Social networks, connection disruptions, export value and resilience

SOCIAL NETWORKS, CONNECTION DISRUPTIONS, EXPORT VALUE AND

RESILIENCE

JINGJING LIANG

Being

Thesis submitted in partial fulfillment for the award of

Doctor of Philosophy (PhD) Degree

Management Research

October 2022

The Department of Management,

School of Business, Economics, and Informatics (BEI),

Birkbeck, University of London

Declaration

I hereby certify that this thesis is my original work. It has neither been previously accepted

for the award of any degree nor concurrently submitted for any other degree.

JINGJING LIANG

October 29, 2022

Abstract

This 3-paper format PhD thesis explores links between social networks and export. All three papers are based on social network theory and empirically test the interactions between social networks and export using quantitative analysis. Specifically, Chapter 2 investigates the relationship between export value and network centrality. It argues that export value can reduce network centrality due to: (1) product specialization enhancement and (2) product quality upgrade. This argument is tested by applying mediational models and the impact of export value on network centrality is significantly negative in all cases, suggesting that exporters occupy a less prominent status in their local social network after being more international. This study sheds new light on the gap between social network theory and business facts by considering the adjustment of firms' production decisions.

Chapter 3 assesses the effect of preferential trade agreement (PTA) networks on export resilience. It firstly puts forward a new concept of export resilience which determines sustainable export growth. It then uses social network theory to argue that PTA networks can negatively influence export resilience by (1) creating reciprocal pressures and hence unproductive reciprocity costs and (2) transferring risk and hence losses from other network members. Empirical evidence from two studies, one at the country level, and the other at the firm level, supports our argument. This study contributes to the international business literature and social network theory by applying social network theory to explain the counter-intuitively negative relationship between PTA networks and export resilience.

Chapter 4 examines the causal effects of political connection disruptions on export value. Political connection disruptions can positively affect export because firms take proactive strategic responses, using export to substitute the shrinking domestic sales to neutralize the damage induced by political network disruptions. This study uses a difference-in-differences design to isolate the effects of political connections. Empirical evidence from publicly listed Chinese export firms supports the arguments. This study enriches the social network theory literature by probing political connectedness and the alternative resources within the interlocked networks.

Acknowledgment

It seems like I arrived in London just a few days ago. However, after all the constant grind, I have finished my PhD thesis and am ready to start another journey in life. The memories during my PhD are full of tears and laughter, and I am glad I finally nailed it.

I would first like to express my deepest gratitude to my supervisor, Professor Xiaming Liu. His unconditional support and help always encourage me to be a better myself. His academically rigorous attitude and invaluable expertise have benefited me a lot. He helps me hone my logical thinking and writing skills and enables me to conduct research independently. I would not be able to finish this thesis without his unreserved guidance.

I also thank Professor Churen Sun and Professor Lili Chen at the Southwestern University of Finance and Economics (SWUFE) in China. Professor Churen Sun co-authored with me my first academic paper, the publication of which instilled my confidence in academic research. His active thinking and broad knowledge constantly stimulate my thinking. Professor Lili Chen brought me up to speed on the most advanced research methods at the beginning of my study. Whenever I think of the time she taught me STATA programming in her office, my heart is filled with warmth and gratitude.

I would give my special appreciation to all the lovely staff members at Birkbeck. Many thanks to Dr. Konstantinos Chalkias, our PhD programme director. Without his continued follow-up, I might have procrastinated much longer to complete this thesis. My thanks also go to my PhD colleagues; I always enjoy communicating and discussing with them.

I am grateful to be sponsored by the China Scholarship Council and Birkbeck-SWUFE PhD Scholar's Award.

Finally, I feel blessed to have my parents, Jianhua Huang and Yanguang Liang, with and beside me. They always encourage me not to resign to fate and give me the freedom to pursue my dreams. Although I am not by their side, I always think of them.

List of Tables

Chapter 1: Introduction

RESEARCH BACKGROUND

A *social network* is defined as "a set of nodes as well as the connections and the absence of connections between these nodes" (Cuypers, Ertug, Cantwell, Zaheer, & Kilduff, 2020: 715). The importance of social networks has received considerable attention in the literature (Borgatti, 2005; Duxbury & Haynie, 2018). The relationships with other players bring social capital to the focal player (Burt, 1992). Different network structures yield specific outcomes (Borgatti & Halgin, 2011). The position in the network affects inter-organizational information and group performance (Ahuja, 2000a; Haunschild & Beckman, 1998). According to the advantages of different connections, Burt, Kilduff, and Tasselli (2013) illustrate five distinct streams of network theories, weak ties theory (Granovetter, 1973), network centrality theory (Freeman, 1979), exchange theory (Cook & Emerson, 1978), structural holes theory (Burt, 1992), and social resource theory (Lin, 1982). Despite the advancements of social network research in disciplines like sociology and psychology (Burt, 2004; Buskens & van de Rijt, 2008), the theoretical and empirical research on social network theory in the international business field remains limited (Cuypers et al., 2020).

Since exporting is a more straightforward and accessible way to enter foreign markets than foreign direct investment (Lu & Beamish, 2006), it is an exceptionally essential internationalization strategy for firms (Cassiman & Golovko, 2011). Export growth increases revenues and profits for businesses and contributes to economic growth. Firm size, output, and employment of exporters grow faster than non-exporters (Bernard, Jensen, Redding, & Schott,

2007), and increasing revenues for exporters can induce firms to increase technology investment and cause significant technological upgrades (Bloom, Draca, & Van Reenen, 2016; Bustos, 2011). However, export growth is unstable as uncertainty exposes long-term export growth to the associated volatility (Bloom, 2014). Uncertainty makes it difficult for firms and countries to forecast the likelihood of events happening, which makes firms and countries cautious about their investment and consumption decisions (Bertola, Guiso, & Pistaferri, 2005; Bloom, Floetotto, Jaimovich, Saporta - Eksten, & Terry, 2018a), resulting in a massive growth rate dispersion. Research on export growth alone cannot figure out the ability of a firm's or country's export to withstand and recover from shocks and disruptions.

Export can lead to resource reallocation from less to more productive firms (Melitz, 2003), and social networks are related to accessing resources and information (Brass, 2002). Therefore, there are interactions between export and social networks. Borgatti and Halgin (2011) divide the research on social networks into two domains: the theory of networks and the network theory. The former examines the antecedents of networks to explain why networks have their current appearance, while the latter focuses on the consequences of networks. The literature on social networks affecting essential outcome variables is growing (Ahuja, 2000a; Gnyawali & Madhavan, 2001; Kharrazi, Rovenskaya, & Fath, 2017b), while networks' evolution and change have drawn limited attention (Chaney, 2014; Ikeda & Iyetomi, 2018). For the literature on the consequences of networks, existing research seldom considers the subsequent effects of network disruptions (Duxbury & Haynie, 2018; Shaw, Duffy, Johnson, & Lockhart, 2005).

In brief, existing literature has the following three research gaps that can be identified:

(1) the impact of export on network evolution,

(2) the effect of networks on sustainable export growth,

(3) the consequences of network disruptions on export.

This thesis proposes three research questions aimed at bridging the above research gaps. Based on the taxonomy of Borgatti and Halgin (2011), this thesis enriches sparse research on the interplay between export and social networks from two aspects. First, this thesis investigates the effect of export on network structures, which belongs to the theory of networks. Second, this thesis explores the effects of two different networks, i.e., the preferential trade agreement (PTA) networks and political networks, on export, which is in the domain of the network theory. Specifically, according to the above five streams of network theories (Burt et al., 2013), this thesis is closely related to network centrality theory (Freeman, 1979) and structural holes theory (Burt, 1992). In addition, this thesis is relevant to network closure (Coleman, 1988) and destruction (Burt, 1992; Shaw et al., 2005).

RESEARCH QUESTIONS AND CONTRIBUTIONS

This thesis consists of three core research questions.

Research question 1: How does firms' export value reduce social network centrality via the mediating effects of product diversification and product quality, and how can product complexity moderate the direct negative relationship?

This research question contains three parts. The first part is the direct effects of firms' export value on their social network centrality in their home city. The baseline relationship is addressed both theoretically and empirically. The second part argues that the direct negative relationship is achieved through two main mechanisms. One is that an increase in a firm's export value reduces

its product diversification and enhances its specialization, inducing a decline in its number of connections with other firms and leading to a decrease in its network centrality. The other is that a firm's export expansion improves its product quality, decreasing the number of satisfactory suppliers and decreasing its network centrality. The third part refers to the boundary conditions of the direct effect. Export value is expected to reduce a firm's local network centrality, but a firm with higher product complexity is less likely to be affected.

Theoretically, this research question sheds new light on the gap between social network theory and business facts. Network centrality theory suggests that a firm at the central position has the maximum possible connections with other firms. The export literature suggests that exporters create more local and international connections than before without exporting. However, the two streams of literature ignore the adjustment of firms' production decisions, which results in a less prominent status of exporters after being more international. This research question proposes two main mechanisms for the relationship between a firm's export value and its local network centrality to reconcile a contradiction between the social network theory and business facts. Empirically, this research question advances research on firms' network evolution and directly tests why a firm's local network centrality decreases when its export value increases.

Research question 2: How do PTA networks affect export resilience, and to what extent is the direct effect contingent on the importing country's access to structural holes and the exporting firm's or country's export sophistication?

This research question contains two parts. The first part is the direct effect of (1) the existence of a PTA between an exporting and importing country and (2) The number of PTAs signed between an exporting and importing country on export resilience. Signing a PTA with trade

partners is likely to increase the pressure on an exporter to conform to rules on the priority of mutual benefits and expose the exporter to risks transferred through the connected network, resulting in a decrease in export resilience. An increase in the number of bilateral PTAs increases the cost of maintaining the PTA networks for an exporter and weakens its ability to perceive risk resulting from overreliance on existing contacts, leading to a decrease in export resilience. The second part investigates the moderating effects of the importing country's access to structural holes and the exporting firm's or country's export sophistication. As brokerage is often seen as the opposite of closure (Kwon, Rondi, Levin, De Massis, & Brass, 2020), exploring the role of countries at structural holes that interconnect across clusters can further deepen the understanding of the relationship between PTA networks and export resilience. Moreover, how an exporter's export resilience can respond to the negative effect of PTA networks depends on how much its export structure is exposed to the PTA network changes.

Theoretically, this research question applies social network theory to develop a novel counter-intuitive hypothesis. Although the relationship between PTA networks and export resilience is intuitively positive, social network theory can explain why it can be negative in reality. This research question has indirectly contributed to social network theory by applying "existing theory to a *phenomenon* that has yet to be adequately understood and explained theoretically" (Crane, Henriques, Husted, & Matten, 2016: 785). Empirically, this research question helps inform firms and countries of the downside of PTA networks on export resilience. While verifying the existing literature that PTA signing is positively related to export growth, this research question demonstrates that PTA signing leads to a decline in export resilience. A firm or country must enhance export resilience to sustain its export growth.

Research question 3: How do political connection disruptions affect export value, and how is the direct effect moderated by independent director network centrality and mediated by R&D expenditures?

This research question contains three parts. The first part is the direct effects of political connection disruptions on export value. Political connection disruptions make domestic markets contract, pushing firms to increase export. The second part explores the moderating effect of a firm's independent director network centrality, which alters the relative importance of a firm's political connections by providing alternative resources and information. The third part taps into the partially mediating effect of R&D expenditures, by which firms achieve strategic reconfiguration from the domestic market to export.

Theoretically, this research question considers the detrimental effect of removing actors brokering connections across structural holes. According to social network theory, the forced resignations of politically connected independent directors fracture the interlocked corporate and political network clusters into distinct components. Empirically, this research question enriches the consequences of political connection disruptions. Firms actively adopt market strategy adjustments to cope with the ruin of non-market strategies.

Based on the above three research questions, this thesis contributes to the existing literature in the following ways. First, it theoretically and empirically contributes to the theory of networks and the network theory (Borgatti & Halgin, 2011). This thesis covers both the study of network evolution (Research question 1) and the consequences of networks (Research questions 2 and 3). Second, it explores the interaction between social networks and export in detail. For all three research questions, attention is paid to the mechanisms of the direct effects and the role of the

mediating or moderating variables in the direct relationship. Third, this thesis makes marginal contributions to different branches of social network theory. Specifically, Research question 1 involves network centrality theory, Research question 2 refers to network closure and structural holes theory, and Research question 3 is relevant to network destruction and network centrality theory.

THESIS STRUCTURE

The structure and outline of this thesis are organized as follows.

Chapter 1 introduces the research background, research questions, and contributions.

Chapter 2 is the first self-contained paper, *Export value and network centrality in home cities: A negative relationship in an emerging economy*. Based on an extensive panel data set from Chinese Customs Import and Export Statistics between 2000 and 2011, it examines the direct effect of export value on local network centrality by using a mediational model, tests the role of product diversification and product quality in the relationship, and investigates the moderating effect of product complexity.

Chapter 3 is the second independent paper, *Preferential trade agreement networks and export resilience*. This chapter contains two studies: Firstly, an exporting country-importing country-specific product level panel dataset, which merges bilateral trade flows of the BACI database with PTA information of the DESTA dataset from 1995 to 2019, and secondly, an exporting firm-importing country-specific product level panel data from the Chinese Customs Import and Export Statistics database from 2000 to 2011. This chapter investigates the relationship between PTA networks and firms' or countries' export resilience, the moderator of an importing country's access

to structural holes in the PTA networks, and an exporting firm's or country's export sophistication.

Chapter 4 is the third distinct paper, *Political connection disruptions and firms' export value*. This chapter conducts a difference-in-differences (DID) design and tests the causal relationship between political connection disruptions and firms' export value based on a panel dataset of publicly listed Chinese export firms from 2012 to 2015. It also examines the moderator of a firm's independent director network centrality and the mediator of its R&D expenditures in the relationship.

Chapter 5 concludes the whole thesis, summarizes theoretical contributions, provides managerial implications, and discusses the limitations and future research directions.

Table 1 provides the links and differences between the three papers (Chapters 2, 3, and 4) to prove that the papers form a coherent body of work. In brief, all three papers are based on social network theory and empirically test the interactions between social networks and export using quantitative analysis. Although the three papers are about social network theory and export, the first paper focuses on the role of export in network evolution. The second paper is on the dark side of networks, and the third paper discusses market strategy adjustments when the existing networks are disrupted.

Table 1 The Links and Differences Between Chapters 2, 3, and 4

Theory	Datasets	Empirical models	Research level
Chapter 2: Export value and network centrality in home cities: A negative relationship in an emerging economy			
Network centrality theory	The Chinese Customs Import and Export Statistics database (CCIES), the China City Statistical Yearbook, and the BACI database	Fixed effect model, the mediational model, and the instrumental variable approach	Firm level
Chapter 3: *Preferential trade agreement networks and export resilience*			
Network closure and structural holes theory	The BACI database, The Gravity Database, the Design of Trade Agreements dataset, and the CCIES database	Fixed effect model and the instrumental variable approach	Country level and firm level
Chapter 4: *Political connection disruptions and firms' export value*			
Network destruction and network centrality theory	Manually collected datasets on independent director resignations, the CSMAR database, and the CCIES database	Difference-in-differences approach and the mediational model	Firm level

Chapter 2: Export Value and Network Centrality in Home Cities: A Negative Relationship in an

Emerging Economy

Abstract

Social network theory predicts that export enables a firm to create connections so that its network centrality will increase. However, we argue that export can reduce a firm's network centrality in an emerging economy due to the following two mechanisms: (1) a change in the firm's product specialization (product diversification) and (2) an upgrade of the firm's product quality. Empirical evidence from a very large panel data set of Chinese export firms between 2000 and 2011 supports our argument. By considering the adjustments of firms' production decisions resulting from the above two mechanisms, our research reconciles the contradiction between the social network theory and business facts. Further, we investigate the heterogeneous nature of the relationship. Firms' network centrality will experience a decrease following an increase in export value, but firms with higher product complexity are less likely to be affected.

Keywords: Export value, Network centrality, Social network theory, Specialization, Product quality, Product complexity

INTRODUCTION

Network centrality (Freeman, 1979) is closely associated with power and resource control (Brass, 1984; Burt, 1982; Ibarra & Andrews, 1993). A firm's network centrality in a city implies its position in the city's status hierarchy (Ibarra, 1993) and refers to the number of connections with others (Scott, 1988). A firm will have more access to and control over valuable resources if it occupies higher network centrality. Therefore, firms are motivated to improve their network centrality in order to become more competitive. It is crucial to explore the effects of various economic behaviors on network centrality for theoretical and practical purposes.

As export can lead to resource reallocation (Melitz, 2003), studying the effects of export on network centrality is necessary. According to the conventional social network theory, increasing international connections tends to play a stimulative role in improving firms' network centrality. Cantwell and Zaman (2018) propose that external connections can offer actors within a region diverse sources to empower greater adaptive capacity and more opportunities. Local networks and external connections complement one another. Zhang and Pezeshkan (2016) find that firms prefer to cooperate with partners that can bring more valuable resources and conduct less opportunistic behavior. Therefore, firms with critical connections in crucial locations can enhance their position further in the networks and be more selective for partners (Cuypers et al., 2020). An exporter has a higher status than non-exporters in its home city at the initial stage (Melitz, 2003). Non-exporters can have more communication and contact with exporters to enhance their positions in the city's network, resulting in a higher density of exporters' connections. In addition, firms can control more valuable resources such as advanced technology (Bustos, 2011) and home government subsidies (Girma, Gong, Görg, & Yu, 2009) through international connections, which

implies that firms' network centrality should increase with more international connections. Taken together, with the improvement of export performance, a firm should gradually enhance its network centrality in its home city over time.

However, in reality, some firms in emerging economies such as China experience a decline in local resources and power with export expansion. One of the famous examples is TCL Corporation. With an increase in overseas business, TCL has experienced a shrink in the product lines, and there is an increase in its proportion of the top five suppliers' purchases in the total annual purchases[1], which means that TCL purchases more from fewer suppliers and reduces connections with other firms. Therefore, we notice that the existing inference based on social network theory cannot explain such a business phenomenon. It overlooks the adjustment of a firm's production decisions and overemphasizes the benefits that a firm can gain through these connections. Existing social network literature has overlooked key factors and links in discussing the relationship between international connections and local network status. We advance the current understanding of the relationship between export and network centrality by clarifying two boundaries. One is that our discussion is concerned with an emerging economy. The other is that we only consider a firm's network centrality in its home city rather than in a global network.

To solve this inconsistency between social network theory and business facts, we examine in this paper how an increase in a firm's export value affects its network centrality and reveal the mechanisms of causal chains. Prior studies have linked international sources to cities' local sources (Cantwell & Zaman, 2018). However, to the best of our knowledge, no research has been carried out on how an increase in international connections negatively affects a firm's network

---

[1] Data comes from TCL 2016-2019 annual reports, http://electronics.tcl.com/en/ir/reports.php?year=2019.

centrality.

We argue that the network centrality of an emerging market firm in its home city can be reduced following an increase in its export value due to the following two main mechanisms: (1) product specialization enhancing, and (2) product quality upgrading. Based on a very large panel data set from Chinese Customs Import and Export Statistics between 2000 and 2011, we have tested our argument by applying mediational models. We have found that the impact of a firm's export value on network centrality is significantly negative in all cases, suggesting that exporters occupy a less prominent status in their local social network after being more international. We have also found that firms with higher product complexity are less likely to be affected when they export more. Therefore, this paper enriches our understanding of firms' network evolution and explains the negative relationship between network centrality and export value.

This paper makes several contributions to the literature on export and social network centrality. First, considering the adjustment of firms' production decisions, we shed new light on the gap between social network theory and business facts. Specifically, in the social network view, export enables a firm to create more connections than before, so that its network centrality will increase. Nevertheless, in reality, the impact of export value on network centrality is significantly negative in all cases, suggesting that there is an inconsistency between existing theory and business facts. Second, the literature on social networks affecting essential outcome variables is growing, while networks' evolution and change have drawn limited attention. This paper directly investigates the relationship between export value of Chinese firms and network centrality empirically and reveals the mechanisms of causal chains. Finally, this paper adds to the social network theory by combining the research fields of export, social network, and new economic

geography. Our paper considers the relationships and interplay among firms' products, cities, and destinations to construct a multi-level network centrality index. The results highlight that firms will specialize in exporting products with competitive advantages and high quality, leading to a decrease in their network centrality. The results provide new insights into social network theory development.

The structure of this paper is organized as follows. The second section will review the existing literature and develop hypotheses. The next section describes the sample, variable construction, and research design. The subsequent section presents our empirical results. Finally, the discussion and conclusion section wraps up the paper.

THEORY AND HYPOTHESES

Prior Research on Export and Firm Networks

Network centrality is one of the main branches of social network theory. With the surge of social network research, Borgatti and Halgin (2011) and Burt et al. (2013) among others develop different taxonomies of the field. Built on the terminology of Brass (2002), Borgatti and Ofem (2010) and Borgatti and Halgin (2011) divide the research on social networks into two domains, namely the theory of networks and the network theory. The former examines the antecedents of networks to explain why networks have their current appearance, while the latter focuses on the consequences of networks. As mentioned in the Introduction, Burt et al. (2013) illustrate five distinct streams of network theory according to the advantages of different connections. This paper applies and extends the theory of networks (Borgatti & Halgin, 2011), especially its network centrality stream (Freeman, 1979), by examining how a firm's export value affects its network

centrality in its home city. Particularly, we study the effect of export value on network evolution to explain why a firm's network has its current structure and properties.

A firm has the motivation to improve its network centrality in its home city. There is a consensus in the social network literature that centrality is an essential structural attribute (Freeman, 1979), describing the extent to which an actor occupies a central position. In line with the reasoning of Freeman (1979), when we conceptualize all firms in a city as a network, a firm's network centrality refers to its position in the city. A firm with high network centrality will possess a high position in the city's status hierarchy and have a high degree of access to and control over valuable resources (Burt, 1982; Ibarra, 1993). Network centrality is strongly related to power and resources (Brass, 1984). Tsai (2001) argues that occupying a central network position allows an organizational unit to access new knowledge more efficiently, produce more innovations, and perform better than other units. A firm occupying high network centrality is viewed as potentially powerful, suggesting a firm can benefit from more opportunities and fewer constraints in its home city than those on the periphery of the city's network (Ibarra & Andrews, 1993). Therefore, the motivation to improve network centrality is virtually the intention to have greater control over relevant resources. The change of power and resources controlled by a firm directly reflects the revolution of the firm's network centrality.

Export will lead to resource reallocation, thereby affecting a firm's network centrality. The effect of export on resource reallocation and welfare has always been regarded as an important issue in international trade research. International trade will lead to resource reallocation from less to more productive firms (Melitz, 2003). Bernard et al. (2007) find that firm size, output, and employment of exporters grow faster than non-exporters. Bustos (2011) demonstrates that

increasing revenues for exporters can induce firms to increase technology investment faster. Bloom et al. (2016), in an empirical study of twelve European countries, show that import competition with low-wage countries like China will cause a significant technological upgrading in local firms by both faster diffusion and innovation. As the consequences of resource reallocation result from export, there is a stream of literature that refers to dynamic change and reconstruction of networks. Chaney (2014) characterizes the dynamic formation of an international network of exporters and establishes a theoretical model to predict how exporters search for new trading partners based on the existing network of contacts. Ikeda and Iyetomi (2018) propose a model to reconstruct the international trade network and cost network by maximizing entropy based on trade information and showing that a trade network could be successfully reconstructed. International trade will inevitably affect network structure. As a result, exploring the relationship between export and network centrality becomes necessary.

A firm's network centrality refers to the number of connections with others (Scott, 1988). Existing social network research has drawn inferences of the relationship between international connections and local sources, but those inferences are intuitive and taken-for-granted with neglected key factors and links. Cantwell and Zaman (2018) investigate how a city's international citations affect its local citations using patent citation data of 33 global cities with patents above a certain threshold level. They think external knowledge connections can offer actors within a region diverse sources to empower greater adaptive capacity and more opportunities. As a result, local networks and external connections complement each other, which is shown as being more connected worldwide related to increased local connectivity. However, Cantwell and Zaman (2018) only focus on cities above a certain threshold level, and most of those are well-developed

cities, making it challenging to generate their conclusion. In addition, their research is carried out at the city-level. When we conduct firm-level research, the interaction between international connections and local resources is more complex, involving the adjustment of firms' production decisions. Rauch (2001) suggests that domestic networks promote trade by alleviating contract enforcement problems and providing information about trading opportunities, and trade can help maintain transnational networks through the establishment of a moral community and collective punishment of cheaters once those networks are established. Rauch (2001) is concerned with the whole transnational networks' maintenance rather than changes in each participant's network status. Employing a qualitative comparative analysis method, Kim (2013) argues that a firm may sustain its competitive advantage by increasing its international knowledge network's geographic scope. It is difficult for competitors to imitate a firm's knowledge when the firm acquires it from multiple countries. As knowledge is embedded in multiple layers of nested networks, the firm can benefit from creating isolating mechanisms and sustain its competitive advantage. Although Kim (2013) emphasizes that a firm can sustain its competitive advantage by acquiring knowledge from multiple countries, it is unclear whether reliance on international knowledge will weaken the firm's attention and control of local resources.

From the perspective of social network theory, Zhang and Pezeshkan (2016) argue that firms like to syndicate high-status partners who can bring more valuable resources and conduct less opportunistic behavior to enhance performance. Therefore, firms with critical connections in crucial locations can enhance their position further in the networks and be more selective for partners (Cuypers et al., 2020). Following this logic, export firms have higher productivity and are more likely to access information, knowledge, and other resources than non-exporters (Melitz,

2003), and therefore exporters will have higher status than non-exporters in the same city at the initial stage. Non-exporters can have more communication and contact with exporters to enhance their positions in the city's network, resulting in a higher density of exporters' connections. Consequently, there is a possible positive relationship between firm export value and network status. However, if we do not consider exporters' actual production adjustments, such an inference is untenable.

We believe that existing social network literature has overlooked key factors and links in discussing the relationship between international connections and local network status. To address this concern and bridge the research gap, we in this paper propose and empirically test the possible mechanisms through which firms' export performance affects their social network positions in an emerging economy, using China as an example. We begin by exploring whether and how firms' social network centrality will change after the export. We then consider the potential mechanisms of causal chains for this change through the mediational models. Finally, we examine the relationship between the heterogeneity of product complexity and firms' social network centrality.

The Mediating Role of Product Diversification

In an emerging economy, regarding the adjustment of a firm's product diversification, we argue that when a firm increases its export value, its network centrality in the home city will be reduced. Our inference appears contrary to the established view that an increase in international connections enhances local status (Cantwell & Zaman, 2018; Cuypers et al., 2020). There are two critical differences between our inference and the established view: First, we add and complete the causal chain of the current view by considering firms' production adjustment, leading to a

more precise conclusion. Second, we emphasize two boundaries of the inference. One is the context boundary: our inference is believed to be appropriate for an emerging economy. The other is that we only consider a firm's network centrality in its home city rather than in its global network. We limit our analysis in an emerging economy context because product development in emerging markets is not yet mature and faces a relatively drastic adjustment in rapid economic development (Arnold & Quelch, 1998), which helps us capture the impact of export value change on production adjustment. Since we study the influence of increased international connections on local resource control, it is more appropriate to investigate a firm's network centrality in its home city's network than in its global network.

A change in a firm's export value has an impact on the firm's product diversification. There are two reasons why an increase in a firm's export value will reduce its product diversification and enhance its specialization. First, specialization in export products allows a firm to maintain competitive advantages, benefit from knowledge spillover, and achieve technology upgrades. Li (2018) analyzes the impact of export expansion on regional industrial specialization by linking export demand shocks to educational choice. Due to these shocks, the high school and college enrollment rates have increased faster in prefectures specializing in high-skill industries, resulting in enlarged differences in skill abundance. The differences thereby reinforce the initial industry specialization. An and Iyigun (2004) investigate the relationship between trade-induced learning by doing and export content variation. Countries can gain from learning by doing and then change the technology intensity of the industry. Therefore, countries with much export experience tend to specialize in producing and exporting relatively new and high-technology goods.

Second, specialization helps reduce operating costs and makes it possible for a firm to take

advantage of scale economies. Ramdas (2003) argues that there are two main costs of increasing product variety, the mismatch between supply and demand and diseconomies of scale. The former stems from demand uncertainty and volatility, and the latter results from the need to realize synergies across products in a firm's product line. Baldwin, Beckstead, and Caves (2001) consider firm diversification as a long-run phenomenon reflecting specialization. They find that many firms concentrate on their core business by discarding peripheral activities. In particular, plant specialization increases most in plants that move most strongly into export markets to fully exploit scale economies and offset the product line's high fixed costs.

A decrease in a firm's product diversification with increased export value will induce a decline in its number of connections with other firms. In the example of TCL, with the expansion of overseas business, TCL sold its smart terminal business, including the production and sales of TVs and mobile phones, and concentrated on the production and export of LCD panels. The decrease in product diversity means that TCL purchases more raw materials from fewer suppliers, reducing the connections with others. The decrease of connections with other firms means that TCL's network centrality has declined with its increased export value in LCD panels. Therefore, we expect that an increase in export value will decrease a firm's product diversification and consequently reduce its linkages, leading to a decrease in its network centrality. Formally stated:

Hypothesis 1: A firm's export value negatively affects its social network centrality via the mediating effect of its product diversification in an emerging economy.

The Mediating Role of Product Quality

Apart from product diversification, an increase in export value also affects a firm's network

centrality in its home city through changing product quality in an emerging economy. First and foremost, a firm's export expansion has an important influence on its product quality. On the one hand, exporters in emerging markets have to meet product standards of foreign markets, which is a kind of exogenous power to force exporters to improve product quality. Hu and Lin (2016) argue that product standards are usually issued by developed counties, and emerging economy exporters have to satisfy those standards. They examine the impact of product standards on quality via a triple difference approach using the European Union's safety requirements on lighters as a natural experiment. They confirm that product standards will increase export quality. In particular, sizeable single-product firms lift the export quality more efficiently to adapt to increasing product standards. Similarly, Brambilla and Porto (2016) assert that high-income countries demand high-quality goods, resulting in exporters shipping higher quality products to those destinations. Alvarez and Fuentes (2011) also find exporters in Chile have to upgrade product quality to compete with incumbent international exporters.

On the other hand, export will facilitate resource reallocation among different quality products within a firm. Dingel (2017) finds that a large share of quality specialization can be attributed to two mechanisms, i.e., market access and factors input. Factor-input differences enable exporters with abundant supplies of capital and skills to produce and export high-quality goods. Market access emphasizes high-income customers prefer high-quality products, so that firms with better access to high-income consumers should focus on high-quality goods export. Dingel (2017) stresses that poor countries with rich neighbors benefit from specializing in producing high-quality products. Verhoogen (2008) also suggests that increased export to the U.S. has induced quality upgrading in Mexican manufacturing industries. Furthermore, Hahn, Ito, and

Narjoko (2016) imply that the entry to export markets is related to resource reallocation among different products and accompanied by adding higher-quality products and dropping lower-quality products, leading to significant upgrading of the product portfolio.

