



The effects of innovative capabilities on exporting: Do institutional forces matter?

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ABSTRACT

We challenge the assumption that innovative capabilities are always beneficial for exporting by developing and testing the premise that export performance is contingent on firm- and location-specific institutional idiosyncrasies. Testing our framework against a large dataset for China, we demonstrate that foreign ownership, business group affiliation, and the degree of marketization of the region where the firm operates positively moderate the effects of innovative capabilities on export performance. Government relationships have a stronger positive moderating effect on the innovation–export relationship in regions with a high level of marketization only. Our findings suggest that the relationship between innovative capabilities and export performance is not uniform but rather contingent upon the institutional setting in which the firm is embedded. These results have important implications for how policymakers promote exporting and open up new theoretical avenues for conceptualizing the internationalization implications of innovation.

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1. Introduction

Technological innovation is an increasingly important element of globalization and of competitiveness (Gorodnichenko, Svejnar, & Terrell, 2010). As globalization and international competition intensifies, technology becomes more central to firms' exporting performance in the global market. Although prior evidence indicates that innovation has the potential to enhance export performance (Basile, 2001; Cassiman & Golovko, 2011; Girma, Gorg, & Hanley, 2008), it also shows that there is significant variation in the effects of innovation.¹ Yet, while such heterogeneity is a stylized fact, understanding of its origins and the reasons why it persists remains incomplete. An intriguing paradox is that many Chinese firms that are less R&D intensive have been exporting successfully.

Building on this paradox, we argue that the innovation–exports relationship is not universal but rather context specific. We advance prior work on innovation and export performance in two ways. First, with a few exceptions (Dhanaraj & Beamish, 2003; Estrin, Meyer, Wright, & Foliano, 2008; Lu, Xu, & Liu, 2009; Morgan, Vorhies, & Schlegelmilch, 2006), recent theorizing on export performance focuses on idiosyncratic firm-specific capabilities but overlooks how a firm's institutional characteristics and the institutional environment in which it operates influence its export performance. Although the contingent resource-based view (RBV) suggests that the effective deployment of firm capabilities depends upon the

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¹ The empirical evidence with respect to the relationship between R&D expenditure and export sales is mixed. While many studies have found a positive relationship between the two (Cooper & Kleinschmidt, 1985; Lachenmaier & Wößmann, 2006), others reported no relationship between R&D expenditure and exports (e.g., Lefebvre, Lefebvre, & Bourgault, 1998; Sterlacchini, 2001).

institutional context (Priem & Butler, 2001) that may in turn impact performance, little research has examined this proposition in the export literature. We address this gap by considering whether and how three firm-specific institutional factors (namely, foreign ownership, government relationship, and business group affiliation) and one location-specific institutional factor (namely, the degree of marketization of the region in which the firm operates) may enhance or constrain the export performance of domestic or foreign firms that operate in emerging markets. Institutional factors can be both country and firm-specific (Dunning, 2006). Some firms such as SOEs are not structurally separate from external institutions; they are in fact part of their country's institutions (Cui & Jiang, 2012). A firm's institutional context includes not only the broader influences of the state, but also its internal organizational culture and practices (Oliver, 1997). While industry and macro level institutional forces affect all firms in a given business sector and region, institutional factors, such as foreign ownership and government relationships, are idiosyncratic to the firm. By treating firm-specific institutional factors as key elements of the institutional environment, we can examine how variations in the institutional environment shape the relationship between innovation and exports.

Second, the export literature has largely been confined to the direct effects of firm resources and capabilities, overlooking the context in which resources affect exports. We argue that firm-specific institutional characteristics and the firm's institutional environment constitute a critical context for understanding the role of innovative capabilities in shaping export performance. We advance the premise that institutions affect export performance not only directly, but also indirectly through their interplay with internal firm resources and capabilities. We posit that the role of innovative capabilities in increasing export performance varies considerably among firms depending on the four institutional parameters discussed above. As this conceptualization rests upon the view that institutional factors act as a moderating mechanism in the relationship between innovative capabilities and export performance, it differs from the prior theoretical perspectives that view exporting as the result of resource superiority and enables us to offer a more complete account of the forces shaping a firm's export performance.

2. The Chinese business climate: exports, innovation and marketization

China has transformed themselves from the world's opponents of globalization into advocates of globalization. This is evidenced by their significant integration in the global economy through foreign direct investment (FDI) and international trade. For instance, China's exports have grown from \$9.8 billion in 1978 to \$1577.9 billion in 2010. In the past, Chinese exports concentrated on the more labor-intensive and less sophisticated end of the product spectrum. In recent years, however, many Chinese firms have managed to climb up the ladder in the global value chain. As result, China overtook the U.S. and the E.U. to become the largest exporter of high-tech products in 2006 (World Bank, 2008).

This upward migration from captive manufacturing towards high value-added technological products is largely driven by Chinese government policies, e.g. in 2005, the Chinese government started an ambitious 15-year plan to promote indigenous innovation. As a result, Chinese enterprises have significantly improved their innovative capabilities. For example, the top 500 Chinese enterprises possessed 169,000 patents in 2010, which represents a 13.3% increase from 2009. Such policies have nurtured domestic innovation that, in turn, led to significant growth in the exports of high tech products. Nevertheless, China's export-led development model has attracted criticisms suggesting that it has caused imbalance in global economy and unemployment in western countries. They also put pressure on China to depreciate its currency and on Chinese companies to focus on domestic demand rather than international markets. Due to these pressures, instead of continuing to encourage exporting, the policy of Chinese government has shifted to the stimulation of domestic demand. Exporting firms no longer enjoy incentives such as export tax rebates, and it is therefore becoming more important for these firms to enhance export performance by relying on innovation and product differentiation.

The export activity of China is also driven by an ongoing market-oriented economic reform. State-owned enterprises (SOEs) accounted for a bulk share of China's exports. Marketization in various areas has also nurtured the growth of non-state firms, especially privately owned enterprises. While Chinese SOEs mainly use FDI to enter foreign markets, small and medium non-state Chinese firms participate in international markets primarily through exporting. Furthermore, the country's thirty-one regions vary significantly in their degree of marketization, with marketization in eastern and coastal areas of China being higher than that in inland regions. Although privately owned firms have received legal recognition in the 1990s, they still face disadvantages when competing with SOEs that operate in oligopolistic or protective industries and receive government support. This leads many privately owned firms to focus on international markets to avoid competition with SOEs in the domestic market. Therefore, institutional factors, especially development of marketization, are fundamental when considering innovation and export performance across state and non-state Chinese firms, but also across different locations or regions across China.

