The importance of institutional and financial resources for export performance associated with technological innovation

Wu, Lichao; Wei, Yingqi; Wang, Chengang; McDonald , Frank; Han, Xia

DOI:
10.1016/j.techfore.2022.122040

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (Harvard):
Wu, L, Wei, Y, Wang, C, McDonald , F & Han, X 2022, 'The importance of institutional and financial resources for export performance associated with technological innovation', *Technological Forecasting and Social Change*, vol. 185, 122040. https://doi.org/10.1016/j.techfore.2022.122040

Technological Forecasting & Social Change 185 (2022) 122040

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

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

The importance of institutional and financial resources for export performance associated with technological innovation

Lichao Wu [a], Yingqi Wei [b,*], Chengang Wang [c], Frank McDonald [d], Xia Han [e]

[a] Department of International Economics and Business, Xiamen University, Xiamen 361005, China
[b] Leeds University Business School, University of Leeds, Leeds LS2 9JT, UK
[c] Birmingham Business School, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK
[d] Leeds University Business School, University of Leeds, Leeds LS2 9JT, UK
[e] Alliance Manchester Business School, University of Manchester, Manchester M15 6PB, UK

ARTICLE INFO

Keywords:
Innovation
Export performance
Resource contingency perspective
Institutional resources
Financial resources
Financial slack
State capitalism
China

ABSTRACT

This study adopts a resource contingency perspective to examine the impact of technological innovation on export performance of manufacturing firms. In view of institutional voids and capital market imperfections in emerging economies, we propose that two types of resources, institutional resources and financial resources, are of differential value in the innovation-exports nexus. Empirical results, based on a large sample of Chinese manufacturing firms, show that technological innovation embodied in the patent has positive effect on exports, but such effect is diminished by institutional resources (captured by state-ownership, business group affiliation and government subsidy) and enhanced by internal financial resources (captured by financial slack).

1. Introduction

Whether technological innovation (hereafter innovation for brevity)[1] contributes to export performance of firms has attracted much attention amongst scholars. Existing studies have documented mixed effects of innovation on export performance measured by export propensity and export intensity[2] (see Table A1 for a summary of studies). The empirical ambiguity is shown even in single country contexts. This signals the need for a contingency perspective that clarifies the conditions under which the value of innovation to exports is enhanced or diminished. Appropriating innovation for exports requires significant resource commitment to ensure success (Cassiman and Golovko, 2011; Golovko and Valentini, 2011; Kiss et al., 2018; Manez et al., 2014). However, in the context of emerging economies, resources for innovation are scarce and institutional characteristics and institutional voids combined with imperfect capital markets (Hoskisson et al., 2000) further exacerbate these resource scarcity problems. The focus of the paper concerns the export performance effects of innovation on the nexus of key characteristics of institutional resources in emerging economies combined with the internal financial resources of firms. The research question is – What is the role played by institutional resources and financial resources on the impact of innovation on export performance in emerging economies?

Institutional resources encompass resources that firms accrue from

* Corresponding author.
E-mail address: y.wei@leeds.ac.uk (Y. Wei).

[1] The existing studies have also covered the export effects of non-technological innovation such as marketing innovation (e.g., Bortoluzzi et al., 2018; Edeh et al., 2020) and management innovation (e.g., Azar and Ciabuschi, 2017; Radicic and Djalilov, 2019). However, due to difficulties in measuring non-technological innovation as well as conceptual ambiguity, technological innovation is still the most frequently investigated innovation construct, especially, for manufacturing firms. This paper thus focuses on technological innovation.

[2] As recognized by Paeleman et al. (2017), export performance is a multidimensional construct and can be captured by export propensity, export intensity and export diversity. Our extensive literature review shows that few studies examine export diversity. Due to data availability, this paper only focuses on export propensity and export intensity.

https://doi.org/10.1016/j.techfore.2022.122040
Received 19 November 2021; Received in revised form 24 July 2022; Accepted 11 September 2022
Available online 26 September 2022

their interactions with the institutional environment (Jackson and Deeg, 2019; Xie and Li, 2018). Emerging economies are characterized by institutional voids,[3] low environmental munificence[4] but high uncertainty, continuous regulative changes, and fast-moving business environment, resulting in more discretionary power of government in resource allocations (Hoskisson et al., 2000). To mitigate uncertainties and risks posed by the characteristics of institutional systems including some institutional voids and resource constraints, firms often utilize or build connections with governmental agencies. Such efforts offer institutional resources for firms to exploit and leverage. Firms' institutional resources can be either ascribed through state-ownership (Li et al., 2018; Nuruzzaman et al., 2020; Pan et al., 2014; Zhu et al., 2019) and business group affiliation (Gaur et al., 2014; Ma et al., 2014), or acquired through government subsidy (Girma et al., 2009; Mao and Xu, 2018). Institutional resources are useful for firms to advance their business interests. Yet such advantages may negatively impact on the innovation-export nexus because institutional resources draw firm's innovation attentions to domestic markets, set boundaries for firms in terms of the needs of satisfying the interests of governments and state and can be associated with governance and management issues (Chen et al., 2011; Chittoor et al., 2009; Choi et al., 2011; Lim et al., 2018; Mahmood and Mitchell, 2004).

On financial resources, due to underdeveloped financial markets in emerging economies, which are characterized by weak investor protection and contract enforcement and high level of information asymmetry, firms often find that accessing to external finance presents a major challenge (Girma et al., 2008a; He et al., 2013), and therefore rely on internal resources. In light of this, we set the focus of financial resources on firm's internal financial resources or financial slack (Bradley et al., 2011; Xu and Hitt, 2020; Zhao and Tan, 2021). Financial slack refers to liquid financial resources that can be quickly (re)deployed (relative to committed resources) to support actions that align with organizational strategies such as innovation and exporting (Carnes et al., 2019; George, 2005; Kiss et al., 2018; Paeleman et al., 2017). Financial slack in such an emerging economy setting not only confer firms resources to leverage innovation for export, but also buffer firm's core activities from environmental uncertainties and allow them to exercise capabilities to adapt to the external environment (Shinkle and Kriauciunas, 2010; Sui and Baum, 2014). In other words, they provide firms the structural foundation, operational flexibility, and managerial discretion in taking prompt actions to realize innovation for exports (George, 2005; Henard and McFadyen, 2012; Satta et al., 2016; Sirmon et al., 2007; Troilo et al., 2014). Consequently, financial slack may enhance the positive effects of innovation on export performance.

We test our theoretical model using a large sample of Chinese manufacturing firms during 1998–2007. China constitutes a valuable context to study the moderating effects of institutional and financial resources in the innovation-export nexus. It has been recognized that China's impressive economic performance, driven mainly by market-oriented reforms, abundant supply of labor and openness to the world economy, is unsustainable (Wei et al., 2017). To address this, China has moved fast on the front of innovation. Both input and output indicators reveal that China has become a serious contender in the world of innovation that used to be dominated by the West (Fan, 2014). Still there have been extensive debates on *whether and under what conditions Chinese firms' economic performance at large, and export performance in particular, has been driven by innovation*. Our empirical evidence reveals the positive effects of innovation on export performance and the differential contingent effects of institutional and financial resources. While firms leverage financial slack to ignite innovation for the export focus, institutional resources pose challenges to the effective use of productive resources, undermining the conditions for realizing the value of innovation for exports.

Our study contributes to the innovation-export literature by establishing the boundary conditions of institutional and financial resources based on resource contingency perspective and suggesting the heterogeneous value of different types of resources to export performance effects of innovation. The impact of resource deployment on firm performance is fundamental to the theories of firm (Sirmon et al., 2007). Challenged by resource scarcity, institutional voids and imperfect capital markets in emerging economies, managers and policymakers need to better understand the role of a variety of resources in business activities. By showing that different types of resources can cause variability in the export performance effects of innovation, our exposition of the moderating role of institutional and financial resources updates the innovation-export research that have largely focused on the direct effects of innovation on export performance with the implicit assumptions of firms having adequate availability and effective utilization of resources to pursue innovation and exports simultaneously and synergistically, but have not formally theorized resource contexts of emerging economies. While both institutional and financial resources are key antecedences for export performance, emerging economy firms focusing on innovation-driven exporting strategy need more nuanced understanding of such contexts for more informed practices. Thus we provide support to Teng and Cummings (2002)'s advice to practitioners that one should "simultaneously consider multiple resources or capabilities instead of examining one resource or capability at a time" (p. 89).

The study also advances understanding on how major attributes of state capitalism connected to institutional systems (Fainshmidt et al., 2018; Musacchio et al., 2015; Wright et al., 2021) influence the innovation - exports nexus thereby responding to calls to secure a better comprehension of how the diversity of national institutional systems affect international business transactions (Aguilera and Grøgaard, 2019; Jackson and Deeg, 2019). State capitalism – and it is remarkably outward orientated – concerns an array of institutional arrangements and practices and shape institutional resources that firms ascribed or acquired from their embeddedness in and interactions with the institutional environment. A recent study (Dong et al., 2022) considers the effect of state and foreign ownership on the innovation-export nexus. This study did not consider how wider institutional resources in Chinese state capitalism influence the nexus. The paper examines if state ownership influences the nexus while this study considers the impact of state compared to non-state ownership. Our empirical findings based on the Chinese context reveal that although institutional resources captured by state ownership, business group affiliation and government subsidy have varied effect on export performance of firms, they consistently show negative moderating effects on the innovation-export nexus. This opens the possibility for a critical dialogue that could lead to a better understanding of how key aspects of Chinese state capitalism influence the innovation export nexus. Our study highlights the importance of how institutional resources affect the nexus and invites the examination of how other types of state capitalism and more market orientated versions of capitalism affect the nexus.

Finally, we fill an important theoretical research gap by introducing into the field of research the neglected issue of the internal financial position of firms in international transactions connected to innovation. Existing studies on the role of financial resources in innovation or in export tend to investigate the effects of these resources separately. See Hall and Lerner (2010) for a survey on the impact of financial resources on innovation, with additional recent studies including Acharya and Xu (2017); García-Quevedo et al. (2018); Gorodnichenko and Schnitzer (2013); Loof and Nabavi (2016); Zhang and Guan (2018); and Zhang et al. (2021); and see Wagner (2014) for a survey on the impact of financial resources on export, with additional recent studies including Kiendrebeogo and Minea (2017); Mancusi et al. (2018); and Paeleman

[3] Institutional voids refer to the underdeveloped or missing institutions that enable and support business activities (Khanna and Palepu, 1997).

[4] Environmental munificence, a concept similar to environmental capacity, refers to "the extent to which the environment can support sustained growth" (Dess and Beard, 1984: 55).

et al. (2017). Ito and Lechevalier (2010), Kiss et al. (2018) and Manez et al. (2014) are the few exceptions that examine the impact of financial resources on firms' joint decision on export and innovation. These studies have however not paid much attention to its role for leveraging innovation for exporting. Bridging these two research streams, our findings of positive moderating effects of financial slack advances our understanding of the role of internal financial resources in economic activities, highlighting the need of financial reforms to (further) develop capital markets in emerging economies that are on route to innovation-based sustainable economic development.

2. Literature review and hypotheses development

2.1. The impact of innovation on export performance

Through technological innovation firms develop new knowledge and technologies, introduce new products and processes, and improve the quality of existing products and processes. Patent, representing the codified technological innovation and offering protections against imitation by competitors, is one of the most commonly used indicators for measuring innovation output performance and overlaps with other innovation measures such as R&D and new product announcements/sales (Dziallas and Blind, 2019; Hagedoorn and Cloodt, 2003; Taques et al., 2021). Patents are generally connected to production of intellectual property that relates to technological innovation. This is in contrast to non-technological innovation that is centered on developing know-how in management systems such as supply chain practices, assembly, marketing, distribution and after sales procedures. This study investigates the technological innovation – exports nexus and uses patents as a measure of technological innovation. There is a consensus that innovation positively impacts on firm's export performance, in terms of both export propensity to engage in exporting and to export intensity.

From the motivational perspective, innovative firms have incentives to engage in exports in order to exploit and appropriate innovation outputs, such as patents, beyond domestic markets (Kafouros et al., 2008). Thus, they tend to have a higher level of export propensity. Innovation and specifically, patenting, can be costly and risky. It often takes some time between the conception of innovative ideas and the realization of innovative outputs, e.g., patentable products and processes. The application, registration and maintenance costs associated with patenting can be significant. The non-rival nature of innovation outputs can lead to knowledge spillovers, i.e., knowledge cannot be fully appropriated by the innovators (Hall and Lerner, 2010; Kim et al., 2016; Taques et al., 2021). Through exporting, patents can be leveraged in production for more than one market at no or small marginal costs. Firms can achieve economies of scale and scope as the fixed costs of innovation can be spread over increased sales in export markets, in addition to domestic markets (Gkypali et al., 2018). Additionally, product life cycle has increasingly become shorter, and the speed of knowledge spillovers has become faster thanks to the advancement in information and communication technologies. Exporting offers firms opportunities to recoup costs associated with innovation (both R&D and patenting) activities at a faster pace, and to earn higher returns from innovation investment as they can charge premium prices for their innovative products (Kotabe et al., 2002).

Innovative firms also have the means to achieve better export sales, attainting to a higher level of export intensity. Innovation improves firm's competitive advantage which can be leveraged in export markets (Dong et al., 2022). The theoretical expectation for the economic values of innovation rests on offering new, differentiated and/or high-quality products in export markets, taking advantage of economies of scale and scope in production, marketing and sales, and reducing costs derived from improved production processes (e.g. Cassiman and Golovko, 2011; Golovko and Valentini, 2011; Haddoud et al., 2021; Xie and Li, 2018). Furthermore, the efficacy of innovation for enhancing export sales can be indirect. Patents reflect the underlying strength of firm's innovative capabilities. Through innovation activities that generating patents, firms can accrue valuable knowledge, improve absorptive capacity, and enhance productivity, which may help them with managing export activities and responding to changes in the global marketplace, contributing to export sales (Guan and Ma, 2003; Rodil et al., 2016; Wu et al., 2021). The literature indicates that a positive impact of innovation from engaging in exporting is likely for two main reasons. For the benefits of engaging in exporting, these are spreading the costs of innovation by expanding revenue beyond that available from domestic markets and reaping economies of scale and scope by expanding output (Cassiman and Golovko, 2011). These benefits also affect export intensity as increased revenue by expanding exporting and obtaining further economies of scale and scope contributes to higher net benefits for firms. In addition, innovation in existing export markets may offset loss of competitive advantage from spillovers in host countries by providing a flow of new/or improved products and processes that enhances export sales.

This reasoning leads to H1 on the impact of innovation on export performance which can be broken down to two specific hypotheses – H1a and H1b which are specific to export propensity and export intensity, respectively.

H1. *Innovation positively impacts on export performance.*

H1a. *Innovation positively impacts on export propensity, such that innovative firms with patents are more likely to engage in exporting.*

H1b. *Innovation positively impacts on export intensity, such that innovative firms with patents tend to have higher export sales.*

A systematic review of the literature on the impact of innovation on export (see Appendix A) reveals that the theoretical consensus on the positive impact of innovation on exports is not corroborated by empirical evidence. The consensus reflected in the case for H1 implicitly assumes that resources available to firms are effectively used and are sufficient to pursue innovation and exports simultaneously and synergistically. There may be some truth with this assumption for firms in developed economies most of which can access the necessary resources for innovation and exporting and for developing the synergy between innovation and export. This kind of outcomes flows from high quality institutions that provide effective labor, financial and business support markets that enable firms to secure necessary resources. Emerging economies institutional systems are however often underdeveloped and have institutional voids that exacerbates resource scarcity problems for firms.

Similar to innovation, exports are subject to considerable (and often different types of) risks and uncertainties and require significant resource commitment to ensure success (Cassiman and Golovko, 2011; Golovko and Valentini, 2011; Manez et al., 2014; Roper and Love, 2002). Exports entail significant, often locational-specific costs and risks, including establishing export channels, transportation, dealing with export-specific administrative functions and accumulating information on export-market demand, in addition to enduring such negative shocks as adversity in international markets or unexpected foreign exchange risks (Golovko and Valentini, 2011; Manova et al., 2015). Furthermore, leveraging innovation for exports often requires the deployment of additional resources. For example, producing for international market might necessitate exporters to secure more information on foreign customer's preferences and market regulations, then modify newly developed products or processes to meet export market requirements. Additional productive resources associated with the hiring of additional personnel and modification of infrastructure and facilities, therefore, are needed. Given the centrality of resources in both innovation and exports and in leveraging innovation for exports, it is logical to examine the innovation-exports nexus from a resource contingency perspective in the emerging economy context. Taking a resource contingency perspective helps to clarify the boundary conditions under which the value of innovation to exports (in terms of both export

propensity and export intensity) is enhanced or diminished. Such efforts may help reconcile the mixed findings revealed in the literature. As shown in Table A1, emerging economies only account for a minority of the existing studies (38 % or 49 out of 130), our paper therefore has empirical values, contributing further to our understanding of the effects of innovation on firm exports in emerging economies.

2.2. The contingency value of resources to the export effects of innovation

Emerging economies face institutional voids and imperfect capital markets, which exacerbates the need for understanding two types of resources in the innovation-exports nexus: institutional resources and financial slack resources (hereafter financial slack).

