 15 provinces that are above the average were classified into the 'Higher marketization' group, with the remaining 16 classified into the 'Lower marketization' group.

obtained remain qualitatively consistent, as shown in Table 4.[59]

5. Discussion and conclusion

How innovative capabilities affect the internationalization of a firm is an important question in IB research. This study draws on RBV and incorporates it with IBV to address this question by examining the OFDI commitment of EMEs. Using financial and OFDI information from Chinese listed firms over a 13-year period, our empirical consistently results show that innovative capabilities have a positive direct effect on EMEs' OFDI commitment, while such positive relationship is negatively moderated by state ownership and regional marketization. These findings are robust to different model specifications and estimation methods, including using the number of Qing Confucian academies as the IV. Therefore, this paper supports the negative narratives surrounding the role of state ownership in the innovation-OFDI nexus. It also reveals the complex role of marketization in OFDI by showing that the direct effects of the regional institutional environment on OFDI differ in nature from the moderating effects. These results provide novel insights into how institutional factors indirectly affect OFDI.

5.1. Theoretical contributions

Our findings have three concrete implications for research on the sources of competitive advantages that enable EMEs to internationalize, and the effects of institutions on a firm's OFDI commitment. First, although existing research recognizes the role of innovation in facilitating foreign investments by firms in developed economies (e.g., Cassiman & Golovko, 2011), little is known about how innovation affects firms' foreign investments in EEs and how this effect differs from that in developed countries. Firms in developed countries have invested in internal R&D for decades, developed their innovation and investment models around a set of mature and homogeneous institutions, and established innovation and international expansion systems. In contrast, EMEs from transitional economies are in the early stages of innovation and internationalization. They have to innovate in an uncertain and more risky environment taking into account of institutional settings (Wu, Wei & Wang, 2021). Empirical results of this study show that the combination of RBV and IBV explains innovative capabilities as the internal driving force of EMEs' OFDI under the influence of their state ownership and regional institutional environment, supporting the notion that ownership advantages and institutional

[59] The results of all robustness checks are available from the authors upon request.

capital jointly influence a firm's internationalization strategies (Purkayastha, Manolova & Edelman, 2018; Qiao, Lv & Zeng, 2020). This may explain why EME OFDI activities that are supported by institutional forces have improved their position in the global race.

Second, beyond the result that state ownership has a negative impact on the relationship between innovation and OFDI – a finding that challenges much of the existing literature (e.g., Hong, Wang & Kafouros, 2015; Liang, Ren & Sun, 2015), this study provides evidence-based insights into the mechanisms underlying this negative effect. Specifically, although state ownership enables firms to enjoy government supports and SOEs' privileged status in their home country, it may also result in government-related bureaucratic governance and low overseas compatibility, both of which hinder the efficiency and legitimacy of capability-driven internationalization, thereby weakening the innovation–OFDI nexus. In addition, OFDI activities by most SOEs are state-oriented rather than market-oriented, and their responsibilities and dilemmas may affect their motivation and participation in internationalization (Xia, et al., 2014). For instance, the OFDI decision of a state-owned EME may be subject more strongly to institutional forces when its internationalization strategy based on economic optimization conflicts with government plans/goals (Luo, Xue & Han, 2010). Thus, a theoretically important contribution of this study to IB literature is that ownership has an impact on how effectively firms use their innovative inputs and outputs to internationalize.

Third, based on the premise that different locations within a country have different institutional environments, this study determines that the direct effect of regional marketization on firms' OFDI commitment is different from its indirect or interaction effect with firm-level innovative capabilities. The empirical results show that the relevance of location-specific marketization goes beyond its distinctly positive impact on OFDI commitment; it also interacts with the innovative capabilities of EMEs, thereby reducing their OFDI commitments. The negative moderating effect of marketization contradicts findings of existing literature on the relationship between innovation and internationalization, which documents a positive moderating effect of marketization (e.g., Qiao, Lv & Zeng, 2020; Yi, Wang & Kafouros, 2013). In this regard, by demonstrating that firms without innovation capability in highly marketized regions are more inclined to conduct OFDI activities than those in lowly marketized regions, this paper reveals that regional institutional development may have weakened the role of technological ownership advantages in stimulating firms' foreign investment. One theoretical implication is that researchers who draw on institution

theories should not only examine the direct impact of institutional factors on firm behavior, but also consider the indirect impact of these factors on firms' resource deployment when they try to gain positional advantages relative to their competitors.