While China has become the largest export country, its export-led development model has in recent years received increasing criticism from western countries. Critics of this model claim that China's reliance on exports for economic growth has caused the imbalance of global economy and is blamed for slow economic growth and high unemployment in western countries. They also argue that China's currency policy is intended to make its exports significantly cheaper, pressing China to appreciate its currency and its companies to focus on domestic demand rather than international markets. As a result of this external pressure, instead of continuing to encourage exporting, the policy of Chinese government has shifted gradually to the stimulation of domestic demand. As exporting firms no longer enjoy policy incentives such as export tax rebates, it is

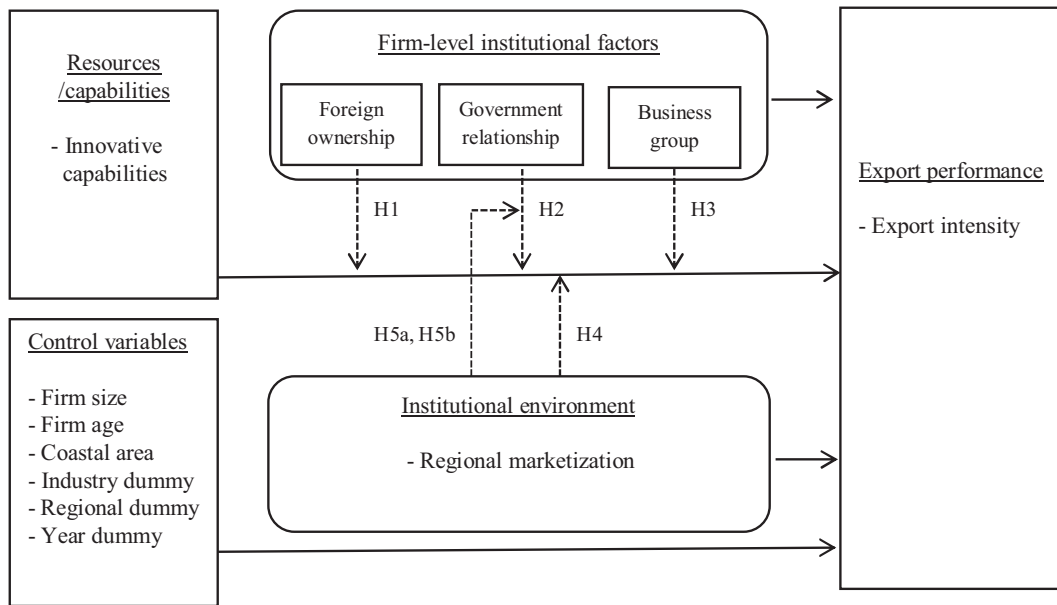


Fig. 1. Research model.

becoming even more important for these firms to enhance export performance by relying on innovation and product differentiation.

3. Theory and hypotheses

3.1. Antecedents of export performance: insights from resource-based and institution-based views

The export literature has been anchored in the RBV paradigm in recent years. The RBV conceives the firm as an idiosyncratic bundle of resources that confer an enduring competitive advantage (Peteraf, 1993). As it places emphasis on firms' ability to accumulate and combine resources, it explains how heterogeneity in resources can lead to inter-firm differences in exporting. Prior evidence supports RBV, indicating that a firm's ability to enter foreign markets is positively associated with its tangible and intangible knowledge-based resources (Bloodgood, Sapienza, & Almeida, 1996; Kogut & Zander, 1992; Morgan, Kaleka, & Katsikeas, 2004; Piercy, Kaleka, & Katsikeas, 1998). Innovative capabilities provide unique competitive advantages because they help the firm improve its products, processes (Coff, 1999), production, problem-solving techniques and therefore operate successfully in global markets (Kafouros, Buckley, Sharp, & Wang, 2008).

While the RBV treats the external environment as an exogenous element in the firm's decision to export, the institutional-based view (IBV) emphasizes that institutional factors, external and internal to the firm, shape the behavior of actors in a given environment (Dunning, 2006; North, 1990; Scott, 1995). Moreover, according to the IBV, the strategic choice of the firm depends on institutional forces that may either promote or hinder the upgrading of a firm's resources (Dunning & Lundan, 2008). As emerging economies feature unique institutional characteristics (Wan & Hoskisson, 2003), the IBV has become an important perspective in international business research on emerging economies (Henisz & Swaminathan, 2008; Hoskisson, Eden, Lau, & Wright, 2000; Peng, Wang, & Jiang, 2008). Institutions are important for export performance in emerging economies because they substitute for insufficient formal infrastructure (Xin & Pearce, 1996). As firms from emerging markets, such as China, have limited resources, they tend to take advantage of imperfect institutional environment to overcome resource constraints (Wang, Hong, Kafouros, & Boateng, 2012).

While the RBV and IBV have assisted us significantly in understanding the antecedents of export performance, each perspective alone explains only partially variations in exporting. The lack of attention to the interaction between resources and institutions hinders understanding of the multilevel mechanisms that shape export performance. To address this, we develop and test a contingency perspective that integrates the RBV and IBV into a coherent theoretical model of the antecedents of export performance.² Thus, rather than simply examining the role of innovative capabilities and institutional factors in isolation, we go beyond their direct effects and focus on their complementarities and interactions (Fig. 1).

² We believe this is a good way to advance the literature. As Zou and Stan (1998) note, the export performance literature has had a relatively poor record of using robust theoretical frameworks to underpin empirical studies.

3.2. Hypotheses

Prior research suggests a positive relationship between foreign ownership and export performance (Du & Girma, 2009; Sun, 2009; Wang, Buckley, Clegg, & Kafourous, 2007). The superior export performance of foreign firms relative to domestic firms is typically attributed to such factors as access to the information, international marketing networks and managerial, entrepreneurial and financial resources (Blomström & Kokko, 1998; Wang et al., 2007). In contrast to prior studies that focus on the direct effects of foreign ownership such as enhancement of resources and an improvement in governance (Filatotchev, Stephan, & Jindra, 2008), we argue that foreign ownership may also enhance export performance through reinforcing the role of innovative capabilities. Theory suggests that multinational enterprises (MNEs) transfer superior technology to local affiliates in order to offset 'liabilities of foreignness'. Empirical evidence confirms that foreign firms have higher propensity to innovate than domestic companies (Dachs, Ebersberger, & Löff, 2008) and are more likely to introduce new products and processes (Frenz & Ietto-Gillies, 2007; Sadowski & Sadowski-Rasters, 2006). Foreign firms may also generate knowledge spillovers through demonstration effects, mobility of labor, forward and backward linkages, and joint ventures (Buckley, Clegg, & Wang, 2002; Buckley, Clegg, & Wang, 2007).³ Such knowledge spillovers not only improve local firms' technological profile but also enhance their export prospects (Wang et al., 2007). Therefore, foreign ownership in a firm is crucial for improving the innovative capabilities of the firm which, in turn, will boost expansion of the firm overseas.

