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Towards an understanding of the nature of dynamic capabilities in high-velocity markets of China

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ABSTRACT

Dynamic capabilities are arguably of more value in the internationalization process, particularly of multinational companies (MNCs) that operate in highly dynamic international markets. Yet there is a scarcity of research on the nature of dynamic capabilities in such highly relevant contexts. This exploratory study presents observations of dynamic capabilities of MNCs operating in ten tightly-defined high-velocity industries of China that shed light on the nature of the concept. The findings suggest that (1) dynamic capabilities of MNCs in high-velocity markets are analytic, strategically planned high-frequency processes and routines, (2) they are highly complicated, and (3) they rely extensively on combined knowledge derived from global and local knowledge. They are likely influenced by diverse sources of environmental velocity and the degree of the MNC's ownership advantages. The complexity and sophistication observed have led us to propose a way to conceptualize dynamic capabilities of MNCs in high-velocity markets.

1. Introduction

China, the world's largest emerging economy, has been one of the largest recipients of foreign direct investment (FDI) in the past three decades (The World Bank, 1970–2015; UNCTAD, 2016). Recent A. T. Kearney FDI Confidence Index shows continued investor interest in the Chinese market. However, operating a foreign-invested business in this large emerging market has been generally perceived as challenging (Pearson, 2005; Weldon & Vanhonacker, 1999). Many MNCs with a strong global foothold, such as Walmart, Amazon and TESCO, have found it difficult to survive in the fast-moving Chinese market (Minter, 2015; Waldmeir & Anderlini, 2015). As one of the world's fastest growing economies for over thirty years, China has demonstrated rapid growth of many sectors due to its dramatic pace of economic reform. The country is arguably one of the world's most dynamic markets (Li, Easterby-Smith, & Lyles, 2008; Luo, 2007). While appreciating the unmatched opportunities in a fast growing market, foreign investors have had a limited understanding of how they could adapt to a fast-changing business environment to ensure success and minimize failure in high-velocity markets of China (Li et al., 2008; Waldmeir & Anderlini, 2015).

“High-velocity” markets are defined by Eisenhardt and Martin (2000) as those in which changes are nonlinear and less predictable,

market boundaries are blurred, and market structures are ambiguous and unstable. They are characterized by rapid and discontinuous change across multiple dimensions (Judge & Miller, 1991; McCarthy, Lawrence, Wixted, & Gordon, 2010) such as technology, competition, demand, industry growth, regulation, business models, and marketing practices (Drnevich & Kriauciunas, 2011; Li & Liu, 2014; Mikalef & Pateli, 2017; Schilke, 2014; Wilden & Gudergan, 2015; Wu, 2010), which often results in incomplete, inaccurate, unavailable, or obsolete information and hence a lack of transparency (Bourgeois & Eisenhardt, 1988; Li et al., 2008).

Research on international business strategy, business performance and failure highlights the effect of environmental dynamism on business performance and emphasizes the importance of adapting and responding to changing market conditions (Amankwah-Amoah, 2014, 2016; Amankwah-Amoah & Debrah, 2014; Amankwah-Amoah & Zhang, 2015; Drnevich & Kriauciunas, 2011; Mikalef & Pateli, 2017; Schilke, 2014; Teece, 2014; Wu, 2010). There has been widespread interest among scholars in the dynamic capability approach to strategy (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, Pisano, & Shuen, 1997; Zollo & Winter, 2002) to explain how firms can overcome path-dependencies and enhance adaptability by reconfiguring and renewing their resources and capabilities in a changing environment. Recently, the wave of this interest has reached a new height with a sharp rise in

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journal articles (Li & Liu, 2014; Lin & Wu, 2014; Mikalef & Pateli, 2017; Schilke, 2014; Wilden & Gudergan, 2015; Zhou & Li, 2010), special issues (e.g., Easterby-Smith, Lyles, & Peteraf, 2009; Lessard, Teece, & Leih, 2016), and qualitative and systematic reviews (Barreto, 2010; Pezeshkan, Fainshmidt, Nair, Frazier, & Markowski, 2016; Vogel & Güttel, 2013).

Despite this significant attention, dynamic capabilities are still underappreciated because their nature has not been adequately explored (Barrales-Molina, Bustinza, & Gutierrez-Gutierrez, 2013; Barreto, 2010; Dixon, Meyer, & Day, 2014; Easterby-Smith et al., 2009; Vogel & Güttel, 2013), particularly for MNCs operating in globally competitive and dynamic markets where dynamic capabilities are of more value (Lessard et al., 2016; Teece, 2014). There has been a small number of conceptual proposals explaining the role of dynamic capabilities in the international expansion of MNCs (e.g., Luo, 2000; Nonaka, Hirose, & Takeda, 2016; Teece, 2014). Yet empirical research designed to uncover the nature of dynamic capabilities of MNCs operating under dynamic international market conditions (e.g., high-velocity markets of China) is rare, making it difficult for foreign investors to develop a competitive set of dynamic capabilities appropriate for their emerging markets.

In this paper we present observations of dynamic capabilities of MNCs operating in tightly-defined high-velocity industries of China that shed light on the nature of the concept. Our main research question is: What constitute dynamic capabilities of MNCs in high-velocity markets of China? Our approach was that of a qualitative multiple-case study which enables the generation of a more elaborate, but externally valid, theory (Eisenhardt, 1989; Langley, 1999). The dynamic capabilities we studied were strategic responses (e.g., organizational changes and re-configuration and renewal processes of company resources) of ten MNCs in various industries to market dynamics of China. Our analysis within and between these companies enables us to identify the main features of dynamic capabilities of MNCs and to consider how far these features are consistent with key arguments in the literature. Our evidence suggests that dynamic capabilities of MNCs in high-velocity markets are analytic, strategically planned high-frequency processes and routines, and that they are highly complicated, and rely extensively on combined knowledge derived from global and local knowledge. They are likely influenced by diverse sources of environmental velocity and the degree of the MNC's "ownership advantages", the firm's possession of superior assets such as home-based technology and production know-how that can be transferred to host markets (Dunning, 1979; Hymer, 1976). The complexity and sophistication observed have led us to propose a new way to conceptualize dynamic capabilities in high-velocity markets. While offering insights into the nature of dynamic capabilities in high-velocity markets, our proposal specifies its boundaries related to environmental conditions and types of firms, which is much-needed for advancing the theory of dynamic capabilities (Barreto, 2010).

2. Theoretical background

The concept of dynamic capabilities initially comes across as an extension of the resource-based view (RBV) of the firm towards regimes of rapid change (Ambrosini, Bowman, & Collier, 2009; Helfat et al., 2007). However, its core elements are derived from several theoretical foundations (Augier & Teece, 2009; Di Stefano, Peteraf, & Verona, 2010; Vogel & Güttel, 2013) such as the behavioural theory of the firm (Cyert & March, 1963), transaction cost theory (Williamson, 1985) and the evolutionary theories of the firm (Nelson & Winter, 1982). Dynamic capabilities are associated with the organization's ability to address organizational rigidities (Schreyögg & Kliesch-Eberl, 2007; Vergne & Durand, 2011), sense and seize business opportunities (Augier & Teece, 2009; Helfat et al., 2007; Teece, 2014), and innovate and adapt to changing market conditions (Teece et al., 1997; Winter, 2003). In their seminal work, Teece et al. (1997) defined dynamic capabilities as "the

firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments" (p. 516). For Teece and colleagues, dynamic capabilities are derived from the firm's unique asset positions and evolutionary paths, and they may involve distinctive business processes and strategic routines cultivated over time through well-known learning mechanisms. This line of argument is rather consistent with Zollo and Winter's (2002) evolutionary perspective that sees a dynamic capability as "a learned and stable pattern of collective activity" (p. 340), developed through the co-evolution of past experience, knowledge articulation and knowledge codification. Such deeply embedded capabilities, therefore, are rather elusive, and thus difficult to observe and measure (Barrales-Molina et al., 2013; Vergne & Durand, 2011; Winter, 2003).