5.2. Managerial and political implications

Our findings offer important guidelines for managers who want to understand how ownership advantages and institutional factors contribute to the success of outward FDI activities. RBV prescriptions suggest that, in order to internationalize, firms need to develop, acquire, evaluate and deploy various resources (e.g., Barney, 1991), which also applies to EMEs. IBV prescriptions suggest that firm managers should adapt their strategies to the institutional environment in which their firms operate (e.g., Yi, Wang & Kafouros, 2013). This study, by contrast, demonstrates that EME managers should focus on the interrelationships between conventional internal resources and external institutional environment, rather than treating them as an independent entity. Specifically, this research suggests that while attempting to expand abroad, managers should emphasize the creation and further development of innovative capabilities, and even make innovation a strategic priority to continuously improve their competitiveness. This is particularly true given the increasing globalization and more intense international competition. At the same time, this study provides another viewpoint for understanding and planning the internationalization of firms: managers should also ensure that their firm's competitive resources are positioned in a way that is not limited by various institutional factors. For example, managers of EMEs may counteract the competitive disadvantages of operating in low marketization regions by engaging in escapist OFDI in other EEs where their competitive advantages can be maximally utilized.

For policymakers, this work identifies that, regardless of its direct impact or interaction with internal technological advantages, state ownership may not be an effective way to stimulate OFDI activities. This suggests that SOEs that respond to market logic can more effectively utilize their access to privileged resources, thereby maximizing profit and creating the competitive advantages needed for successful internationalization. The results of this study show that OFDI offers an escape for innovative EMEs in low marketization regions. Although it is challenging to develop a market-oriented economy equally across subnational regions, the results suggest that policymakers should encourage and support the development of market forces and reduce government intervention, which will benefit all firms (including SOEs) in the internationalization

process.

5.3. Limitations and future research

Although this study significantly expands previous research, it has several limitations. First, given the considerable differences in institutions and regulations across EEs, it may raise concerns regarding generalizability. Examining the explanatory power of other EEs' institutional factors is a potentially valuable avenue to expand the theory of the relationship between innovation and OFDI. Second, although this study considered and tested the possibility that the effects of innovative capabilities on OFDI may be contingent on OFDI types (e.g., resource- or market-seeking) or OFDI destination (host country), this study does not consider OFDI entry modes (e.g., greenfield, acquisition or joint venture). Third, this study did not examine the effect of RBV and IBV on the values and magnitude of OFDI. Future research should employ data on OFDI values to better capture how the relationship between innovation and OFDI evolves with the dynamic changes in China's business and institutional environment.