Following the prior literature, export behavior is likely to improve the product quality of firms. As a consequence of improved product quality, the number of suppliers that can provide raw materials for exporters will decrease. One reason is that suppliers that can provide high-quality raw materials and intermediate products only account for a small proportion of all suppliers in emerging economy home cities. Exporters will reduce the connections or ties with those suppliers that cannot meet the quality standards. Another reason is that exporters have incentives to turn to high-quality foreign suppliers instead of local suppliers in emerging markets, considering local suppliers may not meet the quality standards. Taken together, an improvement of product quality will induce a decline in the connections between exporters and other firms in their home cities in an emerging economy. As a result, a firm's local network centrality will decrease. We formulate the second hypothesis:

Hypothesis 2: A firm's export value negatively affects its social network centrality via the mediating effect of its product quality in an emerging economy.

The Heterogeneity of Product Complexity

Although an emerging economy firm's local network centrality faces downward pressure after export, different exporters can respond to the same effect differently as they hold different product complexity. Hobday (1998) defines "complexity" as a range of dimensions involved in the production, including the knowledge and skills required. Product complexity, also called

sophistication, is a function of the capabilities required to produce a specific product (Felipe, Kumar, Abdon, & Bacate, 2012). The complexity of export products is positively related to technology density, which means that it is more challenging to learn knowledge and technology when product complexity is higher. To produce a higher-sophistication product, a firm must possess more advanced technologies and better coordinating capacities. Therefore, export effects do not necessarily lead to a convergence of firm network centrality but can be moderated by a firm's product complexity. In our context, the main arguments regarding the average effect of increased export value on a firm's social network centrality are related to the mechanisms of decreasing connections with other local firms by reducing product diversification (Hypothesis 1) and improving product quality (Hypothesis 2). These mechanisms are contingent on a firm's product complexity. Specifically, a firm's ties with higher product complexity are likely to be more technology-intensive and thus more stable than those with lower product complexity.

Hidalgo and Hausmann (2009) characterize complexity by a set of capabilities related to a country and a product. They argue that if a country produces a less ubiquitous product, it needs more exclusive capabilities. For an exporter in our context, there are fewer high-complexity component suppliers than low-complexity component suppliers, considering that producing high-complexity components requires more exclusive capabilities. Hidalgo and Hausmann (2009) also assert that countries that grow by accumulating new capabilities will experience a much slower growth speed than those that develop on existing feasible capabilities. It implies that there are barriers to attain exclusive capacities associated with producing high-complexity components. Therefore, even if an exporter with high product complexity adjusts its product portfolio resulting from reducing product diversification and improving product quality, it does not have many

alternatives on its supplier choice in its home city. Consequently, the connections between an exporter with high product complexity and its suppliers (i.e., other firms in the home city) are much more stable and experience less shock by the increased export value.

In sum, compared to those with lower product complexity, firms with higher product complexity will experience lower magnitude of decreasing local network centrality after export. Hence, we expect that export behavior will reduce a firm's local network centrality, but a firm with higher product complexity is less likely to be affected. We hypothesize:

Hypothesis 3: A firm's export value is less negatively related to its social network centrality when its product complexity is higher in an emerging economy.

METHODOLOGY

Sampling

Our sample includes firm-level transaction panel data of universal Chinese exporters listed in the Chinese Customs Import and Export Statistics database from 2000 to 2011. The dataset records the identity of the Chinese firms engaged in trade, date of transaction, value, quantity, classification of the traded goods, city of origin, and destination. Each transaction of goods across a China border falls in the eight-digit Harmonized System (HS8), making it possible for us to take full advantage of detailed product-level information. To enable comparisons between export values in different years, we unify all trade flows in our sample into the 1992 version of the Harmonized System (HS6) product nomenclature according to the Product Codes of BACI database on CEPII website. We aggregate all transaction value of one firm exporting the same product to one country in one year into one observation. In particular, we handle zero-trade flows

by adding a small constant (1 yuan) to the trade value before taking logarithms (Bacchetta et al., 2008). We obtain a sample with 62,234,369 observations.

We then merge the export data with the China City Statistical Yearbook to acquire GDP in China's prefecture-level cities. The China City Statistical Yearbook is an annual statistical publication edited by the National Bureau of Statistics of China. Since the yearbooks cover cities' economic and social data at all levels, we have not lost any observations after the merger.

We also employ bilateral trade flows from 2000-2011 provided by the BACI database to estimate foreign countries' import demand as an instrument variable. The BACI database covers disaggregated bilateral trade data at the product level of more than 200 countries. It defines products as items from the Harmonized System nomenclature at the 6-digit level (Gaulier & Zignago, 2010).

Measures

Network centrality. Network centrality symbolizes the status of a node in the network and implies a node's ability to acquire and control valuable resources (Burt, 1982; Ibarra, 1993). There have been numerous measures developed to capture centrality based on various assumptions, such as closeness centrality, betweenness centrality, and degree centrality (Freeman, 1979). Considering that each firm affects all of its neighbors in the same city simultaneously in the context of gossip or information flows (Borgatti, 2005), eigenvector centrality (Bonacich, 1972) that emphasizes the centrality of a firm's neighbors seems to be more proper here to compute the network centrality of firms. According to Borgatti (2005) and De Benedictis, Nenci, Santoni, Tajoli, and Vicarelli (2014), given the high density of export networks, the eigenvector centrality

and the degree centrality will be highly correlated. Hence, to simplify the index calculation, we

employ degree centrality to measure how and how much every firm's relative position in its local

network. Precisely, we first calculate the number of a firm's ties as equation (1).

$$Ties_{ipdt} = \#\{i : L_{ipdt} = 1\}, \qquad (1)$$

where i, p, d and t denote firm, product, country and year, respectively. When firm i

in a specific city exports product p to country d in year t, there is a trade link shown as

$L_{ipdt} = 1$. In year t, the total ties of focal firm i in the city are the sum of trade links.

As Scott (1988) discusses, a relative centrality measure would give a more standardized

approach than an absolute measurement considering the graph's size. The position of a firm in its

local network depends on its absolute trade links and lies in the ensemble of a city's network ties.

Therefore, we measure the relative position of a firm in its local network using the total number

of its city's trade links as a normalized factor in equation (2):

$$Centrality_{ipdt} = \frac{Ties_{ipdt}}{Ties_{pdt}}. \qquad (2)$$

The indicator $Centrality_{ipdt}$ captures the degree centrality of firm i in the city exporting

product p to country d in year t, describing the importance of a firm in its local networks.

The indicator contains information on how many firms in the city export a specific product to a

specific destination in the year, measuring the irreplaceability of firm i. The larger the number

of firms in the city exporting the same product p to destination d in year t with firm i, the

lower the value of the information provided by firm i, and the worse the status of the firm in the

city's networks. It follows that the indicator $Centrality_{ipdt}$ ranges from 0 to 1. If it is closer to

1, the relative position of firm i in the city is more important. To make the value range of our

dependent variable unrestricted, we perform a logistic transformation on the indicator,

transferring its value range from 0 to 1 to between positive and negative infinity.

Export behavior. Our independent variable is the natural logarithm of the firm-level export value. We deal with zero-trade flows by adding a small constant (1 yuan) to the trade value before taking logarithms (Bacchetta et al., 2008).

Product diversification. Following Imbs and Wacziarg (2003) and Cadot, Carrère, and Strauss-Kahn (2011), we use the Herfindahl index of export concentration to describe product diversification. The Herfindahl index measures the unequal shares among all export products within a firm:

$$HHI_{idt} = \sum_{p} \left(x_{ipdt} / X_{idt} \right)^2. \tag{3}$$

In equation (3), x_{ipdt} denotes the export value of product p of firm i to country d in year t; X_{idt} is the total export value of all products of firm i to country d in year t. The Herfindahl index ranges from 0 to 1. If it is closer to 1, the export concentration of firm i is higher; thus, the product diversification is less.

Product quality. We compute the quality of product in line with prior research (David, 2011; Gervias, 2010; Roberts, Xu, Fan, & Zhang, 2012). Firstly, we need to estimate the parameters in equation (4) for each 6-digit product p:

$$\ln q_{idt} = \chi_{dt} - \sigma \ln p_{idt} + \varepsilon_{idt}, \tag{4}$$

Given a product p, q_{idt} is the export quantity of firm i to country d in year t, and p_{idt} is the export price of firm i to country d in year t. χ_{dt} denotes the country-year fixed effect, measuring all country-year characteristics which include time-variant country-specific variables such as population, market size, and trade costs from the trade gravity model. We need to estimate the values of σ and the error term ε_{idt}. Then, we can calculate:

$$quality_{idt} = \frac{\hat{\varepsilon}_{idt}}{\sigma - 1}, \tag{5}$$

The index $quality_{idt}$ measures the quality of a specific 6-digit product p for firm i to country d in year t. To make it feasible to aggregate, we standardize the indicator using:

$$s\_quality_{idt} = \frac{quality_{idt} - \min quality_{idt}}{\max quality_{idt} - \min quality_{idt}}, \tag{6}$$

For product p, $\mathbf{min}$ represents the minimum value and $\mathbf{max}$ denotes the maximum value. The value range of $s\_quality_{idt}$ is from 0 to 1. Then, we can aggregate it to acquire the firm-level product quality, denoted by TQ_{idt} in equation (7):

$$TQ_{idt} = \sum_{p} \frac{x_{ipdt}}{X_{idt}} \times s\_quality_{idt}. \tag{7}$$

Product complexity. We calculated product complexity concerning the index constructed by Hausmann, Hwang, and Rodrik (2007). The index of product complexity here is a weighted average of the per capita GDP of China's prefecture-level cities. Let an export firm be denoted by i and a product by p, total export of firm i equals

$$X_i = px_{ip}, \tag{8}$$

Let the per-capita GDP of a city c be denoted by Y_c, the productivity related to product p, $prod_p$, equals

$$prod_p = \sum_{i} \frac{\left(x_{ip} / X_i\right)}{\sum_{i}\left(x_{ip} / X_i\right)} Y_c. \tag{9}$$

x_{ip} / X_i is the value-share of product p in the firm's overall export basket. $\sum_{i}\left(x_{ip} / X_i\right)$ aggregates the value-shares across all firms exporting product p. $Prod_p$ represents a weighted average of per-capita GDP associated with the revealed comparative advantage of each firm in product p.

Import demand. Following Redding and Venables (2004) and Crozet, Hering, and Poncet

(2018), we obtain the demand factor M_{dt} from the estimation of equation (10):

$$\ln EX_{odt} = \ln \Phi_{odt} + \ln S_{ot} + \ln M_{dt} + u_{odt}, \qquad (10)$$

where EX_{odt} is the bilateral export flow from the origin country o to destination country d in year t. Φ_{odt} denotes the trade barrier between origin country o and destination country d for the export in year t. S_{ot} reflects the supply capacity of origin country o. M_{dt} captures the market capacity of destination country d. In table 2, we report the descriptive statistics and correlations of primary variables. The variance of inflation factor (VIF) ranges from 1.00 to 2.00 and its mean is 1.41, suggesting that multicollinearity is not a significant concern.

Table 2 Descriptive Statistics and Correlations of Main Variables for Chapter 2

Variable	Obs	Mean	Std.Dev.	Min	Max
1. *centrality*	62,234,369	-6.858	2.277	-14.786	4.590
2. ln *export*	62,234,682	8.903	2.357	0	23.466
3. *HHI*	62,234,682	0.235	0.285	0.005	1
4. *TQ*	61,111,017	0.059	0.130	0	1
5. ln *prody*	62,234,663	19.214	1.456	5.820	22.178
6. ln *demand*	42,285,406	1.592	3.841	-25.205	26.949
Variables	1	2	3	4	5
2. ln *export*	0.016				
3. *HHI*	-0.337	0.213			
4. *TQ*	-0.226	0.280	0.681		
5. ln *prody*	-0.046	-0.100	-0.114	-0.092	
6. ln *demand*	-0.061	0.020	0.050	0.014	0.009

Research Design

In line with the mediational model of Baron and Kenny (1986), hypothesis 1 is tested by the following three regression equations:

$$Centrality_{ipdt} = \beta_1 \ln export_{idt} + \chi_{dt} + \delta_{pt} + \gamma_{it} + \varepsilon_{ipdt}, \qquad (11)$$

$$HHI_{idt} = \beta_2 \ln export_{idt} + \chi_{dt} + \gamma_{it} + \varepsilon_{idt}, \qquad (12)$$

$$Centrality_{ipdt} = \beta_3 \ln export_{idt} + \beta_4 HHI_{idt} + \chi_{dt} + \delta_{pt} + \gamma_{it} + \varepsilon_{ipdt}, \qquad (13)$$

where the export behavior of firms is measured by natural logarithm of export value denoted as $\ln export_{idt}$, that is, the value of firm i exporting to country d in year t. δ_{pt} is the product-year fixed effect, controlling for all product-level changes like product complexity and quality over selected time period. γ_{it} denotes the firm-year fixed effect, measuring all time-variant firm-specific features, such as firm productivity and firm employment; ε_{ipdt} is the error term. We expect β_1 to be negative if the export behavior reduces the centrality of firms in local networks.

The mediational model assumes a three-variable system shown as Figure 1 where two causal paths are leading to the evolution of local networks: the direct effect of the independent variable export behavior which is estimated by equation (11) (path a); and the effect of the mediator diversity which is estimated by equations (12) and (13). Specifically, the path of the latter is firstly from the independent variable export behavior to the mediator product diversification (path b1), and then from the mediator product diversification to the dependent variable network centrality (path c1).

Figure 1 The Path Diagram of Causal Chains for Chapter 2
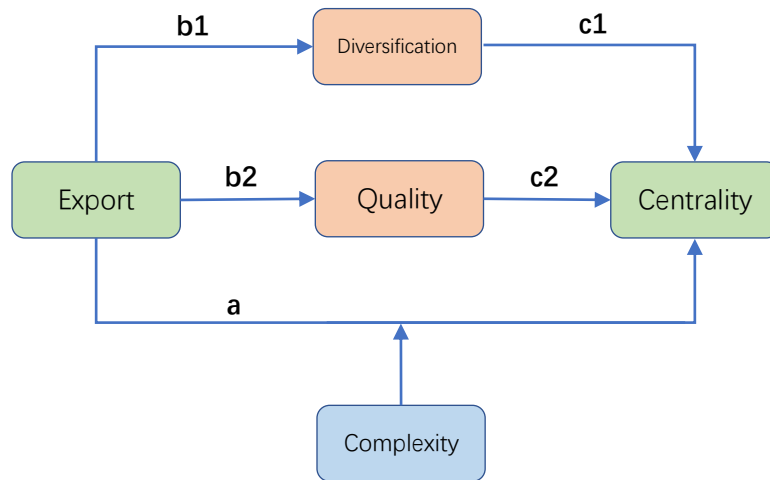
To establish mediation, we have three steps to follow. First, the independent variable export behavior must have a significant impact on the dependent variable network centrality, which means β_1 must be significant. We first examine whether and to what extent firms' network centrality reacts to their export values by estimating the regression equation (11). Based on the significance of β_1, second, the mediator variable product diversification must have a significant effect on the dependent variable network centrality, indicating β_2 and β_4 should be significant. Third, the dependent variable network centrality is regressed on both the independent variable export behavior and on the mediator variable product diversification. If β_3 is significant, we have multiple mediating effects, which means product diversification is one of the multiple causes of network evolution. There is a causal chain that export behavior affects product diversification, and then the change of product diversification will affect the network centrality of firms. Otherwise, perfect mediation holds when β_3 is insignificant. Considering the fact of economic operation, we expect a multiple mediator role of product diversification in this paper.

The examination of hypothesis 2 is similar to that of hypothesis 1. Except equation (12), we set another two regression equations:

$$TQ_{idt} = \beta_5 \ln export_{idt} + \chi_{dt} + \gamma_{it} + \varepsilon_{idt}, \qquad (14)$$

$$Centrality_{ipdt} = \beta_6 \ln export_{idt} + \beta_7 TQ_{idt} + \chi_{dt} + \delta_{pt} + \gamma_{it} + \varepsilon_{ipdt}. \qquad (15)$$

If β_6 is significant, we have multiple mediating effects, which means product quality is one of the multiple causes of network centrality change. We can claim that there is a causal chain that export behavior affects product quality, and then the change of product quality will affect the network centrality of firms. Otherwise, perfect mediation holds when β_6 is insignificant. We also expect a multiple mediator role in product quality.

Hypothesis 3 predicts that β_1 in equation (11) should be greater and less negative in firms exporting products with higher product complexity. Hence, we interact natural logarithm of export value with product complexity, and examine the moderating effect by employing the following regression model:

$$Centrality_{ipdt} = \beta_8 \ln export_{idt} + \beta_9 \ln prod_p + \beta_{10} \ln export_{idt} \times \ln prod_p + \chi_{dt} + \gamma_{it} + \varepsilon_{ipdt}. (16)$$

Note that we do not control for δ_{pt} in equation (16), because product complexity is a time-constant product-specific variable. β_{10} is required to be positive if Hypothesis 3 is supported.

RESULTS

The estimation results of the mediational models are depicted in Table 3. First, we perform three steps to test the mediating role of product diversification according to equations (11)-(13), of which the estimates are presented in columns (1)-(3). In column (1), the independent variable export value is shown to affect the dependent variable network centrality significantly. The estimate of β_1 in equation (11) is -0.009 and significant at the 1% level, implying an average decrease by 0.9% of network centrality when export value increases by 1%. Note that the country-

year fixed effects, product-year fixed effects, and firm-year fixed effects are controlled for in order to mitigate the omitting variable problem to the greatest extent. In column (2), the independent variable export value also has been testified to affect the mediator product diversification, and the coefficient is positive, which means that the greater the export value, the higher the Herfindahl index (i.e., the less product diversification). Specifically, on average, a 1% increase in the export value leads to a 0.1% increase in product diversification. As to column (3), we regress the dependent variable network centrality on both the independent variable export value and the mediator marketization index. The coefficient on HHI is negative and significant at the 1% level, which means a decrease of a firm's product diversity (i.e., the increase of HHI) will consequently lead to a decrease in its network centrality. Note that $\beta_2 \times \beta_4$ (0.001*(-1.609)) is negative, consistent with the symbol of β_3 (-0.009), and the magnitude of the coefficient on $\ln export$ in column (3) is smaller than that in column (1).[2] The results suggest that product diversification plays a multiple mediator role in the relationship between export value and network centrality. In other words, these results confirm Hypothesis 1, which implies that a decrease of product diversification is one of the essential mechanisms through which the export value negatively affects the centrality of network position.

Table 3 The Mediating Role of Product Diversification and Product Quality

VARIABLES	(1) Centrality	(2) HHI	(3) Centrality	(4) Quality	(5) Centrality	(6) Centrality
ln $export$	-0.009	0.001	-0.009	0.009	-0.005	-0.007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.017)	(0.001)
HHI			-1.609			-1.573
			(0.000)			(0.000)
Quality					-0.612	-0.199

---

[2] When we report the coefficients in 4 digits, the magnitude of the coefficient on $\ln export$ is 0.0088 in column (3), while it is 0.0092 in column (1).

	(1)	(2)	(3)	(4)	(5)	(6)
					(0.000)	(0.000)
Observations	62,148,304	62,190,850	62,188,972	61,033,241	61,032,758	61,032,758
R-squared	0.889	0.907	0.893	0.600	0.890	0.894
Country-year fixed effects	YES	YES	YES	YES	YES	YES
Product-year fixed effects	YES	NO	YES	NO	YES	YES
Firm-year fixed effects	YES	YES	YES	YES	YES	YES

Robust *p* values clustered at the city in parenthesis. Robust standard errors and *t* statistics are available from the

authors.

Columns (1), (4), and (5) present another three steps to test the mediating role of product

quality according to equations (11) and (14)-(15). Likewise, a firm with more export value is more

likely to reduce its network centrality, depicted as column (1). The mediating role of product

quality is similar to that of product diversification. In column (4), the export value has been shown

to affect the mediator product quality, and the coefficient is positive. The product quality will

improve by 0.9% when the export value increases by 1%. As to column (5), we regress the

dependent variable network centrality on both the independent variable export value and the

mediator product quality. Note that $\beta_5 \times \beta_7$ (0.009*(-0.612)) is negative, consistent with the

symbol of β_6 (-0.005), and the magnitude of the coefficient on $\ln export$ in column (5) is

smaller than that in column (1). We have a multiple mediator role in product quality, consistent

with Hypothesis 2. As indicated previously, there are two likely mechanisms for the observed

decrease in the network centrality when the export value increases. We further investigate the

sensitivity and robustness of the findings by including the two mediators simultaneously in

column (6). The results are similar to those explained earlier, and the multiple mediator roles of

product diversification and product quality still hold.

Table 4 digs further into the moderator of product complexity by looking at the estimates of

interactions in equation (16) to test Hypothesis 3. We examine whether the negative relation between export value and network centrality varies systematically with product complexity. The export value in column (1) is contemporaneous, and the coefficients of export value and product complexity are strongly negative and significant after including the interaction term between export value and product complexity in the regression. It is consistent with the previous hypothesis that the export behavior will reduce the network centrality of firms. More importantly, we find that the coefficient on the interaction term is significant and positive, which implies the effect of export value on network centrality is stronger when firms export more products with lower product complexity. The results support Hypothesis 3; that is, the network centrality of firms that have higher product complexity is less likely to be affected when firms export more in an emerging economy. We further exhibit the moderating effects of product complexity in Figure 2. Consistent with our estimation, the marginal impact of export value is stronger for firms that export products with lower product complexity than those with higher product complexity.

Table 4 The Moderating Role of Product Complexity and Robustness

VARIABLES	(1) Centrality	(2) Centrality	(3) Centrality	(4) Centrality	(5) Centrality
lnexport* lnprody	0.002				0.122
	(0.000)				(0.000)
L_lnexport* lnprody			0.001		
			(0.000)		
lnexport	-0.052			-0.035	-2.356
	(0.000)			(0.000)	(0.000)
lnprody	-0.026		-0.009		-1.074
	(0.000)		(0.000)		(0.000)
L_lnexport		-0.009	-0.022		
		(0.000)	(0.000)		
HHI		-1.307		-1.560	
		(0.000)		(0.000)	
Quality		-0.113		-0.071	
		(0.000)		(0.074)	

Observations	62,149,860	22,259,555	22,531,653	41,490,299	42,218,520
R-squared	0.888	0.904	0.898	0.896	0.864
Firm-year fixed effects	YES	YES	YES	YES	YES
Country-year fixed effects	YES	YES	YES	YES	YES
Product-year fixed effects	NO	YES	NO	YES	NO

Robust *p* values clustered at the city in parenthesis. Robust standard errors and *t* statistics are available from the

authors.

Figure 2 Moderating Effect of Product Complexity
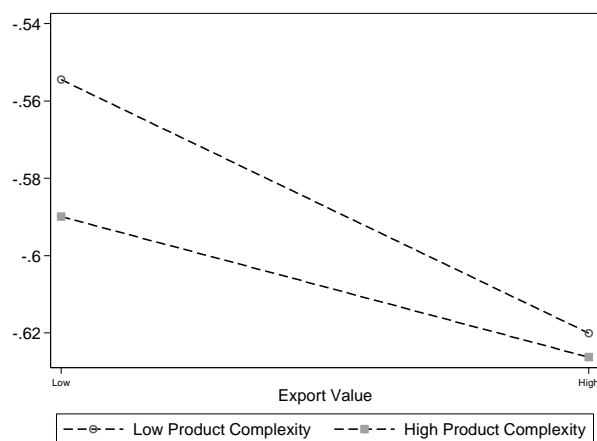
The export value in columns (2) and (3) is one year lag to address the potential reverse

causality problem. As we mentioned before, the relationship between export value and network

centrality may not be merely one-directional, and there can be an interaction between the two. In

other words, export value will affect network centrality, but network centrality will also impact

export value. To eliminate this situation, lagging the export value by one year helps to cut off the

origin of the endogeneity. Consistent with the findings from column (6) in table 3, the results from

column (2) in table 4 indicate that the export value negatively affects the local network centrality

by reducing product diversification and improving product quality. Likewise, we retest

Hypothesis 3 using the lagged value. The results appear in column (3), with similar findings to

those analyzed in column (1).

Columns (4) and (5) show the robust results estimated using the instrumental variable (IV) approach. We assumed the export value to be randomly assigned (Imai, Keele, & Tingley, 2010) as discussed above, but we will introduce an instrumental variable to address further endogeneity problems considering the systematical non-randomness of the export value. We use the import demand as an excluded instrument for the potential endogenous variable – the export value. Our IV approach is valid under the assumption that the import demand does not affect the network centrality, other than its effect through the export value. Intuition-wise, the import demand of the destinations will highly relate to exporters' export value but will not directly affect exporters' geographic distribution in local cities. In column (4), the test of under-identification rejects the null hypothesis of under-identification at the 1% level and suggests that there is no under-identified problem, and the instrument is relevant. As to the weak identification test, the F statistic is 9785.534, which indicates that the instrument is not weak and is highly related to the endogenous variable. Besides, we employ the Hausman's specification test to implement the endogeneity test, which rejects the null hypothesis that the export value is exogenous, implying the OLS results suffer from endogeneity bias. Note that the magnitude of the export value in column (4) using the IV estimate is larger than that in column (6) in table 3 using the OLS estimate. However, the export value coefficient remains negative and highly statistically significant, consistent with table 3. The test results and interpretations in column (5) are similar to those reported in column (4). With the sensitivity and robustness tests, we have greater confidence in the results.

DISCUSSION AND CONCLUSION

Our study investigates whether and how the local network centrality of firms is affected by export value in an emerging economy. We quantify this relationship using a longitudinal panel data from the Chinese Customs Import and Export Statistics between 2000 and 2011. The dataset enables us to identify each firm's network centrality in its home city. Although existing social network studies have drawn inferences of the relationship between international connections and local networks, we notice that these inferences cannot explain business facts with missing key factors and links. We first examine the direct effect of export value on local network centrality by using a mediational model, and test the role of product diversification and product quality in the relationship, and finally test the moderating effect of product complexity. The results show an average decrease in the network centrality following an increase in a firm's export value, and it is robust after considering the lagged effect and potential endogeneity of export. Product diversification and product quality play multiple mediating roles in the causal chains. Moreover, the negative impact of export value on network centrality is more substantial when firms export more products with lower product complexity. Our findings provide novel insights into the relationship between export value and local network centrality and contribute to the extant literature in the following ways.

First, we have proposed two main mechanisms for the relationship between a firm's export value and its local network centrality to reconcile a contradiction between the social network theory and business facts. The existing literature, such as Freeman (1979) and Mizruchi, Mariolis, Schwartz, and Mintz (1986), suggests that a firm at the central position has the maximum possible ties or connections with others. Export behavior will give exporters access to more information,

resources, and opportunities than non-exporters (Bernard et al., 2007; Bustos, 2011; Melitz, 2003).

Therefore, the export will lead exporters to create more local and international connections than

before, so that the network centrality of exporters will increase. However, network theory

overlooks the adjustment of firms' production decisions. We argue that exporters will reduce their

ties or connections with local firms when they increase their export value, and therefore there will

be a negative relationship between a firm's export value and its network centrality in an emerging

economy. In other words, exporters will occupy a less prominent status in their local social

network after being more international. It is inconsistent with the social network theory.

Considering the adjustment of a firm's production decisions, we shed new light on the gap

between the social network theory and the business facts. Our research provides two mechanisms

to explain the inconsistency: on the one hand, exporters will specialize in producing products with

competitive advantages, that is, the product diversification will decrease with the surge of export

value so that exporters will reduce the ties with other firms. On the other hand, an increase of

export value will make firms improve their product quality so that firms will reduce the

connections in their local cities. Taken together, firms will focus on exporting products with

competitive advantages and high quality, leading to a decrease in network centrality. Moreover,

the impact of an increase in export value on network centrality is more substantial when firms

export more products with lower product complexity. By considering both the specialization and

product quality associated with export, our research provides a further understanding of export in

a firm's network evolution in an emerging economy and helps reconcile the contradiction between

the social network theory and business realities.

Second, we contribute to the empirical study of firms' network evolution by testing and

confirming the mechanisms we proposed. As mentioned before, some studies (Chaney, 2014; Ikeda & Iyetomi, 2018) present theoretical mathematical models about the impact of export on networks, and other studies only presume that networks will shrink in importance for international trade (Rauch, 2001). There is a lack of reasoning for this shrink, and there is little empirical evidence to support their inferences. To address this concern and bridge the research gap, our research directly investigates the relationship between export value of Chinese firms and their local network centrality empirically and confirms the mechanisms of causal chains we proposed. We begin by exploring whether and how a firm's network centrality changes after an increase in its export value and conclude that there is a significant negative relationship between a firm's export value and its network centrality in an emerging economy. We then consider the potential mechanisms of causal chains through which a change in a firm's export value leads to a change in its local network centrality through the mediational models, and conclude that firms will specialize in exporting products with competitive advantage and high quality, leading to a decrease in network centrality. Finally, we examine the role of product complexity in a firm's social network centrality, and find that firms with higher product complexity are less likely to be affected when firms export more. Therefore, our paper advances research on firms' network evolution and explains why a firm's local network centrality decreases when its export value increases.

Third, this paper adds to the social network theory by combining the research fields of export, social network, and new economic geography. Previous studies have emphasized that cities with an increase in international connections tend to enhance local knowledge sources (Cantwell & Zaman, 2018). Therefore, they can have more opportunities for development (Storper, 2018). Our

study works towards a novel explanation of the inconsistency between existing social network theory and business phenomena by providing a multi-level analysis of the heterogeneity of firm networks. Exporters, the leading actors in their cities, play the role of multiple hubs. Our paper considers the interplay among firms' products, cities, and destinations to construct a multi-level network centrality index. By absorbing the idea of international trade, we feel that social network theory overemphasizes the importance of building ties but overlooks the adjustment of firms' production decisions. Our findings show the complicated interplay of export, social network, and new economic geography and provide new insights into social network theory development.

Our findings call attention to both the benefits of network connections and the adjustment of production decisions for managers and policymakers. Conventional social network theory emphasizes the network connections or ties as an instinctive advantage to firms' growth, but our findings suggest that creating and maintaining network connections can be costly. We show that there is a decrease in local network centrality with increased export value. As such, managers should understand that network connections can be beneficial or detrimental to their export and development. It is necessary to consider how to maximize the utility of firms' network connections rather than merely care about the number of connections. With an expansion of export scale, a reduction in network connections related to uncompetitive and low-quality products can be an important path to maximize profits.

Our findings also suggest that managers and policymakers should be aware of the negative relationship between local network centrality and export value. A decrease in local network centrality means the decline of exporters' influence in their cities and the reduction of information channels and local communications. Despite the benefits of controlling costs, it might lead to less

gain from local knowledge spillover and resources so that exporters might lose potential development opportunities. Therefore, policymakers should establish some platforms to encourage information exchange and make it possible for non-exporters to learn from exporters. Managers of exporters need to be conscious of maintaining local resources to grow fast.

As with all studies, our paper has limitations. First, we proxy for a firm's network centrality using the ratio of its absolute trade links to the ensemble of its city's network ties. We mainly focus on the number of network connections and do not consider the change in network ties' quality. As Granovetter (1973) and Borgatti and Halgin (2011) suggest, a weak tie might have higher quality than a strong one because only weak ties are likely to bridge the sources of novel information. Therefore, a decline in network ties with an increase in export value could result from a reduction of network overlap so that a firm can improve its network quality. Further research could examine the evolution of firms' network quality: whether exporters will create and keep weak ties but reduce overlapped strong ties when export value increases.