This "evolutionary economics" perspective (Barreto, 2010) assumes a clear link between existing organizational resources such as organizational knowledge and capabilities accumulated in the past and the firm's dynamic capabilities in highly dynamic environments. This stream of research also indicates an explicit purpose, associated with managers' cognitive orientation or intention (Augier & Teece, 2009; Teece, 2007; Vergne & Durand, 2011), of developing dynamic capabilities through organizational learning and knowledge management mechanisms (Easterby-Smith & Prieto, 2008; Hong & Snell, 2013; Lichtenthaler & Lichtenthaler, 2009; Verona & Ravasi, 2003). For example, Zollo and Winter (2002) proposed the notion of "deliberate learning" for pursuing improved effectiveness. In an empirical study on dynamic capabilities, Barrales-Molina et al. (2013) found a positive relationship between organizational learning and the generation of dynamic capabilities. Both "learning by doing" and "trial and error" have been proposed as salient learning modes for dynamic environments (Zahra, Sapienza, & Davidsson, 2006; Zollo & Winter, 2002). Wilden and Gudergan (2015), in their survey of 228 firms located in Australia, found that dynamic capabilities in highly competitive environments are associated with high-frequency learning. Recurrent learning patterns relate to the rate of change of organizational capabilities and therefore they are essential elements for understanding the nature of dynamic capabilities (Collis, 1994; Winter, 2003). Yet it is unclear whether recurrent learning simplifies or complicates the firm's responsive pattern in highly dynamic environments.

Although some scholars (Mikalef & Pateli, 2017; Wilden & Gudergan, 2015; Zahra et al., 2006; Zollo & Winter, 2002) have argued that dynamic capabilities also exist in environments subject to lower rates of change, the possession of dynamic capabilities may be relevant only (or of more value) in fast-moving business environments (Barrales-Molina et al., 2013; Drnevich & Kriauciunas, 2011; Wilden & Gudergan, 2015; Wu, 2010; Zollo & Winter, 2002). Recently, it has been argued that dynamic capabilities are particularly relevant for MNCs whose innovation and manufacturing sources are geographically dispersed while being fully exposed to opportunities and threats associated with environmental volatility (Teece, 2007, 2014). In this context, home-based ownership advantage is insufficient for the firm to cope with pressures of global competition and innovation (Lessard et al., 2016; Nonaka et al., 2016). The scarcity of empirical evidence in this research stream, however, suggests difficulties in justifying the claims made.

On the other hand, Eisenhardt and Martin (2000) pieced together a number of empirical studies on new product/project development processes to argue that the nature of dynamic capabilities varies significantly with the degree of market dynamism. In their view, dynamic capabilities are detailed, analytic and highly structured processes that rely heavily on existing knowledge in a moderately dynamic market where changes are linear and predictable and industry structures are relatively stable. Whereas, in a high-velocity market where basic business environmental characteristics are in flux, they are experiential, simple, and less structured processes that rely extensively on new situation-specific knowledge. This conception of dynamic capabilities suggests a departure from the evolutionary economics perspective and has led towards a "radical dynamization" view of dynamic capabilities

in highly dynamic environments (Schreyögg & Kliesch-Eberl, 2007).

Since then, a number of scholars (Ambrosini et al., 2009; Aragón-Correa & Sharma, 2003; Rindova & Kotha, 2001) have mentioned that there are differences between patterns of dynamic capabilities within various degrees of market dynamism. Although some studies (e.g., Aragón-Correa & Sharma, 2003; Rindova & Kotha, 2001) do suggest the possibility for the firm to take simplified responsive actions in high-velocity markets such as “simple rules” mentioned by Eisenhardt and Martin (2000), other scholarly works do not suggest similar patterns. Ambrosini et al. (2009), for instance, proposed a dynamic framework of three levels of dynamic capabilities associated with managers' perceptions of environmental dynamism. In this conceptualization, dynamic capabilities are incremental at the first level, renewing at the second level, and regenerative at the third level where the conventional way that the firm changes its resource base has been changed (e.g., change of learning patterns). Yet such radical changes in a highly dynamic environment may not necessarily lead to less structured business processes and routines as Eisenhardt and Martin (2000) have suggested. The “dynamic” perspective of dynamic capabilities, therefore, does not provide a consistent pattern of dynamic capabilities in highly dynamic environments.

While dynamic capabilities gain popularity among organizational and strategic management researchers, they have been remarkably difficult to understand due to the apparent contradiction in the literature (Arend & Bromiley, 2009; Barreto, 2010; Pezeshkan et al., 2016; Wang & Ahmed, 2007; Williamson, 2016), which may have resulted from a lack of attention to boundary assumptions related to environmental conditions and types of firms in existing studies (Barreto, 2010). Table 1 shows the main studies on the nature of dynamic capabilities and their inconsistent arguments which obscure our understanding of the nature of dynamic capabilities in highly dynamic environments.

Recent years have seen a surge of empirical studies that have brought support for various claims and counterclaims about the concept (Pezeshkan et al., 2016). For instance, the findings of Wilden and Gudergan (2015) about frequent sensing in highly competitive environments support the recurrent learning patterns suggested by Collis (1994) and Winter (2003). It also implies the reliance on external knowledge under competitive conditions (Eisenhardt & Martin, 2000), though without mention of the role of existing knowledge in developing dynamic capabilities. Wu (2010), by examining 253 Taiwanese technology firms, discovered that, in high volatility environments, firms rely less on existing resources accumulated over time and more on their learning, resource reconfiguration and integration capabilities, which confirms learning as an integral part of dynamic capabilities, a salient point in both the evolutionary and the dynamic perspectives (e.g., Eisenhardt & Martin, 2000; Zollo & Winter, 2002). Although making noticeable attempts to fill the evidence gap and a significant contribution to our understanding of various aspects associated with the concept, the empirical studies predominantly focus on examining the relationships between dynamic capabilities and other variables such as the “DC-performance” link (Pezeshkan et al., 2016) rather than the nature of dynamic capabilities in highly dynamic markets.

There have been a few qualitative studies that have attempted to explore the nature and attributes of dynamic capabilities. Yet they tend to uncover certain aspects of dynamic capabilities (Barrales-Molina et al., 2013) or firm-specific processes which may constitute dynamic capabilities in a specific organization or industry (e.g., Danneels, 2010; Dixon et al., 2014; Gilbert, 2006; Verona & Ravasi, 2003). For example, Verona and Ravasi (2003), in a single case study on product innovation, found that dynamic capabilities in new product development are a complex mix of knowledge creation, absorption, integration and re-configuration processes. Using a single case study, Danneels (2010) explicated how a demised typewriter company based in New York tried to alter its resource base. Williamson (2016) examined new product development processes of 14 Chinese firms mostly in the high-tech industry sector and discovered that dynamic capabilities are a set of

dynamic and flexible processes of frequent sensing and seizing opportunities, and transforming, in which frequent “prototyping” (Eisenhardt & Martin, 2000) and “trial and error” (Zahra et al., 2006; Zollo & Winter, 2002) play an important role. Since these qualitative studies do not provide any measurement for the level of dynamism of their chosen industries, it is unclear whether the dynamic capabilities observed are in moderately or highly dynamic environments.

