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Dynamic capabilities, environmental dynamism, and competitive advantage: Evidence from China

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ABSTRACT

Some scholars hold that dynamic capability is one of the key in searching for competitive advantage in strategic management. But there are still debates on the definition and effects of dynamic capabilities and the role of environmental dynamism. In the context of Chinese-like emerging economies, from a strategic process perspective, this study defines dynamic capability as the firms' potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely decisions, and to implement strategic decisions and changes efficiently to ensure the right direction, and also explores the relationship between dynamic capabilities and competitive advantage and, the role environmental dynamism plays. With an empirical study of 217 enterprises in China, this study finds that dynamic capabilities do significantly positively affect competitive advantage, and environmental dynamism is a driver rather than a moderator.

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1. Introduction

To gain a competitive advantage is the “Holy Grail” of strategic management research (Helfat & Peteraf, 2009, p. 91). But with the ongoing global financial crisis, climate change and other worldwide problems, enterprises find that to obtain and maintain competitive advantage is increasingly difficult, only temporary advantages are possible (D'Aveni, Dagnino, & Smith, 2010).

Some scholars explain the cornerstones of competitive advantage from the resource-based view (RBV) (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984), but recently, the increasingly volatile environment challenges the original propositions of the RBV as being static and neglecting the influence of market dynamism (Eisenhardt & Martin, 2000; Priem & Butler, 2001; Wang & Ahmed, 2007), and scholars put forward a number of dynamic concepts, such as absorptive capacity, integrative capacity, construct capacity, higher order capacity and so on to explore and explain the ways toward success. Based on the demands in practice and the findings in RBV, evolutionary economics and behavior theory, Teece, Pisano and Shuen (1997) extend RBV to the context of dynamic environment and propose that enterprises should constantly adapt, reconfigure and renew their resources and capabilities to address environmental change, which is now the universal concept of dynamic capabilities.

However, as a field of research domain, dynamic capabilities research is still in its infancy (Di Stefano, Peteraf, & Verona, 2010; Helfat & Peteraf,

2009). Current studies focus on the definition, antecedents, nature, processes and consequences of dynamic capabilities (Ambrosini, Bowman, & Collier, 2009; Easterby-Smith, Lyles, & Peteraf, 2009; Helfat et al., 2007; Katkalo, Pitelis, & Teece, 2010; Loasby, 2010; Teece, 2007; Zahra, Sapienza, & Davidsson, 2006; Zollo & Winter, 2002; Zott, 2003), with sharp conflicts regarding to the definitions and effects of dynamic capabilities, and the role environmental dynamism plays. The growing research on dynamic capabilities provides successive and distinct definitions, which create confusion over the meaning and utility of the construct (Barreto, 2010; Di Stefano, Peteraf, & Verona, 2010; Helfat & Winter, 2011). Some scholars believe that dynamic capabilities are the key to competitive advantage (Ambrosini & Bowman, 2009; Helfat & Peteraf, 2009; Helfat et al., 2007; Teece, 2007; Teece et al., 1997), while some others argue that dynamic capabilities do not manifest the characteristics of heterogeneity, thus cannot be a source of competitive advantage (Arend & Bromiley, 2009; Eisenhardt & Martin, 2000), and the role of dynamic capabilities is limited (Zott, 2003) and indirect (Wang & Ahmed, 2007). Many researchers claim that environmental dynamism plays an important moderating role between dynamic capabilities and competitive advantage (Romme, Zollo, & Berends, 2010; Wu, 2010), while others believe that environmental dynamism is an important driving force of dynamic capabilities (Teece, 2007).

Previous studies in this area mainly focus on firms operating in Western developed markets and little is known about what dynamic capability is and its relationship with performance in transition economies. Since there are many differences between developed markets and transition economies, this narrow focus limits theoretical completeness and is a significant gap in the literature. Thus, the study uses China as a testing ground for the universality of the Western-

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generated theory for three reasons: China's size in population and organizations, its vast differences from Western societies, and its increasing integration into the world economy (Lin & Germain, 2003).

To address these research gaps, this study explores the definition and effects of dynamic capabilities and, the role of environmental dynamism in the emerging economy of China. As such, this research contributes to existing literature by entailing the new research context: China, and clarifies the debates on the effect of dynamic capabilities and the role of environmental dynamism.