Appendix

Table A1

Zero-inflated Poisson regression analyses of innovation on OFDI commitments

	(1) Patents granted		(2) R&D intensity	
DV=OFDI Propensity$_{t+1}$	Model 1	Model 2	Model 3	Model 4
Innovative capabilities	0.018**	0.163***	1.088**	8.204***
	(2.20)	(3.91)	(2.17)	(3.80)
State ownership	-0.077	-0.003	-0.081	0.083
	(-0.75)	(-0.02)	(-0.80)	(0.58)
Marketization	0.051***	0.066***	0.049***	0.078***
	(3.82)	(4.68)	(3.64)	(4.81)
Innovative capabilities* State ownership		-0.067		-5.421*
		(-1.29)		(-1.67)
Innovative capabilities* Marketization		-0.016***		-0.788***
		(-3.46)		(-3.30)
Firm age	-0.008***	-0.008***	-0.007***	-0.007***
	(-3.03)	(-3.05)	(-2.71)	(-2.71)
Firm size	0.183***	0.183***	0.187***	0.189***
	(13.47)	(13.43)	(13.80)	(13.87)
Board size	-0.038	-0.038	-0.034	-0.033
	(-0.53)	(-0.54)	(-0.48)	(-0.46)
Financial leverage	0.095	0.093	0.128	0.131
	(1.03)	(1.01)	(1.36)	(1.40)
Operating leverage	-0.642***	-0.635***	-0.546***	-0.540***
	(-6.03)	(-5.96)	(-4.96)	(-4.90)
Return on asset	1.151***	1.156***	1.249***	1.242***
	(4.38)	(4.39)	(4.73)	(4.69)

Marketing capability	-0.124	-0.115	-0.165	-0.158
	(-0.66)	(-0.61)	(-0.86)	(-0.83)
Foreign ownership	0.761**	0.758**	0.762**	0.750**
	(2.37)	(2.35)	(2.36)	(2.33)
OFDI experience	2.021***	2.016***	2.011***	2.008***
	(64.20)	(64.02)	(63.43)	(63.36)
HHI	-0.424**	-0.438**	-0.286	-0.295
Industrial innovation level	-0.000	-0.000	1.254	1.302
	(-0.02)	(-0.04)	(1.36)	(1.41)
Regional division	-0.055*	-0.056*	-0.053*	-0.047
	(-1.79)	(-1.84)	(-1.73)	(-1.55)
Industry dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Constant	-2.190***	-2.199***	-2.149***	-2.186***
	(-17.95)	(-18.00)	(-17.53)	(-17.70)
Industrial innovation level	-0.000	-0.000	1.254	1.302
	(-0.02)	(-0.04)	(1.36)	(1.41)
Regional division	-0.055*	-0.056*	-0.053*	-0.047
	(-1.79)	(-1.84)	(-1.73)	(-1.55)
Industry dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Constant	-2.190***	-2.199***	-2.149***	-2.186***
	(-17.95)	(-18.00)	(-17.53)	(-17.70)
Observations	14,717	14,717	14,717	14,717
Log likelihood	-8283.21	-8276.76	-8279.985	-8273.718
LR chi2 F (P-value)	7840.75 (0.00)	7853.65 (0.00)	7847.20 (0.00)	7859.74 (0.00)
Vuong test of zip vs. standard Poisson Z (P-value)	234.00 (0.00)	16.26 (0.00)	26.41 (0.00)	45.72 (0.00)

z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Given that one of our dependent variables is the number of new foreign subsidiaries in a year, which often shows large intra-firm variation, a simple logarithm transformation would not be appropriate. Therefore, we also adopted a count model to be one of the robustness checks. Since our summary statistics show that the mean (0.390) is similar to the standard deviation (0.686) for the dependent variable, Poisson regression is more appropriate than the negative binomial regression model (Wang et al., 2022). Given that the standard Poisson regression model may lead to biased results due to more than half of the observations having zero counts in the dependent variable (see Table 2), we conducted this robustness check using the zero-inflated Poisson regression (ZIP). The results of the Vuong test (Z-score>0) also suggest that a ZIP model is more appropriate. I did not use the fixed effect model because the ZIP is a non-linear function and the likelihood estimator for fixed effects will generate biased and inconsistent results (Piperopoulos et al., 2018). All results of interest obtained showed no qualitative differences from the Tobit models, except the result of interaction term “Innovative capabilities* State

ownership" in Model 2 (Table 0), which is negative but insignificant only when innovation was measured by the number of granted patents.