There has been little (if any) exploratory empirical research designed to investigate the nature of dynamic capabilities in tightly defined high-velocity markets where dynamic capabilities are arguably of more value (Barrales-Molina et al., 2013; Zahra et al., 2006; Zollo & Winter, 2002). There is also a particularly marked lack of research that explores the concept using qualitative multiple-case studies in multiple industries which enable the generation of a more elaborate, but externally valid, theory (Eisenhardt, 1989; Langley, 1999; Yin, 2003) on dynamic capabilities. In addition, although there have been mentions of the high level of relevance of dynamic capabilities in internationalization processes (Luo, 2000; Sambharya & Lee, 2014; Teece, 2007, 2014; Zahra et al., 2006), studies that are specifically designed to examine the nature of dynamic capabilities of MNCs operating in highly challenging and dynamic international markets such as China are rare.

Our research elaborated in the following sections has been designed to address these deficiencies in the literature.

3. Research design

3.1. The research setting

We selected 10 European MNCs operating in ten high-velocity industries in China to study. We started by communicating with two industry contacts (by email and telephone), who provided initial judgement on industry velocity of 18 principle industries they are familiar with. Both contacts had key positions in European business communities. They were company outsiders but had considerable knowledge about leading MNCs and their industries. We provided Eisenhardt and Martin's (2000) definition on “high-velocity” markets but did not prescribe any measures. This initial communication produced a list of 27 dimensions of velocity which we coded and classified into eight categories – industry growth, increase in labour knowledge base, changes in technology/strategic innovation, competition, industry structure, governmental regulations and policies, consumer demand, and motivation at work. Some specific data on industry growth for each industry were provided. Perceptual ratings for each dimension were obtained using a five-point Likert scale. Responses to each single Likert item were treated as ordinal data. We computed the mean for each item, the median for each category, and the aggregate median for each industry. Thirteen industries were identified as “high” to “very high” (a rating of 4–5) velocity markets.

We then sought access to 13 MNCs operating in the thirteen “high-velocity” industries through a broad network of multinational communities in China based on whether they had long-serving expatriate executives who worked both in China and at home, and thus, could provide comparisons of market dynamism and strategies across countries. Though all 13 MNCs participated in our pre-interview discussions about industry velocity, eleven of them engaged in our core research on dynamic capabilities. We eventually dropped one company, Accor, from the sample due to the different data collection method used for this MNC (the only MNC where we had field observation), and thus, only 10 MNCs are presented in this research.

The eight categories of industry velocity were modified following our pre-interview discussions with the MNCs and reduced to six – industry growth, increase in labour knowledge base, changes in technology/strategic innovation, competition, industry structure, and governmental regulations and policies. The 27 dimensions were also refined and reduced to 21 items. Secondary data on sectoral changes in China that we collected before our field work were used as a validation

Table 1
Attributes of dynamic capabilities.

Study	Type of study	Definition of DCs	Attributes of DCs in moderately dynamic markets	Attributes of DCs in high-velocity markets
Teece et al., 1997	Conceptual	The firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments.	Not relevant	Path-dependent organizational processes, shaped by firm-specific asset positions.
Eisenhardt & Martin, 2000	Conceptual	The organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die.	Detailed, analytic and highly structured processes that rely heavily on existing knowledge.	Experiential, simple and less structured processes that rely extensively on new situation-specific knowledge.
Zollo & Winter, 2002	Conceptual	A learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.	Presumably same as in high-velocity markets but less valuable.	Organizational routines developed through the co-evolution of past experience, low-frequency knowledge articulation and knowledge codification.
Zahra et al., 2006	Conceptual	The processes to reconfigure a firm's resources and operational routines in the manner envisioned and deemed appropriate by its principle decision-makers.	Presumably same as in high-velocity markets but less valuable.	DCs stem from the resources and learning processes the venture puts in place early on.
Helfat et al., 2007	Conceptual	The capacity of an organization to purposefully create, extend, or modify its resource base.	No suggestion of differentiation from DCs in high-velocity markets.	Patterned managerial and organizational processes undertaken with intent that involve functions of search, selection, configuration and deployment of resources.
Ambrosini et al., 2009	Conceptual	There are three levels of dynamic capabilities related to a manager's perceptions of environmental dynamism. At the first level we find incremental dynamic capabilities ..., at the second level are renewing dynamic capabilities ..., at the third level are regenerative dynamic capabilities.	Renewing dynamic capabilities that refresh, adapt and augment the resource base.	Regenerative DCs that renews the firm's current set of DCs.
Barreto, 2010	Conceptual	The firm's 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.	No suggestion of differentiation from DCs in high-velocity markets.	Systematic behaviour, multidimensional construct.
Vergne & Durand, 2011	Conceptual	Same as Teece et al., 1997 .	No suggestion of differentiation from DCs in high-velocity markets but calls for empirical research.	Complex, homogeneous, intentional, path-dependent, higher-order contingently triggered self-reinforcing mechanisms.
Dixon et al., 2014	Empirical (Single case study)	Based on Teece et al., 1997 and Helfat et al., 2007 .	No suggestion of differentiation from DCs in high-velocity markets.	Adaptation and innovation processes combining existing and new knowledge Note: No measurement for level of environmental dynamism
Verona & Ravasi, 2003	Empirical (Single case study)	Based on Teece et al., 1997 and Eisenhardt & Martin, 2000	No suggestion of differentiation from DCs in high-velocity markets.	A complex mix of knowledge creation, absorption, integration and reconfiguration processes Note: No measurement for level of environmental dynamism
Williamson, 2016	Empirical (Multiple case study)	Based on Teece et al., 1997	No suggestion of differentiation from DCs in high-velocity markets.	Dynamic, flexible, experiential, frequent sensing, seizing and transforming processes Note: No measurement for level of environmental dynamism, though strong competition and rapid consumer demand were mentioned as sources of dynamism

Table 2
Descriptions of MNCs studied.

MNCs	Principle industry	Length of time in China (years)	Number of subsidiaries in China	Data collection methods					
				Pre-interview communication		Face-to-face interview		Telephone interview	
				MNC	Industry	MNC	Industry	MNC	Industry
Allianz	Insurance	10	Over 10 branches; 4 service companies	2	2	2	–	–	2
BASF	Chemicals	22	8 offices; 19 operating companies	2	2	1	1 competitor	1	1
AVM (anonymous)	Powertrain systems	25	2 central offices; 5 operating businesses	2	2	2	1 industry customer	–	1
Ericsson	Telecom equipment	19	26 offices; 21 operating businesses	3	2	3	–	–	1
ThyssenKrupp	Industrial components and systems	14	Over 30 offices; 25 operating companies	2	2	1	–	1	1
FLM (anonymous)	Logistics	12	54 branches	3	2	2	2 competitors	–	1
DSM	Life science	11	6 offices; 11 operating companies	2	2	1	1 industry customer	1	2
Siemens	Electronics and equipment	24	Over 30 offices; over 50 operating companies	2	2	2	–	–	1
HSBC	Banking	11	3 offices; 14 branches	2	2	1	–	1	2
ALM (anonymous)	Airlines	8	2 branches; 2 landing facilities	1	2	1	–	2	2

procedure.

We eventually measured “industry growth” as change in industry sales/output/other industry-specific measures and change in world position (see Appendix A for specific evidence). We measured other dimensions using a five-point, multi-item Likert scale assessing our informants’ perceptions of the pace of changes in each industry. Our criteria are in large part consistent with Judge and Miller’s (1991) four dimensions of “environmental velocity” – industry growth, changes in technology, competitive actions, and governmental regulations.