Institutional resources encompass resources that firms accrue from their embeddedness in and interactions with the institutional environment (Dunning and Lundan, 2008; Jackson and Deeg, 2019; Xie and Li, 2018). Emerging economies are characterized by low environmental munificence but high uncertainty, continuous regulative changes, and fast-moving business environment, resulting in more discretionary power of government in resource allocations. The characteristics of their institutional systems such as China are also significantly influenced by the nature of the relationship between firms and the state (Fainshmidt et al., 2018; Wright et al., 2021). In this study we therefore focus on the impact of institutional resources on the innovation – exports nexus as a result of the firm's relationship with governments and state (Nuruzzaman et al., 2020).

Firms' institutional resources can be either ascribed or acquired. Given the importance of state and government influence on how institutional systems affect firms in many emerging economies we pay particular attention to the effect of institutional resources that are shaped by the state. This done by examining state ownership, business group affiliation and government subsidy as these institutional factors exercise important influence on the resources available to firms and are strongly influenced by government and state imperatives.

State owned enterprises (SOEs), being economic and political agents of the government, have ascribed institutional resources as they are naturally, intrinsically instituted or guaranteed by the state. Their institutional embeddedness grants them higher levels of legitimacy than their counterparts of non-state ownership such as private firms. This bestows them numerous advantages including government support and protection in acquiring and developing resources, accessing to privileged resources such as business licenses, land use permits, low interest loans, and administrative rights, and obtaining special considerations that facilitate business operations (Li et al., 2018; Nuruzzaman et al., 2020; Pan et al., 2014; Zhu et al., 2019). An example of the effects on access to resources is evidenced by credit allocation in China that has been shown to be biased towards SOEs (Cull et al., 2015).

Another group of firms enjoy ascribed institutional resources are business group (BG) affiliated firms (Gaur et al., 2014; He et al., 2013; Ma et al., 2014).These BGs are vehicles, particularly in State Capitalist economies, to navigate institutional obstacles to acquiring and developing resources (Hu et al., 2019). BGs typically consist of legally independent firms usually operating in multiproduct and multiple markets, which are bound together by persistent formal and informal ties (Carney et al., 2011). BGs can be viewed as a response to market imperfections and institutional voids in the context of emerging economies and they can be a substitute for markets that are nonexistent or malfunctioning. There is also the associated signaling effect. In the context of weak legal institutions and contract-enforcing mechanisms, BG-affiliated firms can signal their credibility on the basis of the group's reputation, which is often greater than that of their own individually (Khanna and Yafeh, 2007). The prevalence of BGs in emerging economies and their dominant positions of BGs in the domestic markets thus affords BG-affiliated firms ascribed institutional resources (Carney et al., 2018).

Firms may also acquire institutional resources through gaining government subsidies. Government subsidies are a widely used policy instrument for resource allocation aimed at offsetting market imperfections, obtaining economies of scale in production, and accomplishing social objectives (Lim et al., 2018; Schwartz and Clements, 1999). In emerging economies, government subsidies tend to be pervasive and persistence and take various forms, e.g., financial subsidies (e.g., cash) and non-financial subsidies (e.g., loan guarantees or debt forgiveness) (Lee et al., 2014; Lim et al., 2018; Schwartz and Clements, 1999). Firms gain subsidies by establishing rent-seeking connections with politicians as decisions to grant subsidies entirely lie in the hands of governments and the process of government subsidy allocation usually lacks transparency and accountability (Girma et al., 2009; Mao and Xu, 2018). Furthermore, subsidies have a signaling effect, indicating value relevance of accounting information to investors (Lee et al., 2014). Government subsidy therefore also represents a type of institutional resource for firms.

As well as institutional resources, financial resources, particularly financial slack, and how it impacts on organizational performance are widely studied (for a recent meta-analytical research, see Carnes et al., 2019). Financial slack refers to liquid financial resources that can be quickly (re)deployed (relative to committed resources) to support actions that align with organizational strategies such as innovation and exporting (George, 2005; Kiss et al., 2018; Paeleman et al., 2017). Following Bradley et al. (2011: 1074), we focus on available financial slack that is "readily available to be put to alternate use", rather than "slack from debt/equity (potential) or inventory (recoverable)" as they "are less accessible and less flexible than financial slack". Emerging economies have financial markets that are characterized by weak investor protection and contract enforcement, and high information asymmetry (He et al., 2013). As "financial institutions are underdeveloped and/or largely controlled by the government", "financial prices are unknown and remain incalculable to most firms" (Choi et al., 2021: 258). Capital market imperfections thus give rise to financial constraints (Cull et al., 2015). This has three implications: 1) financial slack is "valuable, rare and inimitable"; 2) access to external finance is difficult; 3) absorbed financial resources, i.e., potential slack and recoverable slack, are not easy to redeploy because there are limited sources for external funds and "formal finance is limited to bank credits for most firms" (Cull et al., 2015: 274).

In the next two sub-sections, we develop hypotheses on how these two different types of resources moderate the effects of innovation on exports.

2.2.1. Institutional resources moderating the impact of innovation on export performance

Institutional resources are useful in increasing the power of firms to advance their business interests, including those in the export markets (Gaur et al., 2014; Girma et al., 2009; Li et al., 2018; Ma et al., 2014; Mao and Xu, 2018; Nuruzzaman et al., 2020; Pan et al., 2014; Zhu et al., 2019). Yet such advantages may not translate into improving export performance through innovation. We posit that institutional resources ascribed through state ownership and business group affiliation and acquired through government subsidy diminish the positive value of innovation to exports (in terms of both export propensity and export intensity). Three lines of reasoning associated with market orientation, governance and managerial efficiency, and strategic resource deployment underscore the postulated relationship.

First, firms access institutional resources through deeply embedding in and closely interacting with domestic institutional environments, this makes those with institutional resources to be more domestic-oriented than export-oriented and their innovation activities tend to focus more on domestic projects than serving export markets (Carney et al., 2011; Li et al., 2018; Ossorio, 2018; Sharma et al., 2020). From the motivational perspective, institutional resources therefore undermine the incentives of innovative firms to engage in exporting as they can realize the economic value of innovation and patents in domestic markets, increasing the resistance to explore export markets. Therefore, institutional

resources negatively moderate the impact of innovation on export propensity.

For those innovative firms with institutional resources that do engage in exporting, their patents developed largely for domestic markets may not be directly applicable to export markets. As mentioned above, in general, additional resources are needed when leveraging innovation for exports. Domestic market-orientated firms with institutional resources need to adjust products and/or processes for export markets, which may require substantial costs. This limits the extent to which innovative firms with institutional resources can gain the benefits of economies of scale and scope in production and marketing and improve sales through innovation and patents for exports. This reasoning leads to our overarching hypothesis (H2) that the export market value of innovation is therefore less for firms with institutional resources than those without, making the moderating effects of institutional resources negative.

Second, firms with institutional resources face soft budgetary constraints and easy access to productive resources such as capital and labor (Kornai et al., 2003). This may potentially have a positive impact on realizing the export market value of innovation but there may be a 'resource curse' for these firms. The inherent governance deficiencies, organizational inertia and managerial myopia are known issues in firms with ascribed institutional resources such as SOEs and BG-affiliated firms (Chen et al., 2011; Chittoor et al., 2009; Dong et al., 2022; Khanna and Yafeh, 2007; Mahmood and Mitchell, 2004; Ossorio, 2018; Sharma et al., 2020; Tse et al., 2017). Firms with acquired institutional resources through government subsidy also face governance and managerial constraints due to the imposition of unprofitable social and political goals by governments as part of the conditions of receiving the subsidies (Lim et al., 2018). The possible advantages of institutional resources could be offset by government interference and governance problems are likely to prompt suboptimal decisions in firms endowed with such resources (Chittoor et al., 2009; Khanna and Yafeh, 2007). This leads to our sub-hypotheses that there is a negative influence on the positive effect of innovation on export performance for SOEs (H2a and H2b), BG-affiliated firms (H2c and H2d) and firms receiving subsidies (H2e and H2f).

These negative impacts affect both export propensity and intensity. These governance and management issues create a challenge when leveraging innovation and patents for export engagement and for rent generation from innovation and patents in export markets. This is because the dynamic environment associated with international markets requires managers to make prompt and effective commercial decisions but institutional resources are likely to distort incentives to make such decisions. Given the expected buffering effects against risks and uncertainties they face in business operations (Chittoor et al., 2009), managers in firms with institutional resources are likely to confront 'moral hazard', and are likely to make 'satisficing' strategy of no or inadequate investments in leveraging innovation for export engagement and export sales or make ineffective decisions without due consideration to the likelihood of failure (Kim et al., 2008; Mao and Xu, 2018). Consequently, institutional resources negatively moderate both export propensity and export intensity.

The third reason is associated with how firms strategic deploy productive resources (Sirmon et al., 2007) and this further reinforces our hypotheses. Exporting and leveraging innovation for exporting are cultivated by the market logic. However, possessing institutional resources could lead firms to deviate from market-oriented objectives to state objectives (Chen et al., 2011; Choi et al., 2011; Lim et al., 2018; Mao and Xu, 2018; Ossorio, 2018; Tse et al., 2017). To gain or maintain legitimacy, firms have to comply with government mandates such as regional development, fiscal health and social stability. For example, governments, for the purpose of ensuring social stability, often pressurize firms to provide employment to accommodate a growing workforce or other social objectives (Lim et al., 2018; White et al., 2008; Zhu et al., 2019). This means diverting productive resources to non-productive, redundant human resources. Additionally, managers are encouraged to engage in government imperatives in pursue of political premium which may not necessarily in line with the firm's commercial interests. Under conditions of institutional voids, factor market imperfections and high business environment uncertainties in emerging economies lead to sub-optimal resource deployment that reduces firm's ability to cultivate and appropriate innovation and patents for export engagement and export sales (Sirmon et al., 2007). These constrains to sound commercial decisions associated with institutional resources undermine the ability of firms to capture the export market value of innovation.

The above arguments lead to an overarching hypothesis (H2) on the negative moderating role played by institutional resources in the innovation-exports relationship. This is broken down into six specific hypotheses outlining how institutional resources moderate the impact of innovation on both export propensity and export intensity for firms that are state owned (H2a/H2b) have business group affiliation (H2c/H2d) and firms receiving government subsidies (H2e/H2f).

H2. *Institutional resources weaken the positive impact of innovation on export performance.*

H2a. *The positive impact of innovation on export propensity is weaker in SOEs than non-SOEs.*

H2b. *The positive impact of innovation on export intensity is weaker in SOEs than non-SOEs.*

H2c. *The positive impact of innovation on export propensity is weaker in BG-affiliated firms than non-BG-affiliated firms.*

H2d. *The positive impact of innovation on export intensity is weaker in BG-affiliated firms than non-BG-affiliated firms.*

H2e. *The positive impact of innovation on export propensity is weaker in firms receiving government subsidies than those without.*

H2f. *The positive impact of innovation on export intensity is weaker in firms receiving government subsidies than those without.*

2.2.2. Financial resources moderating the impact of innovation on export performance

Both innovation and export involve high fixed and variable costs which impose significant financial pressures on innovators and exporters, respectively (Deng et al., 2014; Golovko and Valentini, 2011; Hall and Lerner, 2010; Kiendrebeogo and Minea, 2017; Manez et al., 2014; Wagner, 2014). But the financial pressures are even more acute for firms leveraging innovation for exports as they are pursuing two risky growth strategies simultaneously, therefore, incurring not only costs for innovation and for exporting, but also the costs of applying innovation/patents in export activities. Although these costs can be met by either internal or external financing, accessing external funds presents a challenge to firms due to the presence of information asymmetry and moral hazard problems (Hall and Lerner, 2010; Wagner, 2014). Innovators or exporters have more information on the potential of their project success than outside financiers but are reluctant to share the information for fear of information leakages. As a result, outside financiers have difficulties in distinguish between good and bad investment opportunities and therefore charge a premium for these projects. Moreover, innovating or exporting activities provide a lower collateral value. Patents, the outputs of innovation, cannot be used as collateral for external finance to obtain loans as lenders tend to find it hard to accurately value these intangible assets (Acharya and Xu, 2017; Satta et al., 2016). Furthermore, external finance is also more costly because it embraces dividend payout on equity and/or interest payment on debt and it involves external fund providers whose main interests on short-term gain and meeting equity/debt obligations may not align with firm's long term strategy of improving competitiveness through innovation and exports (Hall and Lerner, 2010; Manez et al., 2014; Tseng

et al., 2007; Wagner, 2014). In the context of developed countries, internal financing is shown to be preferred to external financing for innovation (Shaver, 2011) and exports (Bellone et al., 2010; Rossi et al., 2021). In emerging economies, internal finance is even more important than external finance due to capital market imperfections, as discussed above.

Internal finance, more specifically financial slack, is considered to be valuable to firm's broad strategy and operations because it affords firms the capacity to explore emergent opportunities, take risky decisions, and make business transitions, it provides a safety-net and greater flexibility for firms to operate in a dynamic environment, and it reduces intra-organizational conflict by providing resources for a wider range of projects (Bradley et al., 2011; Paeleman et al., 2017; Paeleman and Vanacker, 2015). Financial slack is a pertinent moderator to be considered in the innovation-exports relationship. Because of the costs and risks associated with leveraging innovation for exports, returns to such investment may not be positive in the short run and firms are very likely to face greater liquidity problems. From the structural, operational, and managerial perspectives, the availability of financial slack can influence the existence and magnitude of benefits from innovation/patents to exports.

First, from a strategic perspective, greater financial slack allows firms to sustain the fundamentals in pursuing exporting opportunities and taking timely actions to leverage innovation and patents for exporting in response to the highly dynamic environment (De Massis et al., 2018; Henard and McFadyen, 2012; Troilo et al., 2014). With financial slack, firms can (re)configure strategies, structure and processes to take advantage of the benefits of innovation (Teece, 2007). These enhanced opportunities arise from insider information that gives managers a better understanding than external suppliers of finance of the benefit, risk and cost associated with innovation. The greater insights of managers allow them to better direct funds to enable more effective use of available or easily acquired human resources to develop knowledge useful to securing objectives (Bentley and Kehoe, 2020). The information accessible to managers can also guide the use of surplus funds to obtain knowledge most suitable to address challenges and to take advantage of opportunities that are observable to managers of firms but are not easily understood by external observers. These advantages are often found to be most likely to occur in dynamic and competitive environments that require innovative responses (Bruneel et al., 2016). The conditions for financial slack to provide enhance beneficial innovations are more prone to exist in institutional systems that are underdeveloped and thereby supply lower capabilities to address information asymmetries between firms and external providers of finance (Vanacker et al., 2017). Firms engaged in dynamic and competitive markets require significant innovation to succeed and it is likely that use of financial slack will provide a better route than external finance for securing useful innovations. This is based on the view that firms in dynamic and competitive markets such as exports need to identify innovations necessary to address challenges and secure opportunities if they are to proper or even survive (Bradley et al., 2011). Providers of external finance are less likely to have access to appropriate information on these issues especially in emerging economies that have underdeveloped institutions. These positive effects of using financial slack to organize resources are likely to boost innovation and thereby enhance export performance.

Second, from an operational perspective, financial slack provides firms flexibility in promptly adapting and responding to market opportunities and threats (George, 2005; Paeleman et al., 2017; Tseng et al., 2007). This includes operational issues connected to enhancing the innovation-exports nexus. Financial slack enables firms to sense and seize the opportunities of leveraging innovation/patents for exporting (Teece, 2007). They offer firms capacity to orchestrate productive resources to use resources to develop capabilities that are needed for converting innovation for export benefits. These include employees and networks that provide understanding on product, process and marketing adjustments necessary to meet the demands of export markets. These employees and networks can also supply linkages to regulators in export markets to enable innovations to conform to international and national laws, policies, and rules (George, 2005; Henard and McFadyen, 2012; Satta et al., 2016; Sirmon et al., 2007). Allocating resources to ensure protection of intellectual property rights in export markets is also an important requirement (Hurmelinna-Laukkanen and Puumalainen, 2007) especially given the diversity of national systems for protecting intellectual property rights (Papageorgiadis and McDonald, 2019). Information on these key requirements in the innovation-export nexus is often only clearly understood by managers of firms leading to finance from internal sources being more likely to be available for these functions. Innovation also provides the opportunity of using financial resources towards more productive export opportunities. A shortage of financial resources for employing resources to provide the capabilities outlined above will undermine the linkages between innovation and exporting, whether it is for export market entry or to intensify export sales. Firms facing financial constraints might be compelled to cut back the scope of some of innovation relevant to export market, e.g. adapting patents for export production and sales, or business activities key to promoting their innovative products to foreign customers (e.g. attending export promotion fair or developing website of targeted content), thus diminishing the value of innovation/patents for exports (Ganotakis and Love, 2011; Golovko and Valentini, 2011; Roper and Love, 2002). These operational reasons reinforce the strategic benefits of using financial slack to promote innovation connected to boosting exports.

