CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

Innovation and Export Performance of Emerging Market Enterprises

The Roles of State and Foreign Ownership in China

Dong, Guowei; Kokko, Ari; Zhou, Haoyong

Document Version
Final published version

Published in:
International Business Review

DOI:
10.1016/j.ibusrev.2022.102025

Publication date:
2022

License
CC BY

Citation for published version (APA):
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*, *31*(6), Article 102025. https://doi.org/10.1016/j.ibusrev.2022.102025

Link to publication in CBS Research Portal

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
If you believe that this document breaches copyright please contact us (research.lib@cbs.dk) providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 04. Jul. 2025

International Business Review 31 (2022) 102025

Contents lists available at ScienceDirect

International Business Review

journal homepage: www.elsevier.com/locate/ibusrev

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

Guowei Dong [a], Ari Kokko [a,*], Haoyong Zhou [b]

[a] Copenhagen Business School, Department of International Economics, Government and Business, Porcelænshaven 24A, 2000 Frederiksberg, Denmark
[b] Jönköping University, Jönköping International Business School, Gjuterigatan 5, 553 18 Jönköping, Sweden

ARTICLE INFO

Keywords:
Innovation
Export performance
State ownership
Foreign ownership
China

ABSTRACT

This article 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.

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, et al., 2013). The empirical literature on the impact of innovation on export performance largely supports this view (Ayllón & Radicic, 2019; Cassiman & Golovko, 2011; Silva, et al., 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, et al., 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, et al., 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 et al., 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 et al., 2011; Jiang et al., 2013; Walheer & He, 2020). Recent research on export performance in emerging countries, however, tends to focus on firm-specific characteristics, including innovation capability (Oura et al., 2016; Véganzonès-Varoudakis & Plane, 2019), largely neglecting the role of ownership differences (e.g., Chakrabarti & Mondal, 2017; Rialp-Criado & Komochkova, 2017; Wu et al., 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

* Corresponding author.
E-mail address: ako.egb@cbs.dk (A. Kokko).

https://doi.org/10.1016/j.ibusrev.2022.102025
Received 25 May 2021; Received in revised form 11 May 2022; Accepted 6 June 2022
Available online 14 June 2022
0969-5931/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

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 theoretical debate on how ownership impacts the relationship between innovation and exports by providing some new evidence that partly contradicts existing findings (e.g., Yi et al., 2013). In light of divergent theoretical predictions on the role of state ownership in innovation and internationalization (Cuervo-Cazurra & Li, 2021; Hong et al., 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 by providing convincing 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 et al., 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 et al., 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 et al., 2000; Bernard & Jensen, 1999; Clerides, et al., 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 et al., 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 et al., 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 et al., 2008; Liu et al., 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.[1]

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 et al., 2013). Although these types of policy incentives also impact private firms, they may 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 et al., 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 et al., 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 et al., 2017), we believe that the positive effects outweigh the negative impact of weak governance. This is supported Yi et al. (2013), who examine a large survey data set on Chinese firms in 2005–2007, and who is the only earlier contribution we have found that examines the moderating effect of state ownership. This motivates our first hypothesis for the empirical part of the paper:

Hypothesis 1. State ownership interacts with innovation outputs to generate a positive impact on the firm's export performance.

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 et al., 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

[1] 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.

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.

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 et al., 2013; Kafouros & Buckley, 2008; Zahra et al., 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.[2] Yi et al. (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 et al. (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 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 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 et al., 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 et al., 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. Foreign ownership interacts with innovation outputs to generate a positive impact on the firm's export performance.

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 et al., 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

[2] 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.

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% or more), while "State-owned domestic firms" refer to firms are officially registered as "state-owned enterprises" in China.

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.[3] Accounting for about 90 % 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 et al., 2011). Third, we collected province-level data on regional economics and innovation from the CEIC database.[4] Earlier research has shown that CEIC data are reasonably accurate and reliable (Wu et al., 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.[5] 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% level.[6]

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% of the sample firms were exporters, only 3 % of them owned innovative patents, and only 7 % 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 % of sales. Although Chinese export products tended to be low-cost, high volume products with relatively limited technological sophistication (Yi et al., 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.