The remainder of this paper proceeds as follows. Section 2 presents focal constructs of interest and the relationships among them and develops related hypotheses. Section 3 then outlines the study methodology, and Section 4 shows the empirical results. Finally, the paper presents discussions and conclusions of the findings.

2. Literature review and research hypotheses

2.1. The concept of dynamic capabilities

The original definition of dynamic capabilities is a firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997). To avoid the tautology of defining capability with capability, from the process perspective, Eisenhardt and Martin (2000) propose a broad definition that dynamic capabilities are a set of specific and identifiable processes such as product development, strategic decision making and alliancing. From the routine perspective, Zollo and Winter (2002) define dynamic capabilities as a learned and stable pattern of collective activities directed to the development and adaptation of operating routines. Drawing on the entrepreneurship perspective, Zahra et al. (2006) define dynamic capabilities as the abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriately by its principal decision-maker(s). According to prior literature, Helfat et al. (2007) propose a simple but integrated definition that dynamic capabilities are the capacity of an organization to purposefully create, extend, or modify its resource base. Based on previous literatures, Barreto (2010) proposes that a dynamic capability is the firms' potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base.

Among the researches to define and explain dynamic capabilities, scholars decompose dynamic capabilities from different views, such as content and process perspectives, ontology and epistemology perspectives and so on to unveil the rich and multidimensional contents (Helfat et al., 2007; Najmaei, 2010). However, most scholars deconstruct dynamic capabilities from the process perspective (Narayanan, Colwell & Douglas, 2009), in which some studies deconstruct dynamic capabilities into perception/ search, decision/selection, reconfiguration/deployment and so on (Barreto, 2010; Helfat et al., 2007; Pandza & Thorpe, 2009). While inaugurating the concept of dynamic capabilities, Teece et al. (1997) also propose a 3P framework (i.e., processes, positions and paths), arguing that the competitive advantage of firms lie with their managerial and organizational processes, shaped by their specific asset position, and the paths available to them. However, this framework focuses only on what firms do rather than why doing so. Hence, Teece (1998) proposes another framework, explaining dynamic capabilities from the perspectives of opportunity-sensing capacity and opportunity-seizing capacity. Then after ten years, he proposes and elaborates the new framework, that is, sensing, seizing and reconfiguration (Teece, 2007). Helfat et al. (2007) hold that dynamic capabilities are composed of search, selection and deployment capacities. Even if deployment capacity attracts more attention, search and selection capacities are also important. Barreto (2010) explains dynamic capabilities from four dimensions, that is, the propensity to sense opportunities and threats,

to make timely decisions, to make market-oriented decisions and to change its resource base.

Although the definition of Barreto (2010) overcomes some important limitations of current definitions about dynamic capability such as vague, confusing, tautological, there is still room for improvement. First, this definition applies well to perfect market-oriented economy, but not necessarily to transition economies. In Chinese-like economies where the market mechanism is not so perfect, to make "market-oriented decisions" may not conform to the reality. The reasons may be that, on one hand, as China is still undergoing economic transformation, the product market, factor market and capital market are still far from maturity; on the other hand, central and local governments are still playing important roles in resource allocation. So sometimes market-oriented decisions are not enough, firms should also consider political factors and relational factors (or to say, *guanxi*) in their business operation (Park & Luo, 2001). Second, discussion of processes within organizations often relates to "implementation" of strategy or deployment of resources and capabilities (Helfat et al., 2007). As Helfat et al. (2007) suggest, dynamic capabilities include capacities not only for identifying the need or opportunity for change, formulating a response, but also for implementation of a course of action. Thus, this study defines dynamic capabilities as:

a dynamic capability is the firms' potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely decisions, and to implement strategic decisions and changes efficiently to ensure the right direction.

In line with the definition, this study also decomposes dynamic capabilities into three dimensions from the process perspective, namely, strategic sense-making capacity (Neill, McKee, & Rose, 2007; Pandza & Thorpe, 2009; Weick, Sutcliffe & Obstfeld, 2005), timely decision-making capacity (Benjaafar, Morin, & Talavage, 1995; Shafman & Dean, 1997) and change implementation capacity (Harreld, O'Reilly, & Tushman, 2007; Noble, 1999).