Third, from a managerial perspective, internal finance can encourage more adventurous and innovative behavior as managers are under pressure to take risks for survival (Kiss et al., 2018). Financial slack liberates managers and employees to be creative in managing the dynamism and complexity that are the inherent characteristics of leveraging innovation for exports (George, 2005; Satta et al., 2016; Sui and Baum, 2014; Troilo et al., 2014). The cushion of internal finance can permit a more measured approach towards high-risk and high-return activities such as gaining premium value from innovation for exports but possibly neglecting to thoroughly evaluate the economic value of the strategic choice (Kiss et al., 2018). As has been extensively discussed in the literature financial slack can lead to managerial complacency (Paeleman and Vanacker, 2015), overconfident decision-making leading to inappropriate strategic actions (George, 2005), and slack search (i.e., searching for "innovation that would not be approved in the face of scarcity but have strong subunit support") (Cyert and March, 1963: 279). These agency problems arise from problems associated with asymmetric information. Agents (managers) can use asymmetric power to distort information to allow the pursuit of innovations that have low or zero benefits and/or that have high risk and cost. Providers of external finance (principals) may also generate inappropriate investment as they can lack information leading to overestimating of risk and cost and underestimation of benefits thereby leading to underinvestment for innovation. In cases where the risk of agents using misleading information is less than the risk of external finance providers having inadequate information, the use of financial slack poses lower risk of inappropriate investment (Marino and Matsusaka, 2005). As argued above in countries such as emerging economies, institutional systems associated with external finance are underdeveloped thereby increasing the likelihood that external providers of finance are more prone to making inappropriate decision on investments in innovation than are managers that use financial slack. Moreover, our research context concerns export markets which are dynamic and competitive in which the key drivers of innovations linked to exports are more likely to be secured by use of financial slack as managers are more likely to have the information necessary for sound investment decisions in these areas (Carnes et al., 2019).

In light of the above discussion, we conclude that the use of financial slack will enhance the effect of innovation and patents on export performance. This positive moderating role is due, in the context of this

study, to many cases where the benefits of financial slack exceed the benefits of external finance. The relevant contexts are examination of firms in emerging economies with underdeveloped institutional arrangements and that are engaged in the competitive and dynamic markets of exports.

H3. *Financial resources strengthen the positive impact of innovation on export performance.*

H3a. *Financial slack strengthens the positive impact of innovation on export propensity.*

H3b. *Financial slack strengthens the positive impact of innovation on export intensity.*

Fig. 1 depicts the associations between innovation and export performance and the hypothesized moderating effects of institutional resources and financial resources.

3. Data and methodology

3.1. Data sources

The data are obtained from Annual Census on Industrial Enterprises (ACIE) dataset from the National Bureau of Statistics (NBS) and patent database from China National Intellectual Property Administration (CNIPA), formerly known as State Intellectual Property Office of China (SIPO).

The ACIE database provides a comprehensive set of operational and financial information on all Chinese manufacturing firms with an annual turnover of more than RMB 5 million over the period of 1998–2007. The coverage includes both listed and non-listed firms and firm's ownership includes both state-owned and privately-owned. It is the most comprehensive firm-level dataset in China and provides the basis for NBS to compute China's GDP (He et al., 2018). It has been widely used in articles published in leading journals including recent publications in *European Economic Review* (e.g., Lai et al., 2020), *Journal of International Business Studies* (e.g., Xie and Li, 2018; Zhong et al., 2019), *Journal of International Economics* (e.g., Li, 2018), *Journal of Management* (e.g., Tse et al., 2017), *Journal of World Business* (e.g., Wang and Ma, 2018; Zhu et al., 2019) and *Research Policy* (e.g., Wu et al., 2021). Additionally, a recent study by Dong et al. (2022) has used the same dataset. The sample period of 1998–2007 is suitable for our investigation as it includes the development in Chinese policy to higher value activities and that by excluding the post-2008 crisis period avoids the distorting effects of the global financial crisis which could have masked the effects of using innovation to move up the value chain.

Cai and Liu (2009) and He et al. (2018) have provided discussions on ACIE data collection, commented on data reliability and comprehensiveness, and outlined in detail the steps of data cleaning. Following these research, we cleaned the data via extensive checks for missing values, coding errors and outliers, including checking missing values for key parameters such as total assets, fixed assets, current assets, current liabilities, industrial output and sales and ensuring that financial parameters being nonnegative and total assets being greater than current assets and fixed assets. We also dropped firm-observations that had the number of employees <10.

We then matched the data with the CNIPA patent database which provides detailed information on all patents granted in China, including application number, application date, IPC classification, applicants' names and addresses, inventors' names and patent attorneys' names and addresses. Data quality for this dataset has also been shown to be reasonably accurate and reliable (Choi et al., 2011). Due to entry and exit and to ownership restructuring, the number of firms in operation changes over time. After merging ACIE and CNIPA databases and constructing variables, we winsorize the observations using a 1 % tail wherever appropriate to reduce the influence of outliers. Our final sample therefore is an unbalanced panel of 219,599 firms spanning the period of 1998–2007. We obtained provincial-level data from the CEIC database (https://www.ceicdata.com/en).

3.2. Empirical model and variable measurement

Our objective is to estimate the contingency effects of resources on the innovation-exports relationship. We adopt the following specification for estimation:

$$Export_{it} = \beta_0 Innovation_{it} + \beta_1 Resources_{it-1} + \beta_2 Resources_{it-1} \times Innovation_{it-1} + \gamma X_{it-1} + \varepsilon_{it}$$

where i and t stands for firm i and year t, respectively. *Export* is export performance of firm i in year t. ε_{it} is error term. The independent variables are *Innovation* and *Resources*, with the latter include two sets of variables capturing institutional resources and financial resources. X is a vector of control variables that explain firm export performance including firm-level variables: *Productivity*, *Capital intensity*, *Human capital*, and *Size* and firm, time, province and 2-digit industry dummies. Variable definition and measurement are summarized in Table 1.

Following the extant literature, we measure export performance using export propensity (*EP*) and export intensity (*EI*). The extensive literature review of the innovation and export literature by Wu et al.

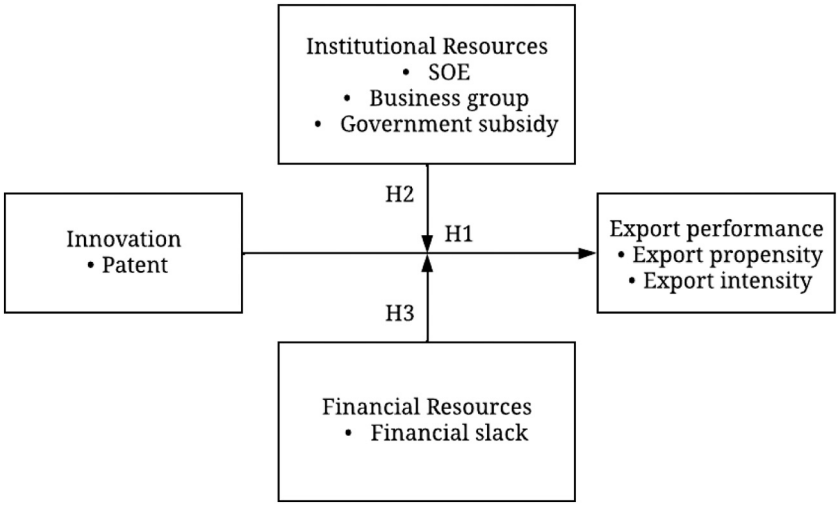

Fig. 1. The proposed model.

Table 1
Variable definition and measurement.

Variable	Measurement
Dependent variables:	
Export propensity (EP)	Dummy variable; =1 if firm is an exporter and 0 if a non-exporter
Export intensity (EI)	log(Export/Employment + 1), adjusted by inflation. Export is export sales
Export intensity in terms of sales (EIS)	Ratio of export sales to total sales
Explanatory variables:	
Innovation	log(Number of patents +1)
SOE	Dummy variable; =1 if a firm is classified as state owned enterprise; 0 otherwise
BGA	Dummy variable; =1 if firm is affiliated with business group and 0 if firm is not affiliated with business group
Subsidy	Dummy variable; =1 if firm receives government subsidy; 0 otherwise
Financial slack$_{-1}$	Current ratio measured by the ratio of current assets to current liabilities, adjusted by four-digit industry mean value. We winsorize the top and bottom 1 % of the variable to exclude the effect of outliers. The subscript (−1) indicates that the variable is lagged by one year.
Control variables:	
Recoverable slack$_{-1}$	The sum of accounts receivable and inventory divided by sales, adjusted by four-digit industry mean values. We winsorize the top and bottom 1 % of the variable to exclude the effect of outliers. The subscript (−1) indicates that the variable is lagged by one year.
Potential slack$_{-1}$	Equity-to-debt ratio, adjusted by four-digit industry mean values. We winsorize the top and bottom 1 % of the variable to exclude the effect of outliers. The subscript (−1) indicates that the variable is lagged by one year.
Productivity$_{-1}$	Following previous research, we measure productivity using firm total factor productivity (TFP) lagged by one year. The methodology is described by Olley and Pakes (1996). The method takes into account simultaneity biases (that arises because productivity level is known to a firm but unobservable to the econometrician) and employs a semi-parametric estimation that deals with correlation between idiosyncratic firm level productivity and input quantities. The subscript, −1, indicates that the variable is lagged by one year.
Capital intensity$_{-1}$	log(Capital/Employment), adjusted by inflation. The subscript, −1, indicates that the variable is lagged by one year.
Human capital$_{-1}$	log(Wages/Employment), adjusted by inflation. The subscript, −1, indicates that the variable is lagged by one year.
Size$_{-1}$	log(Total assets). The subscript, −1, indicates that the variable is lagged by one year.
POE	Dummy variable; =1 if a firm is classified as a privately owned enterprise; 0 otherwise

(2021) shows that EP is commonly measured by a dummy variable with one indicating that a firm is an exporter, but export intensity can be measured by export sales scaled by the number of employment, total sales and total output. For export intensity, we have chosen to follow recent studies (e.g., Tavassoli, 2018; Wu et al., 2021) and use employment as a denominator. Our rationale of choosing this measure over the export to total sales ratio is related the consideration of the interdependence of export and domestic sales. The denominator, total sales, is the sum of export and domestic sales. As noted in the literature, export and domestic sales mutually impact on each other (Berman et al., 2015; Salomon and Shaver, 2005; Wang et al., 2014). If a variable (e.g., innovation) has the same positive impact on both the numerator (e.g., export sales) and the denominator (e.g., total sales), the coefficient on the variable captures net effects. Thus, an insignificant innovation variable may not necessarily mean that it has no impact on export sales. It is possible that it may simultaneously drive up both export sales and domestic sales, but its effects are substantially greater on export sales than on domestic sales. Consequently, its effects on the ratio appear to be insignificant. Similarly, if innovation has a much larger effect on domestic sales and a much smaller effect on export sales, overall, we may observe a negative effect on the ratio of export sales to total sales. Similar arguments would also apply to the export to total output measure. To more accurately capture the effects of innovation on export intensity, we thus choose to use employment to scale export sales rather than total sales and total outputs. However, in robustness check, we use the export intensity measure scaled by total sales and the results are presented in Appendix D.

Innovation is measured using patents. The extant literature has extensively debated the measures of innovation, with a range of measures being proposed, including input-based and output-based (for reviews, see Ding et al., 2021; Dziallas and Blind, 2019). There are advantages of using patent, an output indicator, over input indicators such as R&D expenditure measures or dummy variables capturing whether firms conduct certain types of innovation or not. In terms of the impact of innovation on exports, what really matters for firms is likely to be actual outputs rather than innovation activities per se (Ganotakis and Love, 2011), which renders input indicators an ineffective measure as increasing innovation inputs or undertaking innovation do not necessarily imply outputs (Tavassoli, 2018) and inputs may represent innovative activities realized at the firm level only weakly (Lachenmaier and Wossmann, 2006). Because there is a time-lag of 18 months between the filing and the publishing of granted patent applications, innovation variable is therefore effectively a lagged variable. We choose to use contemporary patent data for innovation variables measurement in the main analysis but used lagged variables to check for robustness and the findings are qualitatively similar.

Institutional resources are captured using three variables: State ownership (*SOE*), Business group affiliation (*BGA*), and Government subsidy (*Subsidy*). For robustness check, we also measure BGA using the logarithm transformation of total assets of the business group added by one for business-group-affiliated firms and 0 for non-business-group-affiliated firms. Financial slack is measured as current ratio, i.e., the ratio of current assets to current liabilities, which is commonly used in the literature (see the two meta-analysis studies on financial slack, Carnes et al., 2019; Daniel et al., 2004). Following previous studies (e.g., Kiss et al., 2018), we lag the variable by one year to address potential endogeneity associated with financial slack.

3.3. Statistical approach

First, we adopt the mean-centering approach in regressions to ameliorate the potential issue of micro multicollinearity, that's, the collinearity between the interaction terms and their constituent parts (Iacobucci et al., 2016; Shieh, 2011). All variables whose interaction terms are included are mean-centered. Second, research on the innovation-exports nexus has simultaneously investigated both the impact of innovation on exports and the impact of exporting on innovation. To mitigate the concerns of reverse causality, we adopt two strategies. The first is to include a set of firm, time, province and industry dummy variables to absorb time-invariant unobserved heterogeneity, e.g. organizational structure, unobservable changes in the firm's business and industrial environment or in the business cycle, that may be correlated with strategic decisions of export and innovation (Golovko and Valentini, 2011; Wu et al., 2021). The second is to employ an instrumental-variable (IV) approach.

When EP is the dependent variable, we estimated IV-Probit regression. When EI is the dependent variable, we estimate 2SLS regression. Following Lachenmaier and Wossmann (2006), we choose variables that reflect policy impulse at the provincial level as instruments. We thus use government expenditure on education in a province (*Education*),

government expenditure on R&D in a province (*R&D expenditure*) and the number of researchers in a province (*R&D personnel*) as instruments. To check the validity of IVs, for export propensity estimation, we report the results of Wald test of the exogeneity, and a significant test statistic indicates endogeneity. For export intensity estimation, we report the results of Kleibergen-Paap rank LM test for under-identification, Kleibergen-Paap rank Wald F test for weak-identification and Hansen-J statistics for over-identification. Significant Kleibergen-Paap LM statistic and significant Kleibergen-Paap F statistic suggest the rejection of the null of under-identification and weak-identification, respectively. Insignificant Hansen test statistic indicates that the orthogonality of conditions cannot be rejected.

As a robustness check, we also estimate a two-step Heckman selection model to account for potential sample-induced endogeneity. The first stage (selection equation) uses a Probit model to estimate export propensity. The second stage (ultimate equation) uses maximum likelihood estimation to predict export intensity with the inclusion of inverse Mills ratio (IMR) that accounts for potential sample-induced endogeneity (Bascle, 2008; Clougherty et al., 2015).

4. Empirical results

Table 2 presents descriptive statistics and spearman correlation coefficients for all variables. Correlation coefficients are low for all pairwise variables. The correlation coefficients between three institutional resources variables range between 0.028 and 0.133. Further examination of the dataset reveals 23.6 % SOEs were affiliated with BGs. 14.6 % of SOEs and 25 % of BG-affiliated firms received government subsidies, respectively. These statistics further confirm that three variables capture different aspects of institutional resources and there is limited degree of overlap. Similarly, the absolute values of correlation coefficients between three slack variables are low (between 0.042 and 0.479). The variance-inflation factors are well below the threshold level of 10, indicating that multicollinearity is not an issue of concern.

Table 3 presents IV-Probit model estimation results for *EP* as dependent variable, while Table 4 presents the 2SLS estimation results when *EI* is the dependent variable. Results for the first stage estimation of *Innovation* are presented in Appendix B. All instrumental variables are statistically significant. Explanatory variables except *SOE*, and control variables except *Potential slack*, *Size* and *POE* are also statistically significant across all models. This gives us the confidence to the results of IV-Probit model and 2SLS model. In Table 3, Wald test statistics indicate the rejection of null hypothesis of endogeneity, thus justifying the use of IV-Probit model. In Table 4, the combination of Kleibergen-Paap LM test, Kleibergen-Paap F test, and Hansen test give us the confidence on the results of IV fixed-effects estimation. We also report the results of the second stage of the Heckman model in Appendix C. The inverse Mills ratio (*IMR*) is statistically insignificant, which means that selection bias is not a significant issue. We thus focus on IV-Probit results for export propensity and 2SLS results for export intensity estimation.

In Tables 3 and 4, models (1)–(4) include each resource variable and models (5)–(8) include each resource variable and its interaction term with innovation. Model (9) is the full model including all variables. Across models (1) and (4), the coefficients on *Innovation* are positive and statistically significant at the 10 % level (the range is between (0.158, $p < 10$ %) in model (3) to (0.464, $p < 1$ %) in model (1) of Table 3 and between (1.843, $p < 1$ %) in model (3) and (1.880, $p < 1$ %) in model (1) of Table 4), revealing the positive link between innovation and firm export performance, both export propensity and export intensity. Thus our H1a and H1b are supported.

In model (1), the coefficient on *SOE* is negative and statistically significant in Table 3 (−0.492, $p < 1$ %), but it is statistically insignificant in Table 4. This suggests SOEs are less likely to export than non-SOEs and being SOEs or not has no significant effect on export intensity. In models (2) and (3), the coefficients on *BGA* (0.293, $p < 1$ %) and *Subsidy* (0.437, $p < 1$ %) in Table 3 and the corresponding ones in

Table 2
Descriptive and summary statistics.