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 et al., 2021; Xie & Li, 2018; Yi et al., 2013).

We measure the key explanatory variable, innovation outputs, using the number of patents granted to each firm each year during the sample period.[7] Furthermore, following Wu et al. (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 et al., 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.[8] 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 et al., 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 et al., 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 et al. (2021) and Yi et al. (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 ownership is defined as the ratio of state-owned paid-in capital to the total paid-in capital of the firm (Genin et al., 2021; Zhou et al., 2017). Similarly, foreign ownership is operationalized as the ratio of paid-in capital owned by foreign investors to total paid-in capital (Hong et al., 2015). Following Buckley et al. (2007) and Deng et al. (2014), we do not treat capital from Hong Kong, Macau and

[3] 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.

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

[5] 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.

[6] See Tukey (1962) for details.

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

[8] 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.

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

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. 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.

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 et al., 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

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	1.1146	1.8129												
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.

Taiwan (HMT) as foreign capital.[9]

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), we include total factor productivity (TFP) among our control variables.[10] TFP is defined in the usual way as $logY - \beta logK - (1-\beta)logL$, where *Y* is value-added; β is (Hong et al., 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 et al., 1985), indicating that multicollinearity is not likely to influence the estimations.

3.3. Model specification and estimation

We test our hypotheses by using the following regression specification.

[9] We also carried out estimations where HMT investments were included in the foreign capital category. The results remained qualitatively unchanged.
[10] We have also experimented with alternative measures of productivity, such as labour productivity. Our key results are not affected.

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) (New Products Sales)/Sales		
	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	1106,219	1106,219	1106,219	1106,219	1106,219	1106,219	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.

$$\boldsymbol{Y}_{it} = \boldsymbol{\alpha} + \boldsymbol{C}_{it-1}\boldsymbol{\alpha} + \boldsymbol{M}_{it-1}\boldsymbol{\beta} + (\boldsymbol{C}_{it-1} \times \boldsymbol{M}_{it-1})\boldsymbol{\gamma} + \boldsymbol{Z}_{it-1}\boldsymbol{\delta} + \boldsymbol{\lambda}_j + \boldsymbol{\lambda}_r + \boldsymbol{\lambda}_t + \boldsymbol{\varepsilon}_{it} \quad (1)$$

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; $\boldsymbol{C}_{it-1} \times \boldsymbol{M}_{it-1}$ 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 et al., 2013) when estimating our models. Hierarchical multiple regressions enable us to determine the order that variables are entered into the regression equation, which in turn enables the regression to test the effects of certain predictors independent of the influence of others.

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

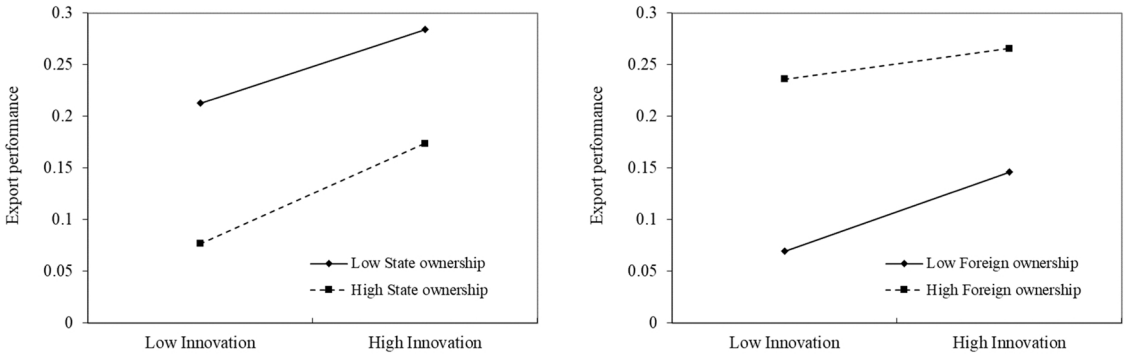

Fig. 1. Moderating effects of state ownership and foreign ownership.