We employed multiple-case studies that follow a replication logic, and thus augment external validity and generalizability (Eisenhardt, 1989; Langley, 1999; Yin, 2003). Our selection of these multinationals is aimed at providing a diverse sample of MNCs operating in a high-velocity business environment, which may offer firmer grounding for the constant elements we observe (Gersick, 1988). Although they were not randomly chosen, they were focal cases (Eisenhardt, 1989) purposely selected to maximize opportunities to “gather the most relevant data about the phenomenon under investigation” (Strauss & Corbin, 1990, p. 181). Table 2 describes the MNCs studied and their respective data collection methods.

3.2. Data collection

Our data were collected from multiple sources at different stages.

Before starting the field study we communicated our main research questions two months in advance with 21 senior managers of our selected companies by post and email. They were expatriate executives holding top positions in China or Asia Pacific such as President, CEO, Executive vice president (VP), CFO, Executive for Asia Pacific, Country Head and Managing Director. One purpose of this communication was to elicit preliminary data before our formal interviews. For example, we asked them to provide a preliminary judgement about the velocity of each business sector. We also gathered information about the company’s operational performance in China, local workforce and its business relationships. This set of data helped us identify whether we would need to approach more informants and where to probe the issue for detailed evidence.

A second purpose of this communication was to offer our interviewees plenty of time to consider these questions and recall events which could better explain their ideas. Because we were investigating how business processes, routines and globally dispersed resources were

reconfigured, adapted and renewed to respond to a dynamic business environment over time, we needed to leave room for the respondent to recall historical events. Certain events might be forgotten by certain respondents, and they might need to ask around within the company. Some were also keen to seek ideas and confirmation from colleagues to enrich and clarify their answers. This proved to be helpful according to our respondents because it addresses the concern of potential bias associated with retrospective accounts.

Based on the results of our pre-interview communications and the final availability of the 21 managers communicated, we interviewed 16 expatriate managers in 2004. They were presidents or senior vice presidents of the MNC in China who had worked as top managers in their home markets for over 10 years, and had been in charge of their Chinese businesses since the very beginning. In 5 cases, the company did not have a top manager who had been in charge of their Chinese businesses since the very beginning. In these firms, we interviewed both the current presidents or vice presidents and their predecessors. They were the right knowledge sources about the reconfiguration and renewal processes of the MNC’s resources, routines and business practices in a fast-changing sector in China, and their professional roles exposed them continuously to this kind of knowledge being sought.

Because our face-to-face interviews were all based on pre-interview communications, our interview questions were rather focused. We started each interview by asking respondents whether they considered China to be a high-velocity market in their sector. We also asked them to provide detailed reasons with the aim to develop our own exploratory-based quantifiable framework for measuring environmental velocity. We asked for specific examples, “market dynamics” in their words, for each reason. We then focused on what the firm had done strategically in response to its market dynamics. We centred on “strategic” responses that either displayed repetitive patterns or had long term effects so that idiosyncratic “one-off” responses to conditions of change, often called evidence of “ad hoc problem solving” (Helfat et al., 2007; Winter, 2003), were ruled out.

We conducted further interviews with senior and middle managers from another 5 companies that served as industry customers and competitors of our participating companies in June of 2006. These companies include Volkswagen as AVM’s industry customer, Jardine and COSCO as FLM’s direct competitors, Sinopec as BASF’s local competitor, and Nestlé as DSM’s industry customer. They were good sources of knowledge of their industries since they all stayed in the industry for

over 10 years. These interviews served as one important validation procedure because as outsiders and industry customers our respondents could comment on each company's strategies more critically than those insiders.

We subsequently conducted telephone interviews with 6 additional senior and middle managers from 5 MNCs – BASF, ThyssenKrupp, DSM, HSBC and ALM – between May and December of 2006. It was not easy to identify additional informants within MNCs we studied because the widespread localization strategy adopted among MNCs meant that there were few “ideal” informants left. However, expatriates who had accumulated years of experience both in China and other markets were critical for providing comparisons of market dynamism and strategies across countries.

With a particular purpose to obtain hard data and to further assess the level of velocity of each sector as a validation procedure, we had 14 telephone interviews with 10 industry information centres in China between April and December of 2006. These information centres are under the administration of major ministries serving as official sources of industry knowledge. Our interviewees were key information officers in each industry. They were asked to comment on and add to existing descriptions about their sectors. Their perceptions were all measured by a five-point, multiple item Likert scale.

3.3. Data analysis

We identified the patterns of organizational processes and strategic actions adopted by multinationals to respond to the dynamics of their high-velocity sectors in China. As the research enquiry suggests some a priori issues, we chose to employ a “thematic analysis” approach, similar to Ritchie and Spencer's (1994) “framework” analysis used in applied policy research, which allows for the inclusion of both a priori and emergent concepts, and is suitable for generating testable theories in a specific setting. We analysed the data in stages.

We initially wrote a narrative of the dynamics of the Chinese market and the business processes, resources and strategic actions adopted by MNCs in response to them by pulling together the preliminary data gathered during our pre-interview discussions to create a broad description (Langley, 1999). Our intention was to capture the big picture of the patterns of environmental velocity, organizational processes and resources, and strategic actions of the MNC. The narrative was extended after our subsequent interviews with our interviewees of the MNCs and verified by a professional transcriber who wrote a *verbatim* transcription of all recorded interviews.

We then examined the data for schemata concerning the key dynamics of the Chinese market and the main business processes adopted and strategic actions taken to respond to them. We applied four coding methods in this process. We marked the passages that informed or underpinned similar phenomena with a descriptive code that summarized the primary topic of the passages. For instance, we applied the code “domestic competition” to passages discussing the pressure caused by the rise of various domestic companies. We used categorizing codes to classify descriptive codes that could be subsumed under broader categories. For example, the descriptive codes “domestic competition”, “state-run competition” and “foreign competition” were subsumed under the code “competition”. We used process codes to capture events or actions in sequence. For instance, we used “¹policy shift” and “²strategic investment” to show the sequential connection between the two events. We used pattern codes (e.g., “domestic competition¹”, meaning that “domestic competition” was mentioned first time, and “domestic competition²”, indicating that “domestic competition” was mentioned second time) to mark repetitive actions or phenomena in order to identify patterns and themes. Although the first two authors collected the data together, they carried out their analysis independently and thus were able to cross-check their results. The examination process was equivalent to Ritchie and Spencer's (1994) thematic framework identification. This early analysis revealed six

types of schemata associated with: (1) the change of strategies in response to fast industry growth and opportunities, (2) the reconfiguration and renewal processes of company resources driven by the need for technological change or strategic innovation, (3) the MNC's evolution of knowledge base and its associated strategies, (4) the change of strategies in response to fierce competition, (5) the MNC's structuring/restructuring process and strategy driven by the rapid industry structural changes in the environment, and (6) business strategies in response to the fast administrative policy shifts introduced by a variety of governmental bodies.

We subsequently conducted within-case analysis for more detailed emergent classifications and patterns (Langley, 1999; Miles & Huberman, 1994). The intention of this process was to allow the unique patterns of each case to emerge before we generalized patterns across cases. We applied the thematic framework identified in our preliminary study to the data collected from each case, using textual codes to identify specific pieces of data which correspond to differing themes. For example, we applied the code “C > 5xE” to the sentence, “The Chinese output grows at more than 15% but it is only about 3% in Europe” to generate nuanced analysis for industry growth in China. This coding process was equivalent to “indexing” in Ritchie and Spencer's (1994) framework analysis approach, and similar to “open coding” in grounded theory approach formulated by Glaser and Strauss (1967). The first two authors coded the transcripts for 5 cases independently and cross-checked the codes applied. We then created a case chart for each case using headings from the thematic framework. In the chart boxes, we put line and page references to relevant passages in the transcripts. We also included shortened quotations as a reminder of what is being referred to. Aided by visual displays and plots of each case chart, we searched for concepts and explanations in each case about the nature of dynamic capabilities in high-velocity markets. This stage was equivalent to the “mapping and interpretation” process in Ritchie and Spencer's (1994) framework analysis approach. These analyses resulted in ten case charts of the emerging nature of dynamic capabilities in the Chinese market.

