Firm Survival and Innovation in Emerging Markets

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Chapter 5

Unraveling the impact of institutional transition on firms' exploratory and exploitative innovation

Abstract: What drives firms' exploratory and exploitative innovation has attracted increasing attention. However, there is little knowledge about its institutional antecedents. This chapter is designed to narrow this gap. To be specific, this study examines to what extent and when the scope and speed of institutional transition shape firms' exploratory and exploitative innovation. Using data from Chinese manufacturing firms during 2009-2014, our findings contribute to both innovation and institutional literature. Empirical results indicate that the scope of institutional transition is positively associated with firms' exploratory and exploitative innovation. The speed of institutional transition is likely to incent exploratory innovation, but it exerts an inverted U-shape influence on exploitative innovation. Furthermore, these direct effects are contingent on firms' political network diversity. Specifically, political network diversity suppresses the positive effect of institutional transition scope on firms' exploratory and exploitative innovation. Particularly, the institutional transition speed has an inverted U-shaped influence on exploratory innovation when firms have a lower political network diversity. In contrast, the institutional transition speed has a U-shaped effect on exploratory innovation when firms' political network diversity is higher.

Keywords: Exploratory innovation, exploitative innovation, institutional transition, political network diversity, emerging market

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2. Yang, C., Bossink, B., and Peter, P. Unraveling the impact of institutional transition on firms' exploratory and exploitative innovation. *Journal of Business Research*, Under review.

5.1 Introduction

Institutional contexts may nurture innovation. An increasing body of empirical studies indicate that firm innovation is influenced by institutional environments they are located in, by facilitating or constraining them to invest in knowledge absorption and new product development (Kafouros and Aliyev, 2016; Yang et al., 2015; Yi et al., 2017). Recently, some studies have concentrated on institutional transition in emerging markets, like China, in order to unravel when and how institutions contribute to firm innovation (Yang et al., 2015; Zhou et al., 2017). Some of these studies view institutional transition as a background factor and examine its contingent value (e.g., Li and Zhang, 2007; Liu et al., 2018). Several studies stress the institutional supports of innovation activities and highlight the direct influence of institutional transition on shaping firm innovation in general (Lavie et al., 2010; Mueller et al., 2013; Posen and Levinthal, 2012; Yang et al., 2015). Despite this, still little is known about when institutional transition determines firm's strategical propensity for specific innovations *i.e.*, exploratory innovation that is featured by creating new technologies and products building on new knowledge outside firms' given knowledge base and exploitative innovation that concentrates on extending and improving existing knowledge and products (Jansen et al., 2006; Lavie et al., 2010; March, 1991; Mueller et al., 2013; Wilden et al., 2018). This study tends to narrow this gap, by exploring under which conditions and through what mechanisms the institutional transition in China shapes firms' exploratory and exploitative innovation.

To better capture a more generalized picture of the influence of institutional transition on firm innovation, the institution-based view (IBV) provides a helpful theoretical analysis framework (Peng, 2003; Zhang et al., 2016). The IBV views the institutions, 'the rules of the game' (North, 1990), are a key determinant of firm's strategic behavior (Oliver, 1997; Peng, 2003; Peng et al., 2009; Wright et al., 2005). It further highlights the national/regional institutional contexts substantially shape a firm's innovation and performance (Yang et al., 2015; Kafouros and Aliyev, 2016), so does the institutional transition that lead to creating a more market-based and innovation-driven economic system in emerging markets. As IBV suggests, an institutional transition may be captured through two dimensions *i.e.*, scope and speed (Banalieva et al., 2015; Haveman et al., 2017; Zhang et al., 2016). Scope refers to the extent to which the institutional system approaches to be more market-based (Chari and David, 2012; Peng et al., 2008), while speed refers to how fast the institutional system changes (Banalieva et al., 2015; Chen et al., 2017). In emerging markets, either of them may determine firms' strategic propensity for innovation through differentiated influence mechanisms. For example, more developed market-based institution means that market

power is more dominating, leading to dramatic market competition, which usually compels firms to conduct innovation; while higher institutional transition speed implies rules change faster, leading to higher turbulence in institutional environments, which may constrain firms' innovation investment. In other words, different dimensions of institutional transition imply varying environmental pressures that further shape firms' innovation propensity (Banalieva et al., 2015; Yang et al., 2015; Zhou et al., 2017). However, in the literature, different dimensions of institutional transition remain unlinked with specific types of innovation *i.e.*, exploratory/exploitative innovation (Mueller et al., 2013; Wilden et al., 2018).

Taken together, using Chinese manufacturing firm data, this study is designed to gain a further understanding about how the scope and speed of institutional transition motivate or suppress firms' exploratory and exploitative innovation. In practice, firms in transitional contexts usually resort to various political ties to deal with constraints arising from rapid regulatory changes and institutional turbulence (Meyer and Peng, 2005; Peng, 2003; Peng et al., 2008; Peng and Heath, 1996). Considering this, we further argue that a firm's portfolio of political ties *i.e.*, the diversity of a firm's political network, may determine the extent to which this firm's innovative activity can benefit from an institutional transition (Banalieva et al., 2015; Zhang et al., 2016).

Our empirical evidence reveals that the scope of institutional transition (hereafter 'transition scope') positively contributes to both exploratory and exploitative innovation, and political network diversity attenuates this relationship. Moreover, the speed of institutional transition (hereafter 'transition speed') enhances firms' propensity for exploratory innovation, and this relationship is significantly moderated by firms' political network diversity. Transition speed exerts an inverted U-shaped influence on firms' exploitative innovation, but political network diversity does not significantly moderate this curvilinear relationship. These findings first contribute to innovation theory by examining the institutional antecedents of firms' exploratory and exploitative innovation, which is largely absent in previous studies (Mueller et al., 2013; Wilden et al., 2018). Second, this study integrates the transition speed dimension into the IBV analytic framework, which provides fresh evidence to enrich and support a dynamic IBV perspective. Third, our study focuses on the role of institutional transition and political networking in China. This may help to depict a more generalized picture of "institution—innovation" links and can support managers and policy makers in transitional economies (e.g., China) in decision-making in how to develop, and/or react to institutional arrangements.

The remainder of this chapter is organized as follows. In section 2 we first review the

literature and propose hypotheses. In section 3 we describe the methods and empirical data that are used to test our hypotheses. Section 4 presents the regression results, which are respectively discussed and concluded in section 5.

5.2 Literature review and hypotheses development

5.2.1 Exploratory and exploitative innovation

Firm's technological innovation can be categorized as two distinct activities, i.e. exploration and exploitation (March, 1991; Jansen et al., 2006). Exploratory innovation builds on new knowledge outside the firm's existing technology base. It develops new technologies and creates new products to meet new demands and new customers in emerging markets. Thus, exploration requires new knowledge which entails uncertainty, risk, and long-term investment (Greve, 2007). In contrast, exploitative innovation primarily conducts incremental product or technology improvements and refinements, using current knowledge and skills. Firms conduct exploitative innovation to expand an existing market, attract more consumers, and improve product quality. An exploitation strategy is usually designed to maintain or improve a firm's short-term performance. Hence, exploitative innovation seeks to reinforce routines based on existing knowledge (Greve, 2007; Posen and Levinthal, 2012).

Although both exploratory and exploitative innovation often have a positive influence on a firm's performance and competitiveness (e.g., Bierly and Daly, 2007), there still is little knowledge on how institutional environments drive firms' exploratory and exploitative innovation (Greve, 2007; Lavie et al., 2010; Mueller et al., 2013). In emerging markets like China, institutional transition normally dominates, which is usually featured by institutional voids, market turbulence, and policy uncertainty. How such an institutional transition constrains or incents firms' exploratory and exploitative innovation awaits further examination (Mueller et al., 2013; Wilden et al., 2018).

5.2.2 Institutional transition's effect on firm's exploratory/exploitative innovation

Scope of institutional transition and firms' exploratory/exploitative innovation

The scope of institutional transition refers to the degree of marketization in a specific province of China (Yi et al., 2017; Zhou et al., 2017). Generally, a certain transition scope may facilitate firms' exploratory and exploitative innovation in several ways. First, a high transition scope may induce market competition that is required for specific innovations. In China, marketization reforms steadily reduce the monopoly of state-owned enterprises

(SOEs) and open the former monopolistic sectors to private and foreign firms. Accordingly, a large number of heterogeneous agents enter into the market, which creates competition and more intensity (Hermelo and Vassolo, 2010; Ramamurti, 2000). To compete and survive, firms, including SOEs, private firms, and foreign firms invest their energy and resources to conduct innovation activities, within or outside their existing technological boundaries (Yang et al., 2015; Yi et al., 2017). Firms that operate under such conditions tend to explore opportunities, introduce new products and technology, restructure marketing channels, and build internal capabilities for both short- and long-term competition (Tripsas, 1997).