Furthermore, FDI at the level of the industry can produce industry-wide effects that enhance the role of innovative capabilities in individual firms through potential competitive effects. The increasing foreign ownership in an industry will also affect the competitive landscape in the domestic industry, leading to an increase in competition for domestic firms. It is well known that competition affects a firm's innovative activity (e.g., Blundell, Griffith, & van Reenen, 1999). As foreign firms possess advanced knowledge, they impose strong competitive pressure upon local companies to become technologically competitive. Thus, at both firm and industry levels foreign ownership may enhance technological competence of local firms affected which, in turn, will boost their expansion overseas. Hence:

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

From a transaction cost perspective, relationships with government provide a governance advantage for an emerging market firm due to its connection with control of resources. As the market for critical inputs remains underdeveloped in emerging economies, close relationship with government (i.e. in the form of state ownership) is often associated with preferential policies, subsidies, more secure property rights, and better public provision. Firms closer to the government depend less on market forces and are protected by the government. Ties with government enable firms to reduce transaction costs and compete in international markets. In contrast, firms which have weak ties with government have less opportunity to obtain strategically important resources that are often not available from market sources. As they are often not well protected by the government and can only obtain all resources from formal market channels, they may suffer from high transaction costs which hinder their internationalization efforts. Government relationship in the form of state ownership may also produce negative effects as SOEs need to accommodate social concerns and needs (Ramamurti, 2001). As such, government relationship may also impact negatively the export performance of firms that seek to maximize private returns (Qian, 1996). From network-based view, business transactions in emerging economies such as China are still deeply embedded in strong personal and political networks (Peng & Luo, 2000). Johanson and Vahlne (2009) distinguish between insidership and outsidership, arguing that firms which are well embedded in a network become insiders. A firm having close relationship with government enables it to be an 'insider'. This 'insidership' may help the firm obtain government support for its technological development. Although firms that are closer to the government are also exposed to market forces, they are less dependent on such forces and are relatively well protected by government. Therefore, these firms have "the best of both worlds", benefiting from government support while taking advantages of market forces. Network of *guanxi* with government reflects the Chinese philosophy of Yin Yang that embodies duality, paradox, unity in diversity, change, and harmony (Fang, 2012; Faure & Fang, 2008). Government relationship in the form of state ownership, according to the Yin Yang principle, is shaped by the integration of two opposite yet integrated elements – state and nonstate elements, allowing firms to use personal connections to seek support from government.

Innovation theory suggests that a firm is unlikely to have superior ability to develop innovations if it relies only on the recombination of the same set of internal knowledge (Katila & Ahuja, 2002). Firms with close relationship with government have relatively easy access to certain government-controlled critical resources and to the results of publicly funded R&D. This access provides firms with opportunities to add new and different elements to their technological resource base, thereby increasing the likelihood of finding valuable and rare technological combinations. Such complementarities may provide facilitating mechanisms to enhance a firm's innovative capabilities to expand in global markets through exporting. Accordingly, we introduce the following hypothesis:

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

³ Görg and Strobl (2001) provide a survey of the spillover literature.

A business group is a “collection of firms bound together in some formal and/or informal ways” (Granovetter, 1995: 454). Business groups exist in the absence of a well-functioning market, providing functional substitutes for allocation failures in the markets for production inputs (Leff, 1978). They are a popular business model particularly in emerging economies where institutions, such as an efficient capital market, labor market, product market, and government regulatory mechanisms, are not well developed (Chacar & Vissa, 2005; Khanna & Palepu, 1997). Firms fill such institutional voids by forming business groups that create internal markets so that member firms can coordinate production factors to a greater extent than if they operate independently (Guillén, 2000). Thus, as business groups reduce transaction costs and facilitates intragroup transfers of resources (Chang, Chung, & Mahmood, 2006), group affiliation acts as a source of competitive advantage in emerging economies.

Business groups may facilitate innovation (Chang et al., 2006; Mahmood & Mitchell, 2004). Due to capital market imperfections and absence of efficient venture capital market, emerging market enterprises often need to use internal capital allocation mechanisms to provide capital for risky scientific projects. Similarly, business groups also facilitate innovation by creating internal markets for scientific talent (Khanna & Palepu, 1997). Such markets help firms incubate scientific talent, and counteract the rigidity and variations of the external labor market (Mahmood & Mitchell, 2004). According to these arguments, group affiliation facilitates innovation which, in turn, should improve export performance. However, groups may also create barriers to new entrants and reduce the diversity in the sources of new ideas, thereby limiting opportunities to experiment with new technology (Chang et al., 2006; Mahmood & Mitchell, 2004). Moreover, group members may involve in internal fighting between member firms for resource allocation which hinders research collaboration. Nevertheless, most empirical studies have arrived at the same conclusion: group affiliation has a positive effect on economic performance for members in emerging economies (e.g., Peng & Delios, 2006); it is also positively associated with innovation (Chang et al., 2006). Overall, this discussion leads to the following hypothesis:

Hypothesis 3. The effects of innovative capabilities on export performance will be stronger for firms affiliated to a business group than for those that are not.

Transaction costs are lower in promarket environments where markets are competitive, laws are impartial and efficiently enforced and monitoring mechanisms are effective. According to this logic, promarket reform improves the functioning of market through a reduction of government intervention and an improvement in national governance (Williamson, 2004), and therefore should be conducive to firm performance (Cuervo-Gazurra & Dau, 2009). However, although marketization is often conceived of as being equally valuable in all contexts in a country, within-country heterogeneity in market development can be substantial across locations in an emerging economy (Lu & Ma, 2008). For example, China's economic reform programme since 1978 aims at shedding central planning so as to build a market-based system that lay institutional foundations for firm growth. However, for various reasons, the pace of such reform is highly uneven across Chinese regions (Child & Tse, 2001). As a result, market-based mechanisms are well developed in some regions, whilst nonmarket influences and government interventions remain prevalent in other regions.

Accordingly, as resources are differentially valuable across environments (Priem & Butler, 2001), the relationship between innovative capabilities and exports may vary significantly across regions within a given nation. Due to better legal protection and low transaction and agency costs, firms in regions where market-based mechanisms are well developed behave like market organizations. They are more likely to invest in R&D, pursue externally oriented development strategies, and emphasize the role of innovation in driving internationalization process. Hence:

Hypothesis 4. The effects of innovative capabilities on export performance will be stronger for firms that operate in regions with a higher degree of marketization than for those that operate in regions with a lower degree of marketization.