	Mean	Standard deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. EP	0.308	0.462														
2. EI	1.360	2.187	0.934													
3. EIS	0.111	0.267	0.840	0.757												
4. Innovation	0.050	0.302	0.073	0.088	0.014											
5. SOE	0.065	0.247	−0.082	−0.060	−0.086	0.041										
6. BGA	0.043	0.203	0.022	0.043	0.025	0.115	0.133									
7. Subsidy	0.130	0.336	0.120	0.131	0.073	0.116	0.028	0.090								
8. Financial slack$_{-1}$	0.991	1.465	0.008	0.011	0.002	0.015	0.021	0.011	0.023							
9. Recoverable slack$_{-1}$	1.045	2.312	0.014	0.008	0.011	0.196	0.114	0.243	0.167	−0.042						
10. Potential slack$_{-1}$	0.998	0.883	0.008	0.007	0.005	0.016	−0.039	−0.005	−0.028	0.479	−0.071					
11. Productivity$_{-1}$	3.516	0.828	0.062	0.021	0.020	0.091	−0.040	0.073	0.048	0.058	0.197	0.015				
12. Capital intensity$_{-1}$	3.658	1.239	0.079	0.105	0.190	0.067	0.125	0.112	0.094	0.028	0.219	0.105	0.018			
13. Human capital$_{-1}$	2.459	0.595	0.081	0.052	0.010	0.105	0.094	0.089	0.093	0.001	0.195	0.000	0.303	0.320		
14. Size$_{-1}$	9.754	1.440	0.161	0.164	0.036	0.227	0.218	0.277	0.245	0.045	0.412	0.047	0.199	0.442	0.300	
15. POE	0.414	0.493	−0.180	−0.180	−0.143	−0.073	−0.202	−0.132	−0.109	−0.032	−0.212	−0.042	−0.063	−0.102	−0.163	−0.344

Table 3
The moderating role of firm resources in the innovation-export propensity relationship (dependent variable = EP; IV-Probit model).

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
H1a	Innovation	0.464***	0.452***	0.158*	0.385***	0.463***	0.487***	0.269**	0.383***	0.319**
		(0.085)	(0.088)	(0.092)	(0.091)	(0.086)	(0.096)	(0.129)	(0.090)	(0.129)
H2a	Innovation × SOE					−0.109***				−0.229***
						(0.039)				(0.044)
H2c	Innovation × BGA						−0.313***			−0.090
							(0.082)			(0.077)
H2e	Innovation × Subsidy							−0.324***		−0.333***
								(0.112)		(0.098)
H3a	Innovation ×								0.020	0.002
	Financial slack$_{-1}$								(0.016)	(0.015)
	SOE	−0.492***				−0.514***				−0.465***
		(0.026)				(0.027)				(0.028)
	BGA		0.293***				0.242***			0.250***
			(0.019)				(0.019)			(0.019)
	Subsidy			0.437***				0.459***		0.449***
				(0.012)				(0.012)		(0.012)
	Financial slack$_{-1}$				0.080***				0.079***	0.077***
					(0.003)				(0.003)	(0.003)
	Recoverable slack$_{-1}$	0.015***	0.015***	0.018***	0.022***	0.015***	0.015***	0.018***	0.022***	0.011***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Potential slack$_{-1}$	0.067***	0.069***	0.069***	0.021***	0.067***	0.068***	0.069***	0.021***	0.031***
		(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
	Productivity$_{-1}$	0.167***	0.175***	0.180***	0.190***	0.167***	0.175***	0.180***	0.190***	0.171***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
	Capital intensity$_{-1}$	0.103***	0.095***	0.088***	0.087***	0.103***	0.095***	0.087***	0.087***	0.110***
		(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
	Human capital$_{-1}$	0.349***	0.371***	0.385***	0.409***	0.350***	0.371***	0.386***	0.409***	0.359***
		(0.021)	(0.019)	(0.020)	(0.021)	(0.021)	(0.019)	(0.020)	(0.021)	(0.022)
	Size	0.014	0.003	0.023**	0.020*	0.014	0.003	0.025**	0.020*	0.001
		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.011)
	POE	−0.491***	−0.487***	−0.480***	−0.493***	−0.491***	−0.486***	−0.479***	−0.493***	−0.485***
		(0.009)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)
	Wald test	1305.06 ***	1719.09***	1782.57***	1855.45***	1304.72***	1719.20***	1782.58***	1855.09***	1281.21***
	Number of firms	219,599	219,599	219,599	217,832	219,599	219,599	219,599	217,832	217,832
	Number of observations	418,300	418,300	418,300	413,256	418,300	418,300	418,300	413,256	413,256

Notes: firm, industry, province and time dummies included but not reported for brevity. Robust standard errors in parentheses. *, **, *** significance at 10 %, 5 %, 1 %, respectively (two-tailed tests).

Table 4
The moderating role of firm resources in the innovation-export intensity relationship (dependent variable = EI; 2SLS Model).

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
H1b	Innovation	1.880***	1.848***	1.843***	1.871***	1.882***	1.892***	2.076***	1.918***	2.150***
		(0.581)	(0.583)	(0.582)	(0.577)	(0.582)	(0.603)	(0.666)	(0.594)	(0.710)
H2b	Innovation × SOE					−0.077*				−0.534***
						(0.040)				(0.190)
H2d	Innovation × BGA						−1.340***			−1.288***
							(0.464)			(0.460)
H2f	Innovation × Subsidy							−1.124***		−1.032***
								(0.378)		(0.355)
H3b	Innovation × Financial slack$_{-1}$								0.183***	0.155***
									(0.061)	(0.055)
	SOE	0.046				0.038				0.004
		(0.032)				(0.031)				(0.030)
	BGA		0.247*				0.618***			0.665***
			(0.133)				(0.112)			(0.121)
	Subsidy			0.032***				0.125***		0.119***
				(0.011)				(0.026)		(0.025)
	Financial slack$_{-1}$				0.003				0.005*	0.005*
					(0.002)				(0.003)	(0.003)
	Recoverable slack$_{-1}$	0.011**	0.011**	0.011**	0.010**	0.011**	0.013***	0.013***	0.010**	0.015***
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)
	Potential slack$_{-1}$	0.003	0.003	0.003	0.000	0.003	0.004	0.003	0.0002	0.0003
		(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
	Productivity$_{-1}$	0.082***	0.082***	0.081***	0.083***	0.082***	0.079***	0.083***	0.083***	0.082***
		(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.022)
	Capital intensity$_{-1}$	0.054***	0.053***	0.054***	0.055***	0.054***	0.054***	0.054***	0.055***	0.055***
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
	Human capital$_{-1}$	0.126***	0.126***	0.126***	0.129***	0.126***	0.127***	0.127***	0.128***	0.129***
		(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)
	Size$_{-1}$	0.046***	0.047***	0.046***	0.048***	0.046***	0.047***	0.048***	0.048***	0.051***
		(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
	POE	0.005	0.004	0.004	0.002	0.005	0.0002	0.008	0.003	0.002
		(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
	Kleibergen-Paaprk LM statistic	51.189***	50.394***	50.640***	51.443***	51.077***	51.072***	45.823***	49.586***	43.302***
	Kleibergen-Paaprk	17.066***	16.801***	16.883***	17.151***	17.029***	17.027***	15.277***	16.532***	14.436***
	Hansen-J statistic	0.018	0.001	0.001	0.023	0.014	0.180	0.001	0.027	0.055
	Number of firms	134,482	134,482	134,482	132,625	134,482	134,482	134,482	132,625	132,625
	Number of observations	341,840	341,840	341,840	336,616	341,840	341,840	341,840	336,616	336,616

Notes: control variables, as well as firm, industry, province and time dummies, included but not reported for brevity. Robust standard errors in parentheses. *, **, *** significance at 10 %, 5 %, 1 %, respectively (two-tailed test).

Table 4 (0.247, $p < 10$ %; 0.032, $p < 1$ %) are positive and statistically significant, suggesting that institutional resources associated with BG membership and government subsidy positively impact on export propensity and intensity. The significant coefficient on *Financial slack* in model (4) of Table 3 (0.080, $p < 1$ %) and the insignificant, albeit positive coefficient on *Financial slack* in model (4) of table (4), indicating internal financial resources makes firms more likely to become an exporter, but has limited impact on export intensity.

To test the hypothesized moderating effects of institutional resources and financial resources, we examine the interaction terms and interpret the results based on the full model (model (9) of Tables 3 and 4). The coefficients on the interaction term of *Innovation* × *SOE* (−0.229, $p < 1$ %; −0.534, $p < 1$ %) are statistically significant in both Tables 3 and 4. Thus, H2a and H2b are supported H2b, suggesting that state ownership weakens the positive effects of innovation on export propensity and export intensity. The coefficient on the interaction term of *Innovation* × *BGA* is statistically insignificant in Table 3, but it is significant in Table 4 (−1.288, $p < 1$ %). Thus, H2c is not supported, but H2d is, suggesting that business group affiliation diminishes the positive effects of innovation on export intensity, but plays limited moderating role on the innovation-export propensity relationship. The coefficients on the interaction terms of *Innovation* × *Subsidy* (−0.333, $p < 1$ %; −1.032, $p < 1$ %) in Tables 3 and 4 are negative and statistically significant, supporting H2e and H2f. More specifically, *Subsidy* reduces the positive effects of innovation on exporting (both propensity and intensity). The interaction term of *Innovation* × *Financial slack* is statistically insignificant in Table 3, but is positive and statistically significant in Table 4 (0.155, $p < 1$ %). Internal financial resources as the result of previous year's financial slack positively influences the effects of innovation on export intensity, but not on export propensity. H3a is thus not supported, but H3b is.

Recognizing that coefficients on interaction terms in nonlinear models cannot be interpreted in the same way as they are in linear models (Norton et al., 2004), we use marginal effects to interpret our empirical findings. For illustrative purposes, the graphical representations of the estimates of predicted likelihood of firm exporting for models (1)–(4) of Table 3 are presented in Fig. 2 for the entire range of *Innovation* and the lowest and highest levels of institutional and financial resources variables, while holding all other variables at the mean values. As shown in Fig. 2a–c, the difference in the probability of exporting between SOEs and non-SOEs, that between BG-affiliated firms and non-BG-affiliated firms, and that between firms with government subsidy and those without, become much larger when the number of patent increases, indicating that state ownership, business group affiliation and government subsidy reduce the positive effects of innovation on the probability of firm's exporting. Fig. 2d reveals that, as the number of patent increases, the likelihood of exporting by firms with a high level of financial slack increases at a faster rate than those with a low level of financial slack.

A visual representation of the interaction effects for models (1)–(4) of Table 4 are presented in Fig. 3. Fig. 3a–c shows that the slopes for SOEs, BG-affiliated firms and firms with access to government subsidy are steeper than their corresponding counterparts. The impact of innovation on export intensity is clearly higher in firms with a low level of

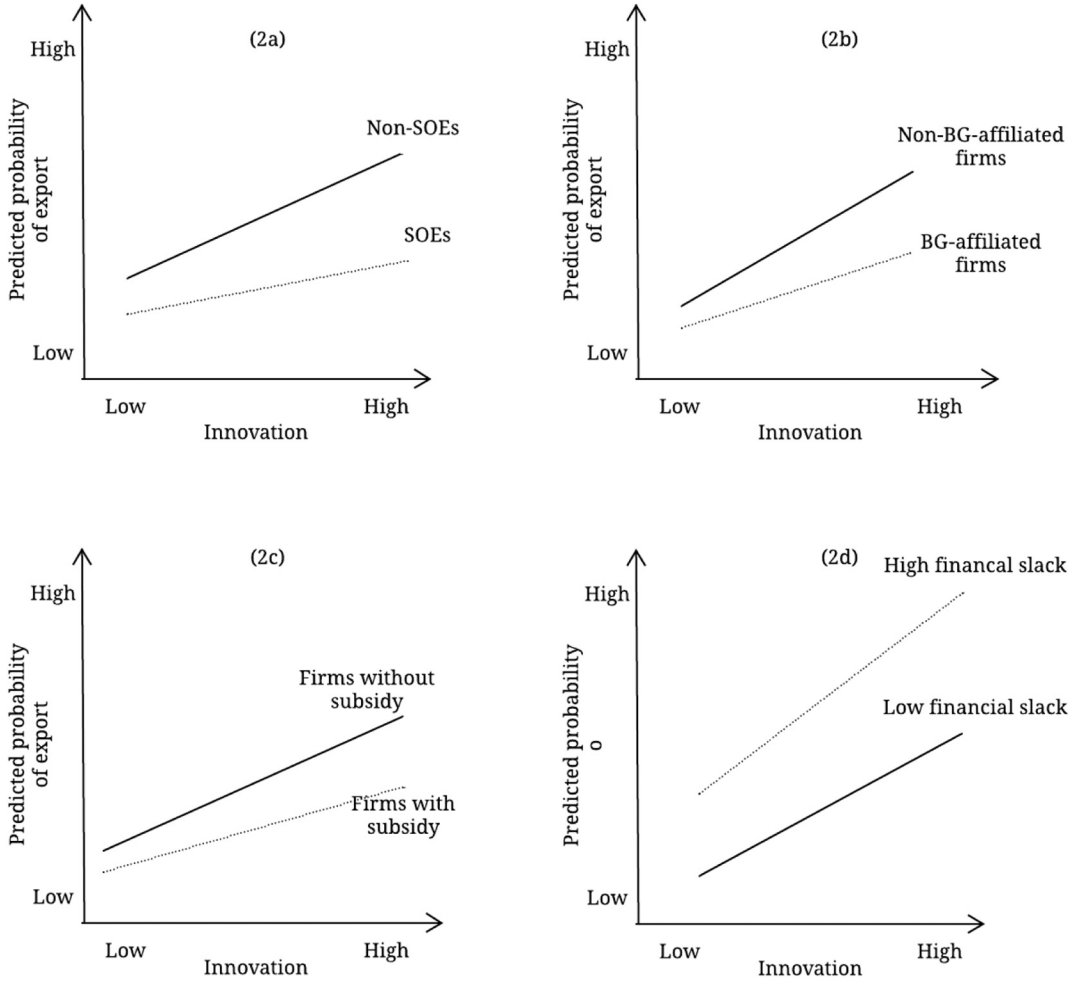

Fig. 2. Interaction plots for export propensity.

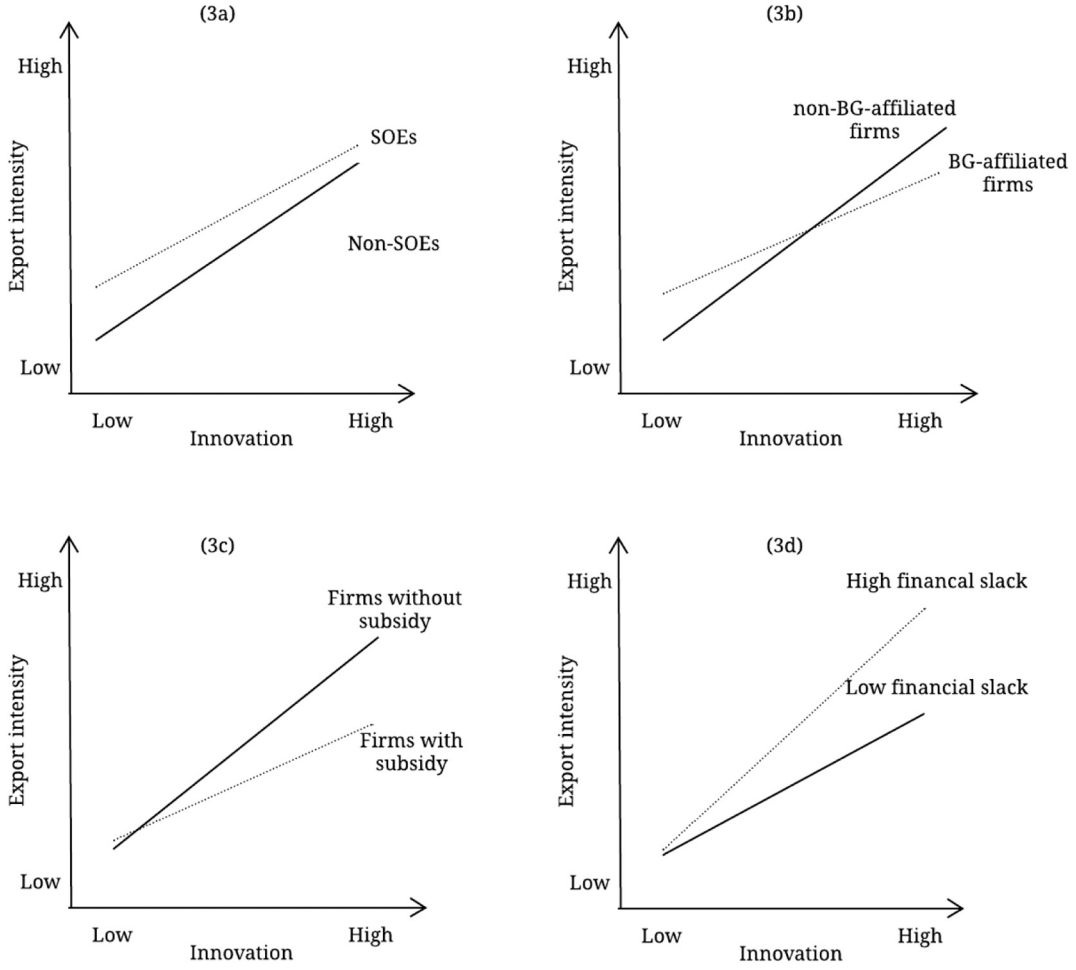

Fig. 3. Interaction plots for export intensity.

institutional resources than those with a high level of institutional resources, thus, H2b, H2d, and H2f are supported. Fig. 3d shows that the slope for firms with high level of financial slack is steeper than their corresponding counterparts. Hence, H3b is supported, i.e., the impact of innovation on export intensity is higher in firms with a high level of financial slack than those with a low level of financial slack.