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 et al. (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 et al. (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.[11]

Fig. 1 illustrates the relationship between exports, ownership, and innovation. The notable feature of the figure is that the marginal effect of innovation in firms with high foreign ownership is relatively small compared to that for SOEs and firms with low foreign ownership shares.

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. The main results do not differ much from the OLS estimations, which indicates that the findings are robust to different estimation methods.

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 %.[12] 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.[13]

Further, we have tried to control for possible estimation biases in

[11] 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".

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

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

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

DV= Export performance $_{t+1}$	Tobit model			Domestic firms			Foreign firms		
	Innovation measurement			Pooled OLS			Pooled OLS		
	(1) Patents	(2) Patents /Employment	(3) (New Products Sales)/Sales	(1) Patents	(2) Patents /Employment	(3) (New Products Sales)/Sales	(1) Patents	(2) Patents /Employment	(3) (New Products Sales)/Sales
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)
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	1106,219	1106,219	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.

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 et al., 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.[14] 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.[15] We argue that the universities' innovation outputs are significantly related to firm-level innovation in their province, e.g. because it reflects the availability of skilled R&D staff at the provincial level. At the same

[14] 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 et al., 2013).

[15] 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/).

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	1447,211	1093,941
R2 (adj.)	0.066	0.076
Wald test of exogeneity (P value)		218009.31 (0.0000)

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

time, university innovation activities are not very likely to influence the export activities of firms, which meets the exclusion restriction: the instrumental variable is orthogonal to the error term.

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.

We conducted five 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.[16] The results are qualitatively consistent with those reported in Table 5. Finally, we re-estimated the models using data for 2011–2014.[17] 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. 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 et al., 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 et al., 2021). This study confirms that innovation is an economically significant antecedent of export performance also in EMEs.

Second, a theoretically important result from the study is that ownership is not only a direct determinant of export performance, but that it also has an impact on how effectively firms use their innovative outputs for exporting. 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 et al., 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 et al., 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

[16] 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.

[17] 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).

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.

Acknowledgements

We are grateful to Bersant Hobdari, Yanlei Zhang and anonymous reviewers for their valuable comments on earlier versions of this work. The work received financial support from China Scholarship Council (# 201706890025).

Appendix

See Appendix Tables A1 and A2.

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 et al. (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

(*continued on next page*)

Table A1 (*continued*)

	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)
8.	Gashi et al. (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 et al. (2015)	Indian pharma-ceutical firms	RDI	EP EIS	No	No	No	Insignificant RDI on EP + RDI on EIS
13.	Ogasavara, et al. (2016)	Brazilian exporters	Subjective measure of innovation	Subjective measures of export performance	No	No	No	+ innovation
14.	Oura et al. (2016)	Brazilian industrial SMEs	Subjective innovation capacity	Subjective export performance	No	No	No	+ innovation
15.	Zhang and Zhu (2016)	Chinese manufacturing exporters	Subjective innovation performance	Subjective export performance	No	No	No	+ innovation
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 et al. (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 et al. (2013)	Chinese manufacturing firms	FO,SO	Export intensity	NPS	+ FO + FO*NPS - SO + SO*NPS
3.	Gashi et al. (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

(*continued on next page*)

Table A2 (*continued*)

	Study	Sample	Ownership measures	Export measures	Innovation included as moderator	Key findings on the effects of ownership and innovation on exports
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 et al. (2020)	Firms from 81 developing countries (incl. China)	SO	Export intensity	No	- SO
10.	Vinh and Duong (2020)	Vietnamese firms	DFO DWF	Export dummy Export intensity	No	+ DFO + DWF
11.	Ye et al. (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