Strategic sense-making capacity is the process to develop cognitive maps, to sense and interpret the stimuli or change in the reference frameworks to effectively search for and analyze information from internal and external environment (Neill et al., 2007; Pandza & Thorpe, 2009). The foundation for business existence is to gain profits by providing products or services that meet customers demand. Therefore, firms should be sensitive to external environmental change to discover new market opportunities and potential threats, thus strategic sense-making capacity is one of the key organizational capacities for firm survival in the changing environment (Zahra & George, 2002). In view of the internal environment, strategic sense-making capacity helps firms to discover the advantage and disadvantage of current resource bases, contributing to the improvement of asset orchestration (Helfat et al., 2007). According to the comprehensive analysis to environmental change and current resource base, firms get better understanding to both themselves and competitors.

Timely decision-making capacity is the process to quickly formulate, evaluate and choose strategic orientations to timely adjust with environmental changes (Shafman & Dean, 1997). To align decision-making with the changing environment, organizations should construct an appropriate tangible or intangible information system with the help of information technology to provide an effective platform for the quick and right decision-making to timely renew the operating activities and staff behaviors (Sher & Lee, 2004). Besides, firms should also quickly deal with different conflicts in the strategic decision-making process, adopt quick remedies to unsatisfactory customers.

Change implementation capacity is the ability to execute and coordinate strategic decision and corporate change, which involves a variety of managerial and organizational processes, depending on the nature of the objective and the specific tasks required (Harreld et al., 2007; Helfat et al., 2007).

2.2. The effects of dynamic capabilities

Wang and Ahmed (2007) propose that the inspection of the effects of dynamic capabilities should be long-term performance, or to say, sustainable advantage. However, in the ever changing environment, the acquirement and maintenance of competitive advantage is quite difficult. Therefore, rather than sustainable advantage, some scholars propose to get a series of short-term advantages (D'Aveni et al., 2010). According to the literature, this study holds that competitive advantage is a state for organizations to cope with environmental dynamism and continuously provide satisfying products or services for customers better than competitors.

Through a specific path of development, firms may gain competitive advantage in a certain time. However, in an increasing dynamic environment with quick changing in demand and frequent shifting in technology, the former advantage may become pitfalls, which needs strategic sense-making, timely decision-making and dynamic implementation to reshape the advantage.

A slight advantage in sense-making can transform into a powerful strategic advantage of an organization (Haeckel, 1999). Firms with strong sense-making capacity may take a more active search and interpretation to get more information and better understanding of the environment they face (Neill et al., 2007), which ensure faster response to competitor initiatives, better understanding of customer needs, more creativity in new product development and ultimately, a competitive advantage.

As the famous Chinese general Sun Tzu writes in "The Art of War" more than two millennia ago, "Rapidity is the essence of war". In the information age nowadays, speed is an important source of competitive advantage for firms (Stalk, 1988). The former chairman of Intel, Andrew Grove said, "Speed is the only weapon we have" (Sumney & Braden, 1995). The faster the decision-making process is, the more likely for a firm to seize opportunities and avoid threats to gain competitive advantage. For example, when a sudden increase in customer demand or a revolutionary new technology appears, firms with higher timely decision-making capacity can grasp such opportunities more quickly than competitors.

With the change of product series, internal strengths and external environments, the original strategies and key resources may be unable to support organizations stepping forward any more, or even become barriers for further development (Leonard-Barton, 1992). Thus, firms should modify, discard, or acquire resources and redesign business models as necessary to ensure the right direction through internal and external learning (Lavie, 2006). With the help of change implementation capacities, firms can renew current strategies and resource bases to adapt to new environment (Newey & Zahra, 2009).

H1. Dynamic capabilities have a positive impact on competitive advantage.

2.3. The role of environmental dynamism

The environment of a firm is "the totality of physical and social factors that are taken directly into consideration in the decision-making behavior of individuals in the organization" (Duncan, 1972). This broad definition includes dimensions used in various research streams. Most scholars classify the characteristics of environment into stability/dynamism, simplicity/complexity, and munificence/hostility (Dess & Beard, 1984; Mintzberg, 1983; Tan & Litschert, 1994). Mintzberg (1983) distinguishes four environmental dimensions: stability versus dynamism, simplicity versus complexity, friendliness versus hostility, and integrated versus diversified markets. Dynamism is interpreted as unpredictability, that is, the rate of change and innovation in an industry as well as the uncertainty or unpredictability of actions by customers.