With respect to control variables, *Recoverable slack*, *Productivity*, *Capital intensity*, and *Human capital* behave consistently across models in Tables 3 and 4 have expected signs, confirming their relevance to firm export performance in the Chinese manufacturing sector. These findings are consistent with what the literature predicts. However, although *Potential slack* is positive in both tables, it is statistically significant in Table 3 and insignificant in Table 4. Although *Size* appears to positively impact on exporting (both propensity and intensity), its level of statistical significance is stable in Table 4, not Table 3. Finally, the coefficients of POE are negative and statistically significant in Table 3 and are positive but statistically insignificant in Table 4, indicating that privately-owned firms have lower export propensity but private ownership has no impact on export intensity.

We further conduct a set of robustness tests by using different measures of variables. First, we checked whether the impact of innovation on exporting (both propensity and intensity) could be curvilinear by including the squared term of innovation. The squared term is statistically insignificant. Second, we measured BGA using total assets of business groups for affiliated firms. Third, we used contemporary control variables for *Productivity*, *Capital intensity*, *Human capital*, and *Size*. Fourth, we ran estimations using variables that are not winsorized. All results are qualitatively similar to those in Tables 3 and 4, therefore, not reported due to space constraint. Finally, we conducted regressions analysis of export intensity by measuring export intensity using the ratio of export sales to total sales and the results are presented in Appendix D. The results are qualitative similar to those in Table 4.

5. Discussion and conclusion

The purpose of this study is to investigate the contingency of resources in the relation between innovation and exports. We base our theoretical logic on the resource contingency perspective and propose that institutional and internal financial resources act as boundary conditions for the effects of the innovation-exports link. Resource scarcity is a prevalent facet of emerging economies. Against the backdrop of institutional voids and the major characteristics of State Capitalism in China and capital market imperfections, we highlight the moderating role played by these resources and argue that they are not of equal value in leveraging innovation for exports. Combining two unique longitudinal, comprehensive datasets on Chinese manufacturing firms, we empirically test our hypotheses. The results show that innovation has positive effects on exports, but the degree of impact depends on firm's institutional and financial slack.

Firms' institutional resources can be ascribed through being state-owned or affiliated with business groups and acquired through government subsidy. The results indicate that these institutional resources have a negative effect on the innovation – export nexus in the case of China. This reinforces the view that a greater understanding of how institutional systems impact international business transactions can be obtained by a deeper examination of the characteristics of institutions in

countries (Aguilera and Grøgaard, 2019; Jackson and Deeg, 2019). Considering these institutional characteristics in the context of emerging countries that have State Capitalism type systems provides insights into how institutions in such countries impacts international business transactions (Fainshmidt et al., 2018; Wright et al., 2021). In view of underdeveloped institutional environment in emerging economies, firms leverage their ascribed or acquired institutional resources to pursue business interests. Despite decades of reforms and economic liberalization policies, SOEs remain an important force, while BGs have emerged to become an important force, in response to institutional voids and missing or malfunctioning markets (Khanna and Yafeh, 2007). Subsidy, another means through which firms can access institutional resources, continues in scope and volume throughout the period. Existing studies have assessed the role of SOEs (e.g. Filatotchev et al., 2009; Ossorio, 2018), BG membership (e.g. Basile, 2001; Sterlacchini, 2001; Yi et al., 2013) and subsidies (e.g. Becchetti and Rossi, 2000; Girma et al., 2009) in export activities. While these studies have not examined the moderating roles of resources in the innovation-exports nexus, they have started to question the welfare implications and efficacy of institutional resources. For example, Girma et al. (2009), after finding subsidies explain China's export performance, concluded the paper with the question: "Is the use of subsidies to foster export activity (intentionally or unintentionally) a good use of resources?" (p. 899–890). Our paper aims to fill the research gap by providing a better understanding of the mechanisms through which firms' institutional resources influence the impact of innovation on export performance. We theorize that firms with institutional resources face misalignment in the interests of constitutes and challenges in governance and management. Our findings reveal, although institutional resources associated with business groups and government subsidies appear to help with firm's export market entry and augment export intensity, their role in facilitating exports through innovation is less promising. These resources, though potentially of more productive use, have dwindled the value of innovation for exports. The findings suggest that Chinese State Capitalism has some aspects that are not conducive to promoting exports by innovation.

In view of capital market imperfections in emerging economies, financial resources/constraints are closely tied to a firm's expansion or growth strategies such as innovation and exports. Firms with internal finance face less constraints in maintaining and sustaining its structure, strategies and operations that are essential in turning innovation into exports (Manez et al., 2014). Financial resources also facilitate risk-taking and experimentation, two essential characteristics of both innovation and exports, and afford firms capabilities to secure value from innovation for exporting. Although the significant role of financial resources in innovation or in exports has been recognized in two separate strands of the literature, empirical research on the impact of innovation on exports has largely overlooked financial variables. Studies that did include these variables tend to treat them as control variables, e.g. Faustino and Matos (2015), Lachenmaier and Wossmann (2006) and Mancusi et al. (2018). Ito and Lechevalier (2010), Kiss et al. (2018) and Manez et al. (2014) are the few exceptions and they have confirmed the relevance of financial resources in firms' joint decision on innovation and exports. Our findings here have attested to the effects of financial resources in the link between innovation and exports.

Taken together, an important theoretical contribution of this study is to bring attention to resource contingency factors that influence the innovation-exports nexus. Our theoretical discussions on firm-specific institutional and financial resources in response to national institutional characteristics and institutional voids combined with capital market imperfections in emerging economies provide novel insights. The emphasis on different types of resources in the innovation-exports nexus echoes Teng and Cummings (2002)'s point that "it is more important to understand the overall value of a bundle of resources and capabilities than the characteristics of individual resources and capabilities" (p. 82).

From our hypotheses and empirical findings, it is clear that there is a need to differentiate resources of different nature and account them in an integrated framework. The finding of contrasting contingency effects of different types of resources calls for more research to enhance our understanding of the conditions under which resources enhance or diminish the positive effects of innovation on exports. Having institutional and financial resources may help firms develop competitive advantages to improve export performance, but such advantages may not always aid firms to leverage their innovation for exporting. While financial resources are the essential ingredient for exporting and driving innovation for exports, institutional resources, encompassing both special privileges and external government and internal governance challenges, undermine the positive value of innovation for exporting.

5.1. Limitations and future research

Our research is subject to several limitations. First, we have only considered the moderating effects of institutional and financial resources and treated other types of resources, such as human capital, as a control variable. This is because, due to data availability, we have chosen to use a proxy to capture human capital, i.e., wage bill. This is in line with existing empirical practice, but wages imperfectly reflect the human capital stock in firms. Future research may benefit from comparing more heterogenous resources as firms need to strategically balance their resource portfolio in order to remain competitive and be successful. The second is related to variable measures. Although patent as an innovation measure provides a continuous and relatively objective measure of innovation that may be closer to market impact than an accurate input measure, problems may arise because of differences in patenting behaviors in different organizations, depending on their strategy and resources (Dziallas and Blind, 2019). Additionally, not all innovation outcomes are patented and not all innovations are patentable. There are also issues related to the equal weighting for radical and incremental innovation, or innovation of different quality (Taques et al., 2021). As a multidimensional construct, export performance can be captured by export diversity which is related to the breadth of export activities and is usually measured by the diversity of export markets (Paeleman et al., 2017; Pastelakos et al., 2022), as well as export propensity and export intensity. Due to data availability, this paper only focuses on the first two dimensions, not export diversity. But our theoretical model may be modified for a follow-up study on the innovation-export diversity relationship and the moderating role played by institutional and financial resources. Third, the hypotheses are developed against the backdrop of two characteristics of emerging economies; nevertheless, the empirical findings are based on one country. The empirical generalizability therefore needs to be further established with more studies based on different country contexts. Fourth, we have focused on a moderation model given our research focus on the conditions under which innovation impacts on export performance. However, equally interesting is the process through which institutional and financial resources impact on export performance. Further research could examine a moderated mediation model to fully explore the effects institutional and financial resources on export performance being simultaneously mediated and moderated by innovation. Finally, our sample period is 1998–2007. Using more recent data for China or data for other emerging economies that have State Capitalism type systems to test the hypotheses would be a valuable exercise.

5.2. Managerial relevance and policy implications

This study offers practical implications. A firm's resource portfolio crucially influences its competitiveness. Active management of institutional and financial resources is important to firm's exports. But it may require different approaches by innovation-oriented exporters and non-innovation-oriented exporters. For exporters with a focused strategy on, for example, low costs not innovation, cultivating institutional resources

through becoming affiliated to a large business group or securing government subsidy is helpful. But for exporters focusing on innovation-led growth, accumulating financial resources is an effective strategy. Managers thus need to take a balanced view on firm resources as acquiring, maintaining and deploying resources often comes with underlying costs and interferences.

From a policy perspective, our findings highlight the importance of institutional development and financial market reform in emerging economies. Our evidence of firm-specific institutional resources helping with exports but working against maximizing the value of innovation for exports suggests the need for more established institutional systems for countries embracing a shift to more innovative economy. One meaningful step would be along the lines suggested by Wei et al. (2017): ensuring effective resource allocations, limiting government's interference on business activities and assuring no strings attached to institutional resources granted to firms. Policy efforts should also concentrate on improving financial conditions for innovators and exporters. More concerted, coordinated efforts by policy-makers in alleviating information asymmetry and promoting the development of financial institutions would be a way forward to maximize the utilization of innovation for exporting.

CRediT authorship contribution statement

Lichao Wu: Data collection, methodology and empirical analysis.

Yingqi Wei: Conceptualization, research design, empirical analysis, writing and reviewing.

Chengang Wang: Conceptualization, empirical analysis, writing, reviewing and editing.

Frank McDonald: Writing, reviewing and editing.

Xia Han: Writing.

Data availability

The authors do not have permission to share data.

Acknowledgments

This study was supported by the National Social Science Foundation of China (grant number 21BJL088).

Appendix A. Systematic literature review methodology

Following the systematic literature review methodology, we summarize the current state of the literature on the impact of innovation on firm exports by comprehensively searching Web of Science (WOS) database for published research articles. Given our focus on firm-level studies, we conducted a search process using a combination of "export" and "firms" with one of the terms: "innovation", "patent", "R and D" or "research and development" in November 2021. This resulted in 1893 papers. We screened all papers and applied the following inclusion criteria: (1) papers analyze the impact of innovation on firm exports; (2) papers published in referred academic journals not conference proceedings, book chapters, book reviews; (3) papers employed quantitative methodology. We identified 130 papers and a summary of findings by country is presented in Table A1.

Table A1
A summary of firm-level studies on the impact of innovation on export performance.

Country/country group	Studies	Findings on export propensity	Findings on export intensity or export sales
Austria	Falk and de Lemos (2019)	+	+
Belgium	Van Beveren and Vandenbussche (2010)	n.s.	
Brazil	Oura et al. (2016)		+
	Ogasavara et al. (2016)		+
	Willmore (1992)	n.s.	n.s.
Canada	De Fuentes et al. (2021)		Mixed findings (+/−/n.s.)
	Lefebvre et al. (1998)	n.s.	n.s.
	Halilem et al. (2014)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)
Chile	Blyde et al. (2018)		+
	Bravo-Ortega et al. (2014)	+	
	Geldres-Weiss et al. (2016)		n.s.
China	Charoenrat and Amornkitvikai (2021)		Mixed findings (+/n.s.)
	Filatotchev et al. (2009)	+ only in returnee-owned firms	+
	Fu (2011)	+	+
	Guan and Ma (2003)		Mixed findings (+/n.s.)
	Leung and Sharma (2021)		Mixed findings (+/n.s.)
	Rialp-Criado and Komochkoya (2017)		−
	Wang (2014)	+	
	Wang et al. (2013)		Mixed findings (+/n.s.)
	Wu et al. (2020)	+	−
	Wu et al. (2021)	+	+
	Yi et al. (2013)		+
	Yuan et al. (2015)		−
	Zhang and Zhu (2016)		+
France	Pla-Barber and Alegre (2007)		+
Germany	Becker and Egger (2013)	+	+
	Dohse and Niebuhr (2018)	Mixed findings (+/n.s.)	
	Fryges et al. (2015)		+
	Kirbach and Schmiedeberg (2008)	Mixed findings (+/n.s./non-linear)	Mixed findings (+/n.s./non-linear)
	Lachenmaier and Wößmann (2006)		+

(continued on next page)

Table A1 (*continued*)

Country/country group	Studies	Findings on export propensity	Findings on export intensity or export sales
	Lecerf and Omrani (2020)		Mixed findings (+/n.s.)
	Papalia et al. (2018)	Mixed findings (+/−/n.s.)	
	Roper and Love (2002)	Mixed findings (+/−/n.s.)	Mixed findings (+/n.s.)
Ghana	Amadu and Danquah (2019)	+	
	Boso et al. (2019)		+
Greece	Gkypali et al. (2018)		n.s.
	Gkypali et al. (2015)		Mixed findings (+/n.s.)
India	Bhat and Momaya (2020)		Mixed findings (+/n.s.)
	Chakrabarti and Mondal (2017)		+
	Danish et al. (2021)	+	Mixed findings (+/n.s.)
	Grazzi et al. (2021)	+	+
	Gubbi et al. (2015)	n.s.	+
	Kumar and Siddharthan (1994)		+ in 4 out of 13 industries
	Singh (2009)		+
	Veganzones-Varoudakis and Plane (2019)		+
Indonesia	Yang and Chen (2012)	+	
Ireland	Girma et al. (2008b)	+	n.s.
Italy	Basile (2001)	+	Mixed findings (+/n.s.)
	Becchetti and Rossi (2000)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)
	Denicolai et al. (2021)		+
	Di Cintio et al. (2017)		+
	Imbriani et al. (2014)	+	
	Laursen et al. (2012)		+
	Mancusi et al. (2018)	+	+
	Nassimbeni (2001)		+
	Ossorio (2018)		+
	Sterlacchini (1999)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)
	Sterlacchini (2001)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)
Japan	Ito and Lechevalier (2010)	+	n.s.
	Tomiura (2007)	+	
Nigeria	Edeh et al. (2020)		Mixed findings (+/n.s.)
Norway	Castellacci and Fevolden (2014)		n.s.
	Azari et al. (2017)	Mixed findings (+/−/n.s.)	Mixed findings (+/−/n.s.)
Poland	Gajewski and Tchorek (2017)		Mixed findings (+/n.s.)
	Haddoud et al. (2021)	Mixed findings (+/n.s.)	
Portugal	Faustino and Matos (2015)		n.s.
	Ribau et al. (2017)		+
	Silva et al. (2017)		+
Spain	Alarcón and Sánchez (2016)	Mixed findings (+/n.s.)	
	Ayllon and Radicic (2019)	n.s.	
	Barrios et al. (2003)	+	+
	Caldera (2010)	+	
	Cassiman and Golovko (2011)	Mixed findings (+/n.s.)	
	Cassiman et al. (2010)	Mixed findings (+/n.s.)	
	Esteve-Perez and Rodriguez (2013)	+	
	Exposito and Sanchis-Llopis (2020)	Mixed findings (+/n.s.)	
	Filipescu et al. (2013)		Mixed findings (+/n.s.)
	Flor and Oltra (2005)		Mixed findings (+/n.s.)
	Golovko and Valentini (2011)	+	
	López Rodríguez and García Rodríguez (2005)	Mixed findings (+/n.s.)	+
	Lopez-Bazo and Motellon (2018)	+	
	Manez et al. (2015)	+	
	Monreal-Pérez et al. (2012)	Mixed findings (+/n.s.)	
	Rodil et al. (2016)	+	Mixed findings (+/n.s.)
	Rodriguez and Rodriguez (2005)		Mixed findings (+/n.s.)
	Villar et al. (2012)		+
Slovenia	Damijan et al. (2010)	n.s.	
Sweden	Azar and Ciabuschi (2017)		+
	Azar and Drogendijk (2016)		+
	Tavassoli (2018)	Mixed findings (+/−)	Mixed findings (+/n.s.)
Switzerland	Stucki (2016)	+	n.s.
Taiwan	Aw et al. (2011)	+	
	Rasiah et al. (2016)		+
	Yang et al. (2004)	+	
Turkey	Lo Turco and Maggioni (2015)	+	
	Ozcelik and Taymaz (2004)		Mixed findings (+/n.s.)
UK	Bleaney and Wakelin (2002)	+ only in innovators group	
	Ganotakis and Love (2011)	Mixed findings (+/n.s.)	n.s.
	Gkypali et al. (2021)	+	
	Girma et al. (2008b)	n.s.	n.s.
	Gourlay and Seaton (2004)	+	
	Gourlay et al. (2005)	+	+
	Harris and Li (2009)	+	n.s.