Second, we have discussed how a firm's local network centrality decreases following an increase in its export value. It will be worthwhile to examine the evolution of a firm's network centrality overseas given an increase in its export value. One of the predominant advantages of exporters is that they have access to international novel information, advanced technology, and market opportunities. Despite a decrease in network centrality in local cities, exporters could maintain their status by improving network centrality overseas. Unfortunately, our existing data does not allow us to carry out such an investigation, so that we would welcome future research that assesses the evolution of firms' network centrality overseas.

Third, while firms' network centrality decreases with their increased export value, the cities'

overall network density and centralization (Scott, 1988) might improve. When we regard a city as a graph and exporters in the city as a set of points on the graph, density depicts the city's cohesion level; centralization measures how non-exporters are organized around exporters. Cantwell and Zaman (2018) suggest that cities would enhance local sources when they have more international knowledge access; thus, the cities' network density would increase with more export value. However, our dataset is restricted to exporters, and it is difficult for us to assess the overall network density, centralization, and the organized structure, without the information of non-exporters. We would certainly encourage future research to explore the network evolution of overall cities.

Finally, our research context is China, one emerging market, limiting the generalizability of our findings. The number of firms in emerging markets has snowballed, and emerging market economic structures have also been continually changing. Firms' network evolution in a rapidly changing economy might differ from a developed and relatively stable market. Nevertheless, we believe that our findings convincingly examine that firms' local network centrality faces a decline when they export more in an emerging economy context. We hope that future research continues to explore the influence of internationalization on firms' networks across various contexts to help improve our understanding.

Chapter 3: Preferential Trade Agreement Networks and Export Resilience

Abstract

There is a lack of research on how preferential trade agreements (PTAs) affect sustainable export growth. We firstly put forward a new concept of export resilience which determines sustainable export growth. We then use social network theory to argue that PTA networks can negatively influence export resilience by (1) creating reciprocal pressures and hence unproductive reciprocity costs and (2) transferring risk and hence losses from other network members. Empirical evidence from two studies, one at the country level, and the other at the firm level, supports our argument. Our study contributes to the international business literature and social network theory by applying social network theory to explain the counter-intuitively negative relationship between PTA networks and export resilience. Further, the relationship is contingent on the PTA network status of the importing country and the export sophistication of the exporting firm or country.

Keywords: Export Resilience, Preferential Trade Agreement, Network Closure, Structural Holes, Export Sophistication

INTRODUCTION

Export growth increases revenues and profits for businesses and contributes to economic growth. However, export growth is unstable as uncertainty always exists (Bloom, 2014). Uncertainty makes it difficult for firms and countries to forecast the likelihood of events happening, which makes firms and countries cautious about their investment and consumption decisions (Bertola et al., 2005; Bloom et al., 2018a), resulting in a massive growth rate dispersion. The financial crisis (Chor & Manova, 2012), the Covid-19 pandemic (Vidya & Prabheesh, 2020), and the rise of trade protection (Kee, Neagu, & Nicita, 2013) expose long-term export growth to the associated volatility. Research on export growth alone cannot figure out the ability of a firm's or country's export to withstand and recover from shocks and disruptions. To address this issue, we introduce a concept of "export resilience". Borrowing the ideas from economic resilience (Martin & Sunley, 2015; Martin & Sunley, 2020), we define *export resilience* as the capability of a firm or country to respond to and recover its exporting activity from a crisis. Export resilience is closely related to uncertainty and challenges a firm or country faces and is a proxy for assessing a firm's or country's sustainable export growth. While there are studies about economic resilience focusing on the capacity of sustainable development (Martin, Sunley, Gardiner, & Tyler, 2016; Pike, Dawley, & Tomaney, 2010; Soroka, Bristow, Naim, & Purvis, 2020), there is a lack of dedicated research on export resilience, especially the impact of preferential trade agreements (PTAs) on export resilience.

This study follows a broadly defined terminology that a PTA is "an international treaty with restrictive membership and including any articles that (i) apply only to its members and (ii) aim to secure or increase their respective market access" (Limão, 2016: 284). Therefore, any bilateral

or plurilateral trade agreement is regarded as a PTA (Gamso & Grosse, 2021). Examples range from the UK-Australia Free Trade Agreement to the North American Free Trade Agreement (NAFTA) to the World Trade Organization (WTO).

Limited indirect or implicit studies on export resilience suggest that PTAs can boost trade in production networks between signatories by lowering tariffs (Fugazza & Nicita, 2013), alleviating trade policy uncertainty (Handley & Limao, 2015), and making international production activities more secure and efficient via imposing disciplines and regulations (Orefice & Rocha, 2014). These studies treat PTAs as an instrument to promote trade liberalization and eliminate national regulatory barriers among members, and hence signing PTAs can mitigate uncertainty associated with specific trading partners and may improve export resilience.

However, such an implicit positive relationship between PTA signing and export resilience as suggested above may not hold theoretically and practically. In theory, countries signing a PTA form closed networks. Social network theory suggests that a closed network creates pressure on signatories to conform to rules under the threat of collective sanctions, and an over-connected network also promotes risk transfer (Coleman, 1988; Kwon et al., 2020). Countries that sign multiple PTAs with the same country experience diminishing returns and negative outcomes from the same network structures (Lechner, Frankenberger, & Floyd, 2010), and redundant PTAs add to network maintaining costs and over-reliance on existing contacts (Burt, 1992). In summary, PTA signing can weaken a country's ability to resist risks, and hence decrease its export resilience.

Practically, while the number of PTAs has been rapidly increasing (Hofmann, Osnago, & Ruta, 2019; Medvedev, 2010), export resilience has actually been decreasing, as indicated in Table 7, where the correlation matrix shows a negative relationship between a country's export

resilience and both signing a PTA and the number of PTAs signed with a partner country. We also observe that some countries withdraw from PTAs, such as the U.S.'s departure from the Trans-Pacific Partnership (TPP) agreement[3]. From Figure 3, we can see that the total number of PTAs in all countries has increased over the years, but the performance of export resilience is quite different. During crises, the United States, China, and Russia are more resilient than other countries in the same group, while most countries' export resilience fluctuates negatively. The implicit positive relationship between PTA signing and export resilience suggested by the existing literature does not seem to be supported by the data.

Figure 3 The Numbers of PTAs and Countries' Export Resilience

Panel A. Five developed countries with the highest GDP in 2020
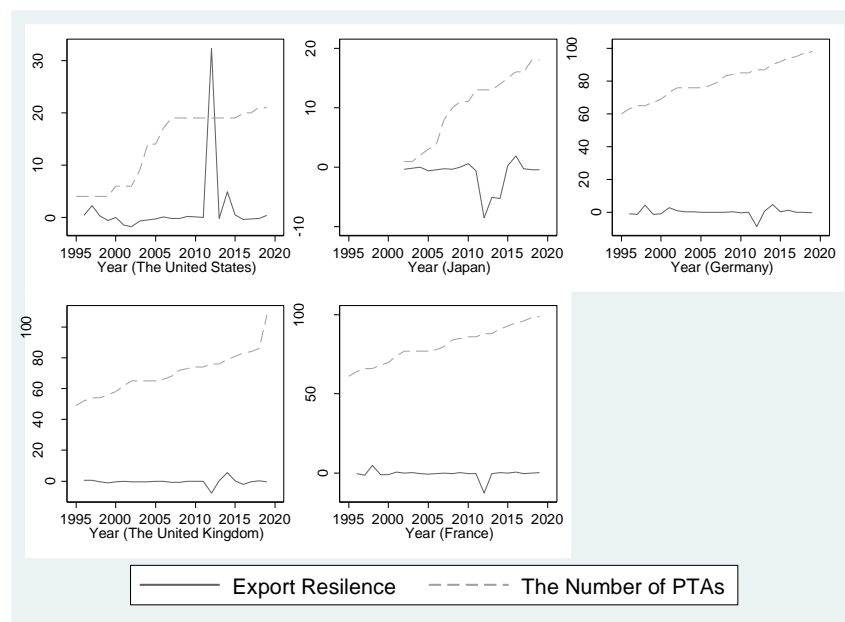
Panel B. Five emerging markets (the BRICS countries)

---

[3] Another argument is that the U.S.'s withdrawal from TPP is mainly driven by deglobalization (Witt, 2019). This paper can provide insight into the causes of deglobalization: declining export resilience creates an urgent need for countries to be able to adjust their strategies on their own.
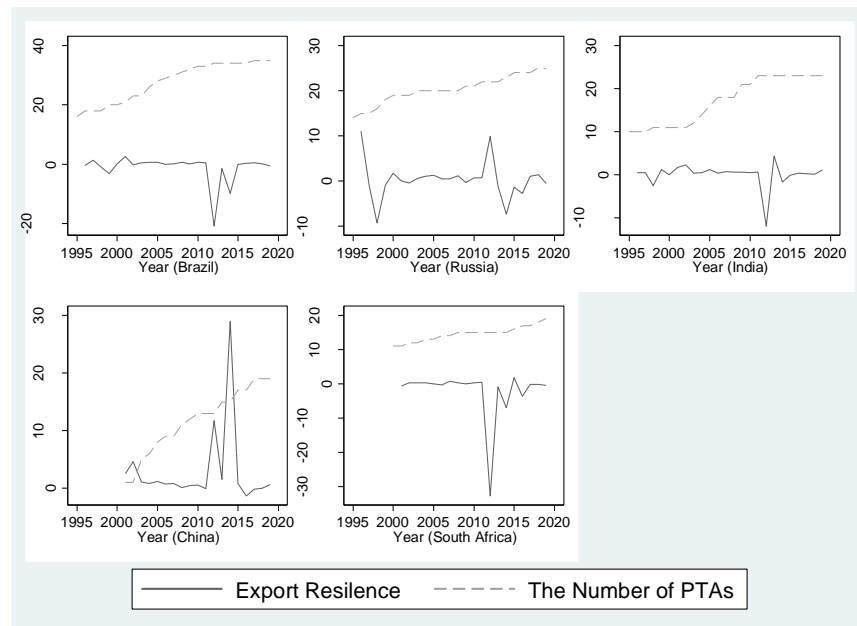
Note: Data of PTA comes from the Design of Trade Agreements (DESTA) dataset. The export resilience index is calculated at the country level in line with equations (1) and (2).

The figures present the time trends of each country's signed PTA numbers and its export resilience:

1. The total number of PTAs in all countries has increased over the years.
2. The number of PTAs signed by developed countries (the United States and Japan) other than the European Union (EU) is not much different from that of emerging markets, and the number of PTAs signed by EU countries far exceeds that of other countries.
3. During crises, the United States, China, and Russia are more resilient than others, while most countries' export resilience fluctuates negatively.

This paper applies social network theory to examine how PTA networks affect a country's export resilience. We argue that PTA networks can negatively affect export resilience by (1) creating reciprocal pressures and (2) transferring risk. We test this relationship based on, firstly, an exporting country-importing country-specific product level panel dataset, which merges bilateral trade flows of the BACI database with PTA information of the DESTA dataset from 1995 to 2019, and secondly, an exporting firm-importing country-specific product level panel data from the Chinese Customs Import and Export Statistics database from 2000 to 2011. We find that a firm's or country's export resilience decreases after a country signs a PTA with its trading partner, and the resilience will decrease further after the country signs multiple PTAs with the same country. We further investigate the moderating roles of the importing country's access to structural

holes and the exporting country's export sophistication. The negative relationship between export resilience and signing a PTA is strengthened when the importing country has access to structural holes in the PTA networks, but weakened when the exporting country has high export sophistication.

This paper makes several contributions to the international business and social network theory literature. First, this paper helps inform firms as well as countries the downside of PTA networks on export resilience. Existing studies emphasize that PTA signing promotes trade growth, but further study on the sustainability and stability of this growth is scant. This paper fills part of the research gap. While verifying the existing literature that PTA signing is positively related to export growth, our study demonstrates that PTA signing leads to a decline in export resilience. A firm or country needs to enhance export resilience in order to sustain its export growth. Second, this paper helps inform the boundary conditions to the causal relationship between PTA networks and export resilience. We investigate the heterogeneous nature of the relationship. We find that the relationship is contingent on the PTA network status of the importing country and the export sophistication of the exporting country. Finally, this paper applies social network theory to develop a novel counter-intuitive hypothesis. Although the relationship between PTA networks and export resilience is intuitively positive, social network theory can explain why it can be negative in reality. Our study complements the empirical application of social network theory. We have made an indirect contribution to social network theory by applying "existing theory to a *phenomenon* that has yet to be adequately understood and explained theoretically" (Crane et al., 2016: 785).

This paper is structured as follows. The second section reviews the literature and develops

hypotheses. We then provide the sample description, variable construction, and research design. The subsequent section presents our empirical results. The final section discusses and concludes.

THEORY AND HYPOTHESES

Prior Research on PTAs and Export Resilience

Based on our definition, export resilience captures how the export performance at the firm or country level responds to and recovers from a shock. The concept of resilience is closely related to uncertainty and challenges. Martin and Sunley (2020) illustrate four types of resilience: bounce back, ability to absorb, positive adaptability, and system transformation. Briguglio, Cordina, Farrugia, and Vella (2009) juxtapose economic vulnerability with economic resilience. The former is ascribed to a country's inherent features resulting in exposure to exogenous shocks, and the latter refers to policy-induced actions that offset and minimize the adverse effects of shocks. Table 5 provides the main arguments made in the key economic resilience literature. To compare export resilience among different countries, we employ the outcome approach of Pendall, Foster, and Cowell (2010), which defines resilience as an equilibrium or a stable growth path (Huang, 2021) and is similar to the bounce back by Martin and Sunley (2020). It needs to be noted that there is a premise concerning export resilience. In line with the discussion of economic resilience (Béné, Newsham, Davies, Ulrichs, & Godfrey-Wood, 2014; Martin et al., 2016), we assume that the export value has a natural steady state and will remain at its stable growth path unless it is exposed to a shock. Specifically, if the export value resumes its pre-shock growth rate within a short time or seldom stagnates in the face of shocks, the country has export resilience. This paper studies the effect of PTA networks on export resilience at both the country-product and firm-

product levels, involving an explanation of why a country might withdraw from its existing PTAs even if these PTAs promote export growth.

Table 5 Key Literature on Economic Resilience (Citation > 100)

Author(s)/year	Journal	Main arguments and/or findings
Acemoglu, Ozdaglar, and Tahbaz-Salehi (2015)	American Economic Review	This paper builds a mathematical model and defines stability and resilience as the expected and worst-case performances of the financial network in the presence of shocks, respectively. The financial network's structure affects the system's resilience, and the guarantee for stability depends on certain thresholds of the magnitude and number of shocks.
Amini, Cont, and Minca (2016)	Mathematical Finance	A measure of resilience is constructed to predict the spread of distress in financial networks. The network's detailed structure determined its global property (i.e., resilience).
Boschma (2015)	Regional Studies	Regional resilience is the ability of a region to accommodate shocks and reconfigure socio-economic and institutional structures to develop new growth paths.
Bristow and Healy (2014)	Regional Studies	This paper puts human agency into the concept of regional economic resilience.
Capello, Caragliu, and Fratesi (2015)	Journal of Economic Geography	The impacts of the crisis have spatial heterogeneity. Cities are taken as sources of regional economic resilience, and regions with strong, large, and dynamic cities are more resilient than rural ones.
Davies (2011)	Cambridge Journal of Regions Economy and Society	The resilience of regional economies varies across European countries in two dimensions: the capacity to withstand the impact of the crisis and the ability to respond positively.
Fingleton, Garretsen, and Martin (2012)	Journal of Regional Science	UK regions differ in their resilience to employment shocks. Two notions of resilience, engineering resilience and ecological resilience, are distinguished. The former assumes an underlying stable growth path to be rebounded following a shock, and the latter supposes the growth path of the regional economy can be permanently affected by shocks.
Hassink (2010)	Cambridge Journal of Regions Economy	This conceptual paper is critical for using regional resilience as a framework for analyzing

	and Society	regional economic adaptability due to three shortcomings: focusing on equilibrium and multi-equilibrium; neglecting state, institutions, and policy at spatial levels; ignoring culture and social factors.
Hudson (2010)	Cambridge Journal of Regions Economy and Society	Resilience has three properties: adaptive capacity, self-organization, and learning. A resilient regional economy should have a lighter environmental footprint and a more significant internal closure and regionalization.
Martin (2012)	Journal of Economic Geography	This paper combines resilience with hysteresis to understand the reactions of the UK regions to major recessionary shocks.
Martin and Sunley (2015)	Journal of Economic Geography	This paper discusses the meaning and explanation of regional economic resilience. Resilience should be regarded as a historical evolutionary process as it changes a region's economic trajectory in the long run.
Martin et al. (2016)	Regional Studies	This empirical paper measures the resistance and recoverability of the UK regions. Both regional economic structures and locally specific factors can affect regional economic resilience.
Pike et al. (2010)	Cambridge Journal of Regions Economy and Society	This paper distinguishes adaptation and adaptability by using insights from evolutionary economic geography, and provides a means of explaining the uneven resilience of places.
Simmie and Martin (2010)	Cambridge Journal of Regions Economy and Society	Two UK city region (Cambridge and Swansea) case studies are used to demonstrate that the adaptive cycle model is helpful to understand regional economic resilience.
Williams and Vorley (2014)	Entrepreneurship and Regional Development	Entrepreneurship is essential to creating more diversified and resilient economies since it can drive innovation, create employment and boost productivity.

When facing unpredictable global markets, a firm or country is motivated to improve its export resilience. Strong resilience is usually linked to high growth rates (Briguglio et al., 2009), strong resistance, and strong recoverability from risk (Martin et al., 2016). As export value bears much of the impact of perturbations concerning export resilience, it is appropriate to focus on how a firm's or country's export value responds to and recovers from shocks. Like the role of

economic resilience in shaping economic growth at the country level (Diodato & Weterings, 2015; Fingleton et al., 2012), export resilience has a potentially crucial role in shaping the status quo of bilateral trade. Differences in export resilience contribute to varying export growth patterns in countries whose exports react and recover differently in the face of various shocks. Then, an intriguing question arises as to what factors influence a firm's or country's export resilience. Although the determinants of resilience are complex, the role of policy is emphasized in the literature. Martin and Sunley (2020) illustrate five subsystems that collectively affect resilience: industrial and business structure, labor market conditions, financial arrangements, governance arrangements, and agency and decision making. They argue that the form and operation of each subsystem are penetrated and shaped by national institutions and regulations. Di Caro and Fratesi (2018) underline that policies focused in the right directions can sustain resilient economies by addressing resources and efforts. Duval, Elmeskov, and Vogel (2007) attribute the divergences in resilience to different policy settings and institutions, which can cushion and dampen the initial impact and reduce the persistence of shock effects. Signing PTAs with other countries reflects a country's trade policies and is therefore closely linked to a country's export resilience.

Signing PTAs promotes trade growth among member countries (Foster & Stehrer, 2011). Signing PTAs with other countries can help an exporter mitigate uncertainty associated with specific trading partners and reduce trade costs, including tariffs and non-tariff trade barriers (Cooper, 2014). Thereby, signing PTAs can increase market access (Limão, 2016) and create trade (Eicher & Henn, 2011) to promote export growth. Table 6 provides the main findings of articles on trade agreements in the international business field. Given this positive impact, there have been increasing PTAs in recent decades (Dür, Baccini, & Elsig, 2014; Hofmann et al., 2019), leading

to further development of PTA networks.

Table 6 Key Literature on Trade Agreements in the IB Literature

Author(s)/year	Main arguments and/or findings
Journal: JIBS	
Baggs and Brander (2006)	Free trade agreement (FTA) primarily aims to reduce tariffs. The Canadian import-competing firms experience lower profits and higher financial leverage, while export-oriented firms experience the exact opposite with the implementation of the Canada-US FTA.
Brandl, Darendeli, and Mudambi (2019)	In the context of the Trade-relate Aspects of Intellectual Property Rights (TRIPS) agreement, the involvement of advanced country multinational enterprises (AMNEs) and supranational organizations in developing counties' innovation systems promotes the regulatory adoption of intellectual property (IP) protection standards in developing countries. A country-year sample and the institutional theory are used to examine and explain the effects.
Fratianni and Oh (2009)	By taking advantage of annual observations of 143 countries, this paper examines the mixed effects of 11 separate regional trade agreements (RTAs) on trade openness and finds that RTAs foster the regionalization strategy of MNEs.
Globerman and Shapiro (1999)	By tapping into the macro-level time series of Canadian data, this paper suggests that the FTA and North American Free Trade Agreement (NAFTA) significantly increase Canadian inward and outward FDI, while the Foreign Investment Review Act has no significant effects.
Kandogan and Hiller (2018)	Based on country-level data, this paper investigates the causality between the international governmental organization (IGO) alliance and RTA formation. Being allies in IGO helps build trust, reduce political risk, and promote RTA's likelihood.
Moore, Dau, and Mingo (2021)	Analyses using a panel of 68 countries find that trade agreements encourage country-level formal venture creation and discourage informal entrepreneurship by providing supranational institutional structures.
Journal: JIBP	
Cote, Estrin, and Shapiro (2020)	National economic diplomacy promotes trade and investment in goods through trade agreements and promotion agencies. Due to the physical and contextual distance, trade agreements can be challenging policy tools, and this is where city diplomacy comes in.
Di Ubaldo, McGuire, and Shirodkar (2022)	Based on a country-year panel dataset, this paper shows that greater levels of adoption of ISO-14001 are associated with reduced air pollution in countries, and this effect is more significant among countries having trade agreements with environmental protection provisions.

Findlay and Hoekman (2021)	As one of the significant nonmarket strategies of international businesses, trade agreements focus on removing discriminatory policies and play an essential role in addressing regulatory sources of global value chain frictions.
Gamso and Grosse (2021)	By analyzing country-level dyadic data between 179 countries, this paper finds a positive relationship between preferential trade agreement (PTA) depth and FDI, and the property rights moderate the relationship in host countries.
Gereffi, Lim, and Lee (2021)	Trade policies, both restrictions and trade agreements, provide momentum for reconfiguring global value chains (GVCs), and firm strategies can mediate the effect.
Jaax and Miroudot (2021)	A country's participation in trade agreements shapes its economic connectivity, facilitates its integration in GVCs, and promotes firms to invest in intangible assets and knowledge creation. This study relies on a panel dataset covering 64 countries and 36 industries.
Modlhamer (2020)	This paper argues that the difference in innovative capacity between PTA members shapes the demand for the intellectual property right (IPR) provisions in a PTA based on 495 PTAs covering 201 countries.
Urias and Ramani (2020)	This systematic review verifies that compulsory licensing can be used as a countermeasure against the constraints imposed by TRIPS to ensure price reduction and availability of patented medicines in the face of health crises.
Journal: JWB	
Czinkota (2006)	Higher education needs to integrate into the General Agreement on Trade in Services (GATS) to compete for necessary resources.
Rugman and Kirton (1998)	Based on interviews with government and business leaders involved in the NAFTA, this paper finds that the NAFTA helps North American firms increase trade by reducing transaction costs and fostering new standards.

Although existing studies tend to suggest that PTA signing is beneficial to export growth, how PTA networks affect export resilience remains unknown. Briguglio (2016) contends that high exposure to external shocks does not necessarily compromise a country's economic growth. Economic vulnerability is related closely to the size of a country, as small countries have limited resources and product range and highly depend on international suppliers and markets, rendering them more vulnerable than large states. Following this argument, signing PTAs with other countries enables small countries to have stable markets and suppliers and reduce economic

vulnerability. However, the inference is untenable, as overly connected PTA networks are prone to propagating shocks (Kharrazi, Rovenskaya, & Fath, 2017a) and conformity pressure (Hansen, 1999; Lechner et al., 2010; Uzzi, 1997), leading to the need for further discussion.

Regarding the impact of PTA signing, we add to the literature on the relationship between PTA networks and export resilience in network research and relevant fields. We begin by explaining the mechanisms that link PTA networks to export resilience, and then integrate importing and exporting country moderators that likely facilitate or constrain the main effects.

The Direct Effects of PTA networks on Export Resilience

We argue that it is possible for a country to suffer from export resilience decline while signing a PTA with its trade partner. The inference seemingly violates the implicit positive relationship suggested by the existing studies (Fugazza & Nicita, 2013; Handley & Limao, 2015; Orefice & Rocha, 2014). In our context, PTA signing improves trade efficiency by reducing the number of intermediaries. Signing a PTA with trade partners facilitates information sharing, strengthens mutual trust, and benefits both the exporting and importing countries. Nevertheless, the beneficial aspects brought about by PTA signing seem to be embodied in export growth. There are nuances of export resilience. Compared with growth rate, resilience is a more systematic and comprehensive concept, which captures a whole process including five elements (Martin & Sunley, 2020): the risk of exposure to shocks, properties of shocks, resistance to shocks, adaptability of actors, and recoverability of the economy (recoverability of the export in our case). Considering all these aspects of resilience and the nature of PTAs, the network closure argument of Coleman (1988) can provide a reasonable explanation for such a negative relationship.

Coleman (1988) proposes that the closure of a social structure facilitates the existence of effective norms with attempts to encourage certain actions and constrain others. Each actor's behavior in a closed network will be monitored and guided by these norms under the threat of collective sanctions. The closure, therefore, strengthens ties among members and is associated with cooperation and trust (Kwon et al., 2020). As a PTA has restrictive membership and only works among its signatories (Limão, 2016), signing PTAs creates small closed worlds among these signatories. With the trust-improvement and sanction-avoidance concerns, signing a PTA with its trade partner is likely to increase the pressure on an exporter to conform to rules on the priority of mutual benefits, and increase the difficulty of its domestic production adjustments. The more PTAs are signed with its trade partner, the more terms and clauses a country has to abide by and, therefore, the more restrictions the country will be imposed, making it challenging to adapt to shocks. Indeed, Hansen (1999) argues that strong ties create reciprocal pressures, and unproductive reciprocity costs a significant proportion of time and resources. Effective actions are stifled if the social obligation edges out the economic imperatives (Uzzi, 1997).

While providing information and opportunities, connected networks can be associated with risks and interruptions. The most common risks in export can arise from unpredictable fluctuations in production costs (Camuffo, Furlan, & Rettore, 2007) and demand uncertainty in foreign markets (De Sousa, Disdier, & Gaigné, 2020). Trade partners value and maintain long-term relationships if neither party wishes to renege on relational contracts (Camuffo et al., 2007). Signing PTAs promotes vertical integrations by stimulating intra-industry trade among PTA members (Egger, Egger, & Greenaway, 2008; Foster & Stehrer, 2011). A country must share risks with other signatories with the integration progress. For example, in intra-industry trade, an

exporting country's export can be affected by the demand uncertainty of both the importing country and the third countries that import from the importing country. A country has to face the risks that it endures before it is embedded in a PTA network and the risks that its partners suffer. Namely, a country must burden the risks from both inside and outside the PTA networks, compared to only taking risks outside the networks when not joining those PTAs. If its partners do not cope with shocks and absorb losses well, the country will suffer losses as the risks transfer through the connected network (Song, Yang, Zhang, & Wang, 2020). Therefore, a country is exposed to more risks when signing a PTA with more countries.

Hypothesis 1a: Signing a PTA with an importing country has a negative effect on an exporting country's export resilience.

Furthermore, an increase in the PTA numbers between the two countries leads to a decline in export resilience. Signing more than one PTA with the same trade partner[4] provides a country with the same network benefits and sources of information but more maintenance costs, resulting from structural equivalence (Burt, 1992). Due to network efficiency, a country should maximize the number of non-redundant PTAs to maximize benefits obtained per PTA. If a country selects to sign one PTA with its trade partner, it can enjoy the same benefits and maintain the network at less cost than signing two or more redundant PTAs. The portion of the expenses spent on maintaining the redundant PTAs can be reallocated to expanding new partners. Moreover, signing

---

[4] Table 7 shows that at most 12 PTAs have been signed between two countries in our dataset. It is common for a country pair to have multiple PTAs between the two. For example, the United Kingdom and Australia have signed the WTO agreement and the UK-Australia Free Trade Agreement.

multiple PTAs is strengthening the ties between the two countries. Following the argument of the disadvantages of strong ties (Lechner et al., 2010), network inertia (Hansen, 1999) between countries will increase with strengthening ties. A country comes to immerse its established PTA network intensely and is less likely than before to search for information and sources from countries outside its existing network. Under such circumstances, the country loses learning opportunities about potential risks (Malm, Bouchard, Decorte, Vlaemynck, & Wouters, 2017) and has less response time to reduce losses (Song et al., 2020). Together, an increase in the number of bilateral PTAs increases the cost of maintaining the PTA network for a country and weakens its ability to perceive risk resulting from overreliance on existing contacts. Formally:

Hypothesis 1b:The exporting country's export resilience is negatively associated with the number of redundant PTAs signed.

Heterogeneity of the importing country's Access to Structural Holes

As brokerage is often seen as the opposite of closure (Kwon et al., 2020), exploring the role of countries at structural holes that interconnect across clusters can further deepen the understanding of the relationship between PTA networks and export resilience. Research on PTAs has established that partner characteristics have an important influence on the outcome of PTAs between countries (Cheong, Kwak, & Tang, 2015; Dahi & Demir, 2013; Michaely, 1998). The degree to which a signing partner has access to structural holes[5] in the network is a critical

---

[5] In this paper, when a country has access to structural holes, it means that (1) the country has access to more structural holes, and (2) it has more access to structural holes (itself is more likely to become a structural hole).

boundary condition that affects the relationship between PTA networks and export resilience. We define structural holes based on formal structure (Tortoriello & Krackhardt, 2010; Tushman, 1977). According to Burt (1992), if we regard a PTA as a unit or a cluster, a structural hole connects two different PTAs and is a relationship of non-redundancy. An importing country that bridges two or more non-redundant PTAs tends to have access to structural holes. Therefore, an importing country is not just on the other end of an exporter's relations, and it is also a node of access to other PTA clusters. An exporter can be affected by PTAs signed by itself as well as those signed by its importing countries.

By the definition of structural holes, an importing country with access to structural holes is exposed to diversified information and more likely to detect opportunities (Gnyawali & Madhavan, 2001). Exporting to a country that participates in different PTAs is an incentive for an exporter to find synthetic knowledge across all the countries covered by those PTAs. However, structural holes expose a country to too much heterogeneous and conflicting information (Lechner et al., 2010), which overloads information processing capabilities and decreases decision-making performance (O'Reilly III, 1980). Besides, diverse information also means various risks. An importing country with access to structural holes synthesizes uncertainty and risks across different clusters. An exporting country, signed PTAs with an importing country occupying structural holes, experiences decreased information processing efficiency and increased risks from various clusters, leading to a further decline in export resilience.