2.3.1. The moderating role of environmental dynamism

When the environment is relatively stable with no significant technological progress or little customer preference change, strong dynamic capabilities are probably expensive or even destructive owing to the maintaining cost (Schreyögg & Kliesch-Eberl, 2007), thus the relationship between dynamic capabilities and competitive advantages may become weaker, even negative. While in a highly volatile environment with opportunities fleeting quickly and threats from competitors always staying around, such environmental turbulence reduces the competitive position and potential value of current capabilities, forcing enterprises to carry out frequent and complex changes, thus dynamic capabilities can take a more important role.

D'Aveni et al. (2010) propose that in the hyper-competitive environment, resources are difficult to obtain, hence, efficiently sensing, making timely necessary adjustments and implementing dynamically with environmental change is the only way for firms to get series of short-term advantages. On the contrary, in the less fierce environment where resources are easy to get, firms can implement former strategies and deploy resources freely to match environmental change so that relatively weak dynamic capabilities can obtain long-term competitive advantages. Therefore, in the relatively stable environment, current "make a living" operating capabilities are enough to meet customer demand, gain higher profits and maintain competitive advantages, making dynamic capabilities not so necessary. Empirical researches also demonstrate that in a stable environment, the relationship between dynamic capabilities and firm performance is insignificant, while in the turbulent environment is positive, indicating a moderating role (Drnevich & Kraicunas, 2011; Wu, 2010).

H2. The higher the environmental dynamism, the stronger the positive relationship between dynamic capabilities and competitive advantage.

2.3.2. The driving role of environmental dynamism

Teecce et al. (1997) propose that dynamic capabilities are directly fighting against environmental change, which implicates a driving role of environmental dynamism. In a relatively stable and foreseeable environment, enterprises need to develop core competencies (Wang & Ahmed, 2007); while in a highly changing environment, companies must change and upgrade their core competencies to develop a higher level of dynamic capabilities. Eisenhardt and Martin (2000) even argue that the forms of dynamic capabilities are different according to market dynamism: in a moderate dynamic environment, dynamic capabilities are dependent on current knowledge and stable processes, while in the highly dynamic markets, dynamic capabilities are dependent on the rapid creation of new knowledge and more unstable processes.

In the relatively rich environment with abundant resources, little competition and high growth in total industry sales (Dess & Beard, 1984; Harrington & Kendall, 2005), firms face less competition and enjoy more opportunities, and with little need to develop dynamic capabilities, only some in the usual operating business tasks. While in the hyper-competitive environment, firms have to maintain close observation to various uncertainties, like technological innovation, threats from new entrants and default risks from suppliers, and they should also search for more information to deploy suitable resources, carry out more complicated and sophisticated analysis, make more timely decisions and implement accordingly to develop dynamic capabilities (Luo, 1999; Oktemgil & Greenley, 1997).

In a word, the typical response for firms to increasing environmental dynamism is to foster dynamic capabilities. In a highly dynamic environment, enterprises must enhance the perception of change, for example, if the demands from customers have changed, firms should make some necessary adjustments to match with. Or to say, external environmental changes force firms to cultivate dynamic capabilities.

H3. Environmental dynamism has a positive impact on dynamic capabilities.

3. Research design

3.1. Samples

In the context of China, this study employs survey method for data collection. Extensive literature review is the basis for developing an initial list of items to measure the components of the concepts. Then, in order to revise the measurement items, this study carries out interviews with six CEOs from six different pharmaceutical firms which are operating in turbulent environment both from policy makers and competitors in China. For the pre-test, firstly, the study chooses 8 faculty members who have expertise in strategic management from the same university to examine whether these revised measurement items are both necessary and sufficient. And the next step is conducting a pilot study involving 35 manufacturing firms (each with one respondent) to determine the efficiency of the questionnaire. Finally, this study checks item-to-total correlations to refine the measurements.

This study designs measurements with a 5 point Likert scale from strongly disagree to strongly agree. With the research need, the respondents should be middle or senior managers who have been working in the same enterprises for over one year to ensure a full understanding of the firm, helping to enhance data quality. In this study the respondents are students of EMBA, MBA and top managers in enterprises. In China, MBA students are incumbents on management positions in firms who work in firms in weekdays and receive on-the-job training during weekends, so they are quite familiar with what happens in their firms. Totally, this study issues 650 questionnaires and receives 269 copies, among which 217 are valid, with a 33.3% valid rate. Table 1 presents the demographic characteristics of the respondents.