(*continued on next page*)

Table A1 (*continued*)

Country/country group	Studies	Findings on export propensity	Findings on export intensity or export sales
	Harris and Li (2011)	+	
	Añón Higón and Driffield (2011)	Mixed findings (+/n.s.)	
	Love et al. (2016)		Mixed findings (+/n.s.)
	Roper and Love (2002)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)
	Saridakis et al. (2019)	+	
	Sousa et al. (2020)		n.s.
	Wakelin (1998)	Mixed findings (+/−)	n.s.
	Yan et al. (2021)		+
US	Braymen et al. (2011)	+	
Uruguay	Barrère et al. (2021)	Mixed findings (+/−)	
	Peluffo et al. (2020)	Mixed findings (+/n.s.)	
Vietnam	de Oliveira et al. (2021)	n.s.	
Ghana, Bosnia and Herzegovina	Boso et al. (2013)		+
Ireland and Northern Ireland	Roper et al. (2006)		+
Italy and Spain	Alegre et al. (2012)		+
	Fernandez-Mesa and Alegre (2015)		+
4 Sub-Saharan African countries (Ghana, Kenya, Tanzania and Uganda)	Barasa et al. (2021)	Mixed findings (+/n.s.)	
4 European countries (France, Germany, Italy and UK)	Filatotchev and Piesse (2009)		+
4 Southeastern European countries (Albania, Bosnia and Herzegovina, Serbia and Montenegro)	Bortoluzzi et al. (2018)		Curvilinear effects
4 transitional economies: Belarus, Bulgaria, Lithuania, and Ukraine	Shinkle and Kriauciunas (2010)	n.s.	+
7 European countries (Austria, France, Germany, Hungary, Italy Spain and UK)	Altomonte et al. (2016)	+	
	Carboni and Medda (2018)	+	
	Carboni and Medda (2020)		+
	Kiss et al. (2018)		+
27 Eastern European and Central Asian countries	Aristei et al. (2013)	+	+
28 EU countries	Radicic and Djalilov (2019)		Mixed findings (+/n.s.)
29 Eastern European and Central Asian countries	Mulliqi et al. (2019)		Mixed findings (+/n.s.)
31 European countries	Rossi et al. (2021)	+	
31 Eastern European and Central Asian countries	Bigos and Michalik (2020)	Mixed findings (+/n.s.)	
31 transition economies	Gashi et al. (2014)	Mixed findings (+/n.s.)	Mixed findings (+/n.s.)

Note: n.s. = statistically insignificant at the 10 % level.

Appendix B. The instrumented stage (dependent variable = innovation)

	(1)	(2)	(3)	(4)	(5)
Explanatory variables					
SOE	0.024				0.023
	(0.024)				(0.025)
BGA		0.471**			0.472**
		(0.235)			(0.235)
Subsidy			0.036***		0.036***
			(0.008)		(0.008)
Financial slack$_{-1}$				0.001	0.001
				(0.002)	(0.002)
Instrumental variables					
Education	0.465***	0.465***	0.464***	0.449***	0.449***
	(0.074)	(0.074)	(0.074)	(0.075)	(0.075)
R&D expenditure	0.224***	0.224***	0.224***	0.220***	0.220***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
R&D personnel	0.014***	0.014***	0.014***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Control variables					
Recoverable slack$_{-1}$	0.019***	0.019***	0.019***	0.018***	0.018***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Potential slack$_{-1}$	0.002	0.002	0.002	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Capital intensity$_{-1}$	0.008*	0.009*	0.008*	0.009*	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Human capital$_{-1}$	0.001	0.001	0.001	0.000	0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Size$_{-1}$	0.032***	0.032***	0.031***	0.034***	0.034***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
POE	−0.021	−0.021*	−0.022*	−0.021	−0.021
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)

Notes: firm, industry, province and time dummies included but not reported for brevity. Robust standard errors in parentheses. *, **, *** significance at 10 %, 5 %, and 1 %, respectively (two-tailed tests).

Appendix C. The second stage of IV-Heckman estimation

	(1)	(2)	(3)	(4)	(5)
Innovation	1.782***	1.693***	2.094***	1.884***	1.994***
	(0.591)	(0.556)	(0.677)	(0.616)	(0.672)
Innovation × SOE	−0.080*				−0.499***
	(0.042)				(0.185)
Innovation × BGA		−1.188***			−1.188***
		(0.425)			(0.432)
Innovation × Subsidy			−1.138***		−0.958***
			(0.388)		(0.340)
Innovation × Financial slack$_{-1}$				0.185***	0.150***
				(0.063)	(0.052)
SOE	0.020				0.007
	(0.030)				(0.034)
BGA		0.610***			0.659***
		(0.108)			(0.116)
Subsidy			0.135***		0.123***
			(0.038)		(0.036)
Financailslack1$_{-1}$				0.003	0.003
				(0.003)	(0.003)
IMR	0.050	0.031	0.031	0.029	0.031
	(0.050)	(0.041)	(0.039)	(0.037)	(0.043)
Recoverableslack$_{-1}$	0.011**	0.014***	0.013***	0.010*	0.016***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)
Potentialslack$_{-1}$	0.001	0.003	0.002	0.001	0.002
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Productivity$_{-1}$	0.065***	0.065***	0.075***	0.073***	0.069***
	(0.014)	(0.013)	(0.015)	(0.015)	(0.014)
Capital intensity$_{-1}$	0.045***	0.048***	0.049***	0.050***	0.050***
	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)
Human capital$_{-1}$	0.125***	0.127***	0.126***	0.127***	0.129***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Size$_{-1}$	0.051***	0.052***	0.050***	0.051***	0.055***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)
POE	0.010	0.008	0.001	0.005	0.007
	(0.022)	(0.020)	(0.018)	(0.019)	(0.020)

Notes: firm, industry, province and time dummies included but not reported for brevity. Robust standard errors in parentheses. *, **, *** significance at 10 %, 5 %, and 1 %, respectively (two-tailed tests).

Appendix D. The moderating role of firm resources in the innovation-export intensity relationship (dependent variable = EIS; 2SLS model)

	(1)	(2)	(3)	(4)	(5)
Innovation	0.682**	0.566***	0.770**	0.683**	0.615***
	(0.268)	(0.201)	(0.301)	(0.278)	(0.221)
Innovation × SOE	−0.078***				−0.072**
	(0.030)				(0.029)
Innovation × BGA		−0.432***			−0.384***
		(0.157)			(0.142)
Innovation × Subsidy			−0.444**		−0.310***
			(0.175)		(0.112)
Innovation × Financial slack$_{-1}$				0.072**	0.047***
				(0.030)	(0.017)
SOE	−0.019*				−0.004
	(0.011)				(0.006)
BGA		0.040*			0.053**
		(0.023)			(0.027)
Subsidy			0.034***		0.026***
			(0.011)		(0.007)
Financial slack$_{-1}$				0.001	0.0004
				(0.001)	(0.001)
Recoverable slack$_{-1}$	0.004*	0.002	0.003*	0.004*	0.001
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Potential slack$_{-1}$	0.0003	0.0003	0.0004	0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Productivity$_{-1}$	0.080***	0.069***	0.080***	0.081***	0.069***
	(0.018)	(0.013)	(0.018)	(0.019)	(0.013)
Capital intensity$_{-1}$	0.013***	0.012***	0.013***	0.012***	0.012***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Human capital$_{-1}$	0.032***	0.029***	0.033***	0.032***	0.029***
	(0.007)	(0.005)	(0.007)	(0.007)	(0.005)
Size$_{-1}$	0.003	0.005*	0.004	0.004	0.006***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)

(continued on next page)

(*continued*)

	(1)	(2)	(3)	(4)	(5)
POE	0.002	0.004	0.002	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Kleibergen-Paaprk LM statistic	14.025***	22.596***	13.483***	13.116***	21.595***
Kleibergen-Paaprk	7.012***	11.299***	6.741***	6.558***	10.798***
Number of firms	147,713	147,713	147,713	145,693	145,693
Number of observations	378,871	378,871	378,871	373,277	373,277

Notes: firm, industry, province and time dummies, included but not reported for brevity. Robust standard errors in parentheses. *, **, *** significance at 10 %, 5 %, 1 %, respectively (two-tailed test).

References

Acharya, V., Xu, Z., 2017. Financial dependence and innovation: the case of public versus private firms. J. Financ. Econ. 124 (2), 223–243.

Aguilera, R.V., Grøgaard, B., 2019. The dubious role of institutions in international business: a road forward. J. Int. Bus. Stud. 50 (1), 20–35.

Alarcón, S., Sánchez, M., 2016. Is there a virtuous circle relationship between innovation activities and exports? A comparison of food and agricultural firms. Food Policy 61, 70–79.

Alegre, J., Pla-Barber, J., Chiva, R., Villar, C., 2012. Organisational learning capability, product innovation performance and export intensity. Tech. Anal. Strat. Manag. 24 (5), 511–526.

Altomonte, C., Gamba, S., Mancusi, M.L., Vezzulli, A., 2016. R&D investments, financing constraints, exporting and productivity. Econ. Innov. New Technol. 25 (3), 283–303.

Amadu, A.W., Danquah, M., 2019. R&D, human capital and export behavior of manufacturing and service firms in Ghana. J. Afr. Bus. 20 (3), 283–304.

Añón Higón, D., Driffield, N., 2011. Exporting and innovation performance: analysis of the annual small business survey in the UK. Int. Small Bus. J. 29 (1), 4–24.

Aristei, D., Castellani, D., Franco, C., 2013. Firms' exporting and importing activities: is there a two-way relationship? Rev. World Econ. 149 (1), 55–84.

Aw, B.Y., Roberts, M.J., Xu, D.Y., 2011. R&D investment, exporting, and productivity dynamics. Am. Econ. Rev. 101 (4), 1312–1344.

Ayllon, S., Radicic, D., 2019. Product innovation, process innovation and export propensity: persistence, complementarities and feedback effects in spanish firms. Appl. Econ. 51 (33), 3650–3664.

Azar, G., Ciabuschi, F., 2017. Organizational innovation, technological innovation, and export performance: the effects of innovation radicalness and extensiveness. Int. Bus. Rev. 26 (2), 324–336.

Azar, G., Drogendijk, R., 2016. Cultural distance, innovation and export performance: an examination of perceived and objective cultural distance. Eur. Bus. Rev. 28 (2), 176–207.

Azari, M.J., Madsen, T.K., Moen, O., 2017. Antecedent and outcomes of innovation-based growth strategies for exporting SMEs. J. Small Bus. Enterp. Dev. 24 (4), 733–752.

Barasa, L., Kinyanjui, B., Knoben, J., Vermeulen, P., Kimuyu, P., 2021. Innovation and exporting: the case of mediation effects in sub-saharan Africa. Ind. Innov. 28 (2), 113–135.

Barrère, G., Jung, A., Karsaclian, D., 2022. Innovation and exports: different markets, different outcomes. Compet. Rev. 32 (4), 565–581.

Barrios, S., Gorg, H., Strobl, E., 2003. Explaining firms' export behaviour: R&D, spillovers and the destination market. Oxf. Bull. Econ. Stat. 65 (4), 475–496.

Bascle, G., 2008. Controlling for endogeneity with instrumental variables in strategic management research. Strateg. Organ. 6 (3), 285–327.

Basile, R., 2001. Export behaviour of italian manufacturing firms over the nineties: the role of innovation. Res. Policy 30 (8), 1185–1201.

Becchetti, L., Rossi, S.P.S., 2000. The positive effect of industrial district on the export performance of Italian firms. Rev. Ind. Organ. 16 (1), 53–68.

Becker, S.O., Egger, P.H., 2013. Endogenous product versus process innovation and a firm's propensity to export. Empir. Econ. 44 (1), 329–354.

Bellone, F., Musso, P., Nesta, L., Schiavo, S., 2010. Financial constraints and firm export behaviour. World Economy 33 (3), 347–373.

Bentley, F.S., Kehoe, R.R., 2020. Give them some slack—they're trying to change! The benefits of excess cash, excess employees, and increased human capital in the strategic change context. Acad. Manag. J. 63 (1), 181–204.

Berman, N., Berthou, A., Héricourt, J., 2015. Export dynamics and sales at home. J. Int. Econ. 96 (2), 298–310.

Bhat, S., Momaya, K.S., 2020. Innovation capabilities, market characteristics and export performance of EMNEs from India. Eur. Bus. Rev. 32 (5), 801–822.

Bigos, K., Michalik, A., 2020. The influence of innovation on international new ventures' exporting in central and Eastern Europe and Central Asia countries. Entrep. Bus. Econ. Rev. 8 (3), 47–63.

Bleaney, M., Wakelin, K., 2002. Efficiency, innovation and exports. Oxf. Bull. Econ. Stat. 64 (1), 3–15.

Blyde, J., Iberti, G., Mussini, M., 2018. When does innovation matter for exporting? Empir. Econ. 54 (4), 1653–1671.

Bortoluzzi, G., Kadic-Maglajlic, S., Arslanagic-Kalajdzic, M., Balboni, B., 2018. Innovativeness as a driver of the international expansion of developing markets' firms: evidence of curvilinear effects. Int. Mark. Rev. 35 (2), 215–235.

Boso, N., Story, V.M., Cadogan, J.W., Micevski, M., Kadic-Maglajlic, S., 2013. Firm innovativeness and export performance: environmental networking, and structural contingencies. J. Int. Mark. 21 (4), 62–87.

Boso, N., Adeola, O., Danso, A., Assadinia, S., 2019. The effect of export marketing capabilities on export performance: moderating role of dysfunctional competition. Ind. Mark. Manag. 78, 137–145.

Bradley, S.W., Shepherd, D.A., Wiklund, J., 2011. The importance of slack for new organizations facing 'tough'environments. J. Manag. Stud. 48 (5), 1071–1097.

Bravo-Ortega, C., Benavente, J.M., Gonzalez, A., 2014. Innovation, exports, and productivity: learning and self-selection in Chile. Emerg. Mark. Financ. Trade 50, 68–95.

Braymen, C., Briggs, K., Boulware, J., 2011. R&D and the export decision of new firms. South. Econ. J. 78 (1), 191–210.

Bruneel, J., D'Este, P., Salter, A., 2016. The impact of financial slack on explorative and exploitative knowledge sourcing from universities: evidence from the UK. Ind. Corp. Chang. 25 (4), 689–706.

Cai, H., Liu, Q., 2009. Competition and corporate tax avoidance: evidence from chinese industrial firms. Econ. J. 119 (537), 764–795.

Caldera, A., 2010. Innovation and exporting: evidence from Spanish manufacturing firms. Rev. World Econ. 146 (4), 657–689.

Carboni, O.A., Medda, G., 2018. R&D, export and investment decision: evidence from European firms. Appl. Econ. 50 (2), 187–201.

Carboni, O.A., Medda, G., 2020. Linkages between R&D, innovation, investment and export performance: evidence from European manufacturing firms. Tech. Anal. Strat. Manag. 32 (12), 1379–1392.

Carnes, C.M., Xu, K., Sirmon, D.G., Karadag, R., 2019. How competitive action mediates the resource slack–performance relationship: a meta-analytic Approach. J. Manag. Stud. 56 (1), 57–90.

Carney, M., Gedajlovic, E.R., Heugens, P.P.M.A.R., Van Essen, M., Van Oosterhout, J., 2011. Business group affiliation, performance, context, and strategy: a meta-analysis. Acad. Manag. J. 54 (3), 437–460.

Carney, M., Essen, M.V., Estrin, S., Shapiro, D., 2018. Business groups reconsidered: beyond paragons and parasites. Acad. Manag. Perspect. 32 (4), 493–516.

Cassiman, B., Golovko, E., 2011. Innovation and internationalization through exports. J. Int. Bus. Stud. 42 (1), 56–75.

Cassiman, B., Golovko, E., Martínez-Ros, E., 2010. Innovation, exports and productivity. Int. J. Ind. Organ. 28 (4), 372–376.

Castellacci, F., Fevolden, A., 2014. Capable companies or changing markets? Explaining the export performance of firms in the defence industry. Defence and Peace Economics 25 (6), 549–575.

Chakrabarti, A.B., Mondal, A., 2017. Effect of business group affiliation on firm internationalization: the case of India under reforms. J. East-West Bus. 23 (1), 41–70.

Charoenrat, T., Amornkitvikai, Y., 2021. Factors affecting the export intensity of Chinese manufacturing firms. Glob. Bus. Rev. 09721509211000207 https://doi.org/10.1177/09721509211000207.

Chen, S.M., Sun, Z., Tang, S., Wu, D.H., 2011. Government intervention and investment efficiency: evidence from China. J. Corp. Finan. 17 (2), 259–271.

Chittoor, R., Sarkar, M., Ray, S., Aulakh, P.S., 2009. Third-world copycats to emerging multinationals: institutional changes and organizational transformation in the Indian pharmaceutical industry. Organ. Sci. 20 (1), 187–205.

Choi, S.B., Lee, S.H., Williams, C., 2011. Ownership and firm innovation in a transition economy: evidence from China. Res. Policy 40 (3), 441–452.

Choi, S.J., Liu, H.L., Yin, J., Qi, Y.F., Lee, J.Y., 2021. The effect of political turnover on firms' strategic change in the emerging economies: the moderating role of political connections and financial resources. J. Bus. Res. 137 (December), 255–266.