Hypothesis 2 suggests that on average government relationship has a positive moderating effect on the relationship between innovative capabilities and export performance. We postulate that government ties may offset the negative effects of market imperfections, reduce transaction costs, and enhance the role of innovative capabilities in export performance. Accordingly, we argue that the moderating effect of government relationship depends on the marketization level in a region. Regions with lower marketization levels often lack institutions to support market mechanisms and provide intermediary services (Khanna & Palepu, 1997). Such regions feature high environmental uncertainty that forces firms to rely on government ties when entering exchange relationships (Powell, 1990). In such regions, we expect government relationships to play a more important role in facilitating new initiatives, including exporting (Peng & Heath, 1996). Hence:

Hypothesis 5a. Government relationships have a stronger positive moderating effect on the relationship between innovative capabilities and export performance in regions with a lower level of marketization than in regions with a higher level of marketization.

On the other hand, an effective government is instrumental to firm performance (e.g., De Long & Shleifer, 1993). Signs of a well functioning government include lack of intervention, lower levels of regulation and bureaucracy, successful provision of public goods and services, and efficient spending (Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1999). Regions with high marketization levels have better quality institutions and government agencies than regions with lower levels of marketization. These can provide services, resources and other factors that help firms upgrade technological capabilities and export their products to foreign markets. Building strong ties with such governments may thus strengthen firms' political and economic advantages including more secure property rights, better public provision, which in turn may improve the

firm's innovative capabilities and export performance. As governments in regions with developed market-based mechanism are less corrupted, such benefits occur without the firm having to pay high 'management fees' to the government.

In contrast, the quality of institutions and government is lower in regions with a lower level of marketization. Governments in such regions maintain a high level of interventionism. They are less willing or able to protect property rights, keep regulations and taxes light and provide high quality intermediary services and resources. They also are less capable of enforcing the law, protecting commercial contracts and property rights, and ensuring that government officials refrain from participating in various forms of corruption (Pearce, Xin, Xu, & Rao, 2011). In regions where governments are corrupt, both managers and government officials are keen to build relationships to benefit from one another. Thus, although government relationships may serve as a remedy for the lack of pro-market institutions (Qian, 1996), building such relationship incurs a higher 'management fee' (e.g. in the form of bribes). It follows that the cost of government relationships may in some cases outweigh the associated benefits. Hence:

Hypothesis 5b. Government relationships have a stronger positive moderating effect on the relationship between innovative capabilities and export performance in regions with a higher level of marketization than in regions with a lower level of marketization.

4. Data and methodology

4.1. Data

Our analysis is based on a firm-level panel dataset of the Chinese manufacturing industry for the period of 2005–2007. Chinese firms are a particularly interesting group to consider in terms of the role of innovative capabilities in exporting. Although Chinese firms are often not regarded as technology leaders that are capable of manufacturing differentiated products (Buckley et al., 2002, 2007; Wang et al., 2012), they have been successful in the global export market. Therefore, both empirically and in terms of policy it is intriguing to investigate how institutional factors help Chinese firms overcome resource constraints and succeed in expanding overseas.

The data were obtained from the Annual Census of Chinese Industrial Firms compiled by the National Bureau of Statistics of China (NBS). The Census provides detailed firm-level financial and operational information for all firms with annual turnover of over five million Renminbi (around \$680,000). The NBS has requested all these firms to report (objective) information to the local statistical offices that report to the NBS. The NBS has the final responsibility to process the data and produce the Census. The Census is considered to be the most comprehensive firm-level dataset ever compiled by the Chinese statistical office, accounting for about 90% of total output in most industries. The NBS has endeavored to maintain consistency in data collection across time, industries and regions (Zhou & Li, 2008). The Census data were regarded as an internally consistent and accurate source of data for research and have been used extensively by academics (Girma, Gong, Gorg, & Yu, 2009; Jefferson & Su, 2006; Zhang, Li, Hitt, & Cui, 2007; Zhou & Li, 2008). Nevertheless, we cleaned the data by undertaking extensive checks for coding errors (identifier code, industry code, and geographical code), missing values and possible organizational changes (e.g., mergers and acquisitions), and have removed outliers. This process removed 28,728 firms out of the total of 388,602 firms, leaving us a final dataset of 359,874 firms (by far the largest firm level dataset used by any study on export performance), covering 30 two-digit manufacturing sectors throughout all 31 provinces, autonomous regions and municipalities in China.

Tables 1 and 2 give brief description of export and innovation patterns of firms in our sample. Although exports and indigenous R&D are regarded as important forces driving China's economic miracle, on average only 27% of the sample firms were exporters and only 10% of them engaged in innovation during the sample period. Furthermore, the export intensity of Chinese firms, some of which are partly owned by foreign firms, is only 17% over the sample period. Table 2 reveals that sectors such as 'Cultural, educational, and sports goods', 'Garments and other fibre products' and 'Arts and crafts products' have the highest export intensity but only feature an average level of innovative capabilities (around 0.03). On the other hand, some sectors including 'Electric equipment and machinery', 'Telecommunications, computer and other electronic equipment' and 'Instruments and meters' excelled in both export intensity and innovative capabilities. While these sectors themselves are technology intensive, it is also true that Chinese exports of electronics products tend to be low-cost, high volume products with not much technological sophistication. Therefore, we should be cautious to conclude that Chinese indigenous firms have developed strong technological capabilities that lead to exports of high tech products in these

Table 1
Export and innovation patterns of Chinese firms.

Year	All firms	Exporters	Innovators	Export intensity	Innovative capabilities
2005	251,447	74,370 (30%)	25,222 (10%)	0.180	0.038
2006	279,215	78,181 (28%)	29,122 (10%)	0.170	0.042
2007	303,293	75,853 (25%)	32,225 (11%)	0.160	0.040
Average	277,985	76,135 (27%)	28,856 (10%)	0.170	0.040

Note: Exporters are firms that report positive export sales; innovators are firms that report positive R&D expenditures; export intensity is the ratio of export sales to total sales; innovative capabilities are the ratios of new product sales over total sales. Percentage shares of total sample are reported in parentheses.

Table 2
Export performance and innovative capabilities by sector.