3.2. Measures

3.2.1. Dependent variable

3.2.1.1. Competitive advantage. Most researches employ public archive data to measure competitive advantage, among which ROA and Tobin's Q are popular proxies. As in China, on one hand, to get such series data is somewhat difficult for the lack of such database; on the other hand, firms may be not willing to provide their financial data. According to the argument that competitive advantage can be measured by subjective data (Dess & Robinson, 1984; Powell, 1992; Spanos & Lioukas, 2001), this study measures competitive advantage by questions, reflected by 7 financial indicators and non-financial indicators compared with competitors in the same industry, including higher profit growth rate, higher sales revenue growth rate, lower

Table 1
Respondent demographics.

	N	%
Gender		
Female	56	25.81
Male	161	74.19
Age		
Under 25 years	48	22.1
25–40 years	105	48.4
Over 40 years	64	29.5
Tenure		
1–4 years	77	35.5
5–10 years	98	45.2
Over 10 years	42	19.3

operating costs, better product and service quality, increasingly higher market share, more profitable old customers and, more profitable new customers (Chang, 2011; Day & Wensley, 1988; Ketkar, 2006; Li & Zhou, 2010; Newbert, 2008).

3.2.2. Independent variables

3.2.2.1. Dynamic capabilities. According to the connotation and dimensions of dynamic capabilities, drawing on existing scales, this study measures dynamic capabilities according to the three dimensions elaborated earlier, that is, strategic sense-making capacity (SSMC), timely decision-making capacity (TDMC), and change implementation capacity (CIC). According to the aggregate model proposed by Law et al. (1998), the study defines dynamic capabilities as the sum of these three dimensions. As to strategic sense-making capacity, this study develops six items in accordance with previous scales (Neill et al., 2007); as to timely decision-making capacity, this study develops four items (Judge & Miller, 1991; Shafman & Dean, 1997); as to change implementation capacity, this study develops five items on the amendment of current scales (Noble, 1999).

3.2.2.2. Environmental dynamism. The scales of environmental dynamism are quite mature from two perspectives, one measuring environmental elements, and the other on the characteristics of key environmental factors. This study designs four items as key environmental factors, considering the effects of industrial environment, competitor behaviors, technological progresses and customer demands (Dess & Beard, 1984; Duncan, 1972; Tan & Litschert, 1994; Wu, 2010).

3.2.3. Control variables

This study includes firm age and firm size as control variables, which might affect the relationships among dynamic capabilities, environmental dynamism and competitive advantage. The study divides firm age into five groups (i.e., “1” denotes firms with 0–5 years, “2” with 6–10 years, “3” with 11–20 years, “4” with 20–25 years, “5” with over 25 years) and divides firm size into five groups according to the number of employees (i.e., “1” denotes firms with less than 100 employees, “2” with 101–300 employees, “3” with 301–1000 employees, “4” with 1001–3000 employees, “5” with over 3000 employees).

Appendix A shows all these items about dependent, independent and control variables. Table 2 presents the means, standard deviations, and correlations of these measures.

3.3. Reliability and validity

This study uses Cronbach's α to explore the variable reliability. As Appendix A shows, the minimum Cronbach's α of the scales is 0.764, above the critical level of 0.7, indicating high internal consistency. The KMO value of all questions is 0.928, which exceeds the recommended value of 0.6; and the result of Bartlett's Test of Sphericity is also significant ($p < 0.001$). Besides, the minimum

Table 2
Descriptive statistics and correlations.

	Mean	S.D	Size	Age	DC	ED	CA
Size	2.4	1.38	1				
Age	2.0	0.79	0.58	1			
DC	3.6	0.62	0.20	0.17	1		
ED	3.2	0.76	0.09*	0.00	0.36**	1	
CA	3.4	0.72	0.24**	0.23	0.72**	0.34**	1

* $p < 0.05$.

** $p < 0.01$.

standard loading factor is 0.63, indicating datum collected in this study are of great validity.

3.4. Common method bias

A Harman one-factor test serves to assess the potential for common method bias in the data (Podsakoff & Organ, 1986). An unrotated factor analysis using the eigenvalue-greater-than-one criterion results in a solution that accounts for 63% of the total variance, and the first factor accounts for only 28% of the variance. Therefore, common method bias is unlikely to be a serious problem.