The individual case charts were then merged into a 10 × 6 matrix which displays all cases and emerging themes on the nature of dynamic capabilities in the Chinese market in one chart for comparison. Our intention was to search for similarities and differences between cases in an effort to generate genuine patterns with a closer fit with the evidence (Eisenhardt, 1989). We traced original data from multiple sources to re-examine the issue in cases where we found inconsistencies. This action was carried out jointly by the first two authors. A new pattern of the nature of dynamic capabilities in high-velocity markets emerged from this analysis.

4. The nature of dynamic capabilities of MNCs in high-velocity markets: empirical findings

The data analysis revealed that (1) dynamic capabilities of MNCs operating in high-velocity markets of China are analytic, strategically planned and high-frequency processes, (2) they are highly complicated and routinized activities, and (3) they rely extensively on combined knowledge derived from global and local knowledge. In the following sections, each salient aspect of the findings is described in detail with empirical evidence. We then consider how far they are consistent with key arguments of existing conceptualizations in the literature.

4.1. Dynamic capabilities as analytic, strategically planned and high-frequency processes

Evidence from our field study suggests that dynamic capabilities in a strategic fast-moving market like China are strategically planned high-frequency processes and routines, aided by “learning before doing” and thorough analysis. Table 3 provides exemplary data from the case companies on this point. Additional examples are provided in the

Table 3
Dynamic capabilities as analytic, strategically planned and high-frequency processes.

Companies	Market dynamics	Strategic responses (examples)
Allianz	Opportunities arising from liberalization of regulations	“We do frequent planning and we take rational actions. ... We made immediate plans to expand branches in major cities, mid-term plans to establish more service companies, and long-term plans to expand to all other provinces. ... We are fully prepared to forego volume.” (Executive VP)
BASF	Over-capacity resulted from over-heated economy and fierce competition	“We do forecasting a few times each year and we follow up. ... We have an information system which is less biased. ... We have no over-capacity. We knew the likely problems associated with its fast development. We had the right strategies for that.” (President)
AVM (anonymous)	Lack of transparency resulted from rapid industry reforms	“We do strategic planning. We do forecast four times a year. We visit the officials who are involved in making regulations in areas that we're involved with. ... We do not sit in the office, we are always out with customers. We also contract with outside consultants on market study. ... Our investments make sense. Our forecasting is pretty good.” (President)
Ericsson	Fast technology development in telecom	“This potential required us to position our R&D close to this market. This is why we closed some of the R &D centres in North America and moved to China. There are things in the pipeline, which combine both short term applications and long term innovations. ... We are excited to witness China's rapid development.” (Executive VP)
ThyssenKrupp	Over-capacity resulted from over-heated economy and fierce competition	“As a billion-dollar organization we cannot try everywhere. We review our strategies frequently.”(CFO) “We fortunately didn't make so many mistakes. We are a late-mover and we learned before we came. ... We spend time talking with people at the top.... We do planning. ... We are not meant to make losses here. We have no choice.” (President)
FLM (anonymous)	Dramatic increase in foreign investment	“These are good opportunities. We spent years to train local staff and adapt our system, and now we have over 50 subsidiaries. ... We take steps so that we are not falling behind. ... We are prepared.” (President)
DSM	Opportunities arising from fast economic and technology development	“China is a market which plays a key role in DSM's overall growth strategy. We shifted our strategic attention to China. ... The move from our global customers to China is strategically planned and fully supported. ... The introduction of new products ensures that DSM continues to be the leading supplier in China.” (President)
Siemens	Regional differences resulted from rapid reforms	“We developed this market by stages. ... This structured way of occupying the market is very essential for being successful. ... All are based on careful strategic plans.... It is a non-trial business.” (Executive VP)
HSBC	Opportunities arising from regulation changes	“We have a corporate-wide career development system. We develop local people. ... We send our best people to Hong Kong all year round for continued training, normally six months or a year. They are then able to take management responsibilities... It is a long-term development. We are fully prepared.” (Formerly Executive VP)
ALM (anonymous)	Lack of transparency resulted from fast reforms	“It is wrong to say we are big risk takers, experimenters – it is rubbish - because a company wants to eliminate uncertainty as much as possible. I make sure that the major things are under control and we make less mistakes. We do this by changing local staff step by step so that they delegate more, ... so that we consider all factors and we have the best of all ideas, our knowledge, for our decisions. We encourage people to generate more ideas, creative thinking, in cases that we didn't have information available, ...” (Managing Director)

description that follows.

The ten industries studied were described as dynamic and unpredictable business battlegrounds of China by our respondents. In order to sense potential changes and formulate a strategic response in a timely manner, the participating MNCs performed more frequent strategic reviews and planning in China than at home. Prior to planning, they undertook in-house research to get valid information about the market and to benchmark their own results with those of external bodies. “Learning before doing” (Macher & Mowery, 2009) or “creative search” (Augier & Teece, 2009), rather than “learning by doing” or “trial and error” (Eisenhardt & Martin, 2000; Zollo & Winter, 2002) was widely exercised with the aim to increase transparency for each planning cycle. For instance, AVM, a leading MNC in the powertrain system sector, had a normal routine of annual strategic review and planning in its home market to address environmental changes. Yet, in the more dynamic Chinese market, they undertook their strategic planning four times a year. In an attempt to facilitate effective planning processes, they constantly performed in-house research by its marketing department. Its market intelligence fed up-to-date information back to the company. Each planning cycle was followed by a comprehensive review in order to understand better why they were either successful or unsuccessful. Before the planning processes they also employed external consulting companies to conduct similar research for important projects as a validation procedure. This proved to be effective. As the president commented, “The result was pretty good and our forecasting was pretty good. We've been here since 1979 and we have hundreds of people. If it were not good we would have had a big problem.” These high-frequency planning processes ensured its earlier recognition of the changes in the market and quicker response than others. As an executive VP of AVM noted:

The demand in China is skyrocketing. Each week over \$1 billion of foreign investment flows into the booming market. Schneider opened five factories last year. ... They are rapidly expanding in China. Local governments are loosening controls to allow local companies to engage in joint business activities with foreign companies. ... Their aggressive growth strategies are intensifying competition. It is difficult to know who are investing more, when and where, who will work with whom, what each local government will do ... so and so. We need the information for planning ... where and when we should make our investments (and) who we shake hands with. ... We need to move swiftly. We work with the insiders. ... We have in-house research and we use outsiders to make sure our plans like our investment in Hebei (province) are based on accurate information. ... We have forecasting processes (and) review processes (that) support the aggressive growth and overcome the hurdles of China, a unique market undergoing rapid changes. ... We gain an edge by speeding up our processes. We get things done before they (the competition) get there.