Adegbesan, J. A., & Higgins, M. J. (2011). The intra-alliance division of value created through collaboration. *Strategic Management Journal, 32*, 187–211.
Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage Publications.
Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review, 89*, 605–618.
Almeida, R. (2007). The labor market effects of foreign owned firms. *Journal of International Economics, 72*, 75–96.
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.
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.
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.
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.
Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. *Strategic Organization, 6*, 285–327.
Bernard, A. B., & Jensen, J. B. (1999). Exceptional exporter performance: cause, effect, or both? *Journal of International Economics, 47*, 1–25.
Bernard, A. B., & Jensen, J. B. (2004). Why some firms export. *Review of Economics and Statistics, 86*, 561–569.
Bernard, A. B., & Wagner, J. (2001). Export entry and exit by German firms. *Weltwirtschaftliches Archiv, 137*, 105–123.
Björkman, I., & Lu, Y. (1999). The management of human resources in Chinese-Western joint ventures. *Journal of World Business, 34*, 306–324.
Blomström, M., & Kokko, A. (1998). Multinational corporations and spillovers. *Journal of Economic Surveys, 12*, 247–277.
Brødsgaard, K. E. (2012). Politics and business group formation in China: The Party in control? *The China Quarterly, 211*, 624–648.
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.
Cai, H., & Liu, Q. (2009). Competition and corporate tax avoidance: Evidence from Chinese industrial firms. *The Economic Journal, 119*, 764–795.
Caldera, A. (2010). Innovation and exporting: evidence from Spanish manufacturing firms. *Review of World Economics, 146*, 657–689.
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.
Cassiman, B., & Golovko, E. (2011). Innovation and internationalization through exports. *Journal of International Business Studies, 42*, 56–75.
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.
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.
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.
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.
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.
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.
Coe, D. T., & Helpman, E. (1995). International r&d spillovers. *European Economic Review, 39*, 859–887.
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.
Cuervo-Cazurra, A., & Li, C. (2021). State ownership and internationalization: The advantage and disadvantage of stateness. *Journal of World Business, 56*, Article 101112.
Das, S., Roberts, M. J., & Tybout, J. R. (2007). Market entry costs, producer heterogeneity, and export dynamics. *Econometrica, 75*, 837–873.
Deng, Z., Guo, H., Zhang, W., & Wang, C. (2014). Innovation and survival of exporters: A contingency perspective. *International Business Review, 23*, 396–406.
Dunning, J. H., & Lundan, S. M. (2008). *Multinational enterprises and the global economy: Second ed.* Cheltenham UK: Edward Elgar.
Dutta, S., Narasimhan, O., & Rajiv, S. (2005). Conceptualizing and measuring capabilities: Methodology and empirical application. *Strategic Management Journal, 26*, 277–285.
Fan, G., Wang, X., & Zhu, H. (2011). *NERI index of marketization of China's provinces 2011 report*. Beijing: National Economic Research Institute.
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.
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.
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.
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.