Second, a high transition scope incents the establishment of an innovation-supported economic system. After 30 years of rapid development since 1978, Chinese economic growth slowed down, amongst others due to a major focus on low-tech and low-cost economic business development (Vinig and Bossink, 2015). To maintain growth, the Chinese government continued its reforms to make the economy in its provinces more innovation-driven and market-oriented. These reforms are based on the assumption that more market- and innovation-oriented provinces usually associated with a higher level of economic development. In such provinces, the government builds a science and knowledge infrastructure, thereby providing support for firms' exploratory and exploitative innovation (Mahmood and Rufin, 2005). In addition, the government issues a series of policies and regulations to induce and secure firms' innovation investment. Thus, a province with a high transition scope creates a conducive environment for mitigating innovation risks. In contrast, provinces with a lower transition scope are less motivated to foster innovation infrastructure, which curbs firms' investment in new technology exploration and a new combination of knowledge (Yi et al., 2017).

Third, a high transition scope may lead to the improvement of government services. In the age of the planned economy, the Chinese government determined resource allocations. During reforms, China gradually introduced market forces, establish market-based rules, and decrease government intervention (Peng, 2003). It may compel the Chinese government to reform itself, and to transform its role. Although the government withdraws power, its dominant role remains in facilitating market development (Ruan et al., 2014; Shi et al., 2014). To foster high-quality growth, it increasingly plays a role in coordinating market conditions, providing public services, and cultivating an innovation environment (Yi et al., 2017). For example, the government tends to provide policies to fit the needs of firms with prospective innovation projects. In more developed provinces, the government is likely to invest more in innovation infrastructure building, implement talent attracting policies, and deliver more transparent and more efficient public services to boost technology projects. It thus helps

firms to mitigate the risks involved with exploratory and exploitative activities. In contrast, in less developed provinces the government tends to be less efficient with regard to this (Fan et al., 2016).

Based on the above we present the first hypothesis of our study.

> ***Hypothesis 1 (H1):*** *The scope of institutional transition is positively associated with firms' a) exploratory and b) exploitative innovation.*

Speed of institutional transition and firms' exploratory/exploitative innovation

In today's China, the institutions are unevenly developed in sub-national regions due to the unbalanced regional development (He et al., 2008; Luo, 2007; Schlevogt, 2001). In certain provinces institutions change with a higher speed, while in other provinces the institutions change in a much lower pace (Luo, 2007; Schlevogt, 2001; Xu and Meyer, 2013). These varying transition rates challenge firms' investment decision-making in new technology and product development. In general, it can be argued that firms' innovation tends to benefit from transition with a gradual pace. Firstly, gradually paced reforms exert moderate pressure on a firm in terms of organizational development and growth. Gradually paced institutional changes also provide space for new business regulation to develop in such a way that these co-exist with the existing regulation (Peng, 2003). Firms are given more time to learn and adapt to new rules of the game, and then gradually shift their strategic behaviors away from older systems, towards the new. Second, a more slow-paced introduction of market mechanisms allows firms to deliberately adjust their behaviors and strategies. For example, tax favors for new technology may incent firms to invest outside their existing technological boundaries. In an environment with an appropriate transition speed, firms are given time to learn, innovate, capture new knowledge, and commercialize new technology (Zhou, 2017).

Conversely, a much higher speed of institutional transition may lead to increased uncertainty and turbulence, which could curb firms' innovation propensity. First, a high pace of institutional reform is usually associated with a high uncertainty of the market (Banalieva, 2014; Chen et al., 2017; Shi et al., 2017). For instance, some major SOEs may swiftly withdraw from a monopolistic market when this market is opened for all kinds of commercial organizations, which could result in huge market voids. To occupy and exploit these voids, firms then must quickly learn to grasp the opportunities, obtain resources, and identify customers. However, fast-changing institutional environments also challenge firms' existing learning trajectories, technology routines, knowledge stocks, and market strategies, which would increasingly raise their transaction costs (Williamson, 1993; Chan et al., 2008).

In addition, when firms invest more in their organizational, human and strategical assets it can also mean that this leads to a trade-off and a limited or decreased spending in technology and technological development. Therefore, high market turbulence may erode firms' innovation prospects (Banalieva et al., 2015). Second, a rapid institutional transition often leads to a more unpredictable market situation. When old regulations suddenly evaporate and new ones enter the stage in high pace, firms are unforeseeably exposed to new and unfamiliar business rules. It implies that quick institutional changes breed environmental uncertainties, which makes it difficult for firms to predict the market as well as further reforms (Xu and Meyer, 2013). In turn, an increasingly unpredictable environment may make firms' responses less efficient, and thus may negatively influence their new product development or technology improvement activities. Specifically, uncertainties in rules, regulations, legal systems, and market transactions would also amplify the risks that involve in innovation activities. Third, swift changes may lead to opportunistic behaviors. A quick withdrawal of old institutions to support the implementation of new ones may give rise to new opportunities (Luo, 2007; Xin and Pearce, 1996) and to acquire these opportunities, firms and government officials may ally to monopoly the market voids. These opportunistic behaviors can jeopardize firms' confidence in innovation investment. This leads to the second hypothesis.

> ***Hypothesis 2 (H2):*** *The speed of institutional transition has an inverted U-shaped influence, which first has an increasing effect and then a decreasing effect on firms' a) exploratory and b) exploitative innovation.*

5.2.3 Political network diversity as a contingency

Institutional transition usually raises institutional voids and uncertainties (Peng and Luo, 2000). To effectively response, it is often reported that firms' top management teams (TMTs) resort to political networking, which functions as a substitute for insufficient formal institutions (Peng, 2003). Although lots of studies focused on the role of political ties, there have been inconsistent findings on whether firms' political networks complement for the insecurities an institutional transition brings about. For example, a study by Sun et al.'s (2012) indicates that the importance of firms' political networks decreases as the institutions develop; while Yang et al.'s (2019) research finds that the positive effects of political networks on firm innovation increase in Chinese provinces with an advanced institutional system. One possible explanation for these mixed findings may be that in most studies the political network is seen as a general concept, which does not do justice to the diversity of this network. In practice, TMT members may form political ties with various government

agencies or political organizations. Thus, firms' political networks are composed of a variety of dyadic personal connections between TMT members and public agencies (Inoue et al., 2013; Sun et al., 2012). To address this and conduct a study that takes this into account, this study aims to further look inside firms' political network portfolio, and examine the effect of political network diversity, define as a firm's portfolio of various 'TMT member-government agency/political organization' ties (Zhu and Chung, 2014), on the relationship between institutional transition and firms' exploratory and exploitative innovation.

Political network diversity and firms' exploratory/exploitative innovation

Social network studies show that diverse social ties can bring social capital that enables firms to acquire non-redundant information, knowledge, and resource outside their organization boundaries (Sun et al., 2015; Zhu and Chung, 2014). This implies that political network diversity may benefit firms' innovation activities by offering multiple opportunities, complementary resources, heterogeneous information, and broadened government supports (Sun et al., 2015). In emerging markets where institutions are less developed, firms are usually confronted with multiple institutional voids and with various market uncertainties, in the areas of finance, legal, and taxing systems (Zhang et al., 2016; Khwaja and Mian, 2005; Peng and Zhou, 2005). To compete and survive under such circumstances, firms building on more diverse political networks are likely to benefit more from heterogeneous regulatory supports that reside in different government agencies, which can stimulate their innovation performance. Furthermore, firms with diverse political networks may gain access to specific resources that can complement each other. For example, firms building on various ties to government agencies may affect decisions of government policymakers, obtain tax favors from tax administration bureaus, and obtain financial support from state-owned banks in a more effective and efficient way. A diverse portfolio of political network ties can support firms' innovation significantly (Rothaermel, 2001; Yang et al., 2017; Ugur et al., 2016), especially in environments with less developed institutions (Fuentelsaz et al., 2015).