References

1. Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions: Sage Publications, Newbury Park, CA.
2. Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. American Economic Review, 89, 605-618.
3. Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17, 99-120.
4. Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. Strategic Organization, 6, 285-327.
5. Cassiman, B., & Golovko, E. (2011). Innovation and internationalization through exports. Journal of International Business Studies, 42, 56-75.
6. Chang, S.-J., & Rhee, J. H. (2011). Rapid FDI expansion and firm performance. Journal of International Business Studies, 42, 979-994.
7. Child, J., & Rodrigues, S. B. (2005). The internationalization of Chinese firms: a case for theoretical extension? . Management and Organization Review, 1, 381-410.
8. Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. Research Policy, 40, 441-452.
9. Cuervo-Cazurra, A., & Genc, M. (2008). Transforming disadvantages into advantages: developing-country MNEs in the least developed countries. Journal of International Business Studies, 39, 957-979.
10. Cuervo-Cazurra, A., Inkpen, A., Musacchio, A., & Ramaswamy, K. (2014). Governments as owners: State-owned multinational companies. Journal of International Business Studies, 45, 919-942.
11. Cui, L., & Jiang, F. (2010). Behind ownership decision of Chinese outward FDI: Resources and institutions. Asia Pacific Journal of Management, 27, 751-774.
12. Deng, Z., Yan, J., & Van Essen, M. (2018). Heterogeneity of political connections and outward foreign direct investment. International Business Review, 27, 893-903.
13. Du, X. (2016). Does Confucianism reduce board gender diversity? Firm-level evidence from China. Journal of Business Ethics, 136, 399-436.
14. Dunning, J. H. (1993). Multinational Enterprises and the Global Economy. New York: Addison-Wesley Publishing Company.
15. Elia, S., & Santangelo, G. D. (2017). The evolution of strategic asset-seeking acquisitions by emerging market multinationals. International Business Review, 26, 855-866.
16. Fan, G., Wang, X., & Zhu, H. (2017). Marketization index of China's provinces: NERI report 2016 (In Chinese). Beijing: Social Science Literature Press.
17. Fang, E. E., & Zou, S. (2009). Antecedents and consequences of marketing dynamic capabilities in international joint ventures. Journal of International Business Studies, 40, 742-761.
18. Fang, L. H., Lerner, J., & Wu, C. (2017). Intellectual property rights protection, ownership, and innovation: Evidence from China. The Review of Financial Studies, 30, 2446-2477.
19. Fu, X., Hou, J., & Liu, X. (2018). Unpacking the relationship between outward direct investment and innovation performance: evidence from Chinese firms. World Development, 102, 111-123.

20. Fu, X., Hou, J., & Sanfilippo, M. (2017). Highly skilled returnees and the internationalization of EMNEs: Firm level evidence from China. International Business Review, 26, 579-591.

21. Fu, X., Pietrobelli, C., & Soete, L. (2011). The role of foreign technology and indigenous innovation in the emerging economies: technological change and catching-up. World Development, 39, 1204-1212.

22. Greve, H. R., & Man Zhang, C. (2017). Institutional logics and power sources: Merger and acquisition decisions. Academy of Management Journal, 60, 671-694.

23. Gu, Z. (2015). Confucian ethics and agency cost in the context of globalization. Management World 3, 113-123. (in Chinese).

24. Haiyue, L., & Manzoor, A. (2020). The impact of OFDI on the performance of Chinese firms along the 'Belt and Road'. Applied Economics, 52, 1219-1239.

25. Herfindahl, O. (1950). Concentration in the steel industry. Unpublished Ph.D. dissertation. New York: Columbia University.

26. Hong, J., Wang, C., & Kafouros, M. (2015). The role of the state in explaining the internationalization of emerging market enterprises. British Journal of Management, 26, 45-62.

27. Hu, H. W., & Cui, L. (2014). Outward foreign direct investment of publicly listed firms from China: A corporate governance perspective. International Business Review, 23, 750-760.

28. Ji, X. F. (1996). Chinese academy dictionary: Zhejiang: Zhejiang Education Publishing House.

29. Jones, G. K., & Davis, H. J. (2000). National culture and innovation: Implications for locating global R& D operations. MIR: Management International Review, 11-39.