Clougherty, J.A., Duso, T., Muck, J., 2015. Correcting for self-selection based endogeneity in management research: Review, recommendations and simulations. Organ. Res. Methods 19 (2), 286–347.

Cull, R., Li, W., Sun, B., Xu, L.C., 2015. Government connections and financial constraints: evidence from a large representative sample of Chinese firms. J. Corp. Finan. 32, 271–294.

Cyert, R.M., March, J.G., 1963. A Behavioral Theory of the Firm. Prentice-Hall, Englewood Cliffs, NJ.

Damijan, J.P., Kostevc, Č., Polanec, S., 2010. From innovation to exporting or vice versa? World Economy 33 (3), 374–398.

Daniel, F., Lohrke, F.T., Fornaciari, C.J., Turner, R.A., 2004. Slack resources and firm performance: a meta-analysis. J. Bus. Res. 57 (6), 565–574.

Danish, M.S., Haider, S., Dhanora, M., Sharma, R., 2021. Modelling two-way relationship between innovation and internationalisation: does learning by export matter? Transnatl. Corp. Rev. 13 (3), 253–268.

De Fuentes, C., Niosi, J., Peerally, J.A., 2021. Exploring innovation and export interplay in Canadian firms. Econ. Innov. New Technol. 30 (8), 786–806.

De Massis, A., Audretsch, D., Uhlaner, L., Kammerlander, N., 2018. Innovation with limited resources: management lessons from the German Mittelstand. J. Prod. Innov. Manag. 35 (1), 125–146.
de Oliveira, T.R., Nguyen, T., Liesch, P., Verreynne, M.-L., Indulska, M., 2021. Exporting to escape and learn: Vietnamese manufacturers in global value chains. J. World Bus. 56 (4), 101227.
Deng, Z.L., Guo, H.L., Zhang, W.F., Wang, C.Q., 2014. Innovation and survival of exporters: a contingency perspective. Int. Bus. Rev. 23 (2), 396–406.
Denicolai, S., Zucchella, A., Magnani, G., 2021. Internationalization, digitalization, and sustainability: are SMEs ready? A survey on synergies and substituting effects among growth paths. Technol. Forecast. Soc. Chang. 166, 120650.
Dess, G.G., Beard, D.W., 1984. Dimensions of organizational task environments. Adm. Sci. Q. 29 (1), 52–73.
Di Cintio, M., Ghosh, S., Grassi, E., 2017. Firm growth, R&D expenditures and exports: an empirical analysis of Italian SMEs. Res. Policy 46 (4), 836–852.
Ding, S., McDonald, F., Wei, Y., 2021. Is internationalization beneficial to innovation? Evidence from a meta-analysis. Manag. Int. Rev. 61, 469–519.
Dohse, D., Niebuhr, A., 2018. How different kinds of innovation affect exporting. Econ. Lett. 163, 182–185.
Dong, G., Kokko, A., Zhou, H., 2022. Innovation and export performance of emerging market enterprises: The roles of state and foreign ownership in China. Int. Bus. Rev. 102025.
Dunning, J.H., Lundan, S.M., 2008. Institutions and the OLI paradigm of the multinational enterprise. Asia Pac. J. Manag. 25 (4), 573–593.
Dziallas, M., Blind, K., 2019. Innovation indicators throughout the innovation process: An extensive literature analysis. Technovation 80–81, 3–29.
Edeh, J.N., Obodoechi, D.N., Ramos-Hidalgo, E., 2020. Effects of innovation strategies on export performance: new empirical evidence from developing market firms. Technol. Forecast. Soc. Chang. 158, 120167.
Esteve-Perez, S., Rodriguez, D., 2013. The dynamics of exports and R&D in SMEs. Small Bus. Econ. 41 (1), 219–240.
Exposito, A., Sanchis-Llopis, J.A., 2020. The effects of innovation on the decisions of exporting and/or importing in SMEs: empirical evidence in the case of Spain. Small Bus. Econ. 55 (3), 813–829.
!"count(.//sb:host[1]//child::*//sb:date)">Fainshmidt, S., Judge, W.Q., Aguilera, R.V., Smith, A., . Varieties of institutional systems: a contextual taxonomy of understudied countries. J. World Bus. 53 (3), 307–322.
Falk, M., de Lemos, F.F., 2019. Complementarity of R&D and productivity in SME export behavior. J. Bus. Res. 96, 157–168.
Fan, P.L., 2014. Innovation in China. J. Econ. Surv. 28 (4), 725–745.
Faustino, H.C., Matos, P.V., 2015. Exports, productivity and innovation: new firm level empirical evidence. Appl. Econ. 47 (46), 4918–4933.
Fernandez-Mesa, A., Alegre, J., 2015. Entrepreneurial orientation and export intensity: examining the interplay of organizational learning and innovation. Int. Bus. Rev. 24 (1), 148–156.
Filatotchev, I., Piesse, J., 2009. R&D, internationalization and growth of newly listed firms: European evidence. J. Int. Bus. Stud. 40 (8), 1260–1276.
Filatotchev, I., Liu, X.H., 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. J. Int. Bus. Stud. 40 (6), 1005–1021.
Filipescu, D.A., Prashantham, S., Rialp, A., Rialp, J., 2013. Technological innovation and exports: unpacking their reciprocal causality. J. Int. Mark. 21 (1), 23–38.
Flor, M., Oltra, M.J., 2005. The influence of firms' technological capabilities on export performance in supplier-dominated industries: the case of ceramic tiles firms. R&D Manag. 35 (3), 333–347.
Fryges, H., Vogel, A., Wagner, J., 2015. The impact of R&D activities on exports of German business services enterprises: first evidence from a continuous treatment approach. World Economy 38 (4), 716–729.
Fu, X.F., 2011. Processing trade, FDI and the exports of indigenous firms: firm-level evidence from technology-intensive industries in China. Oxf. Bull. Econ. Stat. 73 (6), 792–817.
Gajewski, P., Tchorek, G., 2017. What drives export performance of firms in Eastern and Western Poland? Eur. Plan. Stud. 25 (12), 2250–2271.
Ganotakis, P., Love, J.H., 2011. R&D, product innovation, and exporting: evidence from UK new technology based firms. Oxf. Econ. Pap. 63 (2), 279–306.
García-Quevedo, J., Segarra-Blasco, A., Teruel, M., 2018. Financial constraints and the failure of innovation projects. Technol. Forecast. Soc. Chang. 127, 127–140.
Gashi, P., Hashi, I., Pugh, G., 2014. Export behaviour of SMEs in transition countries. Small Bus. Econ. 42 (2), 407–435.
Gaur, A.S., Kumar, V., Singh, D., 2014. Institutions, resources, and internationalization of emerging economy firms. J. World Bus. 49 (1), 12–20.
Geldres-Weiss, V.V., Uribe-Bórquez, C.T., Coudounaris, D.N., Monreal-Pérez, J., 2016. Innovation and experiential knowledge in firm exports: applying the initial U-model. J. Bus. Res. 69 (11), 5076–5081.
George, G., 2005. Slack resources and the performance of privately held firms. Acad. Manag. J. 48 (4), 661–676.
Girma, S., Gong, Y., Gorg, H., 2008a. Foreign direct investment, access to finance, and innovation activity in Chinese enterprises. World Bank Econ. Rev. 22 (2), 367–382.
Girma, S., Gorg, H., Hanley, A., 2008b. R&D and exporting: a comparison of British and Irish firms. Rev. World Econ. 144 (4), 750–773.
Girma, S., Gong, Y., Gorg, H., Yu, Z., 2009. Can production subsidies explain China's export performance? Evidence from firm-level data. Scand. J. Econ. 111 (4), 863–891.
Gkypali, A., Rafailidis, A., Tsekouras, K., 2015. Innovation and export performance: do young and mature innovative firms differ? Eurasian Business Review 5 (2), 397–415.
Gkypali, A., Arvanitis, S., Tsekouras, K., 2018. Absorptive capacity, exporting activities, innovation openness and innovation performance: a SEM approach towards a unifying framework. Technol. Forecast. Soc. Chang. 132, 143–155.
Gkypali, A., Love, J.H., Roper, S., 2021. Export status and SME productivity: learning-to-export versus learning-by-exporting. J. Bus. Res. 128, 486–498.
Golovko, E., Valentini, G., 2011. Exploring the complementarity between innovation and export for SMEs' growth. J. Int. Bus. Stud. 42 (3), 362–380.
Gorodnichenko, Y., Schnitzer, M., 2013. Financial constraints and innovation: why poor countries don't catch up. J. Eur. Econ. Assoc. 11 (5), 1115–1152.
Gourlay, A., Seaton, J., 2004. Explaining the decision to export: evidence from UK firms. Appl. Econ. Lett. 11 (3), 153–158.
Gourlay, A., Seaton, J., Suppakitjarak, J., 2005. The determinants of export behaviour in UK service firms. Serv. Ind. J. 25 (7), 879–889.
Grazzi, M., Mathew, N., Moschella, D., 2021. Making one's own way: jumping ahead in the capability space and exporting among Indian firms. J. Evol. Econ. 31 (3), 931–957.
Guan, J., Ma, N., 2003. Innovative capability and export performance of Chinese firms. Technovation 23 (9), 737–747.
Gubbi, S.R., Aulakh, P.S., Ray, S., 2015. International search behavior of business group affiliated firms: scope of institutional changes and intragroup heterogeneity. Organ. Sci. 26 (5), 1485–1501.
Haddoud, M.Y., Onjewu, A.-K.E., Nowiński, W., 2021. Environmental commitment and innovation as catalysts for export performance in family firms. Technol. Forecast. Soc. Chang. 173, 121085.
Hagedoorn, J., Cloodt, M., 2003. Measuring innovative performance: is there an advantage in using multiple indicators? Res. Policy 32 (8), 1365–1379.
Halilem, N., Amara, N., Landry, R., 2014. Exploring the relationships between innovation and internationalization of small and medium-sized enterprises: A nonrecursive structural equation model. Can. J. Adm. Sci. 31 (1), 18–34.
Hall, B.H., Lerner, J., 2010. Chapter 14 - The financing of R&D and innovation. In: Hall, B.H., Rosenberg, N. (Eds.), Handbook of the Economics of Innovation vol. 1, 609–639. North-Holland.
Harris, R., Li, Q.C., 2009. Exporting, R&D, and absorptive capacity in UK establishments. Oxf. Econ. Pap. 61 (1), 74–103.
Harris, R., Li, Q.C., 2011. Participation in export markets and the role of R&D: Establishment-level evidence from the UK Community Innovation Survey 2005. Appl. Econ. 43 (23), 3007–3020.
He, J., Mao, X., Rui, O.M., Zha, X., 2013. Business groups in China. J. Corp. Finan. 22, 166–192.
He, Z.-L., Tong, T.W., Zhang, Y., He, W., 2018. A database linking Chinese patents to China's census firms. Sci. Data 5 (1), 180042.
Henard, D.H., McFadyen, M.A., 2012. Resource dedication and new product performance: A resource-based view. J. Prod. Innov. Manag. 29 (2), 193–204.
Hoskisson, R.E., Eden, L., Lau, C.M., Wright, M., 2000. Strategy in emerging economies. Acad. Manag. J. 43 (3), 249–267.
Hu, H.W., Cui, L., Aulakh, P.S., 2019. State capitalism and performance persistence of business group-affiliated firms: A comparative study of China and India. J. Int. Bus. Stud. 50 (2), 193–222.
Hurmelinna-Laukkanen, P., Puumalainen, K., 2007. Nature and dynamics of appropriability: strategies for appropriating returns on innovation. R&D Manag. 37 (2), 95–112.
Iacobucci, D., Schneider, M.J., Popovich, D.L., Bakamitsos, G.A., 2016. Mean centering helps alleviate "micro" but not "macro" multicollinearity. Behav. Res. Methods 48 (4), 1308–1317.
Imbriani, C., Morone, P., Testa, G., 2014. Innovation, quality and exports: the case of Italian SMEs. J. Int. Trade Econ. Dev. 23 (8), 1089–1111.
Ito, K., Lechevalier, S., 2010. Why some firms persistently out-perform others: investigating the interactions between innovation and exporting strategies. Ind. Corp. Chang. 19 (6), 1997–2039.
Jackson, G., Deeg, R., 2019. Comparing capitalisms and taking institutional context seriously. J. Int. Bus. Stud. 50 (1), 4–19.
Kafouros, M.I., Buckley, P.J., Sharp, J.A., Wang, C.Q., 2008. The role of internationalization in explaining innovation performance. Technovation 28 (1–2), 63–74.
Khanna, T., Palepu, K., 1997. Why focused strategies may be wrong for emerging markets. Harv. Bus. Rev. 75 (4), 41–51.
Khanna, T., Yafeh, Y., 2007. Business groups in emerging markets: paragons or parasites? J. Econ. Lit. 45 (2), 331–372.
Kiendrebeogo, Y., Minea, A., 2017. Financial factors and manufacturing exports: firm-level evidence from Egypt. J. Dev. Stud. 53 (12), 2197–2213.
Kim, H., Kim, H., Lee, P.M., 2008. Ownership structure and the relationship between financial slack and R&D investments: evidence from Korean firms. Organ. Sci. 19 (3), 404–418.
Kim, S., Lee, H., Kim, J., 2016. Divergent effects of external financing on technology innovation activity: Korean evidence. Technol. Forecast. Soc. Chang. 106, 22–30.
Kirbach, M., Schmiedeberg, C., 2008. Innovation and export performance: adjustment and remaining differences in East and West German Manufacturing. Econ. Innov. New Technol. 17 (5), 435–457.
Kiss, A.N., Fernhaber, S., McDougall-Covin, P.P., 2018. Slack, innovation, and export intensity: implications for small- and medium-sized enterprises. Entrep. Theory Pract. 42 (5), 671–697.
Kornai, J., Maskin, E., Roland, G., 2003. Understanding the soft budget constraint. J. Econ. Lit. 41 (4), 1095–1136.
Kotabe, M., Srinivasan, S.S., Aulakh, P.S., 2002. Multinationality and firm performance: the moderating role of R&D and marketing capabilities. J. Int. Bus. Stud. 33 (1), 79–97.