However, the above scenario may change as the institutions are getting more developed. The first argument resides in the substitute relationship between formal institutions and political networking. Usually, during the early stages of institutional transition in emerging markets, institutional voids significantly dominate, and political ties prevail that help firms to alleviate pressures and uncertainties arising from the institutional changes (Peng and Luo, 2000; Peng et al., 2009). As institutional reforms proceed, the government withdraws from being a market participant, and market rules take over and gradually govern market transactions. This means that a growing orientation on market mechanisms would erode the social-

economic value of a firm's political networking portfolio. Particularly, the institutional components such as business regulation, financial systems, and legal systems would become more coordinated, synergistic, and complementary in a region with more developed institutions (Yang et al., 2015). Such an institutional system may distinctly secure the support of heterogeneous resources, varied knowledge, and non-redundant information for firms' long-term commitments. It can then be expected that the positive effect of scope of institutional transition on firms' exploratory and exploitative innovation weakens when political network diversity is high.

Furthermore, it usually consumes TMT members' energy and time to maintain, coordinate, and manage political networks. Diverse political ties imply that firms need to deal with the differences among political partners. As a political network portfolio become more diverse, the firm may need to invest more resources to negotiate and interact with different public authorities or government agencies. Diverse political networking may distract TMTs' energy from internal capability building and external changing market responding. Thus, increasing political network diversity is likely to raise operation costs (Cobena et al., 2017; Combs and Ketchen, 1999). In less developed regions, the benefits of political network diversity may outweigh that of the costs, because firms need to rely more on the government resources (Li and Zhang, 2007; Zhu and Chung, 2014). By contrast, in more developed regions, market mechanisms usually dominate business transactions. Firms in these regions have to concentrate more on building business ties with heterogeneous business agents, such as suppliers, banks, and competitors to acquire technology licensing, external knowledge, and high-skilled engineers (Sheng et al., 2011; Gao et al., 2017). Resources spent on political network building cannot be used to build a business network (Sheng et al., 2011). In this context spending on political networking thus discourage firm innovation.

Thirdly, although China's market economy has substantially expanded, China's political institutional reform largely lags behind (Park et al., 2006; Zhang et al., 2016). This makes that political organizations remained influential and exert significant influence on various aspects of China's market economy, in various market sectors (Zhang et al., 2016). Under such circumstances, a firm with diverse political networks may face an inflow of various or even conflicting regulatory information (Ahuja and Lampert, 2001). This makes it likely conflicts among TMT members may rise when they have to decide which regulatory information and resources they adopt and which not (Fleming and Sorenson, 2001). The above leads to the third hypothesis.

Hypothesis 3 (H3): *As political network diversity increases, the positive relationship*

between transition scope and firms' a) exploratory and b) exploitative innovation weakens.

When transition speed increases, new rules are issued and obsolete regulations are aborted with a high frequency, which can make social, economic, legal, and financial systems change more rapidly. In such environments, market uncertainties and institutional voids usually dominate, which make the environment more unpredictable (Xin and Pearce, 1996; Peng et al., 2009). Such a dynamic and turbulent institutional environment challenges firms' recombination of resources, as well as their innovation protection. It may compel firms to build and leverage various political ties to mitigate institutional constraints. Firstly, social capital, which involves multiple political networks enable firms to obtain non-redundant information and diverse institutional support (Lin, 2001). Multiple resources, such as financial capital, tax favors, policy information, and political support, may flow to firms through diverse political connections (Zhu and Chung, 2014; Hagedoorn et al., 2018). Secondly, diverse political networks may help organizations to broaden their channels to gain access to heterogeneous resources. In an environment with a high level of institutional turbulence, firms are usually confronted with uncertainties arising from various sources, such as frequent policy changes, R&D subsidy regulation reforms, and financial systems restructuring. They usually need specific resources from differentiated government agencies (Zhu and Chung, 2014; Hoskisson et al., 2000) to overcome these heterogeneous institutional uncertainties. Thirdly, equipped with diverse political networks, firms may be more flexible to conduct innovation-related strategic decisions. A higher transition speed also raises new kinds of innovation opportunities. Diverse political networks provide varied channels for firms to identify such potential opportunities, such as the potential technology areas that the government intends to support, and forthcoming innovation-supporting programs. Equipping with more diverse political ties, a firm is able to mobilize more alternative ties (Zhu and Chung, 2014), which leads to more space for strategic choices in turbulent environments. Lastly, an increased transition speed sometimes demonstrates the government's ambition to transform the economy and to develop from a low-tech growth pattern into an innovation-driven growth mode (Yang et al., 2017). The government can also rely more on politically connected firms, and help them, and by this achieve its own economic growth goals. Regulatory resources, such as R&D support, policy favors, and bank debt, are then prioritized to firms that widely connect with various government agencies (Schott and Jensen, 2016; Li and Zhang, 2007).

When transition speed increase and reaches a certain point, the complementary benefit of political network diversity may decrease. One possible reason lies in the increasing and high

maintenance costs of diverse political networks, which may transcend the benefits in a highly turbulent environment. Another reason may reside in the mechanism that firms heavily rely on cohesive political ties when their environments are getting more unpredictable (Koka and Prescott, 2008), while a more diverse political network limits the cohesion of these political ties (Koka and Prescott, 2008). A more limited number of alternative political ties would enable firms to leverage necessary regulatory resources for reasonable cost. In other words, maintaining a limited diversity of political networks may be much more beneficial than building an ever-increasing political network. This leads to the fourth hypothesis.

Hypothesis 4 (H4): *Political network diversity positively moderates the relationship between transition speed and a) exploratory and b) exploitative innovation in such a way that the inverted U-shaped effects of transition speed on a) exploratory and b) exploitative innovation are stronger when the level of political network diversity is lower.*

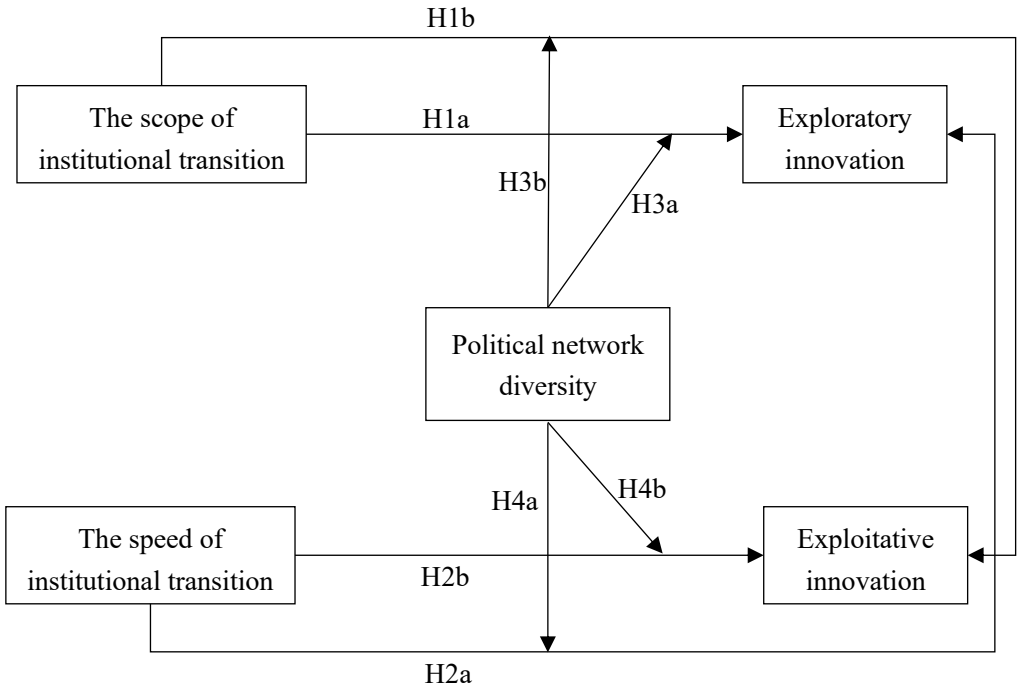

Figure 5-1 The conceptual framework

5.3 Data and methods

5.3.1 Data

To test the hypotheses, this study employs empirical data from China where institutional development and firm innovation vary across provinces. We draw empirical data from two

datasets: The China Stock Market Accounting Research (CSMAR) database, and Marketization Index of China's Provinces (2016) (*i.e.,* NERI Index). We extracted the firm data from CSMAR during the period 2008-2015. CSMAR is one of the largest databases that collect firm-level information of Chinese publicly listed firms, and has been widely used in extant literature (e.g., Banalieva et al., 2015). This data includes key information concerning firms' operation and innovation, such as patent applications, R&D expenditures, and ownership. To minimize the bias estimation, we refine our sample by excluding financial firms, firms with asset-liability ratios that are negative or above 1, real estate firms, firms with incomplete focal information, and firms with only one-year records. Furthermore, we use the NERI Index (2008-2014) that is compiled by the National Economic Research Institute (NERI) (Fan et al. 2016) to measure the institutional transition in China at the provincial level. This index indicates the annual development of Chinese provinces' marketization, and is also widely used in existing studies (e.g., Liu et al., 2018; Yi et al., 2017; Zhou et al., 2017). We set the year 2008 as the reference year when transition speed is calculated. After matching the CSMAR and NERI Index by firm's provincial location, we finally obtain 7857 firm-year observations (2009-2014).