The strategic actions and business processes observed at AVM are not selective phenomena. As Table 3 indicates, the analytic, strategic and high-frequency features of dynamic capabilities were evident in all our participating companies. They are in line with the intentional, strategic and self-reinforcing aspect of existing proposals (Augier & Teece, 2009; Helfat et al., 2007; Teece et al., 1997; Vergne & Durand, 2011; Zahra et al., 2006) as well as the patterned dimension of Zollo and Winter's (2002) learning framework. However, the high-frequency attribute of dynamic capabilities in high-velocity markets of China does suggest differences between patterns of dynamic capabilities of various degrees of market dynamic, which has not been illuminated in the

evolutionary economics perspective but proposed by the dynamization view (e.g., Ambrosini et al., 2009; Aragón-Correa & Sharma, 2003; Eisenhardt & Martin, 2000) and evidenced in recent empirical studies of Williamson (2016) and Wilden and Gudergan (2015). It may conform to the notion of “regenerative dynamic capabilities” proposed by Ambrosini et al. (2009) or “second-order dynamic capabilities” explicated by other researchers (e.g., Collis, 1994; Zollo & Winter, 2002) for it shows how home-based dynamic capabilities (annual strategic review and planning process in the case of AVM) are changed (to four times per year at AVM) in the more dynamic Chinese market. Yet the analytic and strategically planned feature of dynamic capabilities in the Chinese market seems to belie Eisenhardt and Martin's (2000) argument that dynamic capabilities in high-velocity markets are nonlinear processes, experiential with extensive and frequent use of prototyping and early testing and to be at odds with Williamson's (2016) observation of “frequent prototyping” and “trial and error”. Our evidence suggests that MNCs in China have consistently realized that, given the strategic importance of the Chinese market, extensive and frequent use of prototyping and earlier testing can eventually ruin the business because they will lose credibility and worldwide reputation, part of “ownership advantages” (Dunning, 1979; Hymer, 1976), highly valued by local customers and the Chinese government. As a VP at Ericsson stressed, “As a billion-dollar organization, we cannot try everywhere.” This is a salient factor that local Chinese firms observed by Williamson (2016) did not have to worry about. Therefore, the nature of dynamic capabilities of MNCs operating in high-velocity markets of China may be influenced by the degree of their ownership advantages.

We investigated the reasons why analytic and strategically planned (not experiential) business processes led to the MNC's responsiveness in high-velocity industries of China. The key reason is that such processes allow real information to emerge in less predictable situations. Take AVM's case for example: its strategic planning processes required extensive search for real information. As a result, its investment strategy deployed was based on a better understanding of the market. Eisenhardt and Martin (2000) argue that real information is often unavailable in a high-velocity market. However, our findings suggest that real information always exists yet it is invisible and difficult to obtain. As a former VP of Siemens commented, “There are always ideas running in decision-makers' heads long before things happen. It is your job to get the information ahead of time.” Therefore, MNCs with dynamic capabilities in China are those that pave the way to get real information to support their effective strategic planning. Siemens, for example, established close ties with the Chinese government and local pillar organizations which allowed its earlier access to real information about China's earlier development plans. It is critical to understand the intrinsic nature of the socially embedded local knowledge and its implications for learning (Li, Easterby-Smith, Lyles, & Clark, 2016). Those companies that have difficulties to get access to real information and thus are unable to do effective strategic planning in high-velocity markets may have to use prototyping and early testing. Their “luck” in such experiential behaviour is a short-term success and should not be interpreted as the nature of dynamic capabilities (Winter, 2003; Zahra et al., 2006). Yet, there are situations where MNCs cannot get what they need to know, but analytic actions are still taken. ALM, for example, undertook extensive training to encourage local staff to delegate more and generate more ideas for better strategic decision making. This process was interpreted by Eisenhardt and Martin (2000) as “experiential actions”. However, our evidence suggests that this is an analytic process also widely exercised in moderately dynamic Western markets. As the managing director of ALM commented, “It is common in the West but here we try to do the same as we are not big risk takers – experimenters.” Thus, it appears that dynamic capabilities of MNCs in high-velocity markets are analytic and strategically planned (not experiential), and such strategic processes are aided by real information which is invisible and difficult to get.

Proposition 1a. Dynamic capabilities of MNCs in high-velocity markets are strategically planned high-frequency processes and routines, aided by “learning before doing” and thorough analysis.

We explored the underlying causes of the discrepancy between our observation and the argument of Eisenhardt and Martin (2000). They tend to be associated with differences in sources of environmental velocity. Eisenhardt and Martin (2000) examined new product development processes of firms in the high-tech and computer industry of developed markets where the velocity mainly comes from fierce market competition and evolved customer needs. While we observed strategic actions of MNCs operating in diverse industries of China, a large emerging market and a transition economy, where six types of velocity are resulted from continuous economic reforms. Although both contexts are characterized by less predictable changes, blurred market boundaries, and ambiguous and unstable market structure, the sources of environmental velocity vary. Technological information in Eisenhardt and Martin's (2000) context is legally protected hence unavailable, therefore, prototyping and early testing are key actions of the research processes. However, much of the information in our context is non-technological and, though unavailable in the public domain, could be obtained through establishing “close ties” with relevant entities. Thus, the more analytic, strategically planned and high-frequency processes observed in our study are likely to be related to the diverse sources of velocity, a property of “heterogeneity” (Mikalef & Pateli, 2017).

Proposition 1b. The analytic, strategically planned and high-frequency attribute of dynamic capabilities of MNCs in high-velocity markets is likely influenced by the diverse sources of environmental velocity.

We also investigated why the learning mechanism employed by the MNCs in our study differs from that used by the Chinese firms in Williamson's (2016) research although the businesses observed in both studies operate in the same emerging market. One of the main reasons is that Williamson (2016) did not empirically examine the sources of velocity in the industries he studied. Instead of observing responsive patterns to all possible sources of velocity, he focused on new product development processes that respond to two observable sources of velocity, the changing consumer demand and strong competition, similar to those of Eisenhardt and Martin (2000). The second reason lies in differences in the firms observed. Williamson (2016) collected data from relatively less mature Chinese firms, mostly founded after the 1980s, operating at home, whereas our study observed well established MNCs operating in an emerging host market. The mature MNCs we studied already had “ownership advantages” (Dunning, 1979; Hymer, 1976) developed at home and thus focused their strategy on asset exploitation and adaptation rather than new product development in the emerging market, while the less mature Chinese firms were in their “early-stage development” and hence concentrated on asset creation (i.e. new product development) at home without worrying about the possible loss of established reputation, as noted earlier. While recurrent “learning before doing” ensured earlier recognition of opportunities for the MNCs to exploit their home-based advantages, “frequent prototyping” and “trial and error” helped the local Chinese firms to accelerate their development at home. Therefore, the different learning mechanism we observed from the MNCs is likely influenced by the degree of their ownership advantages.

Proposition 1c. The learning mechanism of MNCs in high-velocity markets is likely influenced by the degree of their ownership advantages.

4.2. Dynamic capabilities as highly complex and routinized activities

Our data suggest that the MNCs studied have developed viable routines which are based on general principles but adapted carefully to suit local situations. The adaptations are not made to change the

Table 4
Dynamic capabilities as highly complex and routinized activities.