Two-digit sector	Export intensity	Innovative capabilities
13. Food processing	0.105	0.018
14. Food production	0.112	0.051
15. Beverage production	0.046	0.034
16. Tobacco processing	0.022	0.029
17. Textile	0.211	0.026
18. Garments and other fibre products	0.452	0.032
19. Leather, furs, down, and related products	0.444	0.036
20. Timber processing	0.151	0.021
21. Furniture manufacturing	0.336	0.032
22. Papermaking and paper products	0.056	0.016
23. Printing and record medium reproduction	0.052	0.024
24. Cultural, educational, and sports goods	0.537	0.038
25. Petroleum refining and coking	0.012	0.017
26. Raw chemical materials and chemical products	0.076	0.038
27. Medical and pharmaceutical products	0.075	0.097
28. Chemical fibre	0.055	0.039
29. Rubber products	0.180	0.032
30. Plastic products	0.178	0.028
31. Non-metal mineral products	0.083	0.030
32. Smelting and pressing of ferrous metals	0.029	0.021
33. Smelting and pressing of non-ferrous metals	0.052	0.034
34. Metal products	0.193	0.026
35. Ordinary machinery	0.107	0.043
36. Special purposes equipment	0.090	0.072
37. Transport equipment	0.102	0.056
39. Electric equipment and machinery	0.191	0.060
40. Telecommunications, computer and other electronics	0.328	0.107
41. Instruments and meters	0.244	0.116
42. Arts and crafts products	0.488	0.039
43. Waste resources and materials recycling, processing	0.014	0.014
Average across manufacturing	0.169	0.040

Note: The numbers in the first column are two-digit sector codes used by the National Bureau of Statistics of China.

industries. Overall, these figures do not give a clear pattern of the relationship between innovative capabilities and export performance. Table 3 shows that regions that have low export intensity (such as Gansu, Guizhou, Heilongjiang) tend to feature a low level of marketization, whereas regions where market-based mechanism are well developed enjoy a higher level of export intensity. This observation is consistent with our argument that market-based reforms stimulate Chinese firms' internationalization through exporting.

4.2. Measures

Dependent variable. In line with the objectives of the study, our dependent variable is *export performance*. Following numerous studies (e.g., Basile, 2001; Dhanaraj & Beamish, 2003; Pla-Barber & Alegre, 2007), we operationalize export performance as share of export sales over total sales.

Table 3
Export performance and marketization by region.

Region	Export intensity	Marketization	Region	Export intensity	Marketization
Beijing	0.085	8.996	Fujian	0.305	9.201
Shanghai	0.181	10.915	Hunan	0.053	6.991
Tianjin	0.174	9.071	Hubei	0.048	7.147
Chongqing	0.039	7.873	Henan	0.053	7.073
Jiangsu	0.141	9.946	Hainan	0.088	6.223
Zhejiang	0.274	10.851	Guangxi	0.084	6.186
Guangdong	0.339	10.615	Guizhou	0.024	5.157
Neimeng	0.027	6.172	Sichuan	0.029	7.346
Shanxi	0.037	5.755	Yunnan	0.044	5.725
Hebei	0.077	6.887	Shangxi	0.024	5.099
Liaoning	0.114	8.295	Gansu	0.027	4.950
Jilin	0.046	6.531	Ningxia	0.036	5.375
Heilongjiang	0.033	5.969	Qinghai	0.021	4.240
Anhui	0.088	7.336	Xinjiang	0.035	5.263
Shandong	0.114	8.572	Xizang	0.022	3.075
Jiangxi	0.083	6.880	Average	0.169	9.029

Table 4
Definition of variables.

	Definition	Expected
Dependent variable		
Export performance	Ratio of export sales to total sales	
Independent variable		
Innovative capabilities	Ratio of new product sales to total sales	+
Moderators		
Foreign ownership	Foreign capital share	+
Government relationship	Ratio of state-owned assets to total assets	+
Business group	Dummy: equals to 1 if affiliated to a business group	+
Marketization	Region-specific marketization index by Fan et al. (2010)	+
Control variables		
Firm size	Log (number of employees)	+/-
Firm age	Number of years since establishment	+/-
Coastal area	Dummy: equals to 1 for coastal provinces	+

Independent variable. Our independent variable is *innovative capabilities*. This is operationalized as the share of new products sales in total sales (He & Wang, 2009). Our operationalization is consistent with previous studies (Luo, 2000; Tallman & Fladmoe-Lindquist, 2002; Tallman, 1992) in that R&D output rather than R&D input is used to measure capabilities. Then the difference between our measure and those of prior studies lies in how R&D output is measured. While others use patents to proxy R&D output, (e.g., Dutta, Narasimhan, & Rajiv, 2005), we use new product sales. Thus, it is reasonable to argue that given the same amount of R&D inputs the higher the innovative capabilities, the higher the ratio of new product sales to total sales. Operationalization using R&D output embraces the notion that what really matters for export performance is the efficiency of R&D efforts rather than R&D itself. This operationalization applies well particularly to the context of China. As corruption still exists in China and personal relationships often compromise the application of meritocratic principles in the distribution of research funding, a large share of R&D expenditure is either wasted or is channeled into private pockets. Thus, any measure that uses R&D inputs may distort the true role of innovation in export performance.

Moderator variables. We include four institutional variables as moderators. *Foreign ownership* is measured by the share of foreign capital in total assets. *Government relationship* is similarly operationalized by the share of state-owned assets in total assets. *Business group* is a dummy variable that is coded one if the firm is affiliated to a business group and 0 otherwise. We also include a measure of *regional marketization* developed by Fan, Wang, and Zhu (2010) for 2005–2007.⁴ This is a comprehensive composite index that evaluates the development of market-based mechanisms in five key areas including the role of market relative to government, the development of the private sector, the development of commodity and factor markets, and the development of free market institutions by a total of twenty-six indicators. A larger score indicates a higher level of marketization.

Control variables. We control for several variables to address concerns about the potential endogeneity of the innovative capabilities measure and other firm-level unobserved heterogeneity. Previous studies suggest that firm size is associated with export performance (Caldera, 2010; Dhanaraj & Beamish, 2003). We include *firm size* which is measured using the natural log of total number of employees. A firm's age can also affect export performance as it may facilitate the accumulation of knowledge and experience. *Firm age* is measured by the number of years since the firm was founded. Finally, we introduce some additional *dummy variables* to account for idiosyncrasies associated with time, industry and region variations. Year dummies are included to capture time effects associated with exchange rates and other time-varying factors on export performance. Two-digit industry dummies are included to control for industry-specific idiosyncrasies that may have an impact on variations in export performance of firms. To rule out the possibility that the correlation between export and regional marketization is spurious and measures the role of distance to the sea shore, we include coast area dummies (dummy = 1 if the firm locates in the coastal area), in addition to standard regional dummies to control for any remaining unobservable region-specific effects (Roberts & Tybout, 1997; Yi & Wang, 2011). Table 4 summarizes the variables and their expected effects on a firm's export performance.