5.3.2 Measures

Exploratory and exploitative innovation

Firm's *exploratory innovation* and *exploitative innovation* are the dependent variables. Consistent with previous studies (e.g., Gilsing et al., 2008; Guan and Liu, 2016), we construct the measures based on firms' patent information that is loyally recorded by CSMAR. Following Gilsing et al. (2008) and Guan and Liu's (2016) approach, we first identify the technological classes (i.e., four-digit IPC codes) that each patent of the focal firm belongs to. We then calculate the technological profiles of focal firms by counting their technology classes. We labeled a technology class as 'exploratory' if it appears in the year of observation but not in the previous five years. We labeled a technology class as 'exploitative' if an invention patent stemming from this technology is applied in the previous 5 years and the year of observation. The exploratory (exploitative) innovation of the focal organization is quantified by adding up the exploratory (exploitative) technology classes.

Institutional transition

Building on the NERI Index (Fan et al., 2016), which is widely used in existing literature, especially in institution-related studies (e.g., Zhou et al., 2017; Yang et al., 2015), we construct two measure to indicate the institutional transition in Chinese provinces.

The first is the *scope* of institutional transition. According to extant literature, we contend that the overall NERI Index reflects the developmental status of provincial institutions (Zhou et al., 2017; Yi et al., 2017; Arnoldi and Villadsen, 2015). This study uses the total score of NERI Index to represent the transition scope to which the institution developed each year in each province.

Our second institution-related measure is the *speed* of institutional transition. For province *i*, we define the speed as the rate of institution development over years. Following Banalieva et al.'s (2015) methods (this measure was also applied in Chapter 4), we first construct a measure for a focal province's actual speed of institutional transition, which refers to the difference between the scope of the institutional transition at year *t* and that at the base year (year 2008), divided by time span between year t and 2008 (i.e., t-2008). The formula is as follows:

$$Actual\ Speed_{i,t} = (Scope_{i,t} - Scope_{i,2008})/(t - 2008) \text{.....(1)}$$

China begins its market institution reforms in 1978. After 30 years of high-speed growth, the market economy has significantly expanded in China. However, regional unbalanced development dominates the country (Chan et al., 2010; Zhou, 2014). It implies that some province achieves a higher scope of institutional development in 2008, while others lag behind (Yang et al., 2015). Accordingly, the actual transition speed of less developed provinces may be faster than that of more developed provinces. To alleviate this potential biased influence, we rescale our speed measure (Equation 1) by using the difference between the maximum scope and transition scope at 2008 (i.e., maximum speed), as Banalieva et al. (2015) suggested. Thus, we calculate the potential maximum speed of institutional transition in province *i* at the year 2008 by using the followed formula:

$$Maximum\ Speed_{i,2008} = Maximum\ Scope - Scope_{i,2008} = 10 - Scope_{i,2008} \text{.....(2)}$$

Therefore, the speed of institutional transition of focal province *i* in year *t* is equal to its actual speed over the maximum speed (Equation 1, Banalieva et al., 2015). That is,

$$Speed_{i,t} = Actual\ Speed_{i,t}/Maximum\ Speed_{i,2008} \text{.....(3)}$$

Political network diversity

Political network diversity (*PND*) refers to the portfolio of firms' political ties (Zhu & Chung 2014). We first classify the political authorities that TMT members connect to into eleven

categories *i.e.*, Central Committee of the CCP, the State Council, National People's Congress (NPC), Chinese People's Political Consultative Conference (CCPC), National Party Convention, local people's governments, local committees of the CCP, government departments, non-communist parties, higher education organizations, and public organizations. Second, we identify the political background of each TMT member of the focal firm. If a TMT member is working in or has worked in one of the mentioned political authorities, we denote it 1, and 0 otherwise. Lastly, we use Blau's index to calculate the political network diversity of each firm (Blau, 1977):

$$D_{i,t} = 1 - \sum_{j=1}^{k} P_{i,j,t}^2,$$

where D_{it} denotes the political network diversity of firm i at time t, where P_{ijt} is the proportion of political ties by firm i that represents the specific political authorities or government agency j. k refers to the political network types (up to 11), and t is the observation year. D_{it} varies, with a value between 0 (all political ties belong to the same category of political authority) and 1 (all political ties are balanced distributed among categories). Blau's index is frequently applied to measure social ties' heterogeneity (Powell et al., 1996; Zhu and Chung, 2014).

Control variables

We control for organizational characteristics that may influence firms' exploratory and exploitative innovation. We first control for the effect of *firm size* (which is represented by the logarithm transformation of the firm's annual revenue), firms' *net profit margin*, firm's *R&D intensity*, *firm age*, *debt to asset ratio*, *intangible asset ratio* (the intangible asset divided by firm's total asset), *subsidy ratio* (the amount of government subsidy over firm revenue), return to asset (*ROA*), proportion of *state-owned shares*, *qualification* (whether or not the firm has been qualified as a high-tech firm by government), and *high-tech park* (whether or not the firm is located in a high-tech park). In addition, we also control for the total number of firms' political ties, i.e. *portfolio size*, which indicates the size of firms' overall connections to government agencies (Powell et al., 1996). We lastly control time effects by including *year* dummies.

5.3.3 Analytical approach

Our dependent variables, i.e. exploratory and exploitative innovation, are count variables with non-negative values. Two dependent variables are over-dispersion, i.e., their variances

are much larger than their own expected values (see Table 5-1).

We adopt negative binomial regressions to correct for over-dispersion (Greene, 2011). In addition, not all firms conduct either exploratory or exploitative innovation in each year leading to many zero values on the focal variable; about 48% and 27% observations of the two dependent variables are equal to zero (i.e., zero-inflated, see Figure 5-2).