Companies	Market dynamics	Strategic responses (examples)
Allianz	Opportunities arising from liberalization of regulations	“We apply advanced management model and competitive training program to our operational practice in China. We bring in globalized management and technical systems to deliver superior portfolio services for local customers. We changed a little like the way to approach local customers. ... We added an ‘educational’ layer to marketing tools. ... These are expensive activities.” (Executive VP)
BASF	Rapid evolution of local knowledge base	“Multinationals are all training up China. Local knowledge base has been dramatically increasing. ... We implement BASF systems but we do not copy. We apply them in a way which brings us global benefit. ... It is a flexible management system. It adds up complexity.” (President)
AVM (anonymous)	Communication gap between headquarters and China subsidiaries resulted from rapid changes of China	“We develop a common understanding of the market by adopting a ‘common language’. ... We standardize certain things like our processes, our capabilities and objectives in China. They are the same processes as we have elsewhere. Our job is to make sure that China is one of the most successful in adopting company processes and that the strategies fit together very well into the local environment. ... It is just more complicated.” (President)
Ericsson	Fast technology development in telecom	“We adopt global standards which are customized to local technological requirements. ... Customization adds layers to global standards.” (Executive VP)
ThyssenKrupp	Complex environmental differences resulted from frequent changes	“The strategy is developed at home for all of our activities and that they are adapted for special purposes and special countries. We feed the information back to executive board members and we adapt the processes to meet local situations. But here we have to follow the main rules of the company at home. ... Things are complicated here.” (President)
FLM (anonymous)	Lack of transparency resulted from rapid industry reforms	“But we make quicker decisions because we have better communication and coordination systems. We keep an eye on our industry evaluation survey and improve our services constantly. We attend to emerging problems more quickly and respond to customers faster. ... It is a teamwork. It is complex.” (President)
DSM	Opportunities arising from fast revolution of the industry	“In the last few years food packaging has been revolutionized in China. Packaging of fresh food required specific packaging based on PA6. The Chinese market saw a flow of downstream film investments coming for which we were well equipped to supply our Akulon film polymer as we have world-class technology and established production processes and facilities in this market. ... This locally established strength made it possible.” (President)
Siemens	Environmental differences due to dramatic reforms	“Our framework is composed of business processes that can be used everywhere. But the necessary actions in these processes are flexible, different from one context to another. ... The challenge is greater as we have to do it faster.” (Executive VP)
HSBC	Opportunities arising from changes of regulations and the market	“We apply HSBC routines and procedures, those big bibles, to every country across the world. Based on the local situation, we mend them and recommend our local strategy to the headquarters for their approval. ... But the process is the same. It is challenging. ... This is complicated.” (Country Head, personal banking)
ALM (anonymous)	Fast-paced changes in China	“We have a tight framework within which we have flexibility. We have established processes, regulation system, reservation systems, technical system etc. ... We look at local issues that have impact on company strategy. We find the solutions in order to implement the modern concept. ... It is extremely time consuming to set up systems like that and to keep it up to date.” (Managing Director)

processes but to change the way they are implemented. These routines are more complicated than prior models used in their home markets. Substantial evidence from the interviews and stories corroborated that such complex processes adopted in response to fast environmental changes are typical (not exceptional). When asked about the nature of their strategic actions and business processes in the high-velocity market of China, all our participating managers stated that they are highly complex. As Table 4 indicates, many examples were provided to substantiate their conclusions.

For example, the CEO of AVM commented that many MNCs respond slowly to China's fast environmental changes due to persistent communication problems between China subsidiaries and their overseas headquarters. AVM has skillfully resolved the problem by establishing a more structured routine and secured its responsiveness to the dynamics of this strategic market. This routine consists of the common processes that the company used to rely on but is adapted by routinizing the use of a “common language”, in the words of AVM's China president. The “common language” is a mixture of a glossary and an index system mapping, translating and codifying key managerial, functional and technical terms, classifications of technologies and specifications of products used in the MNC's data bank where key documentation (e.g., the management handbook, operational manuals, blueprints, written rules, and subsidiary-based innovation) is stored, updated and shared across borders. This common language translates company management models and vision into easy-to-understand concrete practices – a “local language” – that local staff, customers and partners understand.

Extensive training is then undertaken in local language. These localized goals are then matched with local conditions and adjusted by employees who work locally. The adjusted principles and insights are then translated back into global company practices and goals – a “global language” – to facilitate better understanding of local issues and to speed up decision-making. This translation process is facilitated by extensive physical interaction. A common language enables cross-border individuals to speak the same technical and business language and to share the same goals. However, adding this translation process into the existing communication system has increased the complexity of the company's processes. Nevertheless, the establishment of a viable routine allows new knowledge to be absorbed faster and thus stimulate new knowledge creation and to push the learning curve to a higher level. This routine triggered more strategic actions that have led to AVM's responsiveness. It is highly routinized.

The routinized feature of dynamic capabilities is consistent with previous suggestions by Zollo and Winter (2002) and others (e.g., Dosi, Nelson, & Winter, 2000; Winter, 2003) and the argument that dynamic capabilities are path-dependent (Teecce et al., 1997; Zahra et al., 2006). The highly complex attribute of dynamic capabilities, however, suggests that learning and adaptation complicate the firm's responsive pattern in high-velocity markets, which has not been illuminated in extant research. The results are certainly not in line with Eisenhardt and Martin's (2000) argument that effective dynamic capabilities in high-velocity markets are simple and less structured.

We examined the reasons why the present results fail to support the

view that dynamic capabilities in high-velocity markets are simple. One reason is that the authors of this view (e.g., Eisenhardt & Martin, 2000) do not distinguish business processes, from the strategic actions adopted to implement them, labelled as “ostensive routines” and “performative routines” respectively by Feldman and Pentland (2003). For example, in Yahoo's case, Eisenhardt and Martin (2000) regard two strategic actions (performative routines) – “simple rules” – adopted to facilitate its alliance formation as an alliancing “process”. However, our evidence suggests that managers do make this distinction, as an executive VP of Siemens explained, “Our framework is composed of business processes that can be used everywhere. But the necessary actions in these processes are flexible, different from one context to another.” There are certain simple strategic actions taken by MNCs in China which could be interpreted as “simple rules” yet these simple routines are often employed as additional layers in a complex business process. In this regard, AVM's strategic use of a “common language” is a typical example. Thus, dynamic capabilities in high-velocity markets are irreducibly complex (not simpler).

Proposition 2a. Dynamic capabilities of MNCs in high-velocity markets are highly complicated and routinized activities.

Proposition 2b. The highly complex attribute of dynamic capabilities complicates the MNC's responsive pattern in high-velocity markets.

In addition, our evidence suggests that the complex nature of dynamic capabilities of MNCs is likely influenced by the degree of their ownership advantages because the purpose of their international expansion is to exploit and adapt their home-based assets, which tend to add layers to existing patterns. As the president of FLM explained:

Many (local competitors) have emerged in recent years. ... They offer low-cost services that foreign companies can hardly match. ... We reduced our cost by localizing our staff and services ... but this piles up on top of what we used to do as we must undergo regular training and establish a localized service protocol. We recruit new graduates directly from good universities. ... We identify what they need to learn each year. We also partner with some local companies. ... They are young and small businesses but we need them to cope with the dramatic demand in China. They are willing to cooperate. ... We implement our standard processes as that is how we established ourselves as a leading company. We are still flexible as our people don't sit in the office. They are with our customers all the time so they know exactly what extra requirements are needed. We then add more to our list. It is built on what we relied on but guarantees our premier services at lower cost.

Proposition 2c. The highly complex attribute of dynamic capabilities of MNCs in high-velocity markets is likely influenced by the degree of their ownership advantages.

4.3. Dynamic capabilities are based on combinations of global and local knowledge

Our empirical data suggest that dynamic capabilities in high-velocity markets of China require a combined knowledge base derived from home-based knowledge and local situation-specific knowledge. The participating MNCs engaged in extensive learning through taking cross-functional responsibilities, database sharing, and intensive internal and external communication in order to gain just-in-time environmental knowledge. However, the purpose for them to gain this new knowledge was often not to rely more on it but to integrate it with existing knowledge in order to implement its home-based advantages successfully in China. As Table 5 delineates, strategic success in the high-velocity Chinese market requires both old and new knowledge. In the words of a VP at Ericsson, “The combination (of existing and new) is important and I believe you should not take anyone away or simply tie them together. The right combination is part of our success.”