5. Results

Table 5 provides descriptive statistics for the variables. All correlations among the independent variables are fairly low. The variance inflation factor (VIF) ranges from 1.00 to 1.43 and the average value is well below the acceptable level of 10 (Neter, Wasserman, & Kutner, 1985), indicating that there are no serious problems of multicollinearity. Nevertheless, following the usual practice (Aiken & West, 1991), we also mean-centered the firm-specific variables and moderators of the

⁴ The values of the index calculated by Fan et al. (2010) for 2005–2007 range from 2.64 to 11.71 among China's regions. Marketization can also be operationalized by such measures as GDP accounted for by SOEs (non-SOEs), but we made the choice as the index developed by Fan et al. (2010) is the most comprehensive one in terms of coverage compared with others and has been used in several other studies (e.g., Du, Lu, & Tao, 2008).

Table 5

Descriptive statistics and correlation matrix of variables.

	Mean	Standard deviation	Correlation matrix									
			1	2	3	4	5	6	7	8	9	
1 Export performance	0.17	0.34	1.00									
2 Innovative capabilities	0.04	0.38	0.02	1.00								
3 Foreign ownership	0.08	0.26	0.26	0.01	1.00							
4 Government relationship	0.03	0.17	−0.07	0.01	−0.05	1.00						
5 Business group	0.03	0.16	−0.01	0.02	−0.02	0.09	1.00					
6 Marketization	9.03	1.73	0.25	0.01	0.11	−0.16	−0.02	1.00				
7 Firm size	4.64	1.08	0.24	0.03	0.12	0.06	0.14	−0.04	1.00			
8 Firm age	8.22	12.01	−0.01	0.01	−0.04	0.25	0.11	−0.04	0.15	1.00		
9 Coastal area	0.74	0.44	0.20	−0.02	0.11	−0.12	−0.04	0.71	−0.02	−0.04	1.00	

Note: All the correlation coefficients are statistically different from zero at the 1% significance level.

study to avoid problems of multicollinearity. The key independent variables are lagged by one year to account for the fact that some of these effects take some time to materialize. Furthermore, a lag structure allows us to control for the possible simultaneity bias (Aitken & Harrison, 1999). To deal with the possible threat of heteroskedasticity, we estimated the OLS regressions using Huber–White's robust standard error (White, 1980).

Hierarchical regression analyses were used to test our conceptual framework (Fig. 1). Table 6 presents the results. Models 1 serves as the baseline model as it includes the predictor variable (innovative capabilities) and control variables only. The results confirm that innovative capabilities are positively associated with export performance (e.g., Basile, 2001; Becker & Egger, 2009). Institutional variables are added in Model 2. In line with our expectations, foreign ownership and marketization have a positive effect on a firm's export performance, thus providing empirical support to institution-based view. In contrast, government relationship and business groups are significant but produce a negative effect. Our foregoing discussion suggests that government relationship and business group can have both positive and negative effects on performance. The results suggest that the negative effects dominate the positive effects in the context of Chinese firms.

As our main focus is the joint effect of innovative capabilities and institutional factors on export performance, we are particularly interested in the coefficients of the interaction terms. In Models 3–6 we add each of the four interactions,

Table 6

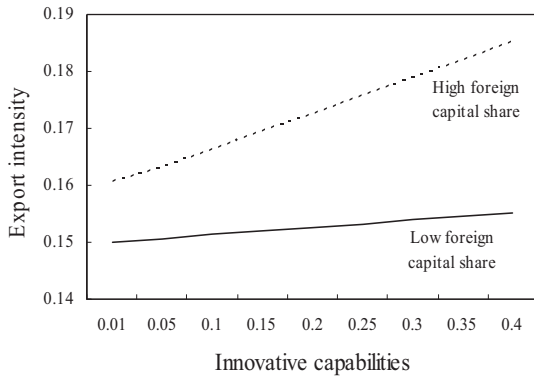
Hierarchical moderated regression of export performance 2005–2007.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 High marketization	Model 8 Low marketization
Independent variables								
Innovative capabilities	0.009***	0.010***	0.013***	0.010***	0.010***	0.031***	0.010***	0.037***
Moderators								
Foreign ownership		0.263***	0.262***	0.263***	0.263***	0.263***	0.260***	0.258***
Government relationship		−0.054***	−0.054***	−0.055***	−0.054***	−0.054***	−0.069***	−0.021***
Business group		−0.061***	−0.061***	−0.061***	−0.062***	−0.061***	−0.064***	−0.018***
Marketization		0.004**	0.004**	0.004**	0.004**	0.004**		
Interactions								
Innovative capabilities *Foreign ownership			0.050***					
Innovative capabilities *Government relationship				0.010			0.023**	0.015
Innovative capabilities *Business group					0.026***			
Innovative capabilities *Marketization						0.018***		
Control variables								
Firm size	0.065***	0.058***	0.058***	0.058***	0.058***	0.058***	0.064***	0.023***
Firm age	−0.001***	−0.000†	−0.000†	−0.000†	−0.000†	−0.000†	−0.000	−0.000**
Coastal area	0.136*	0.147*	0.147*	0.147*	0.147*	0.146*	0.062***	0.032***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	469,977	466,777	466,777	466,777	466,777	466,777	401,129	65,648
F-Statistic	3605.15***	4320.08***	4259.66***	4258.38***	4258.52***	4268.53***	4800.40***	308.81***
R ²	0.22	0.26	0.27	0.27	0.27	0.27	0.26	0.12
Adjusted R ²	0.22	0.26	0.27	0.27	0.27	0.27	0.26	0.12

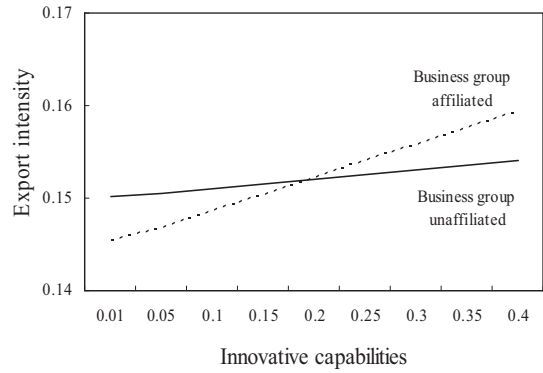
* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

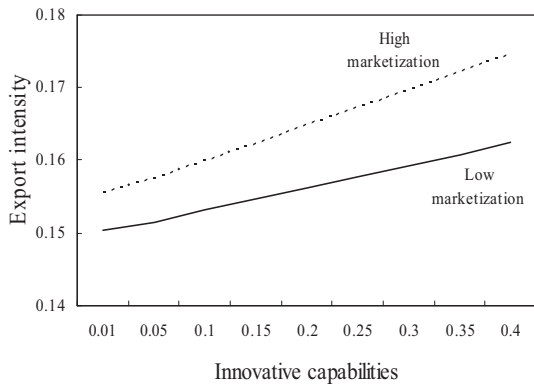
*** Significantly different from zero at the 1% level.