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.
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.
García, F., Jin, B., & Salomon, R. (2013). Does inward foreign direct investment improve the innovative performance of local firms? *Research Policy, 42*, 231–244.
Gashi, P., Hashi, I., & Pugh, G. (2014). Export behaviour of SMEs in transition countries. *Small Business Economics, 42*, 407–435.
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.
Golovko, E., & Valentini, G. (2011). Exploring the complementarity between innovation and export for SMEs' growth. *Journal of International Business Studies, 42*, 362–380.
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.
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.
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.
H.A. Hopenhayn Entry, exit, and firm dynamics in long run equilibrium Econometrica: Journal of the Econometric Society 1992a.1127– 1150.
Hopenhayn, H. A. (1992b). Exit, selection, and the value of firms. *Journal of Economic Dynamics and Control, 16*, 621–653.
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.
Hymer, S. H. (1976). *The international operations of national firms: A study of foreign direct investment (1960)*. Cambridge, MA: MIT Press.
Imbruno, M. (2016). China and WTO liberalization: Imports, tariffs and non-tariff barriers. *China Economic Review, 38*, 222–237.
İpek, İ. (2018). The resource-based view within the export context: An integrative review of empirical studies. *Journal of Global Marketing, 31*, 157–179.
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.
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.
Jormanainen, I., & Koveshnikov, A. (2012). International activities of emerging market firms. *Management International Review, 52*, 691–725.
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.
Kahiya, E. T. (2018). Five decades of research on export barriers: Review and future directions. *International Business Review, 27*, 1172–1188.
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.
Kneller, R., & Pisu, M. (2007). Industrial linkages and export spillovers from FDI. *World Economy, 30*, 105–134.
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.
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.
Krugman, P. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics, 9*, 469–479.
Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *The American Economic Review, 70*, 950–959.
Liu, X., & Buck, T. (2007). Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. *Research Policy, 36*, 355–366.
Liu, X., Xiao, W., & Huang, X. (2008). Bounded entrepreneurship and internationalisation of indigenous Chinese private-owned firms. *International Business Review, 17*, 488–508.
Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: A springboard perspective. *Journal of International Business Studies, 38*, 481–498.
Markusen, J. R. (1995). The boundaries of multinational enterprises and the theory of international trade. *Journal of Economic Perspectives, 9*, 169–189.
Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica, 71*, 1695–1725.
Melitz, M. J., & Redding, S. J. (2021). *Trade and Innovation (Working Paper No. 28945)*. Cambridge, MA: National Bureau of Economic Research. ⟨www.nber.org/papers/w28945⟩.
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.
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].
Nuruzzaman, N., Singh, D., & Gaur, A. S. (2020). Institutional support, hazards, and internationalization of emerging market firms. *Global Strategy Journal, 10*, 361–385.
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.
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.
Peng, M. W. (2001). The resource-based view and international business. *Journal of Management, 27*, 803–829.
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.
Ramamurti, R. (2001). The obsolescing 'bargaining model'? MNC-host developing country relations revisited. *Journal of International Business Studies, 32*, 23–39.
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.
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.
Rodríguez, J. L., & Rodríguez, R. M. G. (2005). Technology and export behaviour: A resource-based view approach. *International Business Review, 14*, 539–557.
Roper, S., & Love, J. H. (2002). Innovation and export performance: evidence from the UK and German manufacturing plants. *Research Policy, 31*, 1087–1102.
Sheldon, P., & Li, Y. (2013). Localized poaching and skills shortages of manufacturing employees among MNEs in China. *Journal of World Business, 48*, 186–195.
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.
Singh, D. A. (2009). Export performance of emerging market firms. *International Business Review, 18*, 321–330.
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.
Tukey, J. W. (1962). The future of data analysis. *The Annals of Mathematical Statistics, 33*, 1–67.
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.
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*, 123–143.
Walheer, B., & He, M. (2020). Technical efficiency and technology gap of the manufacturing industry in China: Does firm ownership matter? *World Development, 127*, Article 104769.
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.
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.
Wang, C., & Kafouros, M. I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. *International Business Review, 18*, 606–616.
Wang, F. (2014). Complementarities between R&D investment and exporting—Evidence from China. *China Economic Review, 31*, 217–227.
Wang, J., & Wang, X. (2015). Benefits of foreign ownership: Evidence from foreign direct investment in China. *Journal of International Economics, 97*, 325–338.
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.
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.
White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica, 48*, 817–838.
WorldBank. (2008). *World development indicators 2008*. New York, USA: World Bank.
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.
Wu, L., Wei, Y., & Wang, C. (2021). Disentangling the effects of business groups in the innovation-export relationship. *Research Policy, 50*, Article 104093.
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.
Yang, C.-H., & Chen, Y.-H. (2012). R&D, productivity, and exports: Plant-level evidence from Indonesia. *Economic Modelling, 29*, 208–216.
Ye, Z., Zhang, F., & Zhang, S. (2021). Export effect and influence mechanism of foreign ownership. *International Review of Economics & Finance, 76*, 258–276.
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.
Yi, J., & Wang, C. (2012). The decision to export: Firm heterogeneity, sunk costs, and spatial concentration. *International Business Review, 21*, 766–781.
Yi, J., Wang, C., & Kafouros, M. (2013). The effects of innovative capabilities on exporting: Do institutional forces matter? *International Business Review, 22*, 392–406.

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