Having discussed the direct impact of the structural hole attributes, we now turn to the increased friction caused by information asymmetry between countries. Obstfeld (2005) argues that an action problem arises from structural holes. A broker, who occupies the structural holes,

has timing and arbitrage advantages by manipulating and exploiting those disconnected clusters (Burt, 2015). To ensure superior information and control the behaviors of other players, a broker tends to filter and maneuver information (Bizzi, 2013). An importing country whose network spans structural holes virtually plays a broker's role. It can consider a broad range of alternatives and have an increased opportunity to play against others for its benefit. It tends to perceive potential risks earlier than other countries as it has more information sources, so it has more response time, which means that it may transfer losses[6] to its trade partners, i.e., the exporting countries signed PTAs with it. The exporting country must pay for the brokerage fee (Buskens & van de Rijt, 2008) resulting from an importing country's access to structural holes, magnifying the negative effect on export resilience. In addition, as the structural hole country withholds and filters information, members in the same PTA share knowledge unequally, exacerbating rivalry and weakening collaboration (Harrison, Price, Gavin, & Florey, 2002), which further engenders intragroup conflict (Lechner et al., 2010). Together, we expect the slope of the negative relationship between PTA signing and export resilience of the exporting country to be steeper if the signing importing country has access to structural holes. Formally:

Hypothesis 2:The effect of PTA signing on a country's export resilience is more negative when the importing country has access to structural holes.

---

[6] For example, when an importing country knows through its PTA networks that a specific production material's price will rise sharply, it will import a large number of related materials from the exporting country in a short time and transfer part of the upcoming production cost to the exporting country.

Heterogeneity of the Exporting Country's Export Sophistication

The previous arguments propose that PTA signing negatively affects export resilience by (1) creating reciprocal pressures and (2) transferring risk. We argue that the degree to which a country's export resilience can respond to the negative effect of these mechanisms depends on the extent to which its export structure is exposed to the PTA network changes. Specifically, export sophistication is a good proxy for export structure. Export sophistication reflects a country's economic transformation (Hausmann et al., 2007), as it is associated with productivity and can predict subsequent economic growth robustly. Hausmann et al. (2007) find that countries with higher export sophistication experience higher export growth than those with lower export sophistication by transferring resources from lower-productivity goods to higher-productivity activities. Jarreau and Poncet (2012) also find that specializing in more sophisticated goods makes regions subsequently grow faster. In addition, export sophistication is determined by a series of factors, including human capital (Zhu & Fu, 2013) and technology (Weldemicael, 2014), which means that export sophistication is closely related to the share of high-technology goods in total exports (Jarreau & Poncet, 2012). Therefore, a country with higher export sophistication tends to produce and export higher-technology products than its counterparts with lower export sophistication.

Thus it can be argued that countries with higher export sophistication perform better under reciprocal pressures and increased risk resulting from PTA networks. Corcoles, Diaz-Mora, and Gandoy (2014) focus on the relationship between product sophistication and the stability of trade flows, showing that the duration and stability of export are positively related to product sophistication using a discrete-time duration model. They argue that countries that supply the

most sophisticated goods are likely to keep their position in the network as they have more production requirements, which need particular production capabilities to fulfill. These capabilities differentiate a country from other exporters and make it difficult to be replaced by a new partner. Besedeš and Prusa (2006) show that trade relationships involving differentiated goods last longer than homogeneous products since differentiated goods require more extensive search and investment costs, i.e., the so-called sunk costs. It suggests that trade relationships of differentiated goods are robust once they are established. Taken together, if a country can produce and export high-sophistication products, it possesses exclusive production capabilities and meets complex production requirements, and the sunk costs to build trade relationships with it are high. As a result, a country with higher export sophistication can easily handle the reciprocal pressures and transfer risks from PTAs, and its competitive position cannot be easily substituted. Therefore, signing a PTA with its trade partner will reduce a country's export resilience, but the effect on the country with higher export sophistication is weaker than that with lower export sophistication. Formally:

Hypothesis 3: The effect of PTA signing on a country's export resilience is less negative when the country has high export sophistication.

Figure 4 The Theoretical Models for Chapter 3

Panel A. The country-level model
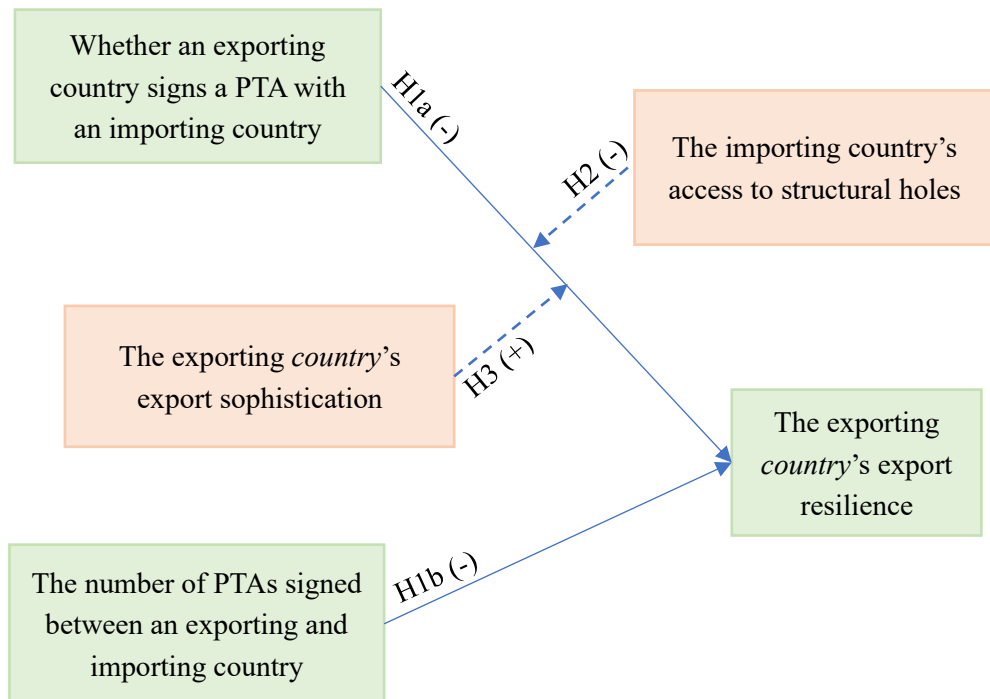
Panel B. The firm-level model
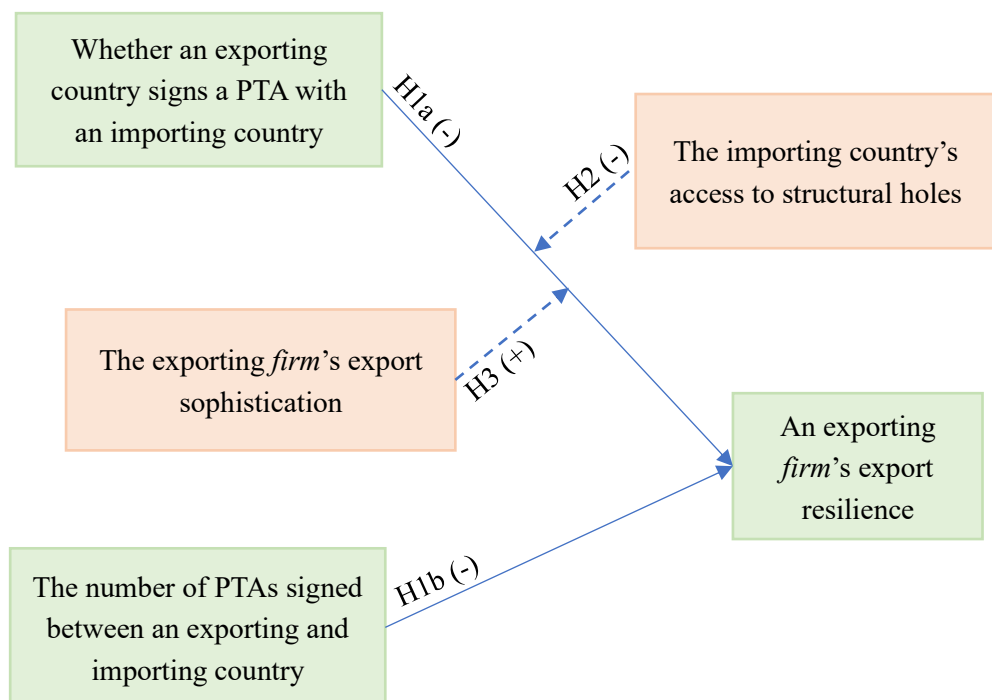
Our framework can be summarized and depicted in Figure 4. Panel A summarizes the theoretical framework at the country level, while Panel B depicts the theoretical framework at the firm level. Since the discussion at the firm level is similar to that at the country level, we do not repeat it to keep the paper reasonably concise. We hypothesize that signing a PTA with its trade partner exerts a negative effect on a firm's or country's export resilience (Hypothesis 1a). The number of PTAs signed between countries negatively affects export resilience (Hypothesis 1b). The framework also considers the moderate roles of the importing country's access to structural holes (Hypothesis 2) and the exporting firm's or country's export sophistication (Hypothesis 3) in the negative direct effect. The negative direct effect will be aggravated if the importing country has access to structural holes, while the negative direct effect will be alleviated if the exporting firm or country has advanced technology.

METHODOLOGY

Sampling

Study 1: country level analysis.

To test our hypotheses at the exporting country-importing country-specific product level, we exploit disaggregated bilateral trade flows from 1995 to 2019 provided by the BACI database on the CEPII website to estimate export resilience. The dataset includes more than 200 countries and records all transaction information, including trade time, exporter, importer, product category in the six-digit Harmonized System (HS), trade value, and quantity. To ensure the maximum length of time series, we employ the 1992 version of the HS product nomenclature (Gaulier & Zignago, 2010). Our sample consists of 213,008,247 observations. To avoid missing observations caused

by overly detailed data when calculating the export resilience index, we aggregate the HS6 transactional information to the HS4 level and obtain 91,883,323 observations. When calculating the export resilience index, we need to use 1995 as the base year, resulting in a loss of 2,164,130 observations. Since a country may not continuously export a certain product, we lose this part of the sample in the export resilience calculation and then have 67,943,999 observations.

We merge our sample with the Gravity Database on the CEPII website to control bilateral country-specific characteristics. The Gravity database provides the variables needed to estimate gravity equations, including geographical distance and proxies for cultural proximity. Since the number of country pairs in the Gravity Database is less than in our sample, we lose some observations and finally obtain 46,563,863 observations. We compare the distribution before and after the data matching and find no noticeable difference, indicating no severe sample selection problem in the data processing.

Study 2: firm level analysis.

To test our hypotheses at the exporting firm-importing country-specific product level, we use data from the Chinese Customs Import and Export Statistics database from 2000 to 2011. The dataset records Chinese trade firms, trade time, trade value and quantity, product category in the eight-digit HS, city of origin, and destination. We aggregate the HS8 transactional information to the HS4 level and obtain 49,152,763 observations. Since many Chinese firms do not continuously export a specific product, using 2000 as the base year and calculating firm export resilience, we then have 14,571,011 observations.

We also merge the sample with the Gravity Database to control the importing country characteristics. We finally obtain 14,451,207 observations.

We then match our two samples separately with the Design of Trade Agreements (DESTA) dataset developed by Dür et al. (2014) to obtain information on PTAs. The DEATA dataset provides the details of PTAs signed and withdrawn between 1945 and 2020 in the dyadic form. We further process it to a panel dataset that captures the dynamic changes in the PTA network between country pairs. Since the number of PTAs signed by a country pair will be treated as zero if no information about the country pair is recorded in the DESTA dataset, we have not lost any observations after the merger.

Measures

Export resilience. We construct the dependent variable export resilience in a similar manner to that for the economic resilience indices developed by Martin et al. (2016). Since the main idea of export resilience is how product export of a firm or country is affected by shocks, we need first to calculate counterfactual product export. Note that the calculation of the firm-level indicators is similar to that of the country-level ones, and we only need to replace the exporting country with the exporting firm. Therefore, we take the calculation of the country-level indicators as an example below. To be specific, if there is no disturbance, the export of a product to an importing country will increase or decrease at the same rate for all exporters. Therefore, we first estimate the expected bilateral product export of a country pair:

$$\left(\Delta E_{odp}^{t+k} \right)^{expected} = \sum g_{dp}^{t+k} E_{odp}^{t} , \tag{17}$$

where o, d, p and t denote the exporting country (or the exporting firm), importing country, product and year, respectively. E_{odp}^{t} is the bilateral export value of product p from exporting country o to importing country d in the base year t, while g_{dp}^{t+k} is the growth or

decline rate of product p exported from all over the world to the importing country d in year $t+k$. Then, we can measure export resilience as:

$$Resil_{odpt} = \frac{\left(\Delta E_{odpt}\right) - \left(\Delta E_{odpt}\right)^{expected}}{\left|\left(\Delta E_{odpt}\right)^{expected}\right|}. \tag{18}$$

The index $Resil_{odpt}$ is centered around zero. A country's product export to an importing country is more resilient than the world average product export if the value of $Resil_{odpt}$ is positive, and less resilient for a negative value. Figure A1 to A4 display the descriptive characteristics of the index to demonstrate its validity.

In summary, we use counterfactual estimates when measuring export resilience. First, a counterfactual estimate for export growth without shocks is calculated as equation (1). Second, we measure export resilience by comparing the counterfactual estimate with actual export growth to derive the magnitude of the impact of shocks on export growth as equation (2). Since actual export growth reflects the influence of shocks, the effects of shocks have been estimated in the resilience index.

Whether a country pair signs a PTA (WPTA). Our independent variable WPTA is a binary dummy variable. If exporting country o and importing country d sign a PTA in year t, the value is 1 from the year of signing to the year of withdrawing from the PTA; otherwise, it is 0.

The number of PTAs signed by a country pair (NPTA). NPTA is a count of PTAs signed between exporting country o and importing country d in year t.

Access to structural holes. For each year, we process the bilateral PTAs signed by country pairs into a 221×221 matrix[7], and we have a total of 25 matrices from 1995 to 2019. Each matrix

---

[7] The DESTA dataset provides a dyadic data format recording the signing of PTAs in 221

element denotes whether a PTA has been signed between a country pair in the year. If there is a PTA signed between a country pair, the value of the element is 1; otherwise, it is 0. Following Burt (2015), we then use two summary measures to capture the importing country's access to structural holes in the PTA network based on each matrix, namely, ego betweenness of Freeman (1977) and effective size of Burt (1980) and Burt (1992). We use the software Ucinet 6 to calculate the two indicators.

Network effective size (NES) is a count of non-redundant PTAs in which the importing country participates. It comprehensively measures three aspects, including the network size, network density, and network hierarchy. We first calculate PTA i's non-redundancy with importing country d's other alternative PTAs j:

$$nr_{di} = 1 - \sum_j p_{dj} m_{ij} ,$$ (19)

where i denotes a PTA, j denotes all other alternative PTAs signed by d, and p_{di} is the proportion of importing country d spent directly with PTA i. Besides, $p_{di} = \left[z_{di} + z_{id} \right] / \left(\sum_j \left[z_{dj} + z_{jd} \right] \right)$, where z_{di} captures the strength of connection from the importing country d to PTA i. Then, p_{dj} is the proportion of importing country d spent with PTA j and involves the strength of connection from the importing country d to PTA j. The marginal strength of i's connection with j is denoted by m_{ij}, which is equal to the connection between i and j divided by the maximum connection of i in importing country d's network. Then, NES defines the number of non-redundant PTAs of importing country d as:

$$NES_d = \sum_i nr_{di} .$$ (20)

For importing country d, if the NES is higher, it has more non-redundant PTAs and more

---

countries.

access to structural holes.

Compared to NES computed based on the importing country's direct PTAs, Freeman's betweenness index is a metric measuring structural hole across indirect PTAs beyond the importing country's network. It captures the extent to which the importing country has exclusive access to structural holes:

$$Betweenness_d = \sum_j \sum_i b_{jid} ,$$
(21)

where b_{jid} is equal to the number of the shortest connection chain that links j and i through importing country d divided by the number of the shortest connection chain between j and i. For importing country d, if the betweenness index is higher, it has more exclusive access to structural holes.

Export sophistication. We use export sophistication constructed by Hausmann et al. (2007) to proxy a country's productivity associated with its product export. We need first to measure product complexity, which is an intrinsic feature of each product p:

$$PRODY_p = \sum_o \frac{\left(x_{op} / X_o \right)}{\sum_o \left(x_{op} / X_o \right)} Y_o ,$$
(22)

where x_{op} is the export value of product p by exporting country o, X_o is total export value of country o, and Y_o is the per capita GDP of country o. Then, export sophistication of a country can be defined as:

$$EXPY_{ot} = \sum_p \frac{x_{opt}}{X_{ot}} PRODY_p ,$$
(23)

where the index $EXPY_{ot}$ is a weighted average of the product complexity for the export baskets of country o in year t. The higher a country's export sophistication is, the more advanced its technology is considered to be.

Control variables. In order to alleviate the problem of omitted variables, we use a set of variables highly related to gravity equations from the Gravity Database on the CEPII website to control bilateral country-specific characteristics, including the distance between capitals, contiguity, common language, common religion, and common colonist. Note that the distance between capitals and contiguity are measures of geographical distance, while language, religion, and colonial relations are proxies for cultural proximity. Table 7 depicts the descriptive statistics and correlations of principal variables at the country level. The variance of inflation factor (VIF) ranges from 1.00 to 2.66, and the mean VIF is 1.64, implying no severe multicollinearity. Specifically, the correlation between the natural logarithm of export value and export resilience is 0.0013, indicating that the association between export growth and resilience is weak despite the positive correlation (Briguglio et al., 2009; Martin, 2012). Promoting export growth is not necessarily correlated with improving resilience.

Table 7 Descriptive Statistics and Correlation Matrix for Study 1

Variables	Mean	S.D.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Export value (logged value)	3.671	3.135	-6.908	18.055												
(2) Whether a country pair signs a PTA	0.537	0.499	0	1	0.055											
(3) The number of PTAs signed by a country pair	1.749	2.235	0	12	0.094	0.727										
(4) Country export resilience	1,555.077	1277807	-7959675	7.160e+09	0.001	-0.0003	-0.0002									
(5) Network effective size	26.989	27.033	0	97.036	0.106	0.277	0.320	0.001								
(6) Betweenness	175.602	229.712	0	1,320.576	0.118	0.175	0.181	0.001	0.753							
(7) Country export sophistication	13400000	7344839	26,806.360	28300000	0.192	-0.084	-0.061	-0.001	-0.007	-0.038						
(8) Contiguity	0.090	0.287	0	1	0.110	0.220	0.319	-0.0001	0.002	0.010	-0.169					
(9) Distance between capitals	5,655.642	4,555.883	10.479	19,812.040	-0.094	-0.458	-0.486	0.0001	-0.171	-0.122	0.142	-0.325				
(10) Common language	0.177	0.382	0	1	-0.034	0.160	0.250	-0.0002	-0.125	-0.115	-0.249	0.194	-0.111			
(11) Common colonist	0.057	0.232	0	1	-0.057	0.023	0.054	-0.0001	-0.124	-0.098	-0.172	0.085	-0.110	0.228		
(12) Common religion	0.192	0.280	0	1	-0.007	0.240	0.297	-0.0002	0.047	-0.004	-0.232	0.190	-0.192	0.337	0.012	
(13) Energy productivity	1,728.931	1,323.393	29.890	25,653.390	0.040	0.034	0.106	-0.0004	0.024	0.012	0.364	-0.122	-0.005	-0.006	-0.084	-0.010

N = 46,563,863; Correlation coefficients with an absolute value greater than 0.0003 are significant at the $p < 0.05$ level.

Research Design

To test hypothesis 1a, the direct effect of PTA signing on export resilience, we first set the following model specification:

$$Resil_{odpt} = \beta_1 WPTA_{odt} + \mathbf{Z}'_{od}\boldsymbol{\eta} + \lambda_{opt} + \delta_{dpt} + \varepsilon_{odpt},\qquad(24)$$

where $Resil_{odpt}$ denotes the export resilience of exporting country o when it exports product p to importing country d in year t, $WPTA_{odt}$ is a dummy variable indicating whether exporting country o signs a PTA with importing country d in year t, and $\mathbf{Z}_{od}$ is the vector of control variables. Note that λ_{opt} is the product-year fixed effect of the exporting country, capturing all time-variant country-specific product-level characteristics such as the product supply capacity of a country and the product quality change of an exporter. δ_{dpt} denotes the product-year fixed effect of the importing country, capturing all product-level changes like the fluctuation in market demand to a specific product. ε_{odpt} is the error term. We expect β_1 to be negative if signing a PTA with the importing country reduces the export resilience of an exporter. To verify hypothesis 1b, we replace the independent variable with the specific number of PTAs:

$$Resil_{odpt} = \beta_2 NPTA_{odt} + \mathbf{Z}'_{od}\boldsymbol{\eta} + \lambda_{opt} + \delta_{dpt} + \varepsilon_{odpt}.\qquad(25)$$

We also expect β_2 to be negative since overly connected PTA networks are likely to accelerate the spread of shocks, making export resilience vulnerable.

Hypothesis 2 predicts that signing a PTA with an importing country should have a more negative effect on the export resilience of an exporter if the importing country has access to structural holes. Hence we estimate the following equation:

$$Resil_{odpt} = \beta_3 WPTA_{odt} \times Network_{dt} + \beta_4 WPTA_{odt} + \mathbf{Z'_{od}}\boldsymbol{\eta} + \lambda_{opt} + \delta_{dpt} + \varepsilon_{odpt} , \quad (26)$$

where $Network_{dt}$ is the PTA network status of importing country d in year t, indicating importing country d's access to structural holes. We consider two different measurements, namely the NES and betweenness. The interaction of $WPTA_{odt}$ with the importing country's access to structural holes, $WPTA \times Network_{dt}$, allows the impact of signing a PTA with an importing country to vary with the extent to which the importing country has access to structural holes. Note that we do not separately control for $Network_{dt}$ in equation (10), because it can be absorbed in the fixed effect δ_{dpt}. As the main effect β_1 is expected to be negative in equation (8), β_3 is supposed to be negative if hypothesis 2 is supported.

In order to examine the moderate effect of the exporting country's technology, we interact $WPTA_{odt}$ with export sophistication as follows:

$$Resil_{odpt} = \beta_5 WPTA_{odt} \times EXPY_{ot} + \beta_6 WPTA_{odt} + \mathbf{Z'_{od}}\boldsymbol{\eta} + \lambda_{opt} + \delta_{dpt} + \varepsilon_{odpt} , \quad (27)$$

where $EXPY_{ot}$ is the export sophistication of exporting country o in year t, capturing the extent to which the exporting country can take advantage of technology to produce and export. By employing the interaction between $WPTA_{odt}$ and export sophistication, $WPTA_{odt} \times EXPY_{ot}$, the effect of signing a PTA with an importing country can differ among countries with various technological levels. Since $EXPY_{ot}$ can be absorbed in the fixed effect λ_{opt}, we do not separately control for it. We expect β_5 to be positive if advanced technology can alleviate the negative impact of signing PTAs on export resilience.

RESULTS

Study 1: country level analysis.

The estimation results of hypothesis 1a and 1b are shown in Table 8. Columns (1) and (2)

present the estimations of equations (8) and (9) without control variables, while columns (3) and (4) show the results controlling for the bilateral features for any country pair, including the distance between the capitals, contiguity, common language, common religion, and common colonist. In order to minimize the omitting variable problem, the exporting country-product-year fixed effects and importing country-product-year fixed effects are controlled in all regressions. First, in columns (5) and (6), our results further verify that signing PTAs has significantly positive effects on a country's export growth. Specifically, when a country signs a PTA with its trade partner, its export value to the partner experiences an average increase of 43%. From column (6), the number of PTAs signed between the exporting country and the importing country increases by 1, and the export value of the exporting country to the importing country increases by 14.8%. The results explain why most countries are keen to sign PTAs with each other for export growth. However, signing PTAs also has a dark side. In column (1), it is notable that a country's export resilience decreases by 123.66% (i.e., the ratio of the coefficient to the mean of export resilience, $\frac{1923.049}{1,555.077} \times 100\%$) when it signs a PTA with its trade partner. In column (2), the number of PTAs signed between the exporting and importing countries increases by 1, but the export resilience of the exporting country decreases by 30.04% (i.e., $\frac{467.141}{1,555.077} \times 100\%$). Columns (3) and (4) show that such negative effects are still significant and robust after controlling for the bilateral country-specific characteristics. A country's export resilience decreases by 86.51% (i.e., $\frac{1345.309}{1,555.077} \times 100\%$) when it signs a PTA with its trade partner, and decreases by 20.15% (i.e., $\frac{313.293}{1,555.077} \times 100\%$) when the number of PTAs signed increases by 1. Our results confirm hypothesis 1a and 1b and explain why some countries withdraw from PTAs despite that signing PTAs is conducive to export growth.

Table 8 The Direct Effects of PTA Networks on Country Export Resilience

VARIABLES	(1) Country export resilience Coef. (SE)	(1) p value	(2) Country export resilience Coef. (SE)	(2) p value	(3) Country export resilience Coef. (SE)	(3) p value	(4) Country export resilience Coef. (SE)	(4) p value	(5) Export value (logged value) Coef. (SE)	(5) p value	(6) Export value (logged value) Coef. (SE)	(6) p value
Whether a country pair signs a PTA	-1,923.049	0.000			-1,345.309	0.024			0.430	0.000		
	(533.316)				(595.508)				(0.001)			
The number of PTAs signed by a country pair			-467.141	0.000			-313.293	0.034			0.148	0.000
			(124.018)				(147.845)				(0.000)	
Contiguity					-250.833	0.774	-78.186	0.930	1.572	0.000	1.461	0.000
					(872.903)		(885.531)		(0.001)		(0.001)	
Common language					-499.089	0.505	-409.920	0.585	0.654	0.000	0.600	0.000
					(748.306)		(751.477)		(0.001)		(0.001)	
Common colonist					291.521	0.810	297.670	0.806	0.696	0.000	0.693	0.000
					(1,210.259)		(1,210.260)		(0.002)		(0.002)	
Common religion					-2,103.342	0.067	-2,021.168	0.079	0.637	0.000	0.582	0.000
					(1,148.761)		(1,151.283)		(0.002)		(0.002)	
Distance between capitals					0.091	0.219	0.086	0.252	-0.0002	0.000	-0.0002	0.000
					(0.074)		(0.075)		(0.000)		(0.000)	

Observations	45,681,886	45,681,886	45,681,886	45,681,886	45,681,886	45,681,886
R-squared	0.096	0.096	0.096	0.096	0.596	0.598
Exporting country-product-year fixed effects	YES	YES	YES	YES	YES	YES
Importing country-product-year fixed effects	YES	YES	YES	YES	YES	YES

SE is standard errors in parentheses.

We report the estimation results of the moderating effects of structural holes and productivity in Table 9. Hypothesis 2 suggests a more substantial negative impact of PTA networks on a country's export resilience when its trade partner has more access to structural holes. In columns (1) and (2), we proxy the importing country's access to structural holes by the NES and Freeman's betweenness, respectively. The coefficient of interaction between WPTA and NES is significantly negative ($\beta_3 = -45.664$, $p < 0.05$), confirming that a country's export resilience is more likely to be affected when it signs a PTA with a trade partner with access to structural holes. Freeman's betweenness also negatively moderates the relationship between WPTA and export resilience ($\beta_3 = -4.495$, $p < 0.05$), further supporting hypothesis 2.

In columns (3) and (4), we dig further into the aspects that can alleviate the negative impact of PTA networks on export resilience. Hypothesis 3 posits that technology development can weaken the negative effect of PTA networks on export resilience. Specifically, in column (3), the interaction of WPTA with export sophistication is significantly positive ($\beta_5 = 0.0002$, $p < 0.05$), which implies the effect of PTA networks on export resilience is weaker when a country has higher export sophistication. In order to test the robustness of the results, we use energy productivity developed by Fouré, Bénassy-Quéré, and Fontagné (2013) as an alternative proxy for technology ($\beta_5 = 0.668$, $p < 0.1$), as shown in column (4). The results further support hypothesis 3.

Figure 5 exhibits the moderators of NES and export sophistication. Consistent with our regression results, the marginal impact of WPTA is more substantial when the importing country has larger NES, whereas it is weaker when the exporting country possesses higher export sophistication.

Table 9 The Moderating Roles of Structural Holes and Country Export Sophistication

VARIABLES	(1) Country export resilience		(2) Country export resilience		(3) Country export resilience		(4) Country export resilience		(5) Country export resilience	
	Coef. (SE)	p value	Coef. (SE)	p value	Coef. (SE)	p value	Coef. (SE)	p value	Coef. (SE)	p value
WPTA * Network effective size	-45.664	0.018							-33.340	0.252
	(19.262)								(29.094)	
WPTA * Betweenness			-4.495	0.031					-1.647	0.600
			(2.080)						(3.143)	
WPTA * Country export sophistication					0.0002	0.023			0.0001	0.089
					(0.000)				(0.0001)	
WPTA * Energy productivity							0.668	0.098	0.381	0.383
							(0.403)		(0.437)	
Whether a country pair signs a PTA (WPTA)	-226.117	0.766	-593.733	0.389	-3,484.544	0.002	-2,388.835	0.006	-2,578.775	0.039
	(759.944)		(689.639)		(1,112.214)		(867.210)		(1,251.287)	
Contiguity	-276.131	0.752	-237.829	0.785	-205.818	0.814	-212.324	0.808	-206.153	0.813
	(872.968)		(872.924)		(873.127)		(873.213)		(873.608)	
Common language	-642.756	0.392	-561.279	0.454	-401.371	0.592	-439.036	0.558	-513.448	0.495
	(750.755)		(748.859)		(749.535)		(749.184)		(752.743)	
Common colonist	372.611	0.758	352.713	0.771	353.376	0.770	340.156	0.779	450.925	0.710
	(1,210.742)		(1,210.590)		(1,210.564)		(1,210.615)		(1,211.212)	
Common religion	-2,105.680	0.067	-2,132.515	0.063	-2,076.694	0.071	-2,118.062	0.065	-2,102.579	0.067

	(1,148.761)		(1,148.840)		(1,148.820)		(1,148.795)		(1,149.082)	
Distance between capitals	0.071	0.337	0.080	0.278	0.094	0.203	0.100	0.176	0.081	0.278
	(0.074)		(0.074)		(0.074)		(0.074)		(0.075)	
Observations	45,681,886		45,681,886		45,681,886		45,681,886		45,681,886	
R-squared	0.096		0.096		0.096		0.096		0.096	
Exporting country-product-year fixed effects	YES		YES		YES		YES		YES	
Importing country-product-year fixed effects	YES		YES		YES		YES		YES	

SE is standard errors in parentheses.