4. Results

4.1. The relationship between dynamic capabilities and competitive advantage

Table 3 shows the results of the ordinary-least-square regression analysis for the effects of dynamic capabilities on competitive advantage. Model 1 shows the relationship between control variables and competitive advantage. Model 2 shows the relationship between dynamic capabilities and competitive advantage on controlling firm age and firm size. In Table 3 dynamic capabilities have significant positive impact on competitive advantage ($\beta = 0.701, p < 0.001$), and the adjusted R^2 is 0.533. Hence, the findings support H1.

4.2. The role of environmental dynamism

H2 pertains to the moderating role of environmental dynamism. According to moderating effect testing procedures, to independent variable X, dependent variable Y, moderator Z, if Z interacts significantly with X, Z is a moderator between X and Y. If no, then check whether Z is significantly related to X or Y. If yes, Z is not a moderator. Otherwise, take subgroup analysis. If R^2 of each subgroup are different, Z is a moderator, if different, not a moderator (Sharma, Durand & Gur-Arie, 1981). Accordingly, this study first examines whether the interaction of Z and X is significant, and then takes further discussions accordingly.

This study uses hierarchy regression method to test the moderating effects of environmental dynamism. As shown in Table 4, model 1 includes control variables of firm size and firm age only, model 2 adds independent variable dynamic capabilities, model 3 adds the moderator environmental dynamism, and model 4 adds the interaction term of dynamic capabilities and environmental dynamism. The interaction of dynamic capabilities and environmental dynamism to competitive advantage is insignificant ($\beta = 0.015, t = 0.313$), so H2 is rejected. The results show that even in highly uncertain environments, the impact of dynamic capabilities has no significant improvement, while in relatively stable environments; dynamic capabilities are also useful to some extent. This finding also shows that whatever the state of

Table 3
The relationship between dynamic capabilities and competitive advantage.

Variables	Competitive advantage	
	Model 1 (β)	Model 2 (β)
Firm size	0.167*	0.063*
Firm age	0.130	0.071
Dynamic capabilities		0.701***
R^2	0.070	0.540
Adjusted R^2	0.061	0.533
F	8.069***	83.261***

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 4
The moderating role of environmental dynamism.

Variables	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Firm size	0.167*	0.063*	0.054	0.053
Firm age	0.130	0.071	0.081	0.082
Dynamic capabilities		0.701***	0.665***	0.669***
Environmental dynamism			0.099*	0.097*
Dynamic capabilities \times Environmental dynamism				0.015
R^2	0.070	0.540	0.548	0.548
Adjusted R^2	0.061	0.533	0.540	0.538
F	8.069	83.261***	64.296	51.237

Dependent variable: CA.
* $p < 0.05$.
*** $p < 0.001$.

the environment is, dynamic capabilities are an important stable source of competitive advantage, which further confirms H1.

H3 argues that environmental dynamism is an antecedent of dynamic capabilities. Table 5 shows environmental dynamism is significantly positive to dynamic capabilities ($\beta = 0.349, p < 0.001$), and the adjusted R^2 is 0.152, so the findings support H3, showing that environmental dynamism drives firms to cultivate dynamic capabilities.

5. Discussions and conclusions

This study contributes to the literature in the following ways. The first is pertaining to the definition and dimensions of dynamic capabilities at the theoretical approach in the Chinese-like emerging economies. The importance of an adequate definition of dynamic capabilities for the development of the field could not be greater (Barreto, 2010). In China, because of the inadequate market and legal support, dysfunctional competitive behavior of firms is widespread, the definition and dimensions of dynamic capabilities are not quite the same as Western countries. This study uses an adapted definition of Barreto (2010) not only to overcome major criticisms, but also to fit better with the Chinese context.

The second contribution is the empirical corroboration that dynamic capabilities are also relevant for the Chinese-like emerging economies. The literature suggests that Western-generated theories may not be fully applicable to societies with vastly different socioeconomic conditions (Lin & Germain, 2003). Theoretical and empirical examination of the theory's applicability and necessary adjustment in China is a meaningful endeavor. As an emerging economy, China has many features in common with other emerging economies. Therefore, empirical findings based on the Chinese context provide important implications for firms operating in other emerging economies (Zhou & Li, 2010). Given that dynamic capabilities also have a significant impact on firms in emerging

Table 5
The driving role of environmental dynamism.

Variables	Dynamic capabilities	
	Model 1 (β)	Model 2 (β)
Firm size	0.149*	0.101
Firm age	0.085	0.112
Environmental dynamism		0.349***
R^2	0.044	0.164
Adjusted R^2	0.035	0.152
F	4.928*	13.931***

* $p < 0.05$.
*** $p < 0.001$.

economies, managers should not excessively worship the decisive role of environmental dynamism, but confidently invest into the development of dynamic capabilities to address environmental changes, avoiding core rigidities and capability traps.