30. Jormanainen, I., & Koveshnikov, A. (2012). International activities of emerging market firms. Management International Review, 52, 691-725.

31. Li, J., Strange, R., Ning, L., & Sutherland, D. (2016). Outward foreign direct investment and domestic innovation performance: Evidence from China. International Business Review, 25, 1010-1019.

32. Li, J., Xia, J., Shapiro, D., & Lin, Z. (2018). Institutional compatibility and the internationalization of Chinese SOEs: The moderating role of home subnational institutions. Journal of World Business, 53, 641-652.

33. Li, X., Quan, R., Stoian, M.-C., & Azar, G. (2018). Do MNEs from developed and emerging economies differ in their location choice of FDI? A 36-year review. International Business Review, 27, 1089-1103.

34. Liang, H., Ren, B., & Sun, S. L. (2015). An anatomy of state control in the globalization of state-owned enterprises. Journal of International Business Studies, 46, 223-240.

35. Liu, X., Lu, J., & Chizema, A. (2014). Top executive compensation, regional institutions and Chinese OFDI. Journal of World Business, 49, 143-155.

36. Lu, J., Liu, X., Wright, M., & Filatotchev, I. (2014). International experience and FDI location choices of Chinese firms: The moderating effects of home country government support and host country institutions. Journal of International Business Studies, 45, 428-449.

37. Luo, Y. (2003). Industrial dynamics and managerial networking in an emerging market: The case of China. Strategic Management Journal, 24, 1315-1327.

38. Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: A springboard perspective. Journal of International Business Studies, 38, 481-498.

39. Luo, Y., Xue, Q., & Han, B. (2010). How emerging market governments promote outward FDI: Experience from China. Journal of World Business, 45, 68-79.

40. Lyles, M., Li, D., & Yan, H. (2014). Chinese outward foreign direct investment performance: The

role of learning. Management and Organization Review, 10, 411-437.

41. Peng, M. W. (2003). Institutional transitions and strategic choices. Academy of Management Review, 28, 275-296.

42. Peng, M. W., Wang, D. Y., & Jiang, Y. (2008). An institution-based view of international business strategy: A focus on emerging economies. Journal of International Business Studies, 39, 920-936.

43. Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, location choices and innovation performance of emerging market enterprises. Research Policy, 47, 232-240.

44. Purkayastha, S., Manolova, T. S., & Edelman, L. F. (2018). Business group effects on the R&D intensity-internationalization relationship: Empirical evidence from India. Journal of World Business, 53, 104-117.

45. Qiao, P., Lv, M., & Zeng, Y. (2020). R&D Intensity, Domestic Institutional Environment, and SMEs' OFDI in Emerging Markets. Management International Review, 60, 939-973.

46. Ralston, D. A., Egri, C. P., Stewart, S., Terpstra, R. H., & Kaicheng, Y. (1999). Doing business in the 21st century with the new generation of Chinese managers: A study of generational shifts in work values in China. Journal of International Business Studies, 30, 415-427.

47. Rodríguez, J. L., & Rodríguez, R. M. G. (2005). Technology and export behaviour: A resource-based view approach. International Business Review, 14, 539-557.

48. Saridakis, G., Idris, B., Hansen, J. M., & Dana, L. P. (2019). SMEs' internationalisation: When does innovation matter? Journal of Business Research, 96, 250-263.

49. Shi, W., Sun, S. L., & Peng, M. W. (2012). Sub-national institutional contingencies, network positions, and IJV partner selection. Journal of Management Studies, 49, 1221-1245.

50. Stoian, C., & Mohr, A. (2016). Outward foreign direct investment from emerging economies: Escaping home country regulative voids. International Business Review, 25, 1124-1135.

51. Sun, S. L., Peng, M. W., Lee, R. P., & Tan, W. (2015). Institutional open access at home and outward internationalization. Journal of World Business, 50, 234-246.