Kumar, N., Siddharthan, N.S., 1994. Technology, firm size and export behavior in developing-countries - the case of Indian enterprises. J. Dev. Stud. 31 (2), 289–309.
Lachenmaier, S., Wossmann, L., 2006. Does innovation cause exports? Evidence from exogenous innovation impulses and obstacles using German micro data. Oxf. Econ. Pap. 58 (2), 317–350.
Lachenmaier, S., Wößmann, L., 2006. Does innovation cause exports? Evidence from exogenous innovation impulses and obstacles using German micro data. Oxf. Econ. Pap. 58 (2), 317–350.
Lai, H., Maskus, K.E., Yang, L., 2020. Intellectual property enforcement, exports and productivity of heterogeneous firms in developing countries: Evidence from China. Eur. Econ. Rev. 123, 103373.
Laursen, K., Masciarelli, F., Prencipe, A., 2012. Trapped or spurred by the home region? The effects of potential social capital on involvement in foreign markets for goods and technology. J. Int. Bus. Stud. 43 (9), 783–807.
Lecerf, M., Omrani, N., 2020. SME internationalization: the impact of information technology and innovation. J. Knowl. Econ. 11 (2), 805–824.
Lee, E., Walker, M., Zeng, C., 2014. Do Chinese government subsidies affect firm value? Acc. Organ. Soc. 39 (3), 149–169.
Lefebvre, É., Lefebvre, L.A., Bourgault, M., 1998. R&D-related capabilities as determinants of export performance. Small Bus. Econ. 10 (4), 365–377.
Leung, T.Y., Sharma, P., 2021. Differences in the impact of R&D intensity and R&D internationalization on firm performance – mediating role of innovation performance. J. Bus. Res. 131, 81–91.
Li, S.Y., 2018. A structural model of productivity, uncertain demand, and export dynamics. J. Int. Econ. 115, 1–15.
Li, J., Xia, J., Shapiro, D., Lin, Z.Y., 2018. Institutional compatibility and the internationalization of Chinese SOEs: the moderating role of home subnational institutions. J. World Bus. 53 (5), 641–652.
Lim, C.Y., Wang, J.W., Zeng, C., 2018. China's "mercantilist" government subsidies, the cost of debt and firm performance. J. Bank. Financ. 86, 37–52.
Lo Turco, A., Maggioni, D., 2015. Dissecting the impact of innovation on exporting in Turkey. Econ. Innov. New Technol. 24 (4), 309–338.
Loof, H., Nabavi, P., 2016. Innovation and credit constraints: evidence from Swedish exporting firms. Econ. Innov. New Technol. 25 (3), 269–282.
López Rodríguez, J., García Rodríguez, R.M., 2005. Technology and export behaviour: a resource-based view approach. Int. Bus. Rev. 14 (5), 539–557.
Lopez-Bazo, E., Motellon, E., 2018. Firm exports, innovation and the regional dimension in Spain. Reg. Stud. 52 (4), 490–502.
Love, J.H., Roper, S., Zhou, Y., 2016. Experience, age and exporting performance in UK SMEs. Int. Bus. Rev. 25 (4), 806–819.
Ma, X.F., Yiu, D.W., Zhou, N., 2014. Facing global economic crisis: foreign sales, ownership groups, and corporate value. J. World Bus. 49 (1), 87–100.
Mahmood, I.P., Mitchell, W., 2004. Two faces: effects of business groups on innovation in emerging economies. Manag. Sci. 50 (10), 1348–1365.
Mancusi, M.L., Vezzulli, A., Frazzoni, S., Rotondi, Z., Sobrero, M., 2018. Export and innovation in small and medium enterprises: the role of concentrated bank borrowing. Economica 85 (337), 177–204.
Manez, J.A., Rochina-Barrachina, M.E., Sanchis-Llopis, J.A., Vicente, O., 2014. Financial constraints and R&D and exporting strategies for Spanish manufacturing firms. Ind. Corp. Chang. 23 (6), 1563–1594.
Manez, J.A., Rochina-Barrachina, M.E., Sanchis-Llopis, J.A., 2015. The dynamic linkages among exports, R&D and productivity. World Economy 38 (4), 583–612.
Manova, K., Wei, S.-J., Zhang, Z., 2015. Firm exports and multinational activity under credit constraints. Rev. Econ. Stat. 97 (3), 574–588.
Mao, Q.L., Xu, J.Y., 2018. The more subsidies, the longer survival? Evidence from Chinese manufacturing firms. Rev. Dev. Econ. 22 (2), 685–705.
Marino, A., Matsusaka, J., 2005. Decision processes, agency problems, and information: an economic analysis of capital budgeting procedures. Rev. Financ. Stud. 18 (1), 301–325.
Monreal-Pérez, J., Aragón-Sánchez, A., Sánchez-Marín, G., 2012. A longitudinal study of the relationship between export activity and innovation in the Spanish firm: the moderating role of productivity. Int. Bus. Rev. 21 (5), 862–877.
Mulliqi, A., Adnett, N., Hisarciklilar, M., 2019. Human capital and exports: a micro-level analysis of transition countries. J. Int. Trade Econ. Dev. 28 (7), 775–800.
Musacchio, A., Lazzarini, S.G., Aguilera, R.V., 2015. New varieties of state capitalism: strategic and governance implications. Acad. Manag. Perspect. 29 (1), 115–131.
Nassimbeni, G., 2001. Technology, innovation capacity, and the export attitude of small manufacturing firms: a logit/tobit model. Res. Policy 30 (2), 245–262.
Norton, E.C., Wang, H., Ai, C., 2004. Computing interaction effects and standard errors in logit and probit models. Stata J. 4 (2), 154–167.
Nuruzzaman, N., Singh, D., Gaur, A.S., 2020. Institutional support, hazards, and internationalization of emerging market firms. Glob. Strateg. J. 10 (2), 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. Int. Mark. Rev. 33 (6), 867–893.
Olley, G.S., Pakes, A., 1996. The dynamics of productivity in the telecommunications equipment industry. Econometrica 64 (6), 1263–1297.
Ossorio, M., 2018. Does R&D investment affect export intensity? The moderating effect of ownership. Int. J. Manag. Financ. Account. 10 (1), 65–83.
Oura, M.M., Zilber, S.N., Lopes, E.L., 2016. Innovation capacity, international experience and export performance of SMEs in Brazil. Int. Bus. Rev. 25 (4), 921–932.
Ozcelik, E., Taymaz, E., 2004. Does innovativeness matter for international competitiveness in developing countries? The case of Turkish manufacturing industries. Res. Policy 33 (3), 409–424.
Paeleman, I., Vanacker, T., 2015. Less is more, or not? On the interplay between bundles of slack resources, firm performance and firm survival. J. Manag. Stud. 52 (6), 819–848.
Paeleman, I., Fuss, C., Vanacker, T., 2017. Untangling the multiple effects of slack resources on firms' exporting behavior. J. World Bus. 52 (6), 769–781.
Pan, Y., Teng, L., Supapol, A.B., Lu, X., Huang, D., Wang, Z., 2014. Firms' FDI ownership: the influence of government ownership and legislative connections. J. Int. Bus. Stud. 45 (8), 1029–1043.
Papageorgiadis, N., McDonald, F., 2019. Defining and measuring the institutional context of national intellectual property systems in a post-TRIPS world. J. Int. Manag. 25 (1), 3–18.
Papalia, R.B., Bertarelli, S., Mancinelli, S., 2018. Innovation, complementarity, and exporting. Evidence from German manufacturing firms. Int. Rev. Appl. Econ. 32 (1), 3–38.
Pastelakos, E., Theodoraki, C., Catanzaro, A., 2022. The role of innovation and internationalization support in small- and medium-sized enterprises' export performance. Eur. Manag. Rev. https://doi.org/10.1111/emre.12513 (forthcoming).
Peluffo, A., Martinez-Zarzoso, I., Silva, E., 2020. New stuff or better ways: what matters to access international markets? J. Appl. Econ. 23 (1), 656–678.
Pla-Barber, J., Alegre, J., 2007. Analysing the link between export intensity, innovation and firm size in a science-based industry. Int. Bus. Rev. 16 (3), 275–293.
Radicic, D., Djalilov, K., 2019. The impact of technological and non-technological innovations on export intensity in SMEs. J. Small Bus. Enterp. Dev. 26 (4), 612–638.
Rasiah, R., Shahrivar, R.B., Yap, X.S., 2016. Institutional support, innovation capabilities and exports: evidence from the semiconductor industry in Taiwan. Technol. Forecast. Soc. Chang. 109, 69–75.
Rialp-Criado, A., Komochkoya, K., 2017. Innovation strategy and export intensity of Chinese SMEs: the moderating role of the home-country business environment. Asian Bus. Manag. 16 (3), 158–186.
Ribau, C.P., Moreira, A.C., Raposo, M., 2017. SMEs innovation capabilities and export performance: an entrepreneurial orientation view. J. Bus. Econ. Manag. 18 (5), 920–934.
Rodil, Ó., Vence, X., Sánchez, M.d.C., 2016. The relationship between innovation and export behaviour: the case of Galician firms. Technol. Forecast. Soc. Chang. 113, 248–265.
Rodriguez, J.L., Rodriguez, R.M.G., 2005. Technology and export behaviour: a resource-based view approach. Int. Bus. Rev. 14 (5), 539–557.
Roper, S., Love, J.H., 2002. Innovation and export performance: evidence from the UK and German manufacturing plants. Res. Policy 31 (7), 1087–1102.
Roper, S., Love, J.H., Añón Higón, D., 2006. The determinants of export performance: evidence for manufacturing plants in ireland and Northern Ireland. Scottish J. Polit. Econ. 53 (5), 586–615.
Rossi, S.P.S., Bonanno, G., Giansoldati, M., Gregori, T., 2021. Export starters and exiters: do innovation and finance matter? Struct. Chang. Econ. Dyn. 56, 280–297.
Salomon, R., Shaver, J.M., 2005. Export and domestic sales: their interrelationship and determinants. Strateg. Manag. J. 26 (9), 855–871.
Saridakis, G., Idris, B., Hansen, J.M., Dana, L.P., 2019. SMEs' internationalisation: when does innovation matter? J. Bus. Res. 96, 250–263.
Satta, G., Parola, F., Penco, L., de Falco, S.E., 2016. Insights to technological alliances and financial resources as antecedents of high-tech firms' innovative performance. R&D Manag. 46 (S1), 127–144.
Schwartz, G., Clements, B., 1999. Government subsidies. J. Econ. Surv. 13 (2), 119–148.
Sharma, P., Cheng, L.T.W., Leung, T.Y., 2020. Impact of political connections on Chinese export firms' performance – lessons for other emerging markets. J. Bus. Res. 106, 24–34.
Shaver, J.M., 2011. The benefits of geographic sales diversification: how exporting facilitates capital investment. Strateg. Manag. J. 32 (10), 1046–1060.
Shieh, G., 2011. Clarifying the role of mean centring in multicollinearity of interaction effects. Br. J. Math. Stat. Psychol. 64 (3), 462–477.
Shinkle, G.A., Kriauciunas, A.P., 2010. Institutions, size and age in transition economies: implications for export growth. J. Int. Bus. Stud. 41 (2), 267–286.
Silva, G.M., Styles, C., Lages, L.F., 2017. Breakthrough innovation in international business: the impact of tech-innovation and market-innovation on performance. Int. Bus. Rev. 26 (2), 391–404.
Singh, D.A., 2009. Export performance of emerging market firms. Int. Bus. Rev. 18 (4), 321–330.
Sirmon, D.G., Hitt, M.A., Ireland, R.D., 2007. Managing firm resources in dynamic environments to create value: looking inside the black box. Acad. Manag. Rev. 32 (1), 273–292.
Sousa, C.M.P., Li, R.Y., He, X., 2020. The impact of exploitation and exploration on export sales growth: the moderating role of domestic and international collaborations. J. Int. Mark. 28 (4), 1–20.
Sterlacchini, A., 1999. Do innovative activities matter to small firms in non-R&D-intensive industries? An application to export performance. Res. Policy 28 (8), 819–832.
Sterlacchini, A., 2001. The determinants of export performance: a firm-level study of Italian manufacturing. Rev. World Econ. 137 (3), 450–472.
Stucki, T., 2016. How the founders' general and specific human capital drives export activities of start-ups. Res. Policy 45 (5), 1014–1030.
Sui, S., Baum, M., 2014. Internationalization strategy, firm resources and the survival of SMEs in the export market. J. Int. Bus. Stud. 45 (7), 821–841.
Taques, F.H., López, M.G., Basso, L.F., Areal, N., 2021. Indicators used to measure service innovation and manufacturing innovation. J. Innov. Knowl. 6 (1), 11–26.
Tavassoli, S., 2018. The role of product innovation on export behavior of firms: is it innovation input or innovation output that matters? Eur. J. Innov. Manag. 21 (2), 294–314.

Teece, D.J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strateg. Manag. J. 28 (13), 1319–1350.
Teng, B.-S., Cummings, J.L., 2002. Trade-offs in managing resources and capabilities. Acad. Manag. Perspect. 16 (2), 81–91.
Tomiura, E., 2007. Effects of R&D and networking on the export decision of Japanese firms. Res. Policy 36 (5), 758–767.
Troilo, G., De Luca, L.M., Atuahene-Gima, K., 2014. More innovation with less? A strategic contingency view of slack resources, information search, and radical innovation. J. Prod. Innov. Manag. 31 (2), 259–277.
Tse, C.H., Yu, L.H., Zhu, J.J., 2017. A multimediation model of learning by exporting: analysis of export-induced productivity gains. J. Manag. 43 (7), 2118–2146.
Tseng, C.-H., Tansuhaj, P., Hallagan, W., McCullough, J., 2007. Effects of firm resources on growth in multinationality. J. Int. Bus. Stud. 38 (6), 961–974.
Van Beveren, I., Vandenbussche, H., 2010. Product and process innovation and firms' decision to export. Journal of Economic Policy Reform 13 (1), 3–24.
Vanacker, T., Collewaert, V., Zahra, S.A., 2017. Slack resources, firm performance, and the institutional context: evidence from privately held European firms. Strateg. Manag. J. 38 (6), 1305–1326.
Veganzones-Varoudakis, M.A., Plane, P., 2019. Innovation, exports, productivity and investment climate; a study based on Indian manufacturing firm-level data. Appl. Econ. 51 (41), 4455–4476.
Villar, C., Pla-Barber, J., Alegre, J., 2012. Unravelling the moderating effects of size and experience on product innovations and exports: a study in a medium knowledge-intensive industry. Tech. Anal. Strat. Manag. 24 (2), 219–238.
Wagner, J., 2014. Credit constraints and exports: a survey of empirical studies using firm-level data. Ind. Corp. Chang. 23 (6), 1477–1492.
Wakelin, K., 1998. Innovation and export behaviour at the firm level. Res. Policy 26 (7), 829–841.
Wang, F., 2014. Complementarities between R&D investment and exporting-evidence from China. China Econ. Rev. 31, 217–227.
Wang, W., Ma, H., 2018. Export strategy, export intensity and learning: integrating the resource perspective and institutional perspective. J. World Bus. 53 (4), 581–592.
Wang, Y.A.D., Cao, W., Zhou, Z., Ning, L.T., 2013. Does external technology acquisition determine export performance? Evidence from Chinese manufacturing firms. Int. Bus. Rev. 22 (6), 1079–1091.
Wang, J., Wei, Y.Q., Liu, X.M., Wang, C.G., Lin, H., 2014. Simultaneous impact of the presence of foreign MNEs on indigenous firms' exports and domestic sales. Manag. Int. Rev. 54 (2), 195–223.
Wei, S.-J., Xie, Z., Zhang, X., 2017. From "made in China" to "innovated in China": necessity, prospect, and challenges. J. Econ. Perspect. 31 (1), 49–70.
White, R.E., Hoskisson, R.E., Yiu, D.W., Bruton, G.D., 2008. Employment and market innovation in Chinese business group affiliated firms: the role of group control systems. Manag. Organ. Rev. 4 (2), 225–256.
Willmore, L., 1992. Tansnationals and foreign trade: evidence from Brazil. J. Dev. Stud. 28 (2), 314–335.
Wright, M., Wood, G., Musacchio, A., Okhmatovskiy, I., Grosman, A., Doh, J.P., 2021. State capitalism in international context: varieties and variations. J. World Bus. 56 (2), 101160.
Wu, F., Wu, H., Zhang, X., 2020. How does innovation activity affect firm export behavior? Evidence from China. Emerg. Mark. Financ. Trade 56 (8), 1730–1751.
Wu, L., Wei, Y., Wang, C., 2021. Disentangling the effects of business groups in the innovation-export relationship. Res. Policy 50 (1), 104093.
Xie, Z.Z., Li, J.T., 2018. Exporting and innovating among emerging market firms: the moderating role of institutional development. J. Int. Bus. Stud. 49 (2), 222–245.
Xu, K., Hitt, M.A., 2020. The international expansion of family firms: the moderating role of internal financial slack and external capital availability. Asia Pac. J. Manag. 37 (1), 127–153.
Yan, J., Tsinopoulos, C., Xiong, Y., 2021. Unpacking the impact of innovation ambidexterity on export performance: microfoundations and infrastructure investment. Int. Bus. Rev. 30 (1), 101766.
Yang, C.-H., Chen, Y.-H., 2012. R&D, productivity, and exports: plant-level evidence from Indonesia. Econ. Model. 29 (2), 208–216.
Yang, C.H., Chen, J.R., Chuang, W.B., 2004. Technology and export decision. Small Bus. Econ. 22 (5), 349–364.
Yi, J., Wang, C., Kafouros, M., 2013. The effects of innovative capabilities on exporting: do institutional forces matter? Int. Bus. Rev. 22 (2), 392–406.
Yuan, X.H., Deng, Z.L., 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. Front. Bus. Res. China 9 (2), 135–160.
Zhang, J.J., Guan, J.C., 2018. The time-varying impacts of government incentives on innovation. Technol. Forecast. Soc. Chang. 135, 132–144.
Zhang, J., Zhu, M., 2016. Market orientation, product innovation and export performance: evidence from Chinese manufacturers. J. Strateg. Mark. 24 (5), 377–397.
Zhang, K., Wang, J.J., Sun, Y., Hossain, S., 2021. Financial slack, institutional shareholding and enterprise innovation investment: evidence from China. Account. Finance 61 (2), 3235–3259.
Zhao, X.Y., Tan, J.T., 2021. The performance implications of patenting - the moderating effect of informal institutions in emerging economies. R&D Manag. 51 (5), 468–483.
Zhong, W.G., Lin, Y., Gao, D.X., Yang, H.B., 2019. Does politician turnover affect foreign subsidiary performance? Evidence in China. J. Int. Bus. Stud. 50 (7), 1184–1212.
Zhu, J.J., Tse, C.H., Li, X., 2019. Unfolding China's state-owned corporate empires and mitigating agency hazards: effects of foreign investments and innovativeness. J. World Bus. 54 (3), 191–212.

Lichao Wu is Associate Professor at Department of International Economics and Business, Xiamen University. Her research interests are at the intersections of innovation and international business. Her research has appeared in leading journals such as *Research Policy* and *Economic Letters*.

Yingqi (Annie) Wei is Professor at Leeds University Business School, University of Leeds. Her main research areas of interest are foreign direct investment, international trade and economic development, with a focus on the internationalization of Chinese firms. She has published in various journals including *Research Policy*, *Journal of International Business Studies*, *Journal of World Business*, *Business History*, and *Regional Studies*.

Chengang Wang is Professor at Birmingham Business School, University of Birmingham. His current research topics focus on the IPR protection, innovation, and the internationalization strategies of firms. His work has appeared in *Research Policy, Journal of International Business Studies,* and *World Development.*

Frank McDonald is Professor at Leeds University Business School, University of Leeds. His research has focused on issues connected to resource based views of MNC strategy and organizational structures, how institutions and spatial factors affect MNC strategy and employee relations in MNCs. He has published in various journals including *Journal of World Business, International Business Review, Management International Review,* and *Regional Studies*.

Dr Xia Han is Lecturer in International Business at Alliance Manchester Business School, University of Manchester. Her research addresses the implications of home-country institutions for EMNCs' post-entry performance. She also looks at political risk management strategies of EMNCs. Her research has appeared in journals such as *International Business Review*, *Journal of Business Research*, and *Management International Review*.