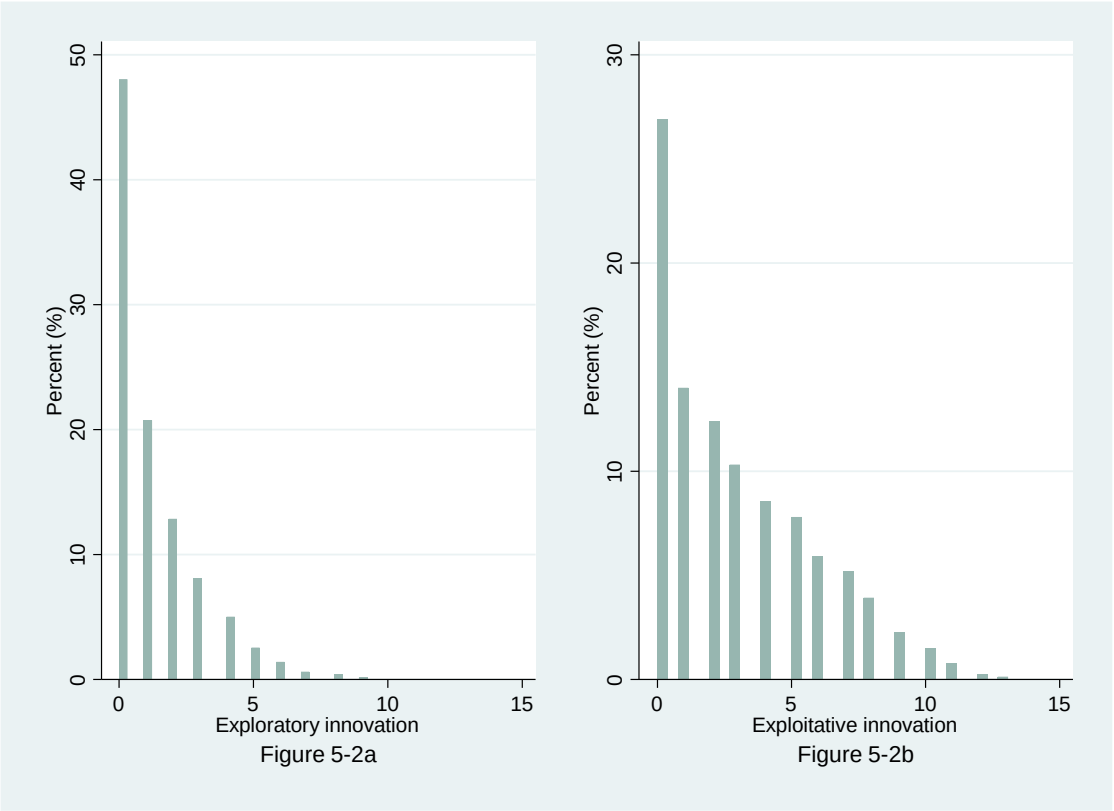

Figure 5-2 Distribution of firm exploratory and exploitative innovation

To estimate these dominated zero outcomes in the data, zero-inflated models are usually recommended. Although our data is of a panel, there is no panel option in STATA15.0 for zero-inflated negative binomial regressions. Building on these considerations, we chose the zero-inflated negative binomial regression model with year-fixed effect to analyze the data, and the results of the Vuong test (P<.05) (Vuong, 1989) supports our choice. Moreover, all independent and control variables are lagged by one year.

Table 5-1 Descriptive statistics and correlations

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Exploratory innovation	1										
2.Exploitative innovation	0.474*	1									
3.Scope	0.07*	0.142*	1								
4.Speed	0.056*	0.094*	0.80*	1							
5.PND	-0.024*	0.017	0.003	-0.008	1						
6.State-owned shares	0.04*	0.044*	-0.165*	-0.128*	-0.001	1					
7.ROA	-0.006	0.027*	0.018	0.001	0.015	0.023*	1				
8.Subsidy	0.011	0.003	-0.028*	-0.026*	-0.025	-0.015	-0.173*	1			
9.Net profit margin	0.07*	0.093*	0.086*	0.066*	0.029*	-0.046*	0.037*	0.009	1		
10.Firm size	0.124*	0.326*	-0.022*	-0.032*	0.079*	0.159*	0.46*	-0.193*	0.047*	1	
11.Asset liability ratio	0.011	0.074*	-0.169*	-0.131*	-0.011	0.135*	0.204*	-0.045*	-0.303*	0.47*	1
12.Intangible asset ratio	-0.059*	-0.071*	-0.037*	-0.044*	0.034*	-0.005	-0.049*	0.04*	-0.103*	-0.122*	0.072*
13.R&D intensity	0.128*	0.184*	0.214*	0.144*	-0.046*	-0.088*	-0.253*	0.21*	0.074*	-0.274*	-0.35*
14.Portfolio size	-0.027*	0.032*	-0.07*	-0.083*	0.55*	0.058*	0.007	0.001	-0.015	0.138*	0.083*
15.Firm age	-0.051*	0.019	0.008	-0.006	-0.019	0.013	0.118*	-0.015	-0.108*	0.167*	0.247*
16.High-tech park	0.093*	0.129*	-0.044*	-0.089*	-0.064*	-0.004	-0.061*	0.061*	0.052*	-0.075*	-0.111*
17.Qualification	0.035*	0.027*	0.041*	0.026*	0.019	-0.017	-0.034*	0.032*	0.034*	-0.089*	-0.109*
18.Year	0.013	0.136*	0.304*	0.226*	0.003	-0.177*	-0.06*	0.035*	-0.027*	0.06*	-0.051*
Mean	1.24	3.047	7.391	0.071	0.351	0.051	0.698	0.013	9.336	21.117	0.412
Std. Dev.	1.646	2.897	1.743	0.067	0.274	0.141	0.479	0.035	6.629	1.385	0.214
VIF			4.19	3.95	1.47	1.09	1.36	1.09	1.18	1.88	1.7

Table 5-1 Descriptive statistics and correlations (Continued)

Variables	**12**	**13**	**14**	**15**	**16**	**17**	**18**
12.Intangible asset ratio	1						
13.R&D intensity	-0.035*	1					
14.Portfolio size	0.049*	-0.068*	1				
15.Firm age	0.044*	-0.163*	0.032*	1			
16.High-tech park	-0.003	0.186*	-0.012	-0.072*	1		
17.Qualification	-0.021	0.122*	-0.01	-0.104*	0.061*	1	
18.Year	0.034*	0.295*	-0.0001	0.242*	0.016	-0.097*	1
Mean	0.047	2.657	2.901	13.455	0.197	0.124	2011.75
Std. Dev.	0.044	3.557	2.083	5.23	0.397	0.329	1.656
VIF	1.06	1.47	1.5	1.19	1.07	1.05	1.39

* P<.05, + P<.10.

5.4 Results

Table 5-1 presents the descriptive statistics. Table 5-1 shows all VIF (the variance of inflation factors) values is distinctly below the threshold value of 5, which suggests that the multicollinearity is not a serious concern in this study. Additionally, a high correlation between the scope and speed of institutional transition (β=0.80) implies potential collinearity, thus we include them into regression models separately.

Table 5-2 displays the influence of the transition scope and speed on firms' exploratory innovation.

Table 5-2 Regression results (DV=Exploratory innovation)

Variables	Model1	Model2	Model3	Model4	Model5	Model6
Scope		.038***			.061***	
		(.010)			(.014)	
Scope×PND					-.066**	
					(.031)	
Speed			.891***	.947		2.439***
			(.235)	(.638)		(.903)
$Speed^2$				-.292		-7.063
				(3.029)		(4.291)
Speed×PND						-4.442**
						(1.997)
$Speed^2$×PND						20.52**
						(9.761)
PND	-.031	-.032	-.037	-.037	.463*	.091
	(.065)	(.065)	(.065)	(.065)	(.247)	(.097)
State-owned shares	.155	.191*	.180*	.181*	.193*	.185*
	(.101)	(.102)	(.102)	(.102)	(.102)	(.102)
ROA	-.207***	-.211***	-.204***	-.204***	-.211***	-.204***
	(.044)	(.045)	(.045)	(.045)	(.044)	(.045)
Subsidy	.208	.283	.244	.243	.318	.247
	(.637)	(.656)	(.645)	(.645)	(.665)	(.645)
Net profit margin	.007**	.007**	.007**	.007**	.007**	.007**
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
Firm size	.112***	.115***	.115***	.115***	.115***	.115***
	(.016)	(.016)	(.016)	(.016)	(.016)	(.016)
Asset liability ratio	.245***	.281***	.270***	.270***	.285***	.271***
	(.095)	(.095)	(.094)	(.094)	(.094)	(.094)
Intangible asset ratio	-.774*	-.786*	-.755	-.756	-.766*	-.723
	(.465)	(.463)	(.464)	(.464)	(.463)	(.464)
R&D intensity	.020***	.020***	.021***	.021***	.020***	.020***
	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)
Portfolio size	-.031***	-.030***	-.029***	-.029***	-.030***	-.029***
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)
Firm age	-.006**	-.006**	-.006**	-.006**	-.006**	-.006**
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
High-tech park	.098***	.105***	.112***	.111***	.104***	.111***
	(.037)	(.037)	(.037)	(.038)	(.037)	(.037)
Qualification	.058	.053	.060	.060	.052	.060
	(.045)	(.045)	(.045)	(.045)	(.045)	(.045)
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.806***	-2.145***	-1.951***	-1.952***	-2.314***	-1.986***
	(.310)	(.325)	(.315)	(.316)	(.335)	(.316)