Figure 5 Moderating Effects of Network Effective Size and Export Sophistication

Panel A. Moderating effect of Network Effective Size at the Country Level
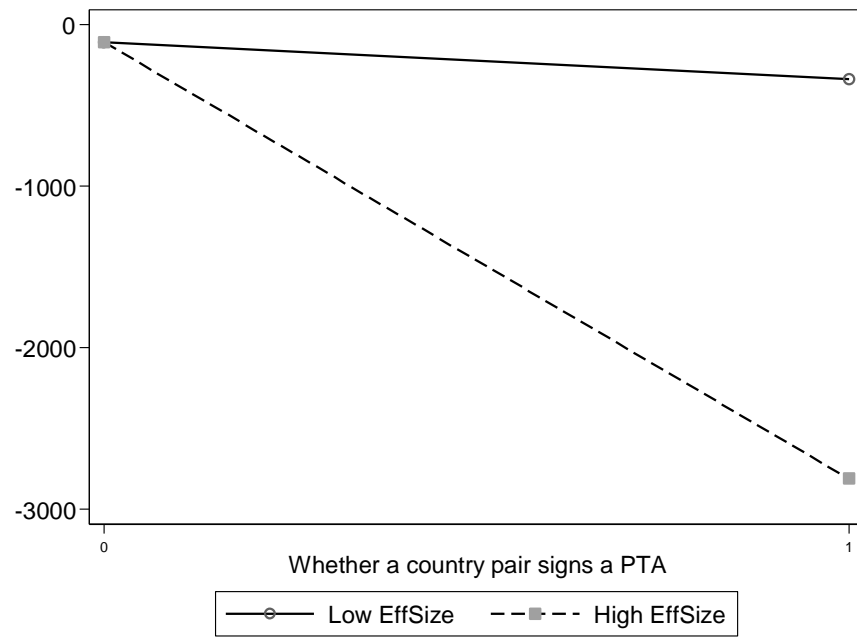
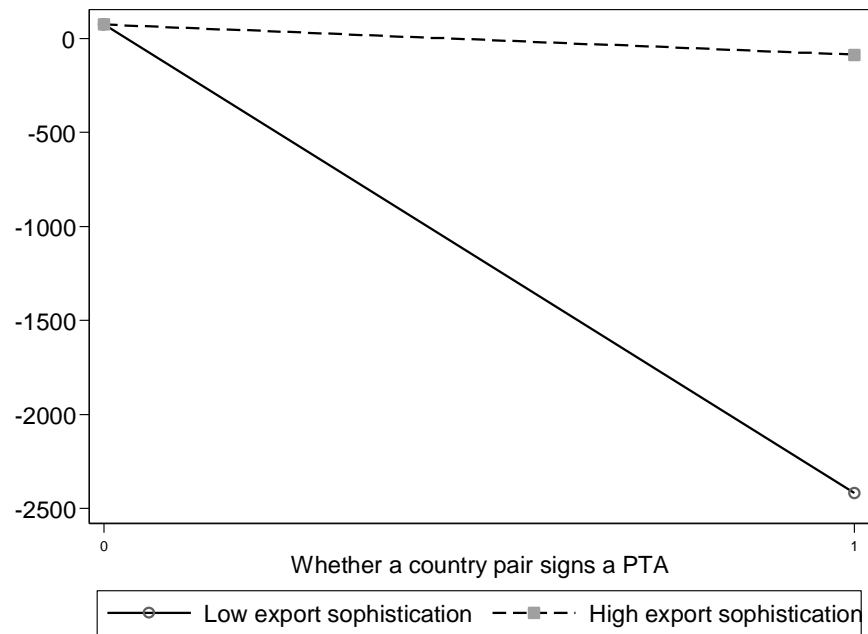Panel B. Moderating effect of Export Sophistication at the Country Level

Table 10 shows the robust results using the instrumental variable (IV) approach. In this paper, the reverse causality is not a severe issue since the dependent variable export resilience is at the product level, while the independent variable PTA signing is at the country level. The independent variable is at a relatively more macro level than the dependent variable. However, considering the omitting variable and measurement error issues, we introduce an instrumental variable to address potential endogeneity problems. In line with Vicard (2012), we use the number of PTAs signed with third countries by the two countries as an instrument for a PTA between two countries in a given year. The underlying reason is that the creation of PTAs by third countries increases the probability of the two countries signing a PTA (Egger & Larch, 2008). There is no reason to believe that the number of PTAs signed with third countries directly affects export resilience between the two countries, as bilateral gravity variables are controlled for in the regression (Vicard, 2012).

We employ a three-stage method to avoid inconsistent estimates since the independent variable WPTA is a dummy one. In the first stage, we use a probit model to generate the fitted values for WPTA with the number of PTAs signed with third countries. We then predict the probability of WPTA based on the probit regression results. In the third stage, we estimate the effect of the probability of WPTA on export resilience. In column (1), the Hausman test rejects the null hypothesis, implying that the independent variable WPTA is not exogenous. The under-identification tests reject the null hypothesis at a 1% level, suggesting that there is no under-identified problem and the instrumental variable is relevant. The F statistic is 10.98, indicating that the instrumental variable is not a weak instrument and the equation is not weakly identified. Although the magnitude of WPTA in column (1) of Table 10 estimated by the IV method is larger

than that in column (1) of Table 8 estimated by the OLS method, the coefficient of WPTA remains

negative and highly statistically significant ($\beta_1 = -3877.262$, $p < 0.01$). In column (2), we

refer to Vicard (2012) and lag the number of PTAs signed with third countries by five years ($t-5$)

as the instrument, of which the result is robust ($\beta_1 = -4269.503$, $p < 0.05$). We have more

confidence in the empirical results with all the sensitivity and robustness tests.

Table 10 The Instrumental Variable Approach

VARIABLES	(1) Country export resilience		(2) Country export resilience	
	Coef. (SE)	p value	Coef. (SE)	p value
Whether a country pair signs a PTA	-3,877.262	0.001	-4,269.503	0.016
	(1,170.224)		(1,771.438)	
Observations	45,681,886		26,597,760	
R-squared	0.096		0.075	
Exporting country-product-year fixed effects	YES		YES	
Importing country-product-year fixed effects	YES		YES	

SE is standard errors in parentheses.

Study 2: firm level analysis.

To verify the robustness of our results, we use Chinese exporting firms as a subsample for

further analysis. We report the descriptive statistics and correlations for the variables in Table 11.

Table 11 Descriptive Statistics and Correlation Matrix for Study 2

Variables	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)
(1) Firm export resilience	753.587	420,845.200						
(2) Whether a country pair signs a PTA	0.190	0.392	-0.0005					
(3) The number of PTAs signed by a country pair	0.359	0.792	-0.0004	0.936				
(4) Network	29.247	28.114	-0.0001	-0.213	-0.195			

effective size								
(5) Betweenness	231.628	291.085	-0.0000	-0.047	-0.050	0.847		
(6) Firm export sophistication	5.650e+09	8.240e+09	-0.001	-0.046	-0.044	0.067	0.035	
(7) GDP of the importing country (logged value)	20.331	1.849	0.001	-0.225	-0.199	0.095	0.089	-0.086

N = 14,451,207; Correlation coefficients with an absolute value greater than 0.0005 are significant at the $p < 0.05$ level.

The estimation results using firm-level export data are shown in Table 12. Columns (1) and (2) present the estimations of hypotheses 1a and 1b, columns (3) and (4) examine hypothesis 2, while column (5) tests hypothesis 3. The results of columns (1) and (2) remain negative and highly statistically significant ($\beta_1 = -335.213$, $p < 0.05$; $\beta_2 = -178.669$, $p < 0.05$), further verifying that PTA networks have substantial adverse effects on firms' export resilience. In column (5), the interaction of WPTA with export sophistication is significantly positive ($\beta_5 = 254.347$, $p < 0.05$), suggesting firms' export sophistication can mitigate the negative effect of PTA networks on export resilience. However, the coefficients of interaction between WPTA and structural hole indices in columns (3) and (4) become insignificant. The network positions of the trading countries do not significantly affect a firm's export resilience. A possible explanation is that an exporting firm's actual trade partner is importing firms rather than importing countries, and we should use the network status of importing firms as a moderator. Unfortunately, the data on the importing firms is unavailable.

Table 12 The Effects of PTA Networks on Firm Export Resilience

VARIABLES	(1) Firm export resilience Coef. (SE)	p value	(2) Firm export resilience Coef. (SE)	p value	(3) Firm export resilience Coef. (SE)	p value	(4) Firm export resilience Coef. (SE)	p value	(5) Firm export resilience Coef. (SE)	p value
Whether a country pair signs a PTA (WPTA)	-335.213	0.046			-522.603	0.121	-500.307	0.057	-5,849.878	0.012
	(168.099)				(336.605)		(262.983)		(2,328.777)	
The number of PTAs signed by a country pair			-178.699	0.033						
			(83.774)							
WPTA * Network effective size					11.810	0.475				
					(16.539)					
WPTA * Betweenness							0.774	0.415		
							(0.950)			
WPTA * Firm export sophistication									254.347	0.018
									(107.128)	
Network effective size					1.340	0.550				
					(2.241)					
Betweenness							0.092	0.663		
							(0.211)			
GDP of the importing country (logged value)	149.252	0.000	149.661	0.000	147.467	0.000	146.740	0.000	147.487	0.000
	(37.025)		(36.881)		(37.074)		(37.199)		(37.032)	
Observations	14,200,252		14,200,252		14,200,252		14,200,252		14,200,252	
R-squared	0.159		0.159		0.159		0.159		0.159	
Firm-Year fixed effects	YES		YES		YES		YES		YES	
Product-Year fixed effects	YES		YES		YES		YES		YES	

DISCUSSION AND CONCLUSION

This paper investigates how a country's export resilience reacts to its PTA signing behavior at both the exporting country-importing country-specific product level and the exporting firm-importing country-specific product level. Although existing research shows that PTAs promote trade flows (Eicher & Henn, 2011; Medvedev, 2010), we argue that trade growth can be fragile. In line with social network theory, we suggest that it is possible for an exporting firm or country to experience a fall in export resilience when the country signs a PTA with its trading partner. The empirical results from the two panel data sets confirm that a firm's or country's export resilience decreases after signing a PTA with its trading partner. The number of PTAs signed between the exporting and importing country also negatively affects the exporting firm's or country's export resilience. Namely, the more PTAs the two countries sign, the more likely a firm's or country's export resilience will decline. The direct effects are remarkably robust after considering potential endogeneity issues. The moderator of the importing country's access to structural holes in the PTA networks plays a role in strengthening the direct effect, whereas the moderator of the exporting country's export sophistication can mitigate the negative impact. We take these results to suggest that PTA networks have a dark side despite promoting export growth. Signing a PTA with its trade partner is likely to increase the pressure on a country to conform to rules on the priority of mutual benefits, spread risks through connected networks, and increase the difficulty of its domestic production adjustment, leading to a decline in its export resilience.

The findings from this study make several contributions to the literature on the international business and social network theory. First, this study helps inform the other side of the coin. While

PTA signing is positively related to export growth, it leads to a decline in export resilience. Our findings provide an explanation of the puzzle that some countries choose to withdraw from PTAs despite those PTAs being initially conducive to their export growth. We argue that PTA networks negatively affect export resilience at both the firm and country levels by (1) creating reciprocal pressures and (2) transferring risk. Our study, therefore, examines the relationship between PTA networks and export resilience and helps deepen our understanding of the economic impact of PTA networks.

Second, this study adds to the literature about the heterogeneous nature of the relationship between PTA networks and export resilience. We argue that the relationship is contingent on the PTA network status of the importing country and the export sophistication of the exporting firm or country. We differentiate the importing countries with different access to structural holes and the exporting firms or countries with different export sophistication. Our study, therefore, helps inform the boundary conditions to the causal relationship between PTA networks and export resilience at the firm and country levels.

Third, we apply social network theory to the explanation of a counter-intuitive business fact. Intuition-wise, PTA networks facilitate information sharing, reduce the number of intermediaries, and strengthen the mutual trust between the exporting and importing countries. However, in reality, PTA networks can hurt export resilience, and this seemingly counter-intuitive phenomenon can actually be explained by social network theory. The mechanisms of creating reciprocal pressures and transferring risk for the negative impact of PTA networks on export resilience are well documented in social network theory (Burt, 1992; Coleman, 1988), and our study contributes to the theoretical and empirical literature by applying social network theory to

analyze an important international business activity which has not yet been understood and explained theoretically.

For international business firm managers and policymakers of countries, our findings call for explicit attention to export resilience when joining PTAs. PTA signing indeed boosts a country's export value, but the adverse effects of joining PTAs are also significant. A decrease in export resilience means the decline of a firm's or country's resistance and recoverability from world economic disturbances. When faced with shocks such as the financial crisis and the COVID-19 pandemic, it will take a longer time for a firm or country to recover its previous export growth rate, or it will bounce to an equilibrium path worse than the previous one. Moreover, it would be wise for policymakers to exercise caution across the network status of countries with which PTAs are signed. Signing PTAs with countries with more access to structural holes can obtain richer information and more trade opportunities, but the resulting brokerage fees can also be expensive. While export growth needs to be encouraged, policymakers and firms need to adopt measures to reduce the negative impact of PTAs on export resilience.

Our findings suggest that firms and policymakers should attach great importance to the domestic production structure and export sophistication. This study shows that the negative effect of PTA networks on export resilience can be alleviated if a firm's or country's export sophistication is high. Increasing export sophistication cultivates a firm's or country's exclusive production capabilities and technology, and it achieves economic transformation, making it difficult for the firm or country to be substituted in the network, thereby reducing the substitutability for its export products. Therefore, optimizing the domestic industrial structure and increasing export sophistication are conducive to a firm's or country's resistance to the decline in

export resilience resulting from PTA networks.

Export resilience is an emerging research field, and this study helps improve our understanding of the effect of PTA networks on export resilience. For future research, the related question is, what factors other than PTA networks will affect export resilience? This question is associated with improving a country's export resilience and the strategies that policymakers can adopt to offset adverse effects on export resilience. Moreover, we implicitly assume that PTAs are homogenous in this paper, and it would be helpful to examine the contingent effects of heterogenous PTA clauses for future research.

APPENDIX

Figure A1. Export Resilience Distribution Histogram
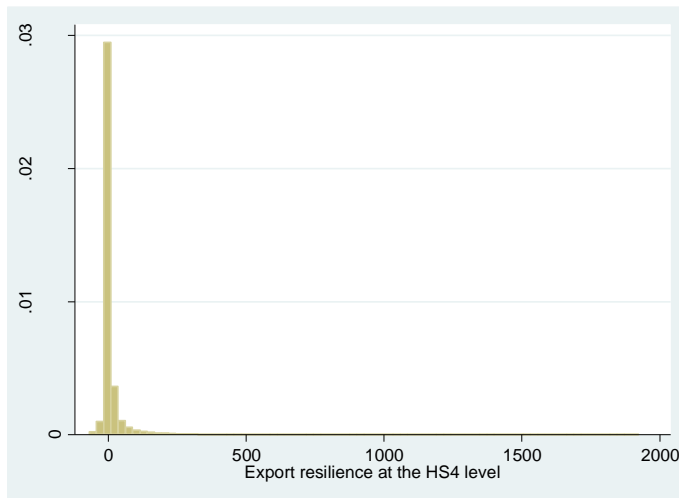
To demonstrate the validity of our core variable, export resilience, we further display its descriptive characteristics. We first winsorize export resilience calculated by equation (2) at the 1% and 99% levels to mitigate the influence of outliers. Specifically, we discard values smaller than the 1% level or greater than the 99% level. We obtain 45,632,587 observations after winsorizing, in contrast to 46,563,863 observations before winsorizing. Figure A1 depicts the value distribution of export resilience. Consistent with the interpretation in our paper, the index is mainly centered around zero.

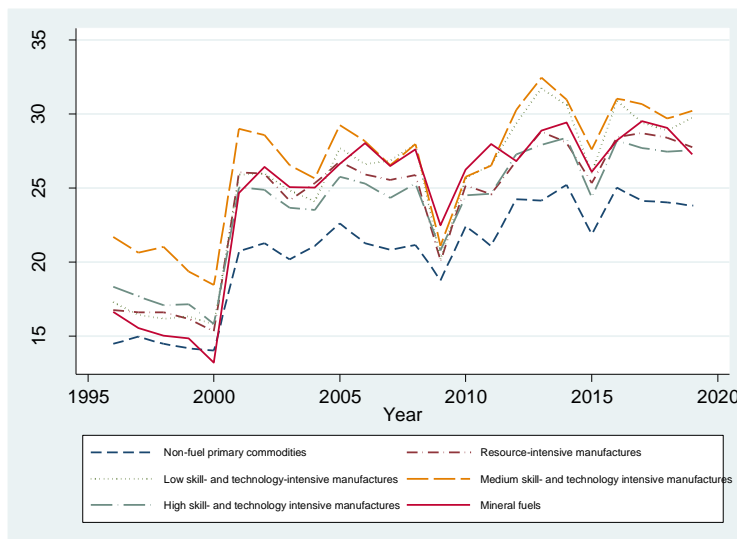**Figure A2.** Export Resilience by Product Classification

Figure A2 presents export resilience by six different levels (Basu & Das, 2011): Non-fuel primary commodities, Resource-intensive manufactures, Low skill- and technology-intensive manufactures, Medium skill- and technology-intensive manufactures, High skill- and technology-

intensive manufactures, and Mineral fuels. While the overall trend of export resilience has been on the rise, there was a substantial fall in 2009, consistent with the 2009 financial crisis (Chor & Manova, 2012). Furthermore, the most resilient are Medium skill- and technology-intensive manufactures, and the least resilient are Non-fuel primary commodities.

Figure A3 and Figure A4 compare export growth rates and resilience between large and small countries. We start by ordering the countries' populations in our sample, with the most populous being China, India, and the United States, and the least dense being Montserrat, Saint Pierre and Miquelon, and Saint Helena. At the country level, export growth rates reflect the financial crisis in real-time, as a sharp decline in 2009. Export resilience demonstrates a delay in the situation, as most countries' large fluctuations in export resilience happened in 2012. It takes time for a country's economy to respond to shocks. In addition, the exports of China and the United States are the most resilient, with resilience values above 0, and they have responded well to the crisis. The fluctuation range of export resilience of small countries is broader than that of large countries, considering that industries of small countries are relatively single and more vulnerable to shocks.

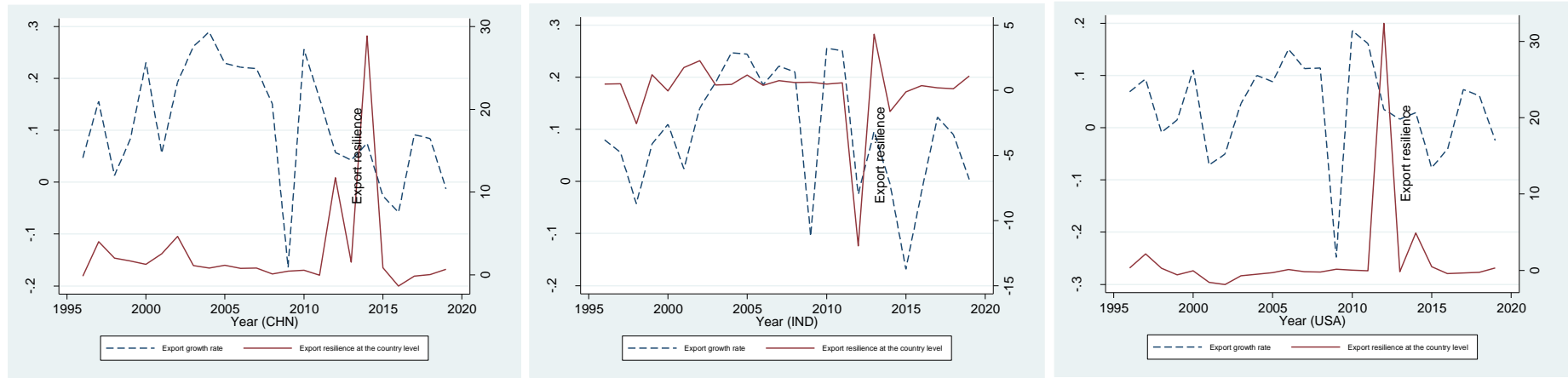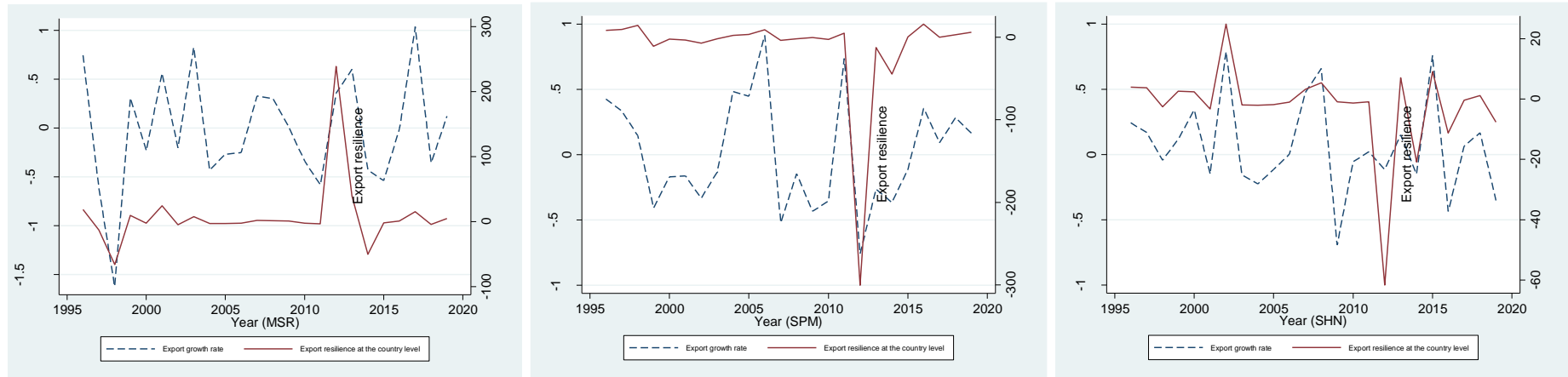**Figure A3.** Export Growth Rate and Resilience of Large Countries

Figure A4. Export Growth Rate and Resilience of Small Countries

Chapter 4: Political Connection Disruptions and Firms' Export Value

Abstract

While political connections have been a widespread global phenomenon, our understanding of how they affect firm export remains limited. Drawing on the social network theory, we argue that the forced resignations of politically connected independent directors fracture the interlocked corporate and political network clusters into distinct components. Political connection disruptions can positively affect firm export because firms take proactive strategic responses, using export to substitute the shrinking domestic market to neutralize the damage induced by political network disruptions. High independent director network centrality mitigates the detrimental effect of political connection disruptions. Further, firms' strategic reconfiguration from the domestic market to export is achieved by boosting their R&D expenditures. We use a difference-in-differences design to isolate the effects of political connections. Empirical evidence from publicly listed Chinese export firms supports our arguments.

Keywords: Political Connection Disruptions, Firm Export, Network Centrality, R&D Expenditures

INTRODUCTION

Political connections have been widely studied in the international business and strategic management fields (Boubakri, Mansi, & Saffar, 2013; Chen, Ding, & Kim, 2010; Yan & Chang, 2018; Zheng, Singh, & Mitchell, 2015) since political disadvantage cannot be compensated by advantageous business networks (Burt & Opper, 2020). Political connections, or political ties, are "boundary spanning personal and institutional linkages between firms and the constituent parts of public authorities" (Sun, Mellahi, & Wright, 2012: 68). More bluntly, political connections are "the presence of politicians on the board of directors or in the management ranks of the firm" (Tihanyi et al., 2019: 2295). Political connections are seen as one of the firms' main non-market strategies (Mellahi, Frynas, Sun, & Siegel, 2016) and can give firms various advantages in the market competition, such as financing support (Cull, Li, Sun, & Xu, 2015; Li, Meng, Wang, & Zhou, 2008), regulatory relief (Brown & Huang, 2020), and government contracts (Díaz-Díaz, López-Iturriaga, & Santana-Martín, 2022). Although prior studies have investigated the value of political connections (Cheng, 2018; Fisman, 2001; Sun et al., 2012), there is a lack of research on the interaction between political connections and firms' market strategies. From the perspective of suddenly being bereft of political connections, this study focuses on the effect of political connection disruptions on firms' market strategy reconfiguration.

Exporting is an exceptionally essential internationalization strategy for firms (Cassiman & Golovko, 2011). Since exporting is a more straightforward and accessible way to enter foreign markets than foreign direct investment (Lu & Beamish, 2006), our work uses export as a proxy for firms' international strategy. Existing evidence on the value of political connections to firms' export is thin and equivocal. On the one hand, related literature suggests that politically connected

firms have privileged access to government-controlled resources and tax exemptions to develop

comparative advantages and promote export (Ding, Fan, & Lin, 2018; Rijkers, Baghdadi, &

Raballand, 2017). On the other hand, considering the domestic preferential treatment, political

connections can dampen firms' export since connected firms are more likely to suffer from

managerial inefficiency and have less incentive to export than their counterparts (Chaney, Faccio,

& Parsley, 2011; Lee & Weng, 2013).

We argue that the ruin of non-market strategies results in subsequent market strategic

redeployments. According to Ahuja (2000b), firms have three asset stocks: Technical, commercial,

and social capital. Firms need to accumulate the above capital over time to create value. Political

connections are one of the most valuable social capital (Burt & Opper, 2020), and firms'

distribution between domestic and export markets is commercial capital to commercialize new

technologies. Therefore, when firms experience the loss of political connections, they have a solid

incentive to boost commercial and technical capital to stay competitive. As connected firms enjoy

preferential domestic treatment and export entails extra costs (Golovko & Valentini, 2011; López-

Bazo & Motellón, 2018), they prefer to trade domestically rather than export. However, when

they experience abrupt political connection disruptions, their dominance in the domestic markets

is weakened. As a result, firms bereft of political connections are forced to export. Further, the

transfer from domestic sales to export resulting from social capital losses is partially achieved by

developing technical capital, which refers to increasing research and development (R&D)

expenditures in this paper.

This paper utilizes the Communist Party of China's Rule No. 18 (Rule No. 18) issued on

October 19, 2013, as a quasi-natural experimental event and conducts a difference-in-differences

(DID) design to identify the causal effects of political connection disruptions on firms' export value. Rule No. 18 prohibits party and government officials who are incumbent or within three years of retirement from holding positions in firms, triggering a wave of resignations of politically connected independent directors (PCIDs) from Chinese listed firms (Cheng & Sun, 2019; Liu, Lin, & Wu, 2018). Drawing on the social network theory (Burt, 2004; Burt, 1992), we argue that PCIDs bridge structural holes as they span corporate and political network clusters, and the forced resignations of PCIDs fracture the interlocked network clusters into distinct components. Firms with PCID losses experience a diminishing dominance in the domestic markets. We test the positive relationship between political connection disruptions and firms' export value based on a panel dataset of publicly listed Chinese export firms from 2012 to 2015. We manually collect the dataset on PCID resignations and merge it with the China Stock Market and Accounting Research (CSMAR) database and the Chinese Customs Import and Export Statistics (CCIES) database. We find that the effect of political connection disruptions on firms' export value is significantly positive, and the effect is weakened when firms have higher independent director network centrality. Further, the relationship between political connection disruptions and firms' export value is partially mediated by firm R&D expenditures. Political connection disruptions increase firm R&D expenditures and thereby boost firms' export value.

This paper makes several theoretical contributions to international business and strategic management literature. First, this study sheds light on the consequences of political connection disruptions. Prior studies concern the direct adverse effect of political connection losses on firms (Cheng & Sun, 2019; Liu et al., 2018), whereas our focus on the surge of firms' export value allows us to explore the subsequent influence of network disruptions on firms' market strategies.

Second, this study contributes to the literature on reconfiguring firms' market strategies when non-market strategies face unanticipated external changes. Existing research focuses on the link between non-market strategy and organizational performance (Mellahi et al., 2016), and our work adds to the sparse research on integrating market and non-market strategies. Namely, firms actively adopt market strategy adjustments to cope with the ruin of non-market strategies. Our work also adds insights to the research on the interaction among firms' market strategies by revealing the interplay between domestic market, export, and innovation strategies. Third, this study enriches the social network theory literature by probing political connectedness and the alternative resources within the interlocked networks. We contribute to the empirical research that uses social network theory to consider the detrimental effect of removing actors brokering connections across structural holes (Duxbury & Haynie, 2018; Shaw et al., 2005). By considering the independent director network centrality, we explore the boundary conditions under which firms can be less vulnerable to deterioration by leveraging alternative resources and information from interlocked networks.

This paper proceeds as follows. In the second section, we review the related literature and develop hypotheses. We then describe our sample, measures, and research design. The following section presents our empirical results. The final section discusses and concludes.

THEORY AND HYPOTHESES

Prior Research on Political Connections and Export

Although it is necessary to consider the appropriate political context (Cui, Hu, Li, & Meyer, 2018), political connections are a widespread global phenomenon (Faccio, 2006). They play an

essential role in fueling business activity in both developed economies (Cohen, Coval, & Malloy, 2011; Shirodkar, Batsakis, Konara, & Mohr, 2022) and emerging markets (Armanios, Eesley, Li, & Eisenhardt, 2017; Cheng, Chan, & Leung, 2018). Political institutions shape the business environment and constrain firms' operations (Doh, Lawton, & Rajwani, 2012). Governments usually control critical resources required for firms, such as land, loans, and public subsidy (Wei, Hu, & Chen, 2020). Propping up political relationships helps firms absorb uncertainties in accessing critical resources (Huang, Xie, Li, & Reddy, 2017; Wu & Zhao, 2015) and improves the bargaining positions in negotiations with governments (Calluzzo, Nathan Dong, & Godsell, 2017; King, 2015). Therefore, firms can develop and deploy their political connections to achieve their objectives and alleviate the influence of external dependence (Shirodkar & Mohr, 2015).

The value of political connections has long been investigated in the existing literature. Consistent with the conventional economic view, political connections mask transparency and increase information asymmetry (Chen et al., 2010) due to helping politicians transfer benefits to connected firms (Faccio & Parsley, 2009). Those resources transferred by the government come with distortionary consequences and crowd out firm investment, making firms experience a decline in sales growth (Cohen et al., 2011). However, the marginal benefits of political connections outweigh their marginal costs for most connected firms (Faccio, 2006). Political connections bring high returns (Ferguson & Voth, 2008) and account for a large percentage of well-connected firms' value (Fisman, 2001). They can directly provide firms with regulatory relief (Brown & Huang, 2020) and secure lucrative government contracts (Wei et al., 2020) to firms as governments play a prominent role of regulators and customers in the economy. These preferential treatments and contracts boost product sales and help firms expand their business. Political access

also grants firms favors in financing support (Claessens, Feijen, & Laeven, 2008; Cull et al., 2015) and government bailouts (Boubakri et al., 2013; King, 2015), making firms insulate from budget constraints.

Preferential domestic resources related to political connections also profoundly affect firms' international market expansions (Tihanyi et al., 2019). Due to the exchange of benefits between connected firms and politicians, firms need to repay the favors (Diwan, Keefer, & Schiffbauer, 2015; Yan & Chang, 2018) and help relevant government officials achieve performance goals (Bertrand, Kramarz, Schoar, & Thesmar, 2018). Most officials are concerned with domestic economic development and discourage overseas investment (Cui et al., 2018), which can restrict firms' ability to internationalize (Lebedev, Sun, Markóczy, & Peng, 2021). However, different from other forms of internationalization, such as outward foreign direct investment, the production activity of export usually can be done domestically, promoting local employment and economic development. Political actors actively encourage exports (Sharma, Cheng, & Leung, 2020).