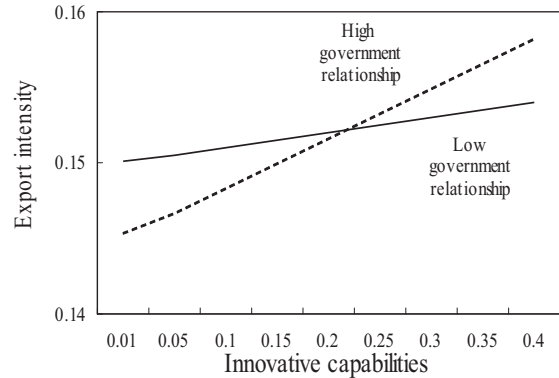
(a) The moderating role of foreign ownership



(b) The moderating role of business group



(c) The moderating role of marketization



(d) The moderating role of government relationship in regions with high marketization

Fig. 2. Moderating effects of institutional factors.

respectively. The coefficient of the interaction term in Models 3 is positive and statistically significant, corroborating Hypothesis 1. This suggests that foreign ownership facilitates exporting through its interplay with innovative capabilities. We find that although business group affiliation is negative and significant, it positively moderates the relationship between innovative capabilities and export performance (Model 5). This finding lends support to Hypothesis 3. The result suggests that group affiliation helps firms develop innovative capabilities which, in turn, enhance their export performance. As for the moderating role of marketization, the results show that innovative capabilities interact with marketization to increase export performance (Model 6). Hence, Hypothesis 4 is supported. Location-specific variations in institutional environments moderate the relationship between innovative capabilities and export performance. The coefficient of the interaction between government relationship and innovative capabilities is insignificant (Model 4), lending no support for Hypothesis 2. However, while government relationships, on average, have an insignificant moderating effect on the relationship between innovative capabilities and export performance, its moderating effect may vary across regions with different marketization levels. To examine this hypothesis, we split our sample into regions with higher and lower marketization levels (we assign a value of one for regions with higher marketization).⁵ The interaction term of government relationship and innovative capabilities is positive and statistically significant in Model 7, but insignificant in Model 8. Thus, government relationship indeed exerts a differential effect across regions. It has a positive moderating effect in regions with higher marketization, but plays an insignificant role in regions with lower marketization. Hence, Hypothesis 5b is corroborated, while Hypothesis 5a is not supported. To better explain the moderating effects of institutional variables, these relationships are presented in Fig. 2.

5.1. Robustness checks

Although our use of a lag structure may reduce endogeneity, if any, there still might be unobserved effects that influence both innovative capabilities and exports, and as a result the respective error terms may be correlated with innovative

⁵ We calculated the average level of marketization for all regions. Fifteen regions that are above the average fall into the group of ‘Higher marketization’, while the remaining sixteen regions that are below the average fall into the group of ‘Lower marketization’.

Table 6A
GMM regression of export performance with instruments 2005–2007.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 High marketization	Model 8 Low marketization
Independent variables								
Innovative capabilities	0.058***	0.064***	0.062***	0.065***	0.065***	0.054***	0.070***	0.051***
Moderators								
Foreign ownership		0.263***	0.262***	0.263***	0.263***	0.263***	0.261***	0.257***
Government relationship		−0.055***	−0.055***	−0.057***	−0.055***	−0.054***	−0.074***	−0.021***
Business group		−0.062***	−0.061***	−0.062***	−0.061***	−0.061***	−0.066***	−0.018***
Marketization		0.003 [†]	0.003 [†]	0.003 [†]	0.003 [†]	0.004 [†]		
Interactions								
Innovative capabilities			0.090**					
*Foreign ownership								
Innovative capabilities				0.106			0.201**	0.006
*Government relationship								
Innovative capabilities					−0.027			
*Business group								
Innovative capabilities						0.029***		
*Marketization								
Control variables								
Firm size	0.064***	0.058***	0.058***	0.058***	0.058***	0.058***	0.063***	0.023***
Firm age	−0.001***	−0.000 [†]	−0.000 [†]	−0.000	−0.000 [†]	−0.000 [†]	−0.000	−0.000**
Coastal area	0.050**	0.015 [†]	0.015 [†]	0.014 [†]	0.015 [†]	0.018 [†]	0.058**	0.037**
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	469,977	466,777	466,777	466,777	466,777	466,777	401,129	65,648
Wu–Hausman F test	335.63	449.49	402.56	445.38	441.50	140.17	405.24	14.93
of endogeneity	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Durbin–Wu–Hausman	335.52	449.28	402.40	445.18	441.30	140.16	405.04	14.94
test of endogeneity	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen J test for	2.47	2.50	2.53	1.47	2.49	1.76	1.34	1.56
overidentification	(0.116)	(0.114)	(0.112)	(0.226)	(0.114)	(0.184)	(0.247)	(0.203)

P values are given in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

capabilities. This implies that a reverse relationship that runs from exports to innovative capabilities may still exist (Caldera, 2010; Cassiman & Golovko, 2011; Salomon & Jin, 2008).⁶ One way to deal with endogeneity is to use GMM. The GMM estimator takes into account econometric problems that arise when estimating the model with endogenous variables, heteroskedasticity and autocorrelation (Caldera, 2010).

In this study, we use GMM with instrumental variables. To implement this approach, we must make sure that the instrumental variable (in our case, innovative capabilities) is indeed endogenous. Then we need to find an instrumental variable that is correlated with the key explanatory variable and is also orthogonal to the error term. Following Ganotakis and Love (2011), we use R&D intensity (expenditure/total sales) as the instrumental variable. Since a firm's R&D efforts are not directly affected by determinants of its export activity, the R&D measure can be considered to be exogenous to a firm's export activity. However, as we cannot be fully sure that R&D intensity is perfectly exogenous to export performance, we need one more instrumental variable and use overidentification tests to gauge whether the instruments are endogenous. We add innovative entrepreneurship as the second instrumental variable (which is coded one if a firm has product innovation in the preceding years). This measure reflects a firm's willingness to innovate. Firms may engage in innovative activities for making profits and not directly for promoting exports. Thus, innovative entrepreneurship can be regarded as exogenous to a firm's export activities. The Wu–Hausman test indicates that innovative capabilities are indeed endogenous at the 1% significance level. The Hansen test for overidentification does not reject the over-identifying restrictions, suggesting that both R&D intensity and innovative entrepreneurship are valid instruments and they influence innovative capabilities in a way that is exogenous to the error term of the export equation.