Observations	7,855	7,855	7,855	7,855	7,855	7,855

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

Model 1 only involves control variables. Model 2-6 present testing results for Hypothesis 1a, 2a, 3a, and 4a. The *Scope* in Model 2 shows a positive and significant coefficient ($\beta = 0.038, P < 0.05$), which supports the assertion of H1a that transition scope enhances firms' exploratory innovation. The results in Model 3-4 illustrate that firms tend to invest more in exploratory innovation as the speed of institutional transition increase ($\beta = 0.891, P < 0.01$, Model 3), although the influence inverts as the speed achieves a certain level ($\beta = -0.292, P = n.s$, Model 4). Obviously, our inverted U-shape prediction in hypothesis 2a got partial support. Hypothesis 3a argues that political network diversity may decrease the positive effects of scope on exploratory innovation, and the results in Model 5 support this ($\beta = -0.066, P < .05$). Model 6 presents a significant moderation effect of political network diversity on the non-linear links of 'speed—exploratory innovation' ($\beta_{speed \times PND} = -4.442, P < 0.05; \beta_{speed^2 \times PND} = 20.52, P < 0.05$). Following Hoisl et al.'s (2017) approach, we further test the significance of this moderation effect. Given Model 6, with the following equation: $\text{Exploratory innovation} = \beta_0 + \beta_1 \times Speed + \beta_2 \times Speed^2 + \beta_3 \times Speed \times PND + \beta_4 \times Speed^2 \times PND + Z\gamma + \varepsilon$, where Z denotes the vector of control variables. To make sure that PND moderates the inverted U-shaped relationship between speed and exploratory innovation, it requires that $\beta_1 \times \beta_4 - \beta_2 \times \beta_3$ is strictly larger than zero (Hoisl et al. 2017). Our Chi-test supports this requirement ($\chi^2 = 3.20, P = 0.073 < 0.10$). Taken together, empirical evidence corroborates Hypothesis 4a.

Table 5-3 shows the influence of transition scope and speed on firms' exploitative innovation.

Table 5-3 Regression results (DV=Exploitative innovation)

Variables	**Model1**	**Model2**	**Model3**	**Model4**	**Model5**	**Model6**
Scope		.043***			.061***	
		(.006)			(.010)	
Scope×PND					-.051**	
					(.020)	
Speed			.749***	1.946***		2.751***
			(.148)	(.429)		(.629)
Speed^2				-6.260***		-9.262***
				(2.045)		(2.966)
Speed×PND						-2.293
						(1.394)
Speed^2×PND						8.668
						(6.783)
PND	.020	.019	.017	.015	.409**	.104
	(.040)	(.040)	(.040)	(.040)	(.163)	(.066)
State-owned shares	.079	.113*	.097	.10	.113*	.10
	(.063)	(.063)	(.063)	(.063)	(.063)	(.063)
ROA	-.259***	-.266***	-.260***	-.263***	-.266***	-.263***
	(.028)	(.028)	(.028)	(.028)	(.028)	(.028)
Subsidy	.325	.503	.420	.405	.555	.423
	(.514)	(.535)	(.534)	(.535)	(.534)	(.535)
Net profit margin	.005***	.004**	.004**	.004**	.004**	.004**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Firm size	.236***	.238***	.238***	.237***	.238***	.237***

Variables	Model1	Model2	Model3	Model4	Model5	Model6
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)
Asset liability ratio	.108*	.154**	.132**	.141**	.154**	.140**
	(.061)	(.060)	(.060)	(.061)	(.060)	(.061)
Intangible asset ratio	-.599**	-.573**	-.552**	-.563**	-.560**	-.548**
	(.270)	(.270)	(.271)	(.271)	(.270)	(.271)
R&D intensity	.031***	.030***	.031***	.030***	.030***	.030***
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
Portfolio size	-.010*	-.009	-.008	-.009	-.009*	-.009
	(.005)	(.005)	(.005)	(.005)	(.005)	(.006)
Firm age	.002	.002	.002	.002	.001	.001
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
High-tech park	.143***	.154***	.157***	.151***	.154***	.151***
	(.021)	(.021)	(.022)	(.022)	(.022)	(.022)
Qualification	.074***	.069**	.076***	.076***	.070**	.076***
	(.029)	(.029)	(.029)	(.029)	(.029)	(.029)
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.825***	-4.191***	-3.934***	-3.943***	-4.335***	-3.982***
	(.186)	(.199)	(.190)	(.190)	(.208)	(.192)
Observations	7,857	7,857	7,857	7,857	7,857	7,857

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

Model 2 indicates that the scope of institutional transition is positively associated with firms' exploitative innovation ($\beta = 0.043, \mathrm{P} < 0.01$), which lends support for Hypothesis 1b. Our Hypothesis 2b predicted an inverted-U shaped relationship between the speed of institutional transition and firms' exploitative innovation ($\beta = 0.749, \mathrm{P} < 0.05, \mathrm{Model\ 3}$; $\beta = -6.26, \mathrm{P} < 0.05, \mathrm{Model\ 4}$). The turning point of this curvilinear relationship is reported at 0.16, which lies within the range of Speed. Thus, results in Model 3 and 4 confirm H2b. As proposed in Hypothesis 3b, results in Model 5 indicate that firms' political network diversity may devalue the positive effects of scope on firms' exploitative innovation ($\beta = -0.051, \mathrm{P} < 0.05$). Hypothesis 4b states a moderation effect of political network diversity on 'speed—exploitative innovation' links. Results in Model 6 reveal a non-significant moderate effect ($\beta_{speed \times PND} = -2.293, \mathrm{P} = \mathrm{n.s}$; $\beta_{speed^2 \times PND} = 8.668, \mathrm{P} = \mathrm{n.s}$) , thus contradicting expectations: H4b is not supported.

5.4.1 Plotting

To further explore, we visually display above results in Figure 5-3, 5-4, 5-5, and 5-6.