Although domestic institutions have been seen as a significant determinant of a country's comparative advantage (Manova, 2013; Nunn, 2007), the overall effect of political connections on firm export is not unanimous. On the one hand, politically connected firms are more prone to import tariff evasion (Rijkers et al., 2017), and tax exemptions can promote their exports if their production of exported goods requires imported goods inputs. More directly, politically connected firms can mobilize government-controlled resources and power to gain a comparative advantage (Ding et al., 2018), especially when contract enforcement (Levchenko, 2007; Lu, 2011) and financial support (Ju & Wei, 2011; Li et al., 2008) are highly requested. On the other hand,

political connections can significantly dampen firms' export (Bloom, Manova, Van Reenen, Sun, & Yu, 2018b) since managerial inefficiency (Chaney et al., 2011; Ding et al., 2018) exists. For example, to help politicians achieve the goal of job-creating, connected firms are likely to hire more workers than the economically efficient level (Bertrand et al., 2018). Besides, the domestic preferential treatment can reduce the incentive of connected firms to export (Hundley & Jacobson, 1998; Lee & Weng, 2013).

The existing literature has relatively little research on the relationship between political connections and firm export (Sharma et al., 2020), and the conclusions on the relationship between the two are inconsistent. We tap into a quasi-natural experimental event, Rule No. 18, issued on October 19, 2013, and identify the causal effects of political connection disruptions on firms' export value. We add insights to strategic responses to the loss of political resources in the firm management field. We begin by exploring the direct effect of political connection disruptions on firm export and then analyze a contingent firm characteristic, independent director network centrality, that can alter the main effect. Finally, we reveal the mediating role of firm R&D expenditures in the relationship between political connection disruptions and export.

The Direct Effects of Political Connection Disruptions on Export Value

Since we use the forced resignation of PCIDs as a proxy for political connection disruption, we first figure out the value of independent directors. Independent directors have important board monitoring roles in protecting shareholder interests (Masulis & Zhang, 2019; Vafeas & Vlittis, 2018), but their value goes far beyond that. In addition to the monitor roles, independent directors provide firms with pertinent advice (Nguyen & Nielsen, 2010) on critical strategic decisions

(Masulis, Wang, & Xie, 2012), and the contribution of independent directors to firms is determined by their independence, individual ability, and firm characteristics (Oh, Ding, & Park, 2021). PCIDs can take advantage of their political capital and play coordinating and consultative roles in helping firms foster a relationship with the government (Wang, Feng, & Xu, 2019) and acquire critical government resources (Wei & Muratova, 2020). Accordingly, firms with PCIDs are inclined to outperform their non-connected counterparts (Wang, 2015). A growing body of literature has used sudden deaths (Cheng, 2018; Nguyen & Nielsen, 2010) or mandatory resignations (Liu et al., 2018; Xu, 2018) of independent directors as exogenous shocks to identify the value of political connections.

The consequences of network disruptions have long been discussed in prior research. In the social network theory, if the connection dissolves, the social capital contained in the relationship is lost (Burt, 1992; Shaw et al., 2005). PCIDs are a handful of firms' strategic partners (Burt, 1992) strongly connected with political networks, and they bridge structural holes as they span firms' and political network clusters. Since structural hole bridges have vision advantages and numerous opportunities (Burt, 2004), removing actors brokering connections across structural holes can yield a more significant detrimental effect than the loss of actors occupying other network positions (Duxbury & Haynie, 2018; Shaw et al., 2005). The mandatory resignation of PCIDs fractures the interlocked corporate and political network clusters into distinct components, resulting in relevant benefit losses (Cheng & Sun, 2019; Li & Cheng, 2020). Existing research has highlighted that the losses of PCIDs can lead to adverse stock price reactions (Cheng & Sun, 2019; Liu et al., 2018), a decrease in firm value (Xu, 2018), and an increase in labor costs (Wei et al., 2020). However, since social networks are dynamic and evolve with actors' choices

(Eguiluz, Zimmermann, Cela-Conde, & San Miguel, 2005), firms with PCID losses take proactive strategic responses (Li & Cheng, 2020).

We argue that firms with political connection disruptions have a strategic reconfiguration. Institutional factors are more important than factor endowment in economies with low-quality institutions (Ju & Wei, 2011). Government interventions and under-developed economic institutions create barriers for firms to trade between domestic regions (Brun, Combes, & Renard, 2002). Firms deploy political connections to address the unfavorable institutional environment, and political connections help firms mitigate domestic constraints and expand regional trade (Lu, 2011). Moreover, politically connected firms can control entry and maintain price-fixing utilizing political regulation (Kim, 2018; Stigler, 1971), which keeps out rivals and raises profits. However, when firms experience political connection disruptions, domestic institutional barriers become dominant again, reducing the competitiveness of these previous political connected firms in the domestic market. These firms have to face the same domestic operating environment as their competitors and lose previous market controls over their rivals. While existing research (Kim, 2018; Li & Cheng, 2020) investigates that firms use the physical capital investment to replace political capital, the strategic substitution between domestic and international markets deserves attention. Since political connection disruptions decrease labor productivity (Wei et al., 2020), the export growth coming with PCID resignations is different from Melitz (2003), who addresses that only the more productive firms can export. Firms develop coping strategies, using export to substitute the domestic market to neutralize the damage caused by political network disruptions.

Existing research has shed light on the interdependent relationship between domestic sales and exporting strategies. Firms' export and domestic sales are affected by firm characteristics and

external factors and are simultaneously determined (Salomon & Shaver, 2005). Firms make strategic allocations in domestic and export markets to maximize profits. Political connection disruptions make connected firms experience abrupt domestic market shrinkage, resulting in strategic decision changes between domestic and export sales to achieve optimal choices. Specifically, when the domestic market suddenly shrinks, firms are forced to increase export to recoup the domestic loss (Lee, Beamish, Lee, & Park, 2009). Taken together, the mandatory resignation of PCIDs disconnects firms from political networks and contracts domestic markets, pushing firms to increase export. Formally:

Hypothesis 1: Political connection disruptions positively affect a firm's export value.

Heterogeneity of Independent Director Network Centrality

Though, on average, a positive relationship may exist between political connection disruptions and firm export due to strategic reconfiguration, a firm's independent director network centrality (IDNC) can alter the relative importance of a firm's political connections, thus moderating this positive relationship. Interlocked independent directors (two or more firms share one or more independent directors in common) form an independent director network from which a firm can access alternative resources and information (Lebedev et al., 2021). Directorate ties are multiplex cooptive (absorptive) relations to external constraints (Burt, 1983) and perform the advice, counsel, and influence functions (Markóczy, Li Sun, Peng, Shi, & Ren, 2013), providing trustworthy information (Burt & Burzynska, 2017) that can be integrated into corporate plans. Interlocks affect firms' involvement and strategies (Haunschild & Beckman, 1998). Besides information, interlocked directors provide firms with numerous critical resources (Zheng et al.,

2015; Zona, Gomez-Mejia, & Withers, 2018), such as financial resources and unique technologies (Howard, Withers, & Tihanyi, 2017). These valuable resources aid investment and financing decisions (Li, Fung, Fung, & Qiao, 2020). Besides, interlocks facilitate interfirm commitments by fostering mutual trust (Sauerwald, Lin, & Peng, 2016; Zhong, Su, Peng, & Yang, 2017) and restraining competition (Mizruchi, 1996; Uzzi, 1997). Growth in trust among interlocked corporations can reduce uncertainty (Martin, Gozubuyuk, & Becerra, 2015) and create favored trade partners (Ma, Huang, & Shenkar, 2011), which enables firms to stabilize interfirm transactions and maximize transaction efficiency. Therefore, interlocking directorates among corporations can ensure access to information flows, valuable resources and interfirm commitments (Davis & Cobb, 2010).

The position in the network affects inter-organizational information and group performance (Ahuja, 2000a; Haunschild & Beckman, 1998). A firm's centrality refers to a central position within the interlocked networks (Li et al., 2020), reflecting its ability to form direct ties with other firms to readily obtain alternative resources (Markóczy et al., 2013). Alternative resources outside the firm-government relationship enable firms to exercise discretion (Zheng & Xia, 2018). Since greater centrality provides firms with more abundant information (Davis, 1991) and smoother alliance collaborations (Yang, Lin, & Lin, 2010), firms can notice and respond to external changes more rapidly. Central firms can have relatively sufficient time to cope with the detrimental effect of political connection disruptions and find alternative solutions. Moreover, as more central firms share joint directors with other firms, centrality indicates the degree of integration with the corporate elite (Davis, 1991). Network centrality can facilitate the transfer of best practices and learning (Martin et al., 2015), enhancing firm performance and reducing the dependence on the

surrounding environment. More central firms are likely to be less dependent on political connections than less central firms. The abundance of alternatives in the interlocked networks alleviates the adverse effects of increased domestic barriers and shrinking domestic markets resulting from political connection disruptions, easing the transfer to the export markets. Specifically:

Hypothesis 2: Political connection disruptions have a less positive effect on the export value of firms with higher independent director network centrality compared to firms with lower independent director network centrality.

The Mediating Role of R&D expenditures

We examine how firm R&D expenditures may mediate the relationship between political connection disruptions and export value. The distribution between domestic sales and export is a firm's commercial capital (Ahuja, 2000b), which can be used to commercialize new technologies. We thereby posit that the strategic reconfiguration of firms from the domestic market to export is achieved by boosting their technical capital. R&D expenditures are an input-based measure of innovation (Cheng, Cheng, & Zhuang, 2019; Díaz-Díaz et al., 2022). As technologies and innovation cannot be instantaneously developed (Ahuja, 2000b) when firms suffer from sudden political capital loss, we use R&D expenditures to measure a firm's willingness and effort to cultivate its technological advantages. We explore the influence of (1) political connection disruptions on firm R&D expenditures and (2) firm R&D expenditures on export value.

There is a substitution relationship between the political capital and firm R&D expenditures (Kim, 2018). First, as explained in hypothesis 1, firms take advantage of their political

connections to avoid domestic barriers (Lu, 2011) and gain preferential treatment (Brown & Huang, 2020; Lee & Weng, 2013), increasing domestic market power (Hou, Hu, & Yuan, 2017) and alleviating competition pressure (Hundley & Jacobson, 1998). Therefore, politically connected firms do not have a strong incentive to make R&D investments (Cheng et al., 2019), which are comparatively high-risk and information asymmetric (He, Li, & Luo, 2021). Second, the investment in political capital can occupy the resources invested in R&D (Díaz-Díaz et al., 2022; Liu, Du, Zhang, & Tian, 2021). Connected firms spend more resources on lobbying (Kim, 2018) and helping connected officials (Bertrand et al., 2018) than their non-connected counterparts, draining resources from R&D investment (Hou et al., 2017). When firms experience political connection disruptions, they are less competitive in the domestic market and have lower rent-seeking costs than before. The increased competitive pressure and decreased crowd-out effect resulting from political capital loss lead these firms to increase their R&D expenditures (Díaz-Díaz et al., 2022; Fudenberg & Tirole, 2013). Moreover, political connection disruptions decrease labor productivity (Wei et al., 2020). Since innovation is usually considered to boost productivity by enhancing production efficiency (Li, 2020) and reducing production costs (Liu, Du, Zhang, Tian, & Kou, 2021), firms tend to increase R&D expenditures to hedge against productivity decrease. Taken together:

Hypothesis 3: If a firm experiences political connection disruptions, it will increase its R&D expenditures.

The positive relationship between firm R&D expenditures and international expansion is well established in the international business field, theoretically and empirically (Dohse & Niebuhr, 2018; Filatotchev & Piesse, 2009; López-Bazo & Motellón, 2018). Cassiman and

Golovko (2011) argue that there are two channels, a direct effect and an indirect effect through enhancing productivity, by which innovation can affect firm export. The former indicates that firms export to expand product demand and increase sales volumes to spread the R&D costs (Filatotchev & Piesse, 2009). The latter suggests that innovation can enhance firm productivity, making firms self-select into the export market. The indirect effect of innovation on export is consistent with Melitz (2003), who emphasizes that only the more productive firms enter the export market (Faustino & Matos, 2015; Golovko & Valentini, 2011). In addition, considering the shrinking domestic market resulting from political connection disruptions, firms invest in R&D targeted for export markets (Geldres-Weiss, Uribe-Bórquez, Coudounaris, & Monreal-Pérez, 2016; Salomon & Shaver, 2005), thereby increasing export sales. Hence:

Hypothesis 4: If a firm has increased its R&D expenditures, its export value increases more than other firms without an R&D expenditure surge.

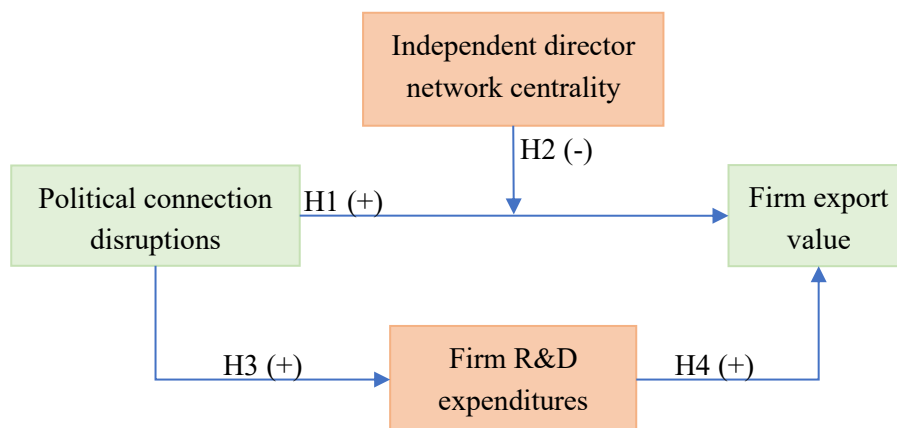**Figure 6 The Theoretical Models for Chapter 4**

Figure 6 depicts our framework. We hypothesize that political connection disruptions positively affect firms' export value (Hypothesis 1), and firm independent director network centrality plays a moderating role in the relationship (Hypothesis 2). The positive direct effect

will be alleviated if a firm has higher independent director network centrality. The framework also suggests that firm R&D expenditures mediate the main effect. Political connection disruptions increase firm R&D expenditures (Hypothesis 3) and boost firms' export value (Hypothesis 4).

METHODOLOGY

Sampling

Our sample data consists of three datasets and covers all Chinese publicly listed (A-share) export firms from 2012 to 2015. We begin by manually collecting information on independent director resignations resulting from Rule No.18. We turn to the *cninfo* website[8] to collect all the affected listed company announcements. In the announcements, 775 independent directors explicitly stated that they resigned due to Rule No. 18. In line with Wei et al. (2020), we exclude 454 directors affiliated with universities and research institutions[9]. Finally, 321 directors with political connections belong to our treatment group. The 321 PCIDs belong to 262 listed companies, and we exclude 86 of them that had never exported[10] and end up with 176 listed exporting firms affected by Rule No.18. Between 2012 and 2015, a total of 1,930 listed companies made exports. The 1,754 listed export firms without PCID resignations served as our control group.

Other firm characteristic variables are from the CSMAR database. CSMAR provides

---

[8] The website (www.cninfo.com.cn) is a statutory information disclosure platform of the Shenzhen Stock Exchange and provides investors with one-stop securities market information services.

[9] The detailed personal backgrounds of directors are from the CSMAR database.

[10] These firms are real estate and financial firms, and they can barely export due to their industrial nature. Since we estimate the impact of political tie disruptions on firm export, we exclude the interference of these firms.

detailed financial and corporate governance information on Chinese-listed companies.

We merge the sample with the CCIES database to obtain firm-level export information. CCIES records every firm transaction of goods across China borders at the HS8 (eight-digit Harmonized System) level. We aggregate all value of one listed firm exporting an HS8 product to one country in the same year. Therefore, our sample data is detailed transaction data for each listed company exporting each product to a specific country each year, resulting in 1,581,472 observations between 2012 to 2015.

Measures

Table 13 provides the definitions and measures for all the variables.

Table 13 Variable Definitions and Measures for Chapter 4

Variable	Definition
Dependent variable	
lnExport	The natural logarithm of the firm-level export value.
Independent variables	
Official	A binary indicator variable to differentiate between treatment firms and control firms. The value is 1 if a firm has one or more PCIDs resigned due to Rule No. 18; otherwise, it is 0.
Post	A binary indicator variable to mark the enforcement of Rule No. 18, which was issued on October 19, 2013. The value equals 0 for years 2012 and 2013, and 1 for years 2014 and 2015.
SA	The SA index measures financial constraints based on firm size and age in line with Hadlock and Pierce (2010), which is calculated as

$$SA = -0.737 \times \ln asset + 0.043 \times \ln asset^2 - 0.040 \times age \quad (28),$$

where $\ln asset$ is a proxy for firm size, and age is the number of years the firm is established. The value of the SA index is negative. The larger the SA (closer to 0), the tighter the firm's financial constraints.

lnGsubsidy	The natural logarithm of government subsidies disclosed in periodic reports of listed companies.
IndDNC	Independent director network centrality. In order to measure the extent to which a firm's independent directors can bring resources to it, we construct a network of independent directors by taking advantage of the information on independent directors' concurrent appointments. In line with Freeman (1979), the index is measured as follows:

$$IndDNC_i = \sum_{j=1}^{n} \frac{P_{ij}}{n-1} \qquad (29),$$

where n is the number of firms that compose the independent director network. P_{ij} is a binary variable indicating the connection between firm i and firm j. If firms i and j have one or more common independent directors, the value of P_{ij} is 1, and 0 otherwise. The higher the centrality, the greater the firm's status in the independent director network.

lnRD	The natural logarithm of a firm's R&D expenditures.

Control variables

lnAsset	The natural logarithm of a firm's total assets. The index is a proxy for firm size.
IndDRatio	The proportion of independent directors, measured as the number of independent directors divided by the total number of board directors.

lnNstaff	The natural logarithm of the total number of a firm's employees.
Lev	Asset-liability ratio, calculated as total debt divided by total assets. The index is a proxy for a firm's financial leverage.
Boardsize	The total number of board directors.
TFP	Total factor productivity. Melitz (2003) shows that only firms with higher productivity can enter the export market, while firms with lower productivity produce only for the domestic market. We use the LP method (Levinsohn & Petrin, 2003) to estimate firm productivity.
PC	A binary variable indicating whether a firm's board chair or CEO has political connections. The value of PC is 1 if any of the board chairs and CEO is an incumbent or former government official, and 0 otherwise.
ROA	Return on assets, measured as net profit divided by total asset balance.

Table 14 summarizes data and provides descriptive statistics. The values of all variables are as expected.

Table 14 Descriptive Statistics for Chapter 4

Variable	Obs	Mean	Std.Dev.	Min	Max
lnExport	1,581,472	9.301	2.985	0	22.102
Official	1,581,472	0.093	0.290	0	1
Post	1,581,472	0.520	0.500	0	1
SA	1,581,472	-3.678	0.375	-5.053	-1.805
lnGsubsidy	1,581,472	17.227	1.856	5.704	23.115
IndDNC	1,581,472	0.445	0.415	0	3
lnAsset	1,581,472	23.114	1.625	15.577	29.192
IndDRatio	1,581,472	37.816	6.828	18.180	80
lnNstaff	1,581,472	8.577	1.594	1.946	13.215
Lev	1,581,472	0.549	0.206	0.008	8.612
Boardsize	1,581,472	8.850	1.723	4	21
TFP	1,581,472	6.381	0.899	1.855	8.860
PC	1,581,472	0.402	0.490	0	1

ROA	1,581,472	0.054	0.062	-6.349	8.472
lnRD	1,142,391	18.899	2.049	7.409	25.025

Table 15 presents correlations across the main variables. Specifically, the correlation coefficient between lnasset and lnNstaff is 0.816, which is consistent with the fact that large firms tend to employ more people. Since the mean VIF is 2.56 and the largest individual VIF is 6.83, both below threshold 10, there is no severe multicollinearity.

Table 15 Correlation Matrix for Chapter 4

Variables	(1) lnExport	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(2) Official	-0.020										
(3) Post	-0.033	-0.001									
(4) lnAsset	-0.094	0.033	0.085								
(5) IndDRatio	-0.074	0.025	0.025	0.374							
(6) lnNstaff	-0.084	0.012	0.054	0.816	0.374						
(7) Lev	-0.016	0.037	-0.007	0.319	0.149	0.222					
(8) Boardsize	0.036	-0.028	-0.082	0.124	-0.376	0.142	0.001				
(9) TFP	-0.031	-0.088	-0.004	0.488	0.120	0.460	0.302	0.099			
(10) PC	0.006	0.031	-0.138	-0.022	-0.108	-0.084	-0.032	0.089	-0.097		
(11) ROA	-0.006	-0.007	-0.005	0.007	-0.013	0.007	-0.547	0.013	0.016	0.005	
(12) lnRD	-0.128	-0.037	0.100	0.755	0.341	0.775	0.196	0.114	0.611	-0.073	0.040

Research Design

To identify the causal effects of the political connection disruptions on firm export, we use a DID (difference-in-differences) approach. The Communist Party of China issued Rule No. 18 on October 19, 2013[11]. Rule No. 18 prohibits party and government officials who are incumbent or within three years of retirement from holding positions in firms. Party and government officials must be dismissed or resign from their firm positions within three months after Rule No. 18 is issued. As a result, PCIDs of Chinese listed companies resigned on a large scale. The potential

---

[11] See https://jwsj.fjut.edu.cn/b6/07/c3792a46599/page.htm?ivk_sa=1024320u and
http://renshi.people.com.cn/n/2013/1031/c139617-23383982.html.

effects of Rule No. 18 on firm export tend to be exogenous as (1) Rule No.18 is issued by the Communist Party of China and not determined by individual firms, and (2) Rule No.18 does not have a direct impact on firm export decisions.

The basic idea of our DID design is: the average export value variations of the treatment group (i.e., listed export firms with PCID resignations) before and after 2014 include the effects of the political connection disruptions due to Rule No. 18 and other factors, whereas the variations of the control group (i.e., listed export firms without PCID resignations) before and after 2014 only includes the effects of other factors. When other factors have the same effect on the treatment group and the control group (the bias stability assumption), we can estimate the treatment effect of the political connection disruptions on firm export value by subtracting the control group effect from the treatment group effect. The DID design alleviates the endogeneity problem concerns by comparing the treatment and control firms (Reeb, Sakakibara, & Mahmood, 2012).

To test hypothesis 1, we compare the difference in the treatment group to the difference in the control group over the period 2012 to 2015 using the following model:

$$\ln Export_{ipct} = \beta_1 Treat_{it} + \mathbf{Z}'_{it}\boldsymbol{\eta} + \lambda_i + \delta_p + \gamma_{ct} + \varepsilon_{ipct} \tag{30},$$

where $Treat_{it} = Official_i \times Post_t$ captures the implementation of Rule No. 18, $Official_i$ is an indicator of listed export firms with PCID resignations, and $Post_t$ is a post-policy indicator. The dependent variable $\ln Export_{ipct}$ denotes the natural logarithm of firm i's export value when it exports product p to country c in year t. $\mathbf{Z}_{it}$ is the vector of our eight control variables: $\ln Asset_{it}$, $IndDRatio_{it}$, $\ln Nstaff_{it}$, Lev_{it}, $Boardsize_{it}$, TFP_{it}, PC_{it}, and ROA_{it}. Firm fixed effect λ_i captures all time-invariant firm-level characteristics. Product fixed effect δ_p captures all time-invariant product-level characteristics. Country-year fixed effect

γ_{ct} controls all country-level changes like the GDP and population of a country, time-invariant country-level characteristics like the geographic distance between China and the country, and time-fixed effects like macroeconomic shocks to all firms in the same year. ε_{ipct} is the error term. We expect β_1 to be positive if political connection disruptions increase a firm's export.

To further verify hypothesis 1 that the export increase resulting from political connection disruptions is a firm's strategic shift, we need to test hypothesis 2:

$$\ln Export_{ipct} = \beta_2 Treat_{it} \times IndDNC_{it} + \beta_3 Treat_{it} + \beta_4 IndDNC_{it} + \mathbf{Z}'_{it}\boldsymbol{\eta} + \lambda_i + \delta_p + \gamma_{ct} + \varepsilon_{ipct} \quad (31),$$

where $IndDNC_{it}$ is firm i's independent director network centrality in year t, indicating the ability of firm i to obtain alternative resources from its network. The interaction, $Treat_{it} \times IndDNC_{it}$, allows the impact of political connection disruptions to vary with a firm's independent director network centrality. The more alternative resources a firm has access to from its network, the less impact political connection disruptions have on its business strategy. Therefore, β_2 is supposed to be negative.

In line with the causal steps approach (Baron & Kenny, 1986; MacKinnon, Cheong, & Pirlott, 2012) of the single mediator model, along with equation (3), we establish the following two other equations to test hypothesis 3 and hypothesis 4:

$$\ln RD_{it} = \beta_5 Treat_{it} + \mathbf{Z}'_{it}\boldsymbol{\eta} + \lambda_i + \delta_p + \gamma_{ct} + \varepsilon_{it} \quad (32),$$

$$\ln Export_{ipct} = \beta_6 Treat_{it} + \beta_7 \ln RD_{it} + \mathbf{Z}'_{it}\boldsymbol{\eta} + \lambda_i + \delta_p + \gamma_{ct} + \varepsilon_{ipct} \quad (33)$$

where $\ln RD_{it}$ is the mediator and denotes firm i's R&D expenditures in year t. Since we propose that a firm will increase its R&D expenditures after suffering political connection disruptions, which partially explain the boost in its export value, we expect that β_5, β_6, and β_7 are all positive and significant. Namely, we expect partial mediation rather than complete

mediation.

RESULTS

To illustrate the validity of our DID identification strategy, we plot time trends of firm export value for the treatment group and the control group in Figure 7. From the left figure, it is clear that the two groups had parallel pretreatment trends before 2014. From the right figure, when we take 2012 as the base year, the coefficient of 2013 is not significant at the 95% confidence interval, which further shows that there is no significant difference between the two groups before the implementation of Rule No. 18. The satisfaction of parallel pretreatment trends alleviates the concern that the two groups are ex-ante incomparable.

On the other hand, from the left figure, there is a visible divergence in firm export value trends between the two groups after 2014, when Rule No. 18 came into effect. Similarly, from the right figure, the coefficients of 2014 and 2015 are significant, indicating there are significant differences between the two groups after the implementation of Rule No. 18. The consistency in timing between the divergence in firms' export value and the implementation of Rule No. 18 suggests that political connection disruptions boost firms' export value.

Figure 7 Testing the Parallel Trend Assumption
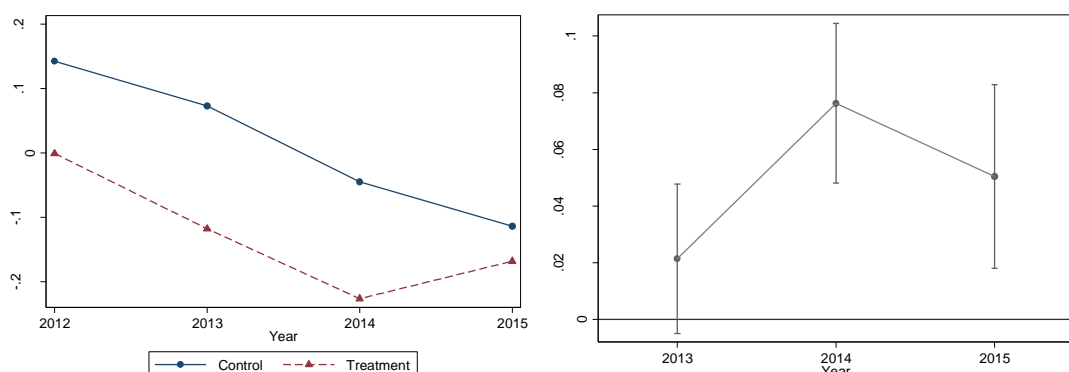
The DID estimation results are shown in Table 16. In order to alleviate the omitting variable concerns, the firm-fixed effects, industry-fixed effects, and country-year-fixed effects are controlled in all the regressions. Column (1) presents equation (3) estimations without control variables. The coefficient of our primary independent variable, $Treat$, is statistically significant and positive, suggesting that the export value of the treatment group will increase by 3.9% compared with the control group after the implementation of Rule No. 18. Given that the treatment group experienced mandatory PCID resignations in 2014, our results imply that political connection disruptions boost firms' export value. In column (2), we add time-varying firm-level control variables that affect firms' export value and political connection disruptions. The results are robust with these additional controls.

To further verify hypothesis 1, we employ the interactions between $Treat$ and a firm's dependence on domestic resources. The results are reported in columns (3) and (4). Existing research suggests that political connections can affect firm financing constraints (Cull et al., 2015; Khwaja & Mian, 2005) and increase government subsidies (Wei et al., 2020). Therefore, firms with more severe financing constraints and more government subsidies depend more on their political connections, resulting in them suffering more from political connection disruptions than their counterparts. In column (3), the interaction, $Treat \times SA$, is significantly positive, suggesting that export value increased more after 2014 in treatment firms with more severe financial constraints than treatment firms with less severe financial constraints. The results are similar in column (4). Export value increased more after 2014 in treatment firms with more government subsidies than treatment firms with fewer government subsidies. These results suggest that political connection disruptions significantly affect firms that depend more on

domestic resources.

Hypothesis 2 posits that a firm's ability to access alternative resources from its network can cushion it from political connection disruptions. In column (5), the interaction of $Treat$ with $IndDNC$ is statistically significant and negative. The export value growth rate of the treatment group with high independent director network centrality is 12.1% lower than that of the treatment group with low centrality after the Rule No. 18 implementation. The results imply that a firm's alternative domestic resources can mitigate the impact of political connection disruptions on its domestic operations.

Table 16 The Direct Effects and The Moderating Effects for Chapter 4

VARIABLES	(1) lnExport	(2) lnExport	(3) lnExport	(4) lnExport	(5) lnExport
$Treat$	0.039**	0.057***	1.095***	-0.281	0.113***
	(0.016)	(0.016)	(0.150)	(0.174)	(0.024)
$Treat \times SA$			0.277***		
			(0.040)		
$Treat \times \ln Gsubsidy$				0.020*	
				(0.010)	
$Treat \times IndDNC$					-0.121***
					(0.041)
SA			-0.277***		
			(0.081)		
lnGsubsidy				0.012***	
				(0.004)	
IndDNC					-0.009
					(0.009)
lnasset		0.005	0.016	-0.003	0.006
		(0.013)	(0.014)	(0.013)	(0.013)
IndDRatio		-0.000	-0.001	-0.000	-0.000
		(0.001)	(0.001)	(0.001)	(0.001)
lnNstaff		-0.048***	-0.046***	-0.048***	-0.048***
		(0.009)	(0.009)	(0.009)	(0.009)
Lev		0.083*	0.036	0.095*	0.075
		(0.050)	(0.050)	(0.050)	(0.050)
Boardsize		0.017***	0.015***	0.017***	0.017***
		(0.004)	(0.004)	(0.004)	(0.004)

TFP		0.124***	0.133***	0.122***	0.123***
		(0.016)	(0.016)	(0.016)	(0.016)
PC		0.008	0.008	0.006	0.006
		(0.010)	(0.010)	(0.010)	(0.010)
ROA		0.224***	0.184***	0.219***	0.223***
		(0.055)	(0.056)	(0.055)	(0.055)
Observations	1,581,038	1,581,038	1,581,038	1,581,038	1,581,038
R-squared	0.244	0.244	0.244	0.244	0.244
Firm Fixed Effect	YES	YES	YES	YES	YES
Industry Fixed Effect	YES	YES	YES	YES	YES
Country-Year Fixed Effect	YES	YES	YES	YES	YES

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

Figure 8 depicts the moderators of financing constraints and independent director network centrality. Consistent with the regression results, the marginal impact of political connection disruptions is more substantial when a firm has more severe financing constraints and lower independent director network centrality.