Third, this study contributes to the debates on the value of dynamic capabilities and the role of environmental dynamism. The finding shows that dynamic capabilities enable firms to be sensitive to opportunities and threats, seize possible chances and implement change as necessary to enhance environmental adaptability and ultimately, achieve competitive advantage (Doving & Gooderham, 2008). Another significant contribution of this study is the focus on the role of environmental dynamism on the effects of dynamic capabilities, which clarifies the debates on whether environmental dynamism is a moderator or a driver. The results support a driving role, which is consistent with current studies (Oktemgil & Greenley, 1997; Teece, 2007). The main reason may be that, as the environment becomes more turbulent, firms may be more sensitive and cultivate higher level of dynamic capabilities to cope with (Schindehutte & Morris, 2001), but the impact of dynamic capabilities on competitive advantage may not necessarily be stronger. Besides, note that environmental dynamism only explains 15% of the variation (see Table 5), indicating some other factors influencing dynamic capabilities. In fact, as an external factor, environmental dynamism just acts as a pusher to dynamic capabilities, many other factors inside the firms may pull the development of dynamic capabilities. Firms may not necessarily form dynamic capabilities just from external pushing pressures, but still need internal pulling forces and subjective efforts. In other words, dynamic capabilities are the results of the co-evolution of internal and external forces (Jacobides & Winter, 2005).

This research also contains some limitations. First, this study just explores the definition, dimensions and consequences of general dynamic capabilities. Further researches should explore deep into some specific capabilities, such as dynamic management capacity, alliance capacity, integration capacity, which may be of great value to high performance. Second, based on theoretical assumptions, this study has considered an adapted definition of dynamic capabilities that excludes the “market-orientation” dimension, but has not empirically tested whether this assumption is pertinent.

Also, political and relational factors may have important influence on dynamic capabilities, but there is a lack of consideration of such factors in the empirical tests. Third, this study only explains the relationship between dynamic capabilities and competitive advantages, with many other topics remaining unexplored. Future researches may systematically study the individual, organizational, inter-organizational levels about the antecedents, processes, effects and contexts of dynamic capabilities. Fourth, this study only treats firm size and age as control variables but without considering other factors such as corporate ownership, industry category and geographical region. Finally, this study employs static and cross-sectional data, which has inevitable drawbacks in reflecting the function and evolution of dynamic capabilities and competitive advantage. The use of panel data may be the future direction of following-up studies.

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Appendix A. Measurement items and validity assessment

	Standardized factor loading
<i>Dynamic capabilities</i>	
Strategic sense-making capacity (Cronbach's $\alpha = 0.840$)	
We can perceive environmental change before competitors	0.642
We often have meetings to discuss the market demand	0.766
We can fully understand the impact of internal and external environment	0.776
We can feel the major potential opportunities and threats	0.757
We have perfect information management system	0.757
We have good observation and judgment ability	0.808
Timely decision-making capacity (Cronbach's $\alpha = 0.849$)	
We can quickly deal with conflicts in the strategic decision-making process	0.806
Under many circumstances we can make timely decisions to deal with strategic problems	0.791
We can remedy quickly to unsatisfactory customers	0.802
We can reconfigure resources in time to address environmental change.	0.808
Change implementation capacity (Cronbach's $\alpha = 0.823$)	
Our strategic changes can be efficiently carried out	0.775
Good cooperation exist among different functions	0.783
We help each other in strategic change implementation	0.769
We have a proper awarding and controlling system	0.774
We can efficiently improve strategic change implementation	0.735
<i>Competitive advantage</i> (Cronbach's $\alpha = 0.886$)	
Compared with our competitors, we have...	
higher profit growth rate	0.788
higher sales revenue growth rate	0.756
lower operating costs	0.630
better product and service quality	0.789
increasingly higher market share	0.806
more profitable old customers	0.831
more profitable new customers	0.814
<i>Perceived environmental dynamism</i> (Cronbach's $\alpha = 0.764$)	
Product or service in our industry updates quickly	0.815
The acts of competitors are difficult to predict	0.782
The technology in our industry progresses quickly	0.726
To predict the change of customer needs is difficult	0.734

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