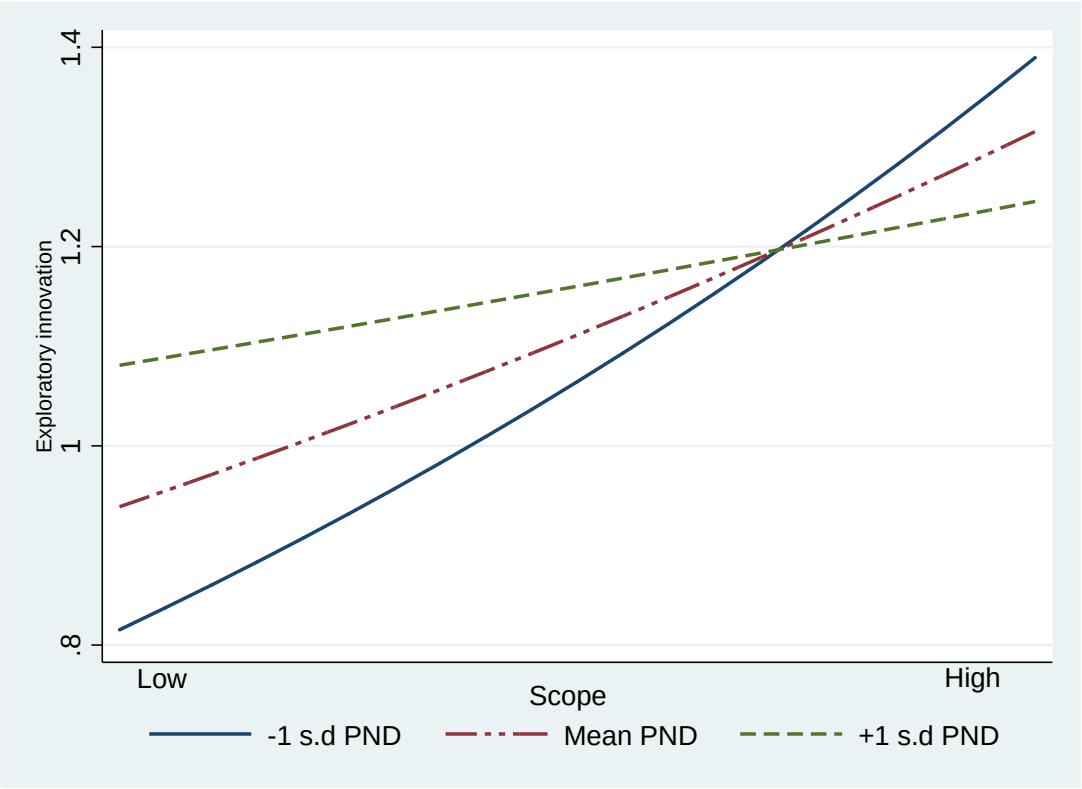

Figure 5-3 Contingent value of PND on 'scope—exploratory innovation' links

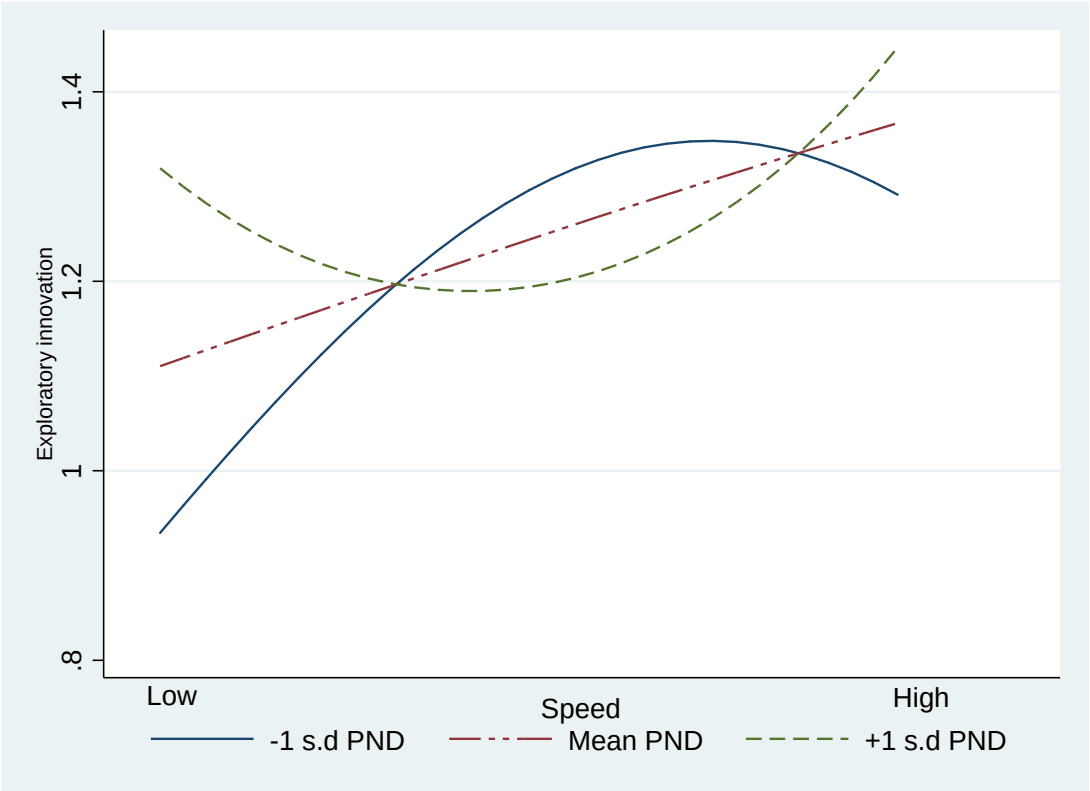

Figure 5-4 Contingent value of PND on 'speed—exploratory innovation' links

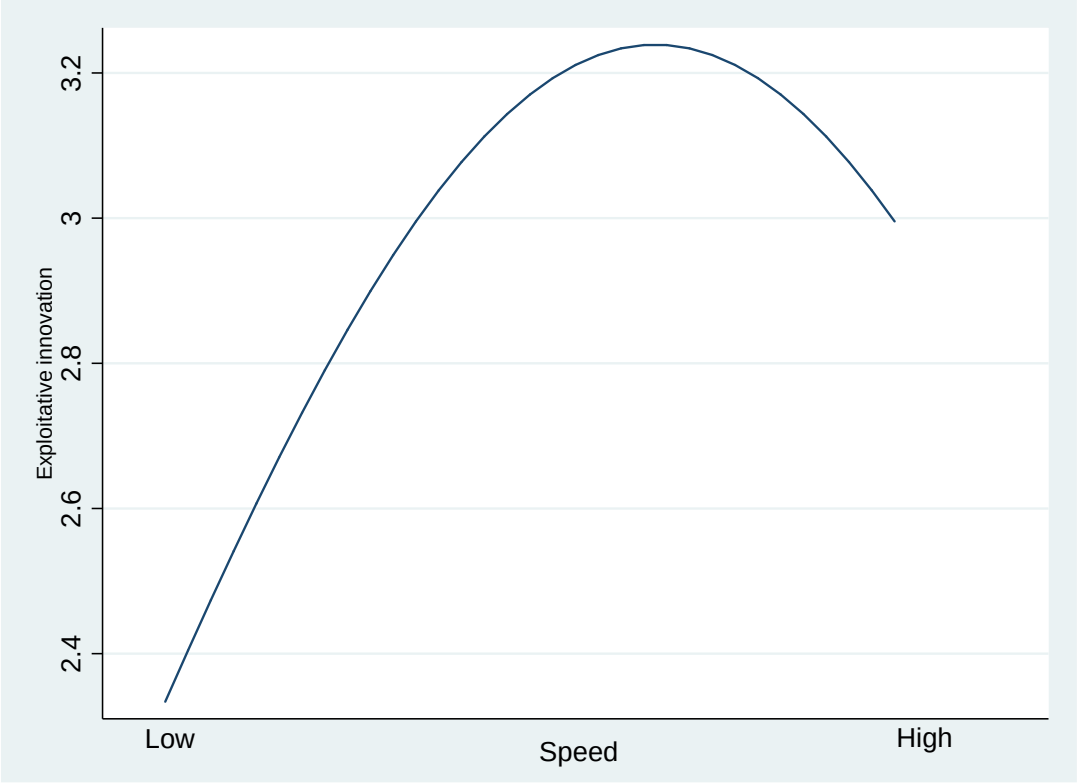

Figure 5-5 Inverted U-shaped relationship between speed and exploitative innovation

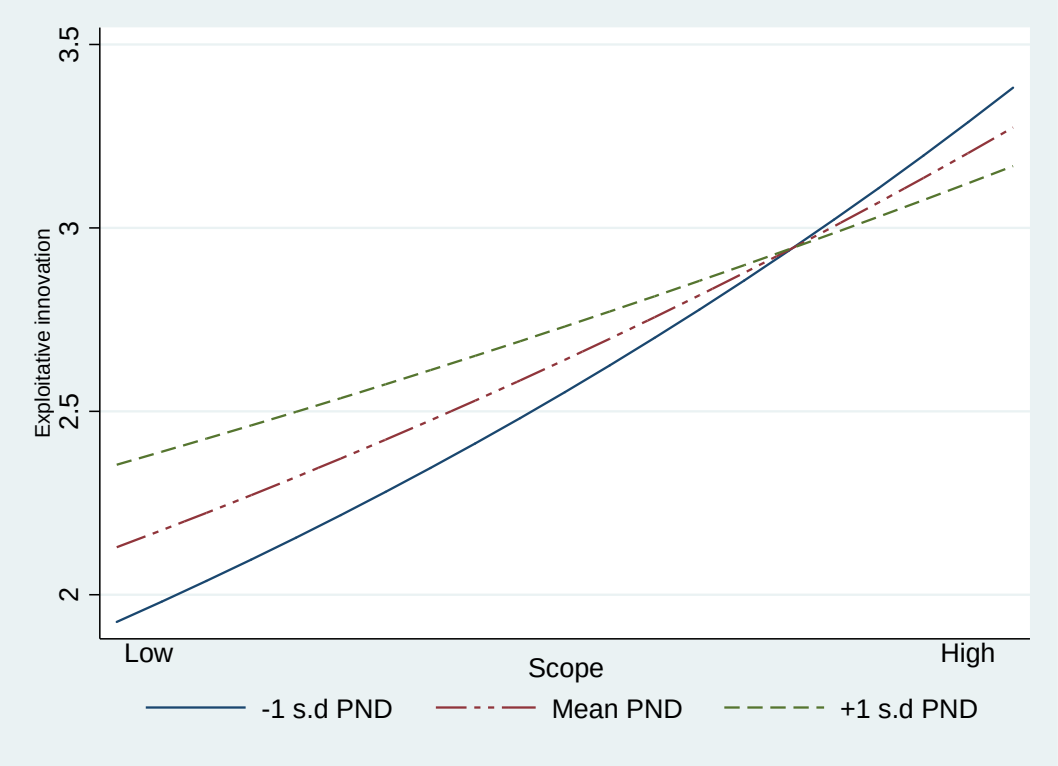

Figure 5-6 Contingent value of PND on 'scope—exploitative innovation' links

As Figure 5-3 shows, high political network diversity (+1 s.d.) enhances the propensity of exploratory innovation if firms operate in provinces with less developed institutions. However, if firms operate in more developed provinces, low political network diversity (-1

s.d.) yields sufficient potential for incenting exploratory innovation, as H3a suggests. Figure 5-4 provides support for Hypothesis 4a. The speed of institutional transition exerts an inverted-U shape influence on exploratory innovation if firms' PND is lower (-1 s.d.). By contrast, firms' exploratory innovation performance first decreases and then increases (i.e., U-shaped influence) as the transition speed increases, if firms are equipped with a higher PND (+1 s.d.). In addition, Figure 5-5 vividly plots the inverted U-shaped effects of speed on firms' exploitative innovation, which lends support for H2b. Figure 5-6 provides evidence to support H3b. It indicates higher PND (+1 s.d) reinforce firms' exploitative innovation if firms operate in provinces with less developed institutions. By contrast, if firms operate in more developed provinces, the positive value arising from lower PND (-1 s.d.) would outperform that of higher PND (+1 s.d.), as H3b represents.