Figure 8 Moderating Effects of SA and Independent Director Network Centrality
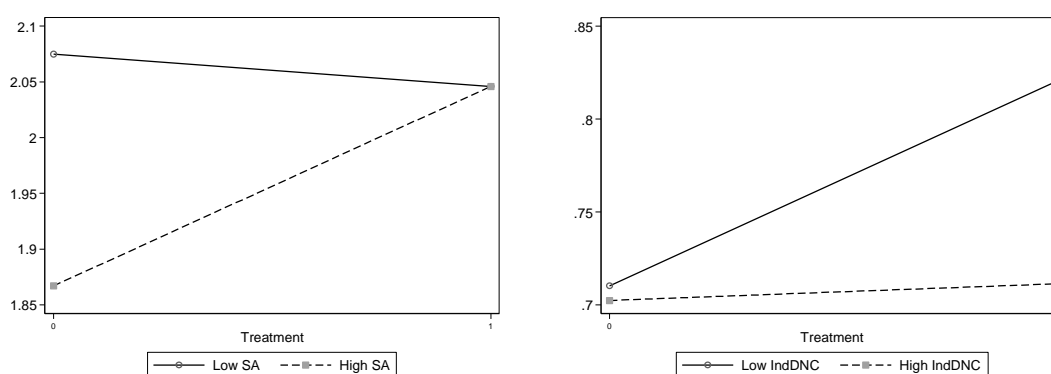

Table 17 reports the robustness of our DID estimation to the identifying assumptions.

Expectation effect. In column (1), we add another control variable, $Official \times D13$, to the regression, where $D13$ is a year dummy denoting one year before the implementation of Rule No. 18. The interaction captures whether the treatment firms changed their business strategy in advance in anticipation of the implementation of Rule No. 18, which can make the treatment and control groups systematically different ex-ante. The coefficient of $Official \times D13$ is

statistically insignificant, suggesting little expectation effect, while the coefficient of *Treat* remains statistically significant and positive.

Placebo test: pre-Rule No. 18 period. The idea is that we should not have any significant effects before the implementation of Rule No. 18 since firm political connections did not change much before the policy. Otherwise, there are other underlying confounding factors affecting firm export value. In column (2), we find that the effect of political connection disruptions on firm export value is statistically insignificant in the pre-Rule No. 18 period.

Placebo test: random treatment groups. In our DID design, the treatment and control groups may have unobservable firm characteristics, which may, in turn, make the exogeneity of Rule No. 18 not hold and systematically bias our estimates. We rule out this concern by constructing random treatment groups. Specifically, we randomly select 176 out of 1930 listed firms to be affected by Rule No. 18 and then construct a false indicator of treatment firms, $Official_r$. We use the false interaction, $Official_r \times Post$, to capture the effects of Rule No. 18 implementation on export between the treatment and control groups. We repeat the exercise 500 times and report the mean value of these 500 coefficients in column (3). The mean value of these estimates is -0.001, close to zero, and is statistically insignificant. The results of the placebo tests indicate that our estimates are unlikely to be obtained by chance and affected by other policies or unobservable factors.

Table 17 Tests on The Identifying Assumptions

VARIABLES	(1) lnExport	(2) lnExport	(3) lnExport
Treat	0.073***		
	(0.020)		
Official × *D13*	0.031	0.032	
	(0.022)	(0.023)	

Official$_r$ × Post			-0.001
			(0.015)
Observations	1,581,038	758,187	1,581,038
R-squared	0.244	0.249	0.239
Control Variables	YES	YES	YES
Firm Fixed Effect	YES	YES	YES
Industry Fixed Effect	YES	YES	YES
Country-Year Fixed Effect	YES	YES	YES

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

We further plot the density distribution of the 500 coefficients of random treatment groups in Figure 9. The dashed line is the mean value of the 500 coefficients, which equals -0.001. The solid line is the coefficient of our actual DID estimation, i.e., 0.057. The distribution of the 500 placebo estimates is centered around zero. These results provide further evidence to illustrate that unobservable firm characteristics would not severely bias our estimates and that the previous estimates are robust.

Figure 9 Placebo Test: The Coefficient Distribution of Random Treatment Groups
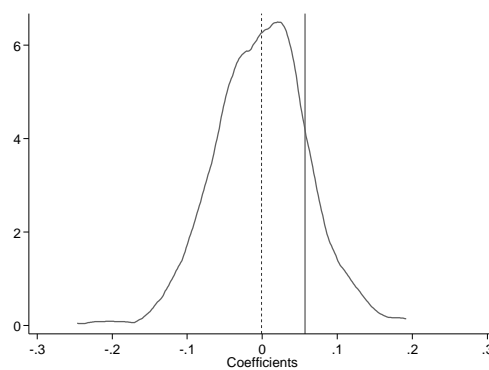
As aforementioned, political connections disruptions destroy firms' valuable domestic resources, and firms proactively adjust their strategies to cope with the impact. One of the spontaneous strategies is to increase R&D expenditures, and these changes, in turn, affect firms' export. We conducted the four steps of MacKinnon et al. (2012) to test hypothesis 3 and hypothesis 4, and the results are reported in Table 18. Since the number of our sample observations

changes after adding a new variable (i.e., $\ln RD$), to ensure the comparability of the mediation estimates, we re-estimate equation (3) and report the results in column (1).

First, in column (1), the coefficient of $Treat$ is statistically significant, indicating the existence of the total effect that political connection disruptions have on firm export value. Second, in column (2), the independent variable $Treat$ is significantly related to the mediating variable $\ln RD$. Third, in column (3), the coefficients of the independent variable $Treat$ and the mediating variable $\ln RD$ are statistically significant. Namely, the relation between $\ln RD$ and $\ln Export$ is significant, controlling for $Treat$. Finally, the coefficient magnitude of $Treat$ in column (3) (i.e., 0.0278) is smaller than that in column (1) (i.e., 0.0283). The direct effect is weaker than the total effect when the mediating variable $\ln RD$ is added to the model. In sum, we have partial mediation. The indirect effect equals 0.0005 (i.e., 0.036×0.016 or $0.0283 - 0.0278$), and the mediated effect equals 0.0177 (i.e., the ratio of indirect effect to total effect, $\frac{0.0005}{0.0283}$).

We then use the bootstrap method to test the significance of the mediated effect. The indirect effect coefficient from bootstrapping with 1000 repetitions is 0.0105, and the direct effect is 0.0673. Both are significant at 99% conference interval. These results further boost our confidence that a firm's R&D expenditures partially mediate the relationship between political connection disruptions and firms' export value.

Table 18 The Mediating Role of R&D Expenditures

	(1)	(2)	(3)
VARIABLES	lnExport	lnRD	lnExport
Treat	0. 0283**	0.036***	0. 0278**
	(0.012)	(0.004)	(0.012)
lnRD			0.016***
			(0.004)

lnAsset	0.054***	0.563***	0.045***
	(0.012)	(0.006)	(0.012)
IndDRatio	-0.004***	0.008***	-0.004***
	(0.001)	(0.000)	(0.001)
lnNstaff	0.044***	0.024***	0.044***
	(0.009)	(0.003)	(0.009)
Lev	0.059**	0.179***	0.056**
	(0.028)	(0.012)	(0.028)
Boardsize	-0.001	-0.003***	-0.001
	(0.003)	(0.001)	(0.003)
TFP	0.248***	0.578***	0.238***
	(0.015)	(0.006)	(0.015)
PC	-0.003	-0.031***	-0.003
	(0.009)	(0.003)	(0.009)
ROA	0.083**	0.253***	0.079**
	(0.037)	(0.016)	(0.038)
Observations	711,816	711,816	711,816
R-squared	0.880	0.962	0.880
Firm Fixed Effect	YES	YES	YES
Industry Fixed Effect	YES	YES	YES
Country-Year Fixed Effect	YES	YES	YES

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

DISCUSSION AND CONCLUSION

Using manually collected data and exploiting a quasi-natural experimental event in China, we conduct a DID design to examine the impact of political connection disruptions on firms' export value. Our results offer critical novel insights into the role of unanticipated network disruptions on firms' strategic reconfiguration. We show strong evidence from publicly listed Chinese export firms that political connection disruptions boost firms' export value significantly, and such positive effects of domestic network disruptions are strengthened when firms depend more on their political connections. Specifically, firms with more severe financing constraints, more government subsidies, and lower independent director network centrality suffer more from political connection disruptions than their counterparts. Firm R&D expenditures play a partial

mediating role in the relationship. Namely, political connection disruptions increase firm R&D expenditures and thereby boost firms' export value. These results suggest that firms take proactive strategic responses to cope with network disruptions. Political connection disruptions lead to abrupt domestic market shrinkage, pushing formerly connected firms to increase export to recoup the domestic loss.

Our work makes several theoretical contributions to international business and strategic management literature. First, this study adds to the research on the consequences of political connection disruptions. Prior studies mainly focus on the outcome of sudden political capital losses related to firm performance, including stock price reactions (Cheng, 2018; Nguyen & Nielsen, 2010) and market value (Liu et al., 2018; Xu, 2018). Those studies concern the direct adverse effect of political capital losses on firms, whereas our focus on the changes in firms' export value allows us to tap into the profound influence of network disruptions on firms' strategy deployment. By considering the surge of firm export value after political connection disruptions, our study adds to the literature by suggesting that the increase in export is not necessarily related to the increase in productivity. Otherwise, there is a substitution between domestic sales and export value when firms lose their political connections. Firms can achieve the transfer from the domestic market to the export market via increasing R&D expenditures.

Second, this study contributes to the literature on the selection and deployment of firms' market strategies when non-market strategies experience exogenous shocks. On the one hand, our work adds to the sparse research on integrating market and non-market strategies (Mellahi et al., 2016). Research recognizes firms' attempts to establish and maintain political ties as their non-market strategies to influence the external environment favorably. As mentioned before, existing

research focuses on the link between non-market strategy and organizational performance. Our work adds insights into the related work that firms actively adopt market strategy adjustments to deal with the destruction of non-market strategies. On the other hand, this study contributes to the research on the interaction among firms' market strategies. In particular, our work reveals the interaction of firms' domestic market, export, and innovation strategies.

Third, this study enriches the social network theory literature by delving into political connectedness and the alternative resources within the interlocked networks. We estimate the value of network connections from the angle of suddenly losing them. By implementing a DID identification strategy and comparing the differences in firms' export before and after Rule No. 18, our study confirms the theoretical link between political connections and firms' market strategies. We contribute to the empirical research that uses social network theory to consider the detrimental effect of removing actors brokering connections across structural holes (Duxbury & Haynie, 2018; Shaw et al., 2005). By considering the independent director network centrality, we explore the boundary conditions under which the adverse effect may be variant. Our study offers insights into how firms can be less vulnerable to deterioration by leveraging alternative resources and information from interlocked networks.

Our findings offer critical insights for managers and policymakers to understand both the benefits and the costs of political connections. Conventional views tend to regard political connections as the culprit behind resource misallocation (Schoenherr, 2019) and unfair market competition (Li & Cheng, 2020), but our findings suggest that abrupt political connection disruptions create detriments to firms' operations. With the increase of anti-corruption and marketization efforts, the policymakers of emerging markets like China should be aware of

exercising caution and developing corresponding institutions to eliminate domestic barriers and enable firms to obtain the required resources legally and efficiently.

Our findings suggest that managers should cultivate interlocked interfirm networks and foster technical capital. This study shows that interlocking directorates among firms provide formerly connected firms with alternative resources and information, reducing firms' dependence on political connections. Firms' commitment to R&D activities is conducive to hedging against productivity decreases resulting from political network disruptions. Therefore, managers should develop technologies, improve productivity, and seek alternative support from interfirm networks to reduce reliance on non-market strategies and make firms resilient to external environment changes.

Our study has potential limitations that suggest helpful directions for future research. First, our sample consists of publicly listed export firms, usually large-scale enterprises (Cheng et al., 2019). In this case, the consequences of political connection disruptions may be somewhat different for non-published firms with smaller sizes and fewer resources, which may influence their subsequent market strategies differently than those publicly listed firms. Second, we examine the consequences of political connection disruptions in a relatively short term, i.e., two years after the Rule No. 18 implementation. We cannot estimate the effect in the long term since the Chinese government continually enacts a series of policies aimed at anti-corruption and marketization, while those policies are confounding factors and make it difficult to estimate long-term effects. Future research may complement our work by utilizing other databases that provide non-published firms' information and long-term comparable institutional context.

Chapter 5: Conclusion

A HOLISTIC DESCRIPTION OF THE RESEARCH

This thesis explores the interactions between social networks and export to address the concern that the critical application and enhancement of social network theory in the international business field remain limited (Cuypers et al., 2020). The three self-contained papers aim at bridging three potential research gaps in the existing literature identified in Chapter1. Chapter 2 contributes to the theory of networks by investigating the effects of a firm's export value on its social network centrality in the home city. Chapters 3 and 4 enrich the network theory by examining the effects of PTA networks on export resilience and political connection disruptions on export value. Theoretically, this thesis refers to network centrality theory, network closure, structural holes theory, and network destruction. Empirically, this thesis uses multiple datasets and employs the fixed effect model, the mediational model, the instrumental variable approach, and the DID approach to conduct quantitative analysis. Table 19 provides a summary of the hypotheses involved in this thesis.

Table 19 A Summary of Hypotheses in Each Chapter

Chapter 2: Export value and network centrality in home cities: A negative relationship in an emerging economy

Hypothesis 1: A firm's export value negatively affects its social network centrality via the mediating effect of its product diversification in an emerging economy.

Hypothesis 2: A firm's export value negatively affects its social network centrality via the mediating effect of its product quality in an emerging economy.

Hypothesis 3: A firm's export value is less negatively related to its social network centrality

when its product complexity is higher in an emerging economy.

Chapter 3: Preferential trade agreement networks and export resilience

Hypothesis 1a: Signing a PTA with an importing country has a negative effect on an exporting country's export resilience.

Hypothesis 1b:The exporting country's export resilience is negatively associated with the number of redundant PTAs signed.

Hypothesis 2:The effect of PTA signing on a country's export resilience is more negative when the importing country has access to structural holes.

Hypothesis 3: The effect of PTA signing on a country's export resilience is less negative when the country has high export sophistication.

Chapter 4: Political connection disruptions and firms' export value

Hypothesis 1: Political connection disruptions positively affect a firm's export value.

Hypothesis 2: Political connection disruptions have a less positive effect on the export value of firms with higher independent director network centrality compared to firms with lower independent director network centrality.

Hypothesis 3: If a firm experiences political connection disruptions, it will increase its R&D expenditures.

Hypothesis 4: If a firm has increased its R&D expenditures, its export value increases more than other firms without an R&D expenditure surge.

Chapter 2 investigates the impact of export value on network centrality. This chapter argues that network centrality can be reduced following an increase in export value due to two main mechanisms: (1) product specialization enhancement and (2) product quality upgrade. Based on a longitudinal panel dataset from Chinese Customs Import and Export Statistics between 2000

and 2011, the argument is tested by applying mediational models. The results show that the impact of a firm's export value on network centrality is significantly negative in all cases, suggesting that exporters occupy a less prominent status in their local social network after being more international. Product diversification and quality play multiple mediating roles in the causal chains, and firms with higher product complexity are less likely to be affected when they export more. As a result, Chapter 2 answers Research question 1: how does firms' export value reduce social network centrality via the mediating effects of product diversification and product quality, and how can product complexity moderate the direct negative relationship?

Chapter 3 studies the effects of PTA networks on export resilience. Research on export growth alone cannot figure out the ability of a firm's or country's export to withstand and recover from shocks and disruptions. This chapter introduces the concept of "export resilience" to address this issue. In line with social network theory (Burt, 1992; Coleman, 1988), two mechanisms are developed: (1) PTA networks increase the pressure on an exporter to conform to rules on the priority of mutual benefits and increase the difficulty of its domestic production adjustments. (2) PTA networks transfer risks and losses from trade partners to an exporter. The relationship between PTA networks and export resilience is tested based on, firstly, an exporting country-importing country-specific product level panel dataset, which merges bilateral trade flows of the BACI database with PTA information of the DESTA dataset from 1995 to 2019, and secondly, an exporting firm-importing country-specific product level panel data from the Chinese Customs Import and Export Statistics database from 2000 to 2011. The empirical results from the two data sets confirm that a firm's or country's export resilience decreases after signing a PTA with its trading partner. The number of PTAs signed between the exporting and importing country also

negatively affects the exporting firm's or country's export resilience. The moderator of the importing country's access to structural holes in the PTA networks plays a role in strengthening the direct effect, whereas the moderator of the exporting country's export sophistication can mitigate the negative impact. Therefore, Chapter 3 resolves Research question 2. Namely, how do PTA networks affect export resilience, and to what extent is the direct effect contingent on the importing country's access to structural holes and the exporting firm's or country's export sophistication?

Chapter 4 examines the impact of political connection disruptions on firms' export value. According to the arguments of network destruction (Burt, 1992; Shaw et al., 2005), the mandatory resignation of PCIDs is the removal of actors brokering connections across structural holes. Political connection disruptions expose formerly connected firms to the same domestic operating environment as their competitors and lose previous market controls over their rivals, thereby shrinking their domestic markets. Firms develop coping strategies, using export to substitute the domestic market to neutralize the damage caused by political network disruptions. A DID design is employed to identify the causal effects of political connection disruptions on export value. Evidence from publicly listed Chinese export firms from 2012 to 2015 shows that political connection disruptions significantly boost firms' export value. Such positive effects are strengthened when firms depend more on their political connections. Specifically, firms with more severe financing constraints, more government subsidies, and lower independent director network centrality suffer more from political connection disruptions than their counterparts. Firm R&D expenditures play a partial mediating role in the relationship. Namely, political connection disruptions increase firm R&D expenditures and boost firms' export value. Hence, Chapter 4

responds to Research question 3, how do political connection disruptions affect export value, and how is the direct effect moderated by independent director network centrality and mediated by R&D expenditures?

THEORETICAL CONTRIBUTIONS

This thesis contributes to the existing literature in numerous ways. First, this thesis adds novel insights into research on the interactions between social networks and export. Three papers study the relationships between export value and network centrality, PTA networks and export resilience, and political network disruptions and export value, respectively. This thesis enriches the sparse literature on social network theory in international business (Cuypers et al., 2020).

Second, equipped with social network theory, this thesis provides new explanations of the gap between the theory and business facts. Although export enables a firm to create more connections, Chapter 2 shows that the impact of export value on network centrality is significantly negative in all cases. The adjustment of firms' production decisions explains the inconsistency between the existing theory and business facts. Chapter 3 demonstrates that PTA signing leads to a decline in export resilience, whereas PTA signing is positively related to export growth. Reciprocal pressures from network closure and transferring risks from overconnected networks can shed new light on the counter-intuitively negative relationship. Chapter 4 investigates that political connection disruptions can boost firms' export value while network disruptions adversely affect available resources. Firms' proactive adjustments of market strategy after the ruin of non-market strategies can explain the phenomenon.

Third, this thesis explores the boundary conditions on the interplay between social networks

and export. Chapter 2 finds that the network centrality of firms with higher product complexity is less likely to be affected when they export more. Chapter 3 highlights that the relationship between PTA networks and export resilience is contingent on the importing country's PTA network status and the exporting country's export sophistication. Chapter 4 argues that firms can be less vulnerable to deterioration of political connection disruptions when they have high independent director network centrality.

MANAGERIAL AND POLICY IMPLICATIONS

Our findings highlight the benefits and costs of social networks for managers and policymakers. Chapter 2 shows a decrease in local network centrality with increased export value and suggests that creating and maintaining network connections can be costly. It is necessary to consider how to maximize the utility of firms' network connections rather than merely care about the number of connections. Chapter 3 finds that PTA networks lead to the decline of a firm's or country's resistance and recoverability from world economic disturbances. Signing PTAs with countries with more access to structural holes can obtain richer information and more trade opportunities, but the resulting brokerage fees can also be expensive. Chapter 4 highlights that abrupt political connection disruptions detriment firms' operations. It is vital to seek alternative support from multiple networks to reduce reliance on a single network. As such, managers and policymakers should understand that social networks can benefit or harm their export and development.

Our findings also suggest that managers and policymakers should attach great importance to technology and export sophistication. Chapter 2 examines the moderating role of product

complexity and finds that the negative impact of export value on network centrality is more substantial when firms export more products with lower product complexity. Chapter 3 shows that the negative effect of PTA networks on export resilience can be alleviated if a firm's or country's export sophistication is high. Chapter 4 finds that firms' commitment to R&D activities is conducive to hedging against productivity decreases resulting from political network disruptions. Therefore, increasing technical capital and export sophistication is conducive to a firm's or country's sustainable growth.

LIMITATIONS AND FUTURE RESEARCH

The limitations of this thesis are mainly due to the unavailability of data. Chapter 2 mainly focuses on the number of network connections, a firm's local network centrality, and the Chinese context. However, further research on the change in network ties' quality, a firm's network centrality overseas, the cities' overall network density and centralization, and various contexts is worthy of attention. For Chapter 3, PTAs are assumed to be homogenous, and it would be helpful to examine the contingent effects of heterogenous PTA clauses for future research. Chapter 4 examines the consequences of political connection disruptions in a relatively short term using publicly listed export firms. Future research is encouraged to complement the work by utilizing databases that provide small firms' information and long-term comparable institutional context.

Chapter 6: References

Acemoglu, D., Ozdaglar, A., & Tahbaz-Salehi, A. 2015. Systemic Risk and Stability in Financial Networks. *American Economic Review*, 105(2): 564-608.

Ahuja, G. 2000a. Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study. *Administrative Science Quarterly*, 45(3): 425-455.

Ahuja, G. 2000b. THE DUALITY OF COLLABORATION: INDUCEMENTS AND OPPORTUNITIES IN THE FORMATION OF INTERFIRM LINKAGES. *Strategic Management Journal (John Wiley & Sons, Inc.) - 1980 to 2009*, 21(3): 317.

Alvarez, R., & Fuentes, J. R. 2011. Entry into Export Markets and Product Quality. *World Economy*, 34(8): 1237-1262.

Amini, H., Cont, R., & Minca, A. 2016. RESILIENCE TO CONTAGION IN FINANCIAL NETWORKS. *Mathematical Finance*, 26(2): 329-365.

An, G., & Iyigun, M. F. 2004. The export technology content, learning by doing and specialization in foreign trade. *Journal of International Economics*, 64(2): 465-483.

Armanios, D. E., Eesley, C. E., Li, J. Z., & Eisenhardt, K. M. 2017. How entrepreneurs leverage institutional intermediaries in emerging economies to acquire public resources. *Strategic Management Journal*, 38(7): 1373-1390.

Arnold, D. J., & Quelch, J. A. 1998. New strategies in emerging markets. *MIT Sloan Management Review*, 40(1): 7.

Bacchetta, M., Beverelli, C., Cadot, O., Fugazza, M., Grether, J.-M., Helble, M., Nicita, A., & Piermartini, R. 2008. A practical guide to trade policy analysis.

Baggs, J., & Brander, J. A. 2006. Trade liberalization, profitability, and financial leverage. *Journal of International Business Studies*, 37(2): 196-211.

Baldwin, J. R., Beckstead, D., & Caves, R. E. 2001. Changes in the diversification of Canadian manufacturing firms (1973-1997): a move to specialization. *Statistics Canada, Analytical Studies-Micro-Economic Analysis Div. Series 11F0019MIE*(179).

Baron, R. M., & Kenny, D. A. 1986. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6): 1173.

Basu, S. R., & Das, M. 2011. *Export structure and economic performance in developing countries: Evidence from nonparametric methodology*: UN.

Béné, C., Newsham, A., Davies, M., Ulrichs, M., & Godfrey-Wood, R. 2014. REVIEW ARTICLE: RESILIENCE, POVERTY AND DEVELOPMENT. *Journal of International Development*, 26(5): 598.

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. 2007. Firms in international trade. *Journal of Economic perspectives*, 21(3): 105-130.

Bertola, G., Guiso, L., & Pistaferri, L. 2005. Uncertainty and consumer durables adjustment. *The Review of Economic Studies*, 72(4): 973-1007.

Bertrand, M., Kramarz, F., Schoar, A., & Thesmar, D. 2018. The Cost of Political Connections. *Review of Finance*, 22(3): 849-876.

Besedeš, T., & Prusa, T. J. 2006. Product differentiation and duration of US import trade. *Journal of international Economics*, 70(2): 339-358.

Bizzi, L. 2013. The Dark Side of Structural Holes: A Multilevel Investigation. *Journal of Management*, 39(6): 1554-1578.

Bloom, N. 2014. Fluctuations in uncertainty. *Journal of Economic Perspectives*, 28(2): 153-176.

Bloom, N., Draca, M., & Van Reenen, J. 2016. Trade induced technical change? The impact of Chinese imports on innovation, IT and productivity. *The review of economic studies*, 83(1): 87-117.

Bloom, N., Floetotto, M., Jaimovich, N., Saporta-Eksten, I., & Terry, S. J. 2018a. Really uncertain business cycles. *Econometrica*, 86(3): 1031-1065.

Bloom, N., Manova, K., Van Reenen, J., Sun, S. T., & Yu, Z. 2018b. Managing trade: evidence from China and the US: National Bureau of Economic Research.

Bonacich, P. 1972. Factoring and weighting approaches to status scores and clique identification. *Journal of mathematical sociology*, 2(1): 113-120.

Borgatti, S. P. 2005. Centrality and network flow. *Social networks*, 27(1): 55-71.

Borgatti, S. P., & Halgin, D. S. 2011. On Network Theory. *Organization Science*, 22(5): 1168-1181.

Borgatti, S. P., & Ofem, B. 2010. Social network theory and analysis. *Social network theory and educational change*: 17-29.

Boschma, R. 2015. Towards an Evolutionary Perspective on Regional Resilience. *Regional Studies*, 49(5): 733-751.

Boubakri, N., Mansi, S. A., & Saffar, W. 2013. Political institutions, connectedness, and corporate risk-taking. *Journal of International Business Studies*, 44(3): 195-215.

Brambilla, I., & Porto, G. G. 2016. High-income export destinations, quality and wages. *Journal of International Economics*, 98: 21-35.

Brandl, K., Darendeli, I., & Mudambi, R. 2019. Foreign actors and intellectual property protection regulations in developing countries. *Journal of International Business Studies*, 50(5): 826-846.

Brass, D. J. 1984. Being in the right place: A structural analysis of individual influence in an organization. *Administrative science quarterly*: 518-539.

Brass, D. J. 2002. Social networks in organizations: Antecedents and consequences. *Unpublished manuscript, University of Kentucky, Lexington*.

Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. 2009. Economic vulnerability and resilience: concepts and measurements. *Oxford development studies*, 37(3): 229-247.

Briguglio, L. P. 2016. Exposure to external shocks and economic resilience of countries: evidence from global indicators. *Journal of Economic Studies*, 43(6): 1057-1078.

Bristow, G., & Healy, A. 2014. Regional Resilience: An Agency Perspective. *Regional Studies*, 48(5): 923-935.

Brown, J. R., & Huang, J. 2020. All the president's friends: Political access and firm value. *Journal of Financial Economics*, 138(2): 415-431.

Brun, J.-F., Combes, J.-L., & Renard, M.-F. 2002. Are there spillover effects between coastal and noncoastal regions in China? *China Economic Review*, 13(2-3): 161-169.

Burt, R. 1983. Firms, directors and time in the directorate tie market. *Social Networks*, 5(1): 13-49.

Burt, R. S. 1980. Autonomy in a social topology. *American Journal of Sociology*, 85(4): 892-925.

Burt, R. S. 2015. Reinforced structural holes. *Social Networks*, 43: 149-161.

Burt, R. S. 2004. Structural holes and good ideas. *American journal of sociology*, 110(2): 349-399.

Burt, R. S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, UNITED STATES: Harvard University Press.

Burt, R. S. 1982. Toward a structural theory of action: network models of social Structure, Perception, and Action.

Burt, R. S., & Burzynska, K. 2017. Chinese entrepreneurs, social networks, and guanxi. *Management and Organization Review*, 13(2): 221-260.

Burt, R. S., Kilduff, M., & Tasselli, S. 2013. Social network analysis: Foundations and frontiers on advantage. *Annual review of psychology*, 64: 527-547.

Burt, R. S., & Opper, S. 2020. Political Connection and Disconnection: Still a Success Factor for Chinese Entrepreneurs. *Entrepreneurship: Theory & Practice*, 44(6): 1199-1228.

Buskens, V., & van de Rijt, A. 2008. Dynamics of Networks if Everyone Strives for Structural Holes. *American Journal of Sociology*, 114(2): 371-407.

Bustos, P. 2011. Trade liberalization, exports, and technology upgrading: Evidence on the impact of MERCOSUR on Argentinian firms. *American economic review*, 101(1): 304-340.

Cadot, O., Carrère, C., & Strauss-Kahn, V. 2011. Export diversification: what's behind the hump? *Review of Economics and Statistics*, 93(2): 590-605.

Calluzzo, P., Nathan Dong, G., & Godsell, D. 2017. Sovereign wealth fund investments and the US political process. *Journal of International Business Studies*, 48(2): 222-243.

Camuffo, A., Furlan, A., & Rettore, E. 2007. Risk sharing in supplier relations: an agency model for the Italian air-conditioning industry. *Strategic Management Journal*, 28(12): 1257-1266.

Cantwell, J., & Zaman, S. 2018. Connecting local and global technological knowledge sourcing. *Competitiveness Review: An International Business Journal*.

Capello, R., Caragliu, A., & Fratesi, U. 2015. Spatial heterogeneity in the costs of the economic crisis in Europe: are cities sources of regional resilience? *Journal of Economic Geography*, 15(5): 951-972.

Cassiman, B., & Golovko, E. 2011. Innovation and internationalization through exports. *Journal of International Business Studies*, 42(1): 56-75.

Chaney, P. K., Faccio, M., & Parsley, D. 2011. The quality of accounting information in politically connected firms. *Journal of accounting and Economics*, 51(1-2): 58-76.

Chaney, T. 2014. The Network Structure of International Trade. *American Economic Review*, 104(11): 3600-3634.

Chen, C. J. P., Ding, Y. A., & Kim, C. 2010. High-level politically connected firms, corruption, and analyst forecast accuracy around the world. *Journal of International Business Studies*, 41(9): 1505-1524.

Cheng, L. 2018. Estimating the value of political connections in China: Evidence from sudden deaths of politically connected independent directors. *Journal of Comparative Economics*, 46(2): 495-514.

Cheng, L., Cheng, H., & Zhuang, Z. 2019. Political connections, corporate innovation and entrepreneurship: Evidence from the China Employer-Employee Survey (CEES). *China Economic Review*, 54: 286-305.

Cheng, L., & Sun, Z. 2019. Do politically connected independent directors matter? Evidence from mandatory resignation events in China. *China Economic Review*, 58.

Cheng, L. T. W., Chan, R. Y. K., & Leung, T. Y. 2018. Impact of perk expenditures and marketing expenditures on corporate performance in China: The moderating role of political connections. *Journal of Business Research*, 86: 83-95.