Table 6A presents the results using GMM regression with the two instruments. The key results concerning innovative capabilities, the four institutional variables and the four interactions remain qualitatively almost unchanged. The only exception is the coefficient of the interaction between innovative capabilities and business group which is now statistically insignificant. Overall, our results are robust to the different estimation methods.

⁶ Indeed, there is a large body of literature that examines the effects of exports on innovation (e.g., Harris & Li, 2009; Salomon & Shaver, 2005).

We also conducted a set of additional robustness tests. First, we conducted a regression analysis by using a composite measure of innovative capabilities based on both R&D intensity (a proxy for R&D input) and innovative capabilities (a proxy for R&D output), the former simply being a control variable in models with the latter. Second, we estimated the models with two-year lagged innovative capabilities. Finally, we replaced export intensity with the absolute value of exports. In all these cases, the key results obtained remain qualitatively consistent with those reported in the paper.⁷

6. Discussion and conclusion

In contrast to prior theorizing that focuses on the direct link between innovation and export performance, our conceptual framework examines how, and the extent to which, institutional factors influence the role of innovative capabilities in shaping export performance. We employed a comprehensive panel dataset of Chinese manufacturing firms to test our theoretical framework. The results indicate that foreign ownership, business affiliation and variations in the marketization level across regions positively moderate the export-enhancing effects of innovative capabilities. By contrast, a different story emerges for the role of government relationships, which have a positive and significant moderating effect on the relationship between innovative capabilities and export performance in regions with higher marketization level. Our study advances the export literature by providing empirical evidence that institutional contexts shape the role of innovative capabilities in export performance. It also provides an explanation for the mixed previous findings regarding the relationship between innovation and exports. Although variations in prior mixed results might be attributed to differences in measurement, sampling and statistical methods, our study suggests that they also arise when studies fail to consider important institutional contingencies.

The study makes three contributions. First, while it provides empirical support for RBV explanations of exporting performance (Lu et al., 2009; Westhead, Wright, & Ucbasaran, 2004), it also extends RBV thinking by proposing a contingent view and by demonstrating that effective deployment of firms' resources is conditioned by institutional factors external and internal to the firm. By merely focusing on the role of resources and capabilities, prior research fails to conceptualize and document export performance variations that result from the differences in institutional factors. Our study contributes to the RBV by identifying the conditions under which technological resources contribute to export performance. This is consistent with the call for empirical research supporting contingency theories of resource value (Priem & Butler, 2001).

Second, our empirical analysis confirms the role of institutional factors in unlocking firms' exporting potential, indicating that some institutional factors not only impact export performance directly but also indirectly by enabling firms to deploy their own innovative capabilities more efficiently. Interestingly, the direct effect of some institutional factors (namely, government relationship and business group) is different from their indirect or interaction effect with internal resources. This suggests that researchers who draw on institution theory should not only examine the direct effect of institutional factors on firm performance but also focus on the indirect effect of such factors on firms' deployment of resources to achieve positional advantage. This study is one of the first to examine how firm capabilities and institutional factors jointly affect a firm's export performance – an approach which according to many scholars is highly necessary and promising (Meyer & Peng, 2005; Yamakawa, Peng, & Deeds, 2008).

Third, the view that RBV and IBV perspectives are competing rather than complementary has limited researchers' ability to explain variations in export performance. By integrating aspects from the two theoretical lenses, our conceptual model and empirical results indicate that the two theoretical approaches can be combined in a way that allows for a more complete account of the factors determining export performance. Thus, developments in this direction have a strong potential for providing a much-needed new theoretical base for export studies.

Our findings offer important guidelines for managers who wish to understand how internal resources and institutional factors enhance export performance. RBV prescriptions suggest that to export, firms need to develop, acquire, assess, and deploy various resources (e.g., Grant, 1991). Institution-based prescriptions, on the other hand, suggest that firm managers should focus their efforts on adapting strategies to the institutional environment in which their firms operate. Our analysis indicates that rather than merely focusing on the development of conventional internal resources and institutions or adapting, controlling and shaping external factor markets and institutional contexts (Capron & Chatain, 2008), managers should focus on the interrelationships between both types of activities. Specifically, our research suggests that in attempting to enhance export performance, managers should place emphasis not only on the enhancement and acquisition of innovative capabilities but also on matching such competitive resources with various institutional factors.

Nevertheless, our findings are subject to a number of limitations. First, as the explanatory power of each theory (RBV and IBV) and their combination may vary depending on the industry and the type of the firm, the relationships between innovative capabilities, institutions and export performance may depend on industry-specific conditions, such as competition, entry and exit barriers and industry policy. Future modeling should better incorporate these industry-specific effects into the configuration of the causal relationships. Second, our study examines the interplay between the RBV and IBV and finds the positive moderating role of institutional factors. Yet, it places less emphasis on a number of institutional setups that may hinder the role of firm resources in shaping export performance. Future research should consider such disadvantages and identify the conditions under which the negative effects of institutional factors may outweigh the

⁷ Results of these analyses are available from the authors on request.

associated benefits. Third, we study the role of innovative capabilities in enhancing the export performance of firms operating in China regardless of ownership. Although we have controlled for the effects of ownership, we have not examined the export performance of “pure” Chinese firms. As Chinese firms which are partly foreign owned are more R&D intensive and export-oriented, the role of innovative capabilities in explaining export performance of “pure” Chinese firms might differ. Fourth, while we have examined the case of the largest emerging economy, we employed a single-country analysis. Institutions and regulations vary significantly across emerging economies. For example, due to the legacies of central planning, the role of government in business affairs in China may be more important than other emerging economies such as India. Therefore, our focus on Chinese firms may limit the generalizability of the results. Examining the explanatory power of institutional factors in other emerging countries is a worthwhile avenue for extending theorizing about the relationship between innovation and export performance. Lastly, the Chinese business and institutional environment is dynamic and is affected by the country’s ongoing transition from a centrally planned economy to a market-oriented system and the country’s integration in the global economy. Future research should employ data for a longer period to better capture how the relationship between innovation and exports evolves as the Chinese business and institutional environment changes.

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