52. Tang, Q., Gu, F. F., Xie, E., & Wu, Z. (2020). Exploratory and exploitative OFDI from emerging markets: Impacts on firm performance. International Business Review, 29, 101661.

53. Tang, R. W. (2019). FDI expansion speed of state-owned enterprises and the moderating role of market capitalism: Evidence from China. International Business Review, 28, 101596.

54. Tang, R. W. (2021). Pro-market institutions and outward FDI of emerging market firms: An institutional arbitrage logic. International Business Review, 30, 101814.

55. Tomiura, E. (2007). Effects of R&D and networking on the export decision of Japanese firms. Research Policy, 36, 758-767.

56. Tukey, J. W. (1962). The future of data analysis. The annals of mathematical statistics, 33, 1-67.

57. Wan, W. P., & Hoskisson, R. E. (2003). Home country environments, corporate diversification strategies, and firm performance. Academy of Management Journal, 46, 27-45.

58. Wang, C., Hong, J., Kafouros, M., & Boateng, A. (2012a). What drives outward FDI of Chinese firms? Testing the explanatory power of three theoretical frameworks. International Business Review, 21, 425-438.

59. Wang, C., Hong, J., Kafouros, M., & Wright, M. (2012b). Exploring the role of government involvement in outward FDI from emerging economies. Journal of International Business Studies, 43, 655-676.

60. Wang, C., & Kafouros, M. I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. International Business Review, 18, 606-616.

61. White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817-838.

62. Wooldridge, J. M. (2002). Inverse probability weighted M-estimators for sample selection, attrition, and stratification. Portuguese Economic Journal, 1, 117-139.

63. Wu, L., Wei, Y., & Wang, C. (2021). Disentangling the effects of business groups in the innovation-export relationship. Research Policy, 50, 104093.

64. Xia, J., Ma, X., Lu, J. W., & Yiu, D. W. (2014). Outward foreign direct investment by emerging market firms: A resource dependence logic. Strategic Management Journal, 35, 1343-1363.

65. Yi, J., Wang, C., & Kafouros, M. (2013). The effects of innovative capabilities on exporting: Do institutional forces matter? International Business Review, 22, 392-406.

66. Yiu, D. W., Lau, C., & Bruton, G. D. (2007). International venturing by emerging economy firms: The effects of firm capabilities, home country networks, and corporate entrepreneurship. Journal of International Business Studies, 38, 519-540.

67. Zhou, L., & Wu, A. (2014). Earliness of internationalization and performance outcomes: Exploring the moderating effects of venture age and international commitment. Journal of World Business, 49, 132-142.

Declaration of co-authorship

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Title of paper	Innovation and Export Performance of Emerging Market Enterprises: The Roles of State and Foreign Ownership in China
Journal and date (if published)	International Business Review

1. Formulation/identification of the scientific problem to be investigated and its operationalization into an appropriate set of research questions to be answered through empirical research and/or conceptual development
Description of contribution: Did the majority independently (75%-100%): Formulation of introduction, research questions, theoretical and empirical framework. The entire first draft version of the paper. The investigation of the scientific problem was part of a broader framework of the PhD fellow's doctoral thesis.
2. Planning of the research, including selection of methods and method development
Description of contribution: Did the majority independently (75%-100%): Formulation of data collection and research methods; the planning of the research incl. participation in various seminars to improve the paper.
3. Involvement in data collection and data analysis
Description of contribution: Did the majority independently (75%-100%): Collection and analysis of quantitative data (e.g., collections of patents and exports data, mergers, statistics, econometrics models).
4. Presentation, interpretation and discussion of the analysis in the form of an article or manuscript
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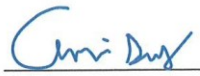
05 May Date	 Signature

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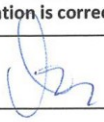
02 June Date	 Signature

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A five-act spectacle on online communication, collaboration & organization.

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Creativity as Balancing 'Constrainedness'

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An empirical study of enacted sensemaking in everyday conflict at work

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