Cheong, J. Y., Kwak, D. W., & Tang, K. K. 2015. Heterogeneous Effects of Preferential Trade

Agreements: How does Partner Similarity Matter? *World Development*, 66: 222-236.

Chor, D., & Manova, K. 2012. Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of international economics*, 87(1): 117-133.

Claessens, S., Feijen, E., & Laeven, L. 2008. Political connections and preferential access to finance: The role of campaign contributions. *Journal of Financial Economics*, 88(3): 554-580.

Cohen, L., Coval, J., & Malloy, C. 2011. Do Powerful Politicians Cause Corporate Downsizing? *Journal of Political Economy*, 119(6): 1015-1060.

Coleman, J. S. 1988. Social capital in the creation of human capital. *American journal of sociology*, 94: S95-S120.

Cook, K. S., & Emerson, R. M. 1978. Power, equity and commitment in exchange networks. *American sociological review*: 721-739.

Cooper, W. H. 2014. Free trade agreements: Impact on US trade and implications for US trade policy.

Corcoles, D., Diaz-Mora, C., & Gandoy, R. 2014. Product sophistication: A tie that binds partners in international trade. *Economic Modelling*, 44: S33-S41.

Cote, C., Estrin, S., & Shapiro, D. 2020. Expanding the international trade and investment policy agenda: The role of cities and services. *Journal of International Business Policy*, 3(3): 199-223.

Crane, A., Henriques, I., Husted, B. W., & Matten, D. 2016. What constitutes a theoretical contribution in the business and society field? *Business & Society*, 55(6): 783-791.

Crozet, M., Hering, L., & Poncet, S. 2018. Looking for the bright side of the China Syndrome: Rising export opportunities and life satisfaction in China.

Cui, L., Hu, H. W., Li, S., & Meyer, K. E. 2018. Corporate political connections in global strategy. *Global Strategy Journal*, 8(3): 379-398.

Cull, R., Li, W., Sun, B., & Xu, L. C. 2015. Government connections and financial constraints: Evidence from a large representative sample of Chinese firms. *Journal of Corporate Finance*, 32: 271-294.

Cuypers, I. R. P., Ertug, G., Cantwell, J., Zaheer, A., & Kilduff, M. 2020. Making connections: Social networks in international business. *Journal of International Business Studies*.

Czinkota, M. R. 2006. Academic freedom for all in higher education: The role of the general agreement on trade in services. *Journal of World Business*, 41(2): 149-160.

Dahi, O. S., & Demir, F. 2013. Preferential trade agreements and manufactured goods exports: does it matter whom you PTA with? *Applied Economics*, 45(34): 4754-4772.

David, J. M. 2011. Competition, innovation, and the sources of product quality and productivity growth. Paper presented at V Intertic Conference.

Davies, S. 2011. Regional resilience in the 2008-2010 downturn: comparative evidence from European countries. *Cambridge Journal of Regions Economy and Society*, 4(3): 369-382.

Davis, G. F. 1991. Agents without Principles? The Spread of the Poison Pill through the Intercorporate Network. *Administrative Science Quarterly*, 36(4): 583-613.

Davis, G. F., & Cobb, J. A. 2010. Resource dependence theory: Past and future. *Stanford's organization theory renaissance, 1970–2000*.

De Benedictis, L., Nenci, S., Santoni, G., Tajoli, L., & Vicarelli, C. 2014. Network Analysis of World Trade using the BACI-CEPII dataset. *Global Economy Journal*, 14(03n04): 287-343.

De Sousa, J., Disdier, A.-C., & Gaigné, C. 2020. Export decision under risk. *European Economic Review*, 121: 1-23.

Di Caro, P., & Fratesi, U. 2018. Regional determinants of economic resilience. *Annals of Regional Science*, 60(2): 235-240.

Di Ubaldo, M., McGuire, S., & Shirodkar, V. 2022. Voluntary programs and emissions revisited: What is the effect of EU trade agreements with environmental provisions? *Journal of International Business Policy*: 1-23.

Díaz-Díaz, N. L., López-Iturriaga, F. J., & Santana-Martín, D. J. 2022. The role of political ties and political uncertainty in corporate innovation. *Long Range Planning*, 55(1): N.PAG-N.PAG.

Ding, H. Y., Fan, H. C., & Lin, S. 2018. Connect to trade. *Journal of International Economics*, 110: 50-62.

Dingel, J. I. 2017. The Determinants of Quality Specialization. *Review of Economic Studies*, 84(4): 1551-1582.

Diodato, D., & Weterings, A. B. R. 2015. The resilience of regional labour markets to economic shocks: Exploring the role of interactions among firms and workers. *Journal of Economic Geography*, 15(4): 723.

Diwan, I., Keefer, P., & Schiffbauer, M. 2015. Pyramid capitalism: political connections, regulation, and firm productivity in Egypt. *World Bank policy research working paper*(7354).

Doh, J. P., Lawton, T. C., & Rajwani, T. 2012. Advancing nonmarket strategy research: Institutional perspectives in a changing world. *Academy of management perspectives*, 26(3): 22-39.

Dohse, D., & Niebuhr, A. 2018. How different kinds of innovation affect exporting. *Economics Letters*, 163: 182-185.

Dür, A., Baccini, L., & Elsig, M. 2014. The design of international trade agreements: Introducing a new dataset. *The Review of International Organizations*, 9(3): 353-375.

Duval, R., Elmeskov, J., & Vogel, L. 2007. Structural policies and economic resilience to shocks.

Duxbury, S. W., & Haynie, D. L. 2018. Building them up, breaking them down: Topology, vendor selection patterns, and a digital drug market's robustness to disruption. *Social Networks*, 52: 238-250.

Egger, H., Egger, P., & Greenaway, D. 2008. The trade structure effects of endogenous regional trade agreements. *Journal of international Economics*, 74(2): 278-298.

Egger, P., & Larch, M. 2008. Interdependent preferential trade agreement memberships: An empirical analysis. *Journal of International Economics*, 76(2): 384-399.

Eguiluz, V. M., Zimmermann, M. G., Cela-Conde, C. J., & San Miguel, M. 2005. Cooperation and the emergence of role differentiation in the dynamics of social networks. *American Journal of Sociology*, 110(4): 977-1008.

Eicher, T. S., & Henn, C. 2011. In search of WTO trade effects: Preferential trade agreements promote trade strongly, but unevenly. *Journal of International Economics*, 83(2): 137-153.

Faccio, M. 2006. Politically connected firms. *American economic review*, 96(1): 369-386.

Faccio, M., & Parsley, D. C. 2009. Sudden Deaths: Taking Stock of Geographic Ties. *Journal of Financial and Quantitative Analysis*, 44(3): 683.

Faustino, H. C., & Matos, P. V. 2015. Exports, productivity and innovation: new firm level empirical evidence. *Applied Economics*, 47(46): 4918-4933.

Felipe, J., Kumar, U., Abdon, A., & Bacate, M. 2012. Product complexity and economic development. *Structural Change and Economic Dynamics*, 23(1): 36-68.

Ferguson, T., & Voth, H. J. 2008. Betting on Hitler - The value of political connections in Nazi Germany. *Quarterly Journal of Economics*, 123(1): 101-137.

Filatotchev, I., & Piesse, J. 2009. R&D, internationalization and growth of newly listed firms: European evidence. *Journal of International Business Studies*, 40(8): 1260-1276.

Findlay, C., & Hoekman, B. 2021. Value chain approaches to reducing policy spillovers on international business. *Journal of International Business Policy*, 4(3): 390-409.

Fingleton, B., Garretsen, H., & Martin, R. 2012. Recessionary shocks and regional employment: Evidence on the resilience of UK regions. *Journal of Regional Science*, 52(1): 109-133.

Fisman, R. 2001. Estimating the value of political connections. *American Economic Review*, 91(4): 1095-1102.

Foster, N., & Stehrer, R. 2011. Preferential trade agreements and the structure of international trade. *Review of World Economics*, 147(3): 385-409.

Fouré, J., Bénassy-Quéré, A., & Fontagné, L. 2013. Modelling the world economy at the 2050 horizon. *Economics of Transition*, 21(4): 617-654.

Fratianni, M., & Oh, C. H. 2009. Expanding RTAs, trade flows, and the multinational enterprise. *Journal of International Business Studies*, 40(7): 1206-1227.

Freeman, L. 1979. Centrality in Networks: I. Conceptual Clarifications. Social Networks.

Freeman, L. C. 1977. A set of measures of centrality based on betweenness. *Sociometry*: 35-41.

Fudenberg, D., & Tirole, J. 2013. *Dynamic models of oligopoly*: Routledge.

Fugazza, M., & Nicita, A. 2013. The direct and relative effects of preferential market access. *Journal of International Economics*, 89(2): 357-368.

Gamso, J., & Grosse, R. 2021. Trade agreement depth, foreign direct investment, and the moderating role of property rights. *Journal of International Business Policy*, 4(2): 308-325.

Gaulier, G., & Zignago, S. 2010. Baci: international trade database at the product-level (the 1994-2007 version).

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. *Journal of Business Research*, 69(11): 5076-5081.

Gereffi, G., Lim, H. C., & Lee, J. 2021. Trade policies, firm strategies, and adaptive reconfigurations of global value chains. *Journal of International Business Policy*, 4(4): 506-522.

Gervias, A. 2010. Product Quality, Firm Heterogeneity and International Trade, University of Notre Dame.

Girma, S., Gong, Y., Görg, H., & Yu, Z. 2009. Can production subsidies explain China's export performance? Evidence from firm-level data. *Scandinavian Journal of Economics*, 111(4): 863-891.

Globerman, S., & Shapiro, D. M. 1999. The impact of government policies on foreign direct investment: The Canadian experience. *Journal of International Business Studies*, 30(3): 513-532.

Gnyawali, D. R., & Madhavan, R. 2001. Cooperative networks and competitive dynamics: A structural embeddedness perspective. *Academy of Management review*, 26(3): 431-445.

Golovko, E., & Valentini, G. 2011. Exploring the complementarity between innovation and export for SMEs' growth. *Journal of International Business Studies*, 42(3): 362-380.

Granovetter, M. S. 1973. The strength of weak ties. *American journal of sociology*, 78(6): 1360-1380.

Hadlock, C. J., & Pierce, J. R. 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies*, 23(5): 1909-1940.

Hahn, C. H., Ito, K., & Narjoko, D. 2016. Exporting and Upgrading of Product Portfolio: Evidence from

Korea, Japan and Indonesia. *Asian Economic Journal*, 30(4): 349-373.

Handley, K., & Limao, N. 2015. Trade and Investment under Policy Uncertainty: Theory and Firm Evidence. *American Economic Journal-Economic Policy*, 7(4): 189-222.

Hansen, M. T. 1999. The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative science quarterly*, 44(1): 82-111.

Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. 2002. Time, teams, and task performance: Changing effects of surface-and deep-level diversity on group functioning. *Academy of management journal*, 45(5): 1029-1045.

Hassink, R. 2010. Regional resilience: a promising concept to explain differences in regional economic adaptability? *Cambridge Journal of Regions Economy and Society*, 3(1): 45-58.

Haunschild, P. R., & Beckman, C. M. 1998. When do interlocks matter?: Alternate sources of information and interlock influence. *Administrative Science Quarterly*, 43(4): 815-844.

Hausmann, R., Hwang, J., & Rodrik, D. 2007. What you export matters. *Journal of economic growth*, 12(1): 1-25.

He, G., Li, X., & Luo, J. 2021. The impact of the Shanghai–Hong Kong stock market connection on corporate innovation: Evidence from mainland China. *International Journal of Finance & Economics*: 1.

Hidalgo, C. A., & Hausmann, R. 2009. The building blocks of economic complexity. *Proceedings of the national academy of sciences*, 106(26): 10570-10575.

Hobday, M. 1998. Product complexity, innovation and industrial organisation. *Research policy*, 26(6): 689-710.

Hofmann, C., Osnago, A., & Ruta, M. 2019. The content of preferential trade agreements. *World Trade Review*, 18(3): 365-398.

Hou, Q. S., Hu, M., & Yuan, Y. 2017. Corporate innovation and political connections in Chinese listed firms. *Pacific-Basin Finance Journal*, 46: 158-176.

Howard, M. D., Withers, M. C., & Tihanyi, L. 2017. KNOWLEDGE DEPENDENCE AND THE FORMATION OF DIRECTOR INTERLOCKS. *Academy of Management Journal*, 60(5): 1986-2013.

Hu, C., & Lin, F. Q. 2016. Product standards and export quality: Micro evidence from China. *Economics Letters*, 145: 274-277.

Huang, X. 2021. Immigration and economic resilience in the Great Recession. *Urban Studies*, 58(9): 1885-1905.

Huang, Y., Xie, E., Li, Y., & Reddy, K. 2017. Does state ownership facilitate outward FDI of Chinese SOEs? Institutional development, market competition, and the logic of interdependence between governments and SOEs. *International Business Review*, 26(1): 176-188.

Hudson, R. 2010. Resilient regions in an uncertain world: wishful thinking or a practical reality? *Cambridge Journal of Regions Economy and Society*, 3(1): 11-25.

Hundley, G., & Jacobson, C. K. 1998. The Effects of the Keiretsu On the Export Performance of Japanese Companies: Help or Hindrance? *Strategic Management Journal (John Wiley & Sons, Inc.) - 1980 to 2009*, 19(10): 927.

Ibarra, H. 1993. Network centrality, power, and innovation involvement: Determinants of technical and administrative roles. *Academy of Management journal*, 36(3): 471-501.

Ibarra, H., & Andrews, S. B. 1993. Power, social influence, and sense making: Effects of network centrality and proximity on employee perceptions. *Administrative science quarterly*: 277-303.

Ikeda, Y., & Iyetomi, H. 2018. Trade network reconstruction and simulation with changes in trade policy. *Evolutionary and Institutional Economics Review*, 15(2): 495-513.

Imai, K., Keele, L., & Tingley, D. 2010. A general approach to causal mediation analysis. *Psychological methods*, 15(4): 309.

Imbs, J., & Wacziarg, R. 2003. Stages of diversification. *American Economic Review*, 93(1): 63-86.

Jaax, A., & Miroudot, S. 2021. Capturing value in GVCs through intangible assets: The role of the trade-investment-intellectual property nexus. *Journal of International Business Policy*, 4(3): 433-452.

Jarreau, J., & Poncet, S. 2012. Export sophistication and economic growth: Evidence from China. *Journal of Development Economics*, 97(2): 281-292.

Ju, J., & Wei, S.-J. 2011. When is quality of financial system a source of comparative advantage? *Journal of International Economics*, 84(2): 178-187.

Kandogan, Y., & Hiller, J. 2018. Alliances in international governmental organizations, regional trade agreement formation, and multinational enterprise regionalization strategy. *Journal of International Business Studies*, 49(6): 729-742.

Kee, H. L., Neagu, C., & Nicita, A. 2013. Is protectionism on the rise? Assessing national trade policies during the crisis of 2008. *Review of Economics and Statistics*, 95(1): 342-346.

Kharrazi, A., Rovenskaya, E., & Fath, B. D. 2017a. Network structure impacts global commodity trade growth and resilience. *PloS one*, 12(2): 1-13.

Kharrazi, A., Rovenskaya, E., & Fath, B. D. 2017b. Network structure impacts global commodity trade growth and resilience. *PloS one*, 12(2): e0171184.

Khwaja, A. I., & Mian, A. 2005. Do lenders favor politically connected firms? Rent provision in an emerging financial market. *The Quarterly Journal of Economics*, 120(4): 1371-1411.

Kim, M. 2013. Many roads lead to Rome: Implications of geographic scope as a source of isolating mechanisms. *Journal of International Business Studies*, 44(9): 898-921.

Kim, T. 2018. Does a firm's political capital affect its investment and innovation? *Available at SSRN 2971752*.

King, M. R. 2015. Political bargaining and multinational bank bailouts. *Journal of International Business Studies*, 46(2): 206-222.

Kwon, S.-W., Rondi, E., Levin, D. Z., De Massis, A., & Brass, D. J. 2020. Network brokerage: An integrative review and future research agenda. *Journal of Management*, 46(6): 1092-1120.

Lebedev, S., Sun, S. L., Markóczy, L., & Peng, M. W. 2021. Board political ties and firm internationalization. *Journal of International Management*: 100860.

Lechner, C., Frankenberger, K., & Floyd, S. W. 2010. Task contingencies in the curvilinear relationships between intergroup networks and initiative performance. *Academy of Management Journal*, 53(4): 865-889.

Lee, S. H., Beamish, P. W., Lee, H. U., & Park, J. H. 2009. Strategic choice during economic crisis: Domestic market position, organizational capabilities and export flexibility. *Journal of World Business*, 44(1): 1-15.

Lee, S. H., & Weng, D. H. 2013. Does bribery in the home country promote or dampen firm exports? *Strategic Management Journal*, 34(12): 1472-1487.

Levchenko, A. A. 2007. Institutional quality and international trade. *The Review of Economic Studies*, 74(3): 791-819.

Levinsohn, J., & Petrin, A. 2003. Estimating Production Functions Using Inputs to Control for

Unobservables. *The Review of Economic Studies*, 70(2): 317-341.

Li, B. J. 2018. Export expansion, skill acquisition and industry specialization: evidence from china. *Journal of International Economics*, 114: 346-361.

Li, C. 2020. Enhancing or inhibiting: The impact of investment in political ties on the link between firm innovation and productivity. *International Business Review*, 29(2).

Li, H. B., Meng, L. S., Wang, Q., & Zhou, L. A. 2008. Political connections, financing and firm performance: Evidence from Chinese private firms. *Journal of Development Economics*, 87(2): 283-299.

Li, X., Fung, A., Fung, H.-G., & Qiao, P. 2020. Directorate interlocks and corporate cash holdings in emerging economies: Evidence from China. *International Review of Economics & Finance*, 66: 244-260.

Li, Z., & Cheng, L. 2020. What do private firms do after losing political capital? Evidence from China. *Journal of Corporate Finance*, 60: 101551.

Limão, N. 2016. Preferential trade agreements, *Handbook of commercial policy*: Elsevier.

Lin, N. 1982. Social resources and instrumental action. *Social Structure and Network Analysis, Beverly Hills, Sage*: 131-145.

Liu, F., Lin, H., & Wu, H. 2018. Political connections and firm value in China: an event study. *Journal of Business Ethics*, 152(2): 551-571.

Liu, S., Du, J., Zhang, W., & Tian, X. 2021. Opening the box of subsidies: which is more effective for innovation? *Eurasian Business Review*, 11(3): 421-449.

Liu, S., Du, J., Zhang, W., Tian, X., & Kou, G. 2021. Innovation quantity or quality? The role of political connections. *Emerging Markets Review*, 48: N.PAG-N.PAG.

López-Bazo, E., & Motellón, E. 2018. Firm exports, innovation and the regional dimension in Spain. *Regional Studies*, 52(4): 490-502.

Lu, J. W., & Beamish, P. W. 2006. SME internationalization and performance: Growth vs. profitability. *Journal of international entrepreneurship*, 4(1): 27-48.

Lu, Y. 2011. Political connections and trade expansion. *Economics of Transition*, 19(2): 231-254.

Ma, R., Huang, Y. C., & Shenkar, O. 2011. Social networks and opportunity recognition: A cultural comparison between Taiwan and the United States. *Strategic Management Journal*, 32(11): 1183-1205.

MacKinnon, D. P., Cheong, J., & Pirlott, A. G. 2012. Statistical mediation analysis.

Malm, A., Bouchard, M., Decorte, T., Vlaemynck, M., & Wouters, M. 2017. More structural holes, more risk? Network structure and risk perception among marijuana growers. *Social Networks*, 51: 127-134.

Manova, K. 2013. Credit constraints, heterogeneous firms, and international trade. *Review of Economic Studies*, 80(2): 711-744.

Markóczy, L., Li Sun, S., Peng, M. W., Shi, W., & Ren, B. 2013. Social network contingency, symbolic management, and boundary stretching. *Strategic Management Journal*, 34(11): 1367-1387.

Martin, G., Gozubuyuk, R., & Becerra, M. 2015. INTERLOCKS AND FIRM PERFORMANCE: THE ROLE OF UNCERTAINTY IN THE DIRECTORATE INTERLOCK-PERFORMANCE RELATIONSHIP. *Strategic Management Journal*, 36(2): 235-253.

Martin, R. 2012. Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography*, 12(1): 1-32.

Martin, R., & Sunley, P. 2015. On the notion of regional economic resilience: conceptualization and

explanation. *Journal of Economic Geography*, 15(1): 1-42.

Martin, R., & Sunley, P. 2020. Regional economic resilience: evolution and evaluation, *Handbook on regional economic resilience*: Edward Elgar Publishing.

Martin, R., Sunley, P., Gardiner, B., & Tyler, P. 2016. How regions react to recessions: Resilience and the role of economic structure. *Regional Studies*, 50(4): 561-585.

Masulis, R. W., Wang, C., & Xie, F. 2012. Globalizing the boardroom—The effects of foreign directors on corporate governance and firm performance. *Journal of Accounting and Economics*, 53(3): 527-554.

Masulis, R. W., & Zhang, E. J. 2019. How valuable are independent directors? Evidence from external distractions. *Journal of Financial Economics*, 132(3): 226-256.

Medvedev, D. 2010. Preferential trade agreements and their role in world trade. *Review of World Economics*, 146(2): 199-222.

Melitz, M. J. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *econometrica*, 71(6): 1695-1725.

Mellahi, K., Frynas, J. G., Sun, P., & Siegel, D. 2016. A review of the nonmarket strategy literature: Toward a multi-theoretical integration. *Journal of management*, 42(1): 143-173.

Michaely, M. 1998. Partners to a preferential trade agreement: Implications of varying size. *Journal of International Economics*, 46(1): 73-85.

Mizruchi, M. S. 1996. What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual Review of Sociology*, 22: 271-298.

Mizruchi, M. S., Mariolis, P., Schwartz, M., & Mintz, B. 1986. Techniques for disaggregating centrality scores in social networks. *Sociological methodology*, 16: 26-48.

Modlhamer, C. 2020. Innovativeness and the design of intellectual property rights in preferential trade agreements: A refinement of the North-South explanation. *Journal of International Business Policy*, 3(4): 329-348.

Moore, E. M., Dau, L. A., & Mingo, S. 2021. The effects of trade integration on formal and informal entrepreneurship: The moderating role of economic development. *Journal of International Business Studies*, 52(4): 746-772.

Nguyen, B. D., & Nielsen, K. M. 2010. The value of independent directors: Evidence from sudden deaths. *Journal of Financial Economics*, 98(3): 550-567.

Nunn, N. 2007. Relationship-specificity, incomplete contracts, and the pattern of trade. *The Quarterly Journal of Economics*, 122(2): 569-600.

O'Reilly III, C. A. 1980. Individuals and information overload in organizations: is more necessarily better? *Academy of management journal*, 23(4): 684-696.

Obstfeld, D. 2005. Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative science quarterly*, 50(1): 100-130.

Oh, S., Ding, K. L., & Park, H. 2021. Cross-listing, foreign independent directors and firm value. *Journal of Business Research*, 136: 695-708.

Orefice, G., & Rocha, N. 2014. Deep Integration and Production Networks: An Empirical Analysis. *World Economy*, 37(1): 106-136.

Pendall, R., Foster, K. A., & Cowell, M. 2010. Resilience and regions: building understanding of the metaphor. *Cambridge Journal of Regions, Economy and Society*, 3(1): 71-84.

Pike, A., Dawley, S., & Tomaney, J. 2010. Resilience, adaptation and adaptability. *Cambridge Journal of Regions Economy and Society*, 3(1): 59-70.

Ramdas, K. 2003. Managing product variety: An integrative review and research directions. *Production and operations management*, 12(1): 79-101.

Rauch, J. E. 2001. Business and social networks in international trade. *Journal of economic literature*, 39(4): 1177-1203.

Redding, S., & Venables, A. J. 2004. Economic geography and international inequality. *Journal of international Economics*, 62(1): 53-82.

Reeb, D., Sakakibara, M., & Mahmood, I. P. 2012. From the editors: Endogeneity in international business research: Springer.

Rijkers, B., Baghdadi, L., & Raballand, G. 2017. Political connections and tariff evasion evidence from Tunisia. *The World Bank Economic Review*, 31(2): 459-482.

Roberts, M. J., Xu, D. Y., Fan, X., & Zhang, S. 2012. A structural model of demand, cost, and export market selection for chinese footwear producers. *NBER Working Paper Series*: 17725.

Rugman, A. M., & Kirton, J. 1998. Multinational enterprise strategy and the NAFTA trade and environment regime. *Journal of World Business*, 33(4): 438-454.

Salomon, R., & Shaver, J. M. 2005. Export and domestic sales: Their interrelationship and determinants. *Strategic Management Journal*, 26(9): 855-871.

Sauerwald, S., Lin, Z., & Peng, M. W. 2016. BOARD SOCIAL CAPITAL AND EXCESS CEO RETURNS. *Strategic Management Journal (John Wiley & Sons, Inc.)*, 37(3): 498-520.

Schoenherr, D. 2019. Political connections and allocative distortions. *The Journal of Finance*, 74(2): 543-586.

Scott, J. 1988. Social network analysis. *Sociology*, 22(1): 109-127.

Sharma, P., Cheng, L. T. W., & Leung, T. Y. 2020. Impact of political connections on Chinese export firms' performance - Lessons for other emerging markets. *Journal of Business Research*, 106: 24-34.

Shaw, J. D., Duffy, M. K., Johnson, J. L., & Lockhart, D. E. 2005. Turnover, social capital losses, and performance. *Academy of Management Journal*, 48(4): 594-606.

Shirodkar, V., Batsakis, G., Konara, P., & Mohr, A. 2022. Disentangling the effects of domestic corporate political activity and political connections on firms' internationalisation: Evidence from US retail MNEs. *International Business Review*, 31(1).

Shirodkar, V., & Mohr, A. T. 2015. Resource tangibility and foreign firms' corporate political strategies in emerging economies: Evidence from India. *Management International Review*, 55(6): 801-825.

Simmie, J., & Martin, R. 2010. The economic resilience of regions: towards an evolutionary approach. *Cambridge Journal of Regions Economy and Society*, 3(1): 27-43.

Song, Y., Yang, N. D., Zhang, Y. L., & Wang, J. B. 2020. Do more structural holes lead to more risk propagation in R&D networks? *Management Decision*, 58(1): 39-57.

Soroka, A., Bristow, G., Naim, M., & Purvis, L. 2020. Measuring regional business resilience. *Regional Studies*, 54(6): 838-850.

Stigler, G. J. 1971. The Theory of Economic Regulation. *The Bell Journal of Economics and Management Science*, 2(1): 3-21.

Storper, M. 2018. Separate worlds? Explaining the current wave of regional economic polarization. *Journal of Economic Geography*, 18(2): 247-270.

Sun, P., Mellahi, K., & Wright, M. 2012. The Contingent Value of Corporate Political Ties. *Academy of Management Perspectives*, 26(3): 68-82.

Tihanyi, L., Aguilera, R. V., Heugens, P., van Essen, M., Sauerwald, S., Duran, P., & Turturea, R. 2019. State Ownership and Political Connections. *Journal of Management*, 45(6): 2293-2321.

Tortoriello, M., & Krackhardt, D. 2010. Activating cross-boundary knowledge: The role of Simmelian ties in the generation of innovations. *Academy of Management Journal*, 53(1): 167-181.

Tsai, W. 2001. Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of management journal*, 44(5): 996-1004.

Tushman, M. L. 1977. Special boundary roles in the innovation process. *Administrative science quarterly*: 587-605.

Urias, E., & Ramani, S. V. 2020. Access to medicines after TRIPS: Is compulsory licensing an effective mechanism to lower drug prices? A review of the existing evidence. *Journal of International Business Policy*, 3(4): 367-384.

Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*: 35-67.

Vafeas, N., & Vlittis, A. 2018. Independent directors and defined benefit pension plan freezes. *Journal of Corporate Finance*, 50: 505-518.

Verhoogen, E. A. 2008. Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. *Quarterly Journal of Economics*, 123(2): 489-530.

Vicard, V. 2012. Trade, conflict, and political integration: Explaining the heterogeneity of regional trade agreements. *European Economic Review*, 56(1): 54-71.

Vidya, C., & Prabheesh, K. 2020. Implications of COVID-19 pandemic on the global trade networks. *Emerging Markets Finance and Trade*, 56(10): 2408-2421.

Wang, L. 2015. Protection or expropriation: Politically connected independent directors in China. *Journal of Banking & Finance*, 55: 92-106.

Wang, X., Feng, M. M., & Xu, X. D. 2019. Political connections of independent directors and firm internationalization: An empirical study of Chinese listed firms. *Pacific-Basin Finance Journal*, 58.

Wei, C., Hu, S., & Chen, F. 2020. Do political connection disruptions increase labor costs in a government-dominated market? Evidence from publicly listed companies in China. *Journal of Corporate Finance*, 62: 101554.

Wei, W., & Muratova, Y. 2020. Executive power and politically connected independent directors: evidence from China. *Asian Business & Management*.

Weldemicael, E. 2014. Technology, Trade Costs and Export Sophistication. *World Economy*, 37(1): 14-41.

Williams, N., & Vorley, T. 2014. Economic resilience and entrepreneurship: lessons from the Sheffield City Region. *Entrepreneurship and Regional Development*, 26(3-4): 257-281.

Witt, M. A. 2019. De-globalization: Theories, predictions, and opportunities for international business research. *Journal of International Business Studies*, 50(7): 1053-1077.

Wu, J., & Zhao, H. 2015. The dual effects of state ownership on export activities of emerging market firms: An inducement–constraint perspective. *Management International Review*, 55(3): 421-451.

Xu, Y. 2018. Anticorruption regulation and firm value: Evidence from a shock of mandated resignation of directors in China. *Journal of Banking & Finance*, 92: 67-80.

Yan, J. Z., & Chang, S. J. 2018. The contingent effects of political strategies on firm performance: A

political network perspective. *Strategic Management Journal*, 39(8): 2152-2177.

Yang, H., Lin, Z., & Lin, Y. 2010. A multilevel framework of firm boundaries: Firm characteristics, dyadic differences, and network attributes. *Strategic Management Journal*, 31(3): 237-261.

Zhang, J., & Pezeshkan, A. 2016. Host country network, industry experience, and international alliance formation: Evidence from the venture capital industry. *Journal of World Business*, 51(2): 264-277.

Zheng, W. T., Singh, K., & Mitchell, W. 2015. Buffering and enabling: The impact of interlocking political ties on firm survival and sales growth. *Strategic Management Journal*, 36(11): 1615-1636.

Zheng, Y., & Xia, J. 2018. Resource dependence and network relations: A test of venture capital investment termination in China. *Journal of Management Studies*, 55(2): 295-319.

Zhong, W., Su, C., Peng, J., & Yang, Z. 2017. Trust in interorganizational relationships: A meta-analytic integration. *Journal of Management*, 43(4): 1050-1075.

Zhu, S. J., & Fu, X. L. 2013. Drivers of Export Upgrading. *World Development*, 51: 221-233.

Zona, F., Gomez-Mejia, L. R., & Withers, M. C. 2018. Board Interlocks and Firm Performance: Toward a Combined Agency-Resource Dependence Perspective. *Journal of Management*, 44(2): 589-618.