Table 5-4 summarizes the results of hypotheses testing.

Table 5-4 The results of hypotheses testing

	Hypotheses	Hypothesis support
H1a	The transition scope of institutional development is positively associated with firms' exploratory innovation.	Yes
H1b	The transition scope of institutional development is positively associated with firms' exploitative innovation.	Yes
H2a	The speed of institutional transition has an inverted U-shaped influence, which first has an increasing effect and then a decreasing effect on firms' exploratory innovation.	No
H2b	The speed of institutional transition has an inverted U-shaped influence, which first has an increasing effect and then a decreasing effect on firms' exploitative innovation.	Yes
H3a	As political network diversity increases, the positive relationship between transition scope of institutional development and firms' exploratory innovation weakens.	Yes
H3b	As political network diversity increases, the positive relationship between transition scope of institutional development and firms' exploitative innovation weakens.	Yes
H4a	Political network diversity positively moderates the relationship between institutional transition speed and exploratory innovation in such a way that the inverted U-shaped effects of transition speed on exploratory innovation are stronger when the level of political network diversity is lower.	Yes
H4b	Political network diversity positively moderates the relationship between institutional transition speed and exploitative innovation in such a way that the inverted U-shaped effects of transition speed on exploitative innovation are stronger when the level of political network diversity is lower.	No

5.5 Discussion and conclusion

Although the antecedents of exploratory and exploitative innovation have been largely examined at the organizational and industrial level, still relatively little is known about how contextual factors such as institutional transition motivate or suppress the propensity of exploratory and exploitative innovation (Lavie et al., 2010; Mueller et al., 2013; Wilden et

al., 2018). Accordingly, we explore how dimensions of institutional transition influence firms' exploratory and exploitative innovation by using empirical data of Chinese manufacturing firms. Empirical results suggest that the increasing scope of institutional transition is conducive to incenting both exploratory and exploitative innovation at the organizational level. Moreover, the speed of institutional transition may motivate firms' exploratory innovation, but it exerts inverted U-shaped influence on exploitative innovation. Our finding further reveals that these confirmed relationships may vary according to levels of political network diversity that firms involve. To be specific, the positive value of transition scope decreases as political network diversity increases, no matter what types of innovation firms invest in. The 'speed—exploratory innovation' link is significantly moderated by political network diversity; by contrast, political network diversity shows insignificant moderation on 'speed—exploitative innovation' links.

The empirical models also reveal evidence that contrasts to our predictions. Firstly, the influence of transition speed on exploratory innovation is more likely to be linear rather than curvilinear. One possible explanation is that dynamic environments may compel firms to concentrate on internal capability building (Posen and Levinthal, 2012; Kotable et al., 2017). As speed increases, firms are usually confronted with more unpredictable markets, rules, and regulations. To address these adverse impacts, firms may shift their attention in knowledge, technology, and product exploration, which can secure their long-time competitive position. Secondly, political network diversity shows an insignificant moderation on 'transition speed—exploitative innovation' links. High transition speed usually leads to a high frequency of rule changes and government interventions like withdrawing or reversing. It can make regulations and policies more unpredictable. Under such conditions, stable and intense strong ties with specific government authorities would be more effective than having and exploiting a diverse portfolio of political networks.

5.5.1 Contributions

This chapter contributes to the existing literature. First, this study is among the first to explore the institutional antecedents of firms' exploratory and exploitative innovation. After March (1991), in the last two decades there is an increasing volume of literature that focuses on the drivers of firms' exploratory and exploitative innovation (e.g., Enkel et al., 2017; Gilsing et al., 2008; Greve, 2007; Guan and Liu, 2016; Jansen et al., 2006; Posen and Levinthal, 2012). Yet, empirical evidence about how institutional environments shape firms' exploratory and exploitative is nearly absent in extant literature, although scholars have realized the importance of institutional factors for innovation propensity (Lavie et al., 2010; Mueller et al., 2013; Wilden et al., 2018). This study concentrates on how dimensions of institutional transition support or constrain firms' propensity on exploratory and exploitative innovation, which responses to the call for attention to institutional characteristics of firms' location in different institutional environments (Lavie et al., 2010; Mueller et al., 2013; Wilden et al., 2018). The empirical findings indicate an unevenly distributed effect of institutional transition on firms' exploratory and exploitative innovation, which suggests a

possible explanation to why firms' strategic behaviors and competitive advantage differ across regions, in addition to inter-country differences (Galang, 2012; Peng et al., 2008).

Second, it attempts to expand the boundary of the institutions-based view (IBV) by integrating a dynamic aspect. IBV can be a helpful perspective to explain and understand firms' strategic choices in emerging markets that are dominated by institutional dynamics and uncertainties (Peng, 2003; Peng et al., 2008). IBV stresses that institutions are crucial pillars to examine how firms may achieve superior performance across regions and countries, which has been attracted more and more attention in the last 20 years (Chen et al., 2017; Peng et al., 2009; Peng and Heath, 1996; Xin and Pearce, 1996). Given studies have identified that better developed institutions nurture a more conducive environment for firms to innovate, compete, and perform (e.g., Yang et al., 2015). Yet, most of these studies build on a static perspective, which implies that their findings are building on institutional differences among regions or countries (e.g., Yang et al., 2015; Yi et al., 2017). However, the institution itself may change, reverse, and evolve over time, which represents a dynamic dimension (Banalieva, 2014; Banalieva et al., 2015; Chen et al., 2017). This study not only integrates this dynamic dimension by capturing the speed of institutional transition, but also goes further by identifying the non-linear effects of institutional transition speed on firms' exploitative innovation. These empirical findings indicate that institution transition and political network may complement each other in specific environments. Thus, in addition to the substitution effects (Peng, 2003), it implies we need to further examine how and when these contingent factors enable such complementary effects (Yang et al., 2019). Our findings thus complement existing literature, and can lend further support for more dynamic IBV perspectives (Banalieva et al., 2015; Chen et al., 2017).

Third, our measurement of exploratory and exploitative innovation may contribute to innovation literature. Generally, a firm's exploratory innovation can be described by two ways: the strength that is indicated by the total number of a firm's exploratory innovation (Guan and Liu, 2016); the breadth that is measured by the range of a firm's exploratory innovation. Extant literature regularly measures a firm's exploratory innovation by using the number of patents that appear in the technological domain in which the firm did not have any patent filings over past five years (Guan and Liu, 2016). However, such measure neglects the dimension of knowledge breadth that the firm's exploratory innovation involves. Building on March's (1991) definition, we further measure the focal types of innovations by indicating the knowledge breadth that firms' innovation involves. That is, we reveal a firm's exploratory innovation by counting how may knowledge classes its patents belong to. Our breadth measure provides an alternative perspective to explore firm innovation, thus it may complement to the strength measure.

5.5.2 Limitations and avenues for future research

This study has two main limitations. First, we concentrated exclusively on two characteristics of institutional transition, i.e. transition scope and speed. These two

dimensions do not capture the full picture of institutional transition in emerging markets. Institutions literature reports alternative aspects of institutional transition, such as synchronization (Banalieva, 2014; Yang et al., 2015) and fragility (Shi et al., 2017), which are not covered by this chapter. Future studies may further focus on alternative heterogeneous dimensions of institutional transition, which would help to draw a vivid picture of how institutional transition influences firms' exploratory and exploitative innovation. Second, our findings build on data from a large emerging-economy (i.e., China), where institutional transition varies across regions. We recognize that a single context setting limits the value of generalization. Future study may extend the analytical boundary to consider the difference of institutional transition in other specific emerging economies (e.g., Russia), as well as differences across emerging economies.