Consider the magnetic levitation (Maglev) train which travels between Pudong Airport and Shanghai at a speed of 431 km per hour. This project was successfully introduced and implemented by Siemens and ThyssenKrupp. With a strong desire for first-class technology, the Chinese government required the project to be finished successfully within three years rather than the six years as anticipated by the two leading MNCs. In order to respond to this “irrational” requirement the two companies brought in their state-of-the-art technology and hands-on national project experience to discuss with local partners and local government to find out the potential barriers to a faster and smoother process, and to resolve them before the project started. This team communication process integrated the two companies' existing global knowledge with solid new situation-specific knowledge about the local technical base, local ways of working and thinking, and the project's environmental conditions. A new business process emerged from the discussion. It was a combination of global knowledge and local situation-specific knowledge which resulted in the line being completed within only 22 months of the contract being signed in January 2001.

These observations are in line with the contention that dynamic capabilities are derived from the firm's learning mechanisms (Teece et al., 1997; Zollo & Winter, 2002) and suggest the relevance of both existing resources (Helfat et al., 2007; Teece et al., 1997) and new situation-specific knowledge (Eisenhardt & Martin, 2000) to the generation of dynamic capabilities in high-velocity markets. They conform to the exploitation-exploration and the adaptation-innovation paradigms (Dixon et al., 2014; Luo, 2000; Wang & Ahmed, 2007) yet do not lend much support to Eisenhardt and Martin's (2000) argument that dynamic capabilities in high-velocity markets rely extensively on quickly created new situation-specific knowledge. The cases we studied suggest that local situation-specific knowledge is critical to the MNC's success in high-velocity markets of China yet it may not be a single component that explains the nature of dynamic capabilities in that market. In other words, the functions of existing business processes and local situation-specific knowledge are inseparable in forming strategic responses to dramatic environmental changes.

Proposition 3a. Dynamic capabilities of MNCs in high-velocity markets rely extensively on combined knowledge derived from global and local knowledge.

This attribute of dynamic capabilities of MNCs is also likely influenced by the degree of their ownership advantages in which global knowledge including existing technologies is a key component. As Dunning (1979) argued, the greater the ownership advantages of the MNC, the more incentive they have to exploit and rely on these in emerging markets. This is evidenced in the MNCs we studied. For example, an executive VP of Siemens explained:

We build on our own strength. We have established our management framework which is more or less a worldwide system. We have not developed anything special here. ... But we use local knowledge collected as much as possible for planning. ... A company has to adapt continuously its management practices.

Proposition 3b. The reliance on a combined knowledge base of MNCs operating in high-velocity markets is likely influenced by the degree of their ownership advantages.

5. Discussion and conclusion

The pattern of findings did not simply suggest that dynamic capabilities may be affected by market dynamism, a dynamic view proposed by some scholars (e.g., Ambrosini et al., 2009; Eisenhardt & Martin, 2000) yet unrecognized by evolutionary economics theorists (e.g., Teece et al., 1997; Zollo & Winter, 2002). The great complexity and sophistication of dynamic capabilities of MNCs observed in high-velocity sectors of China connote a contextual paradigm. In this paradigm, dynamic capabilities of MNCs operating in high-velocity markets

Table 5
Dynamic capabilities are based on combinations of global and local knowledge.

Companies	Market dynamics	Strategic responses (examples)
Allianz	Regional differences resulted from rapid economic reforms	“Allianz adopts a multi-local management approach which ensures that the know-how of its Chinese joint venture partners and employees can be combined with the Group’s international expertise and network. It also means the company can tailor an extensive range of insurance and financial solutions to suit its customers’ individual needs at all locations. It allowed us to have achieved significant influence in China. ... It is a combination of global and local strengths.” (Executive, Asia Pacific)
BASF	Opportunities arising from fast economic development	“Knowledge base is everything in a fast moving market like this. Our strategy is built on what we know about the market and what we implement here. ... It is a combination of local and global knowledge.” (President)
AVM (anonymous)	Opportunities arising from fast economic development	“We have No1 market share in many of our areas that we compete in. ... We are successful because we have very important local input into our system. We have superior technology, capabilities and processes; we have good planning system; and we have good local management. These together have led to our major success.” (President)
Ericsson	Opportunities arising from fast economic development	“We are playing in a niche. We have almost 40% of the wireless market in China. Our success in seizing this emerging opportunity is attributed to our strength in network know how and our understanding of the market, our local competence. ... The right combination is part of our success.” (Executive VP, CFO)
ThyssenKrupp	Emerging opportunity of launching a magnetic levitation train line	“We have world-wide reputation in technology, production processes, services, and experience. We supply all these. We got together with the Chinese and the line went into operation within only 3 years, the time that in other countries will not be enough for all the planning alone. ... It is a close cooperation.” (President)
FLM (anonymous)	Emerging competitors	“We provide globalized services and we have company strategies which fit in China. Our staff are local but very well trained and they know how to apply the principles in this market. ... We have a global system and a local team.” (President)
DSM	Opportunities arising from fast economic development	“The Chinese market develops very fast, both in volume and at a technical level. There is ample room for DSM to follow a differentiated approach where product performance and application service can add value to the customers. This approach requires transfer of know-how to further build a leadership position in the high-end markets and a good understanding of local industrial customers. ... It is the outcome of both.” (President)
Siemens	Opportunities arising from fast economic development	“We build on our own strength. We have established our management framework which is more or less a worldwide system. We have not developed anything special here. ... But we use local knowledge collected as much as possible for planning. ... A company has to adapt continuously its management practices. ... The combination makes the strength.” (Executive VP)
HSBC	Lack of transparency resulted from frequent adjustment of regulations	“We implement HSBC system and we spend much time in local networking. For example, I am the president of Shanghai Banking Association. There we meet all kinds of people in the sector - expatriates, local bankers and officials. They are good sources of local knowledge. ... It is this objective local knowledge and extra expatriate knowledge together that produced the results.” (Country Head, personal banking)
ALM (anonymous)	Lack of transparency resulted from rapid development of the market	“Westerners try to come up with a reason why we do the things we do – reflective thinking. This is sometimes not the case here. In practice, the Chinese have a rather unthinkable concept. ... We have to bring these together to produce a better outcome.” (Managing Director)

are purposeful arrangements of high-frequency processes and multi-layered routines of irreducible complexity and sophistication that are dependent on inseparable combination of global and local knowledge and are not formed by unguided business processes occurred by chance. They are evolved neither from experiential actions such as “trial and error” nor from simple or less structured rules based on emerging information as Eisenhardt and Martin (2000) have argued. Rather, they are strategically planned actions which increase in complexity and frequency in highly dynamic environments. They are influenced by the diverse sources of environmental velocity and the degree of the MNC’s ownership advantages. They maintain a “dynamic” balance because the integration or addition of local situation-specific knowledge to existing structures over time indicates an “evolutionary” dimension of the construct, which is consistent with Feldman and Pentland’s (2003) ecological perspective on routines, evidenced in our field investigation by the constant search of MNCs for valid market information.

5.1. Contributions to research in strategy

By exploring the nature of dynamic capabilities of MNCs operating in ten tightly-defined high-velocity sectors of China we contribute to a growing body of research intended to illuminate the organization’s capability to respond to fast environmental changes in high-velocity markets.

One important contribution of our work is that it fills both empirical and theoretical gaps in research on the nature of dynamic capabilities in high-velocity markets where dynamic capabilities are arguably of more value (Barrales-Molina et al., 2013; Drnevich & Kriauciunas, 2011;

Wilden & Gudergan, 2015; Wu, 2010; Zollo & Winter, 2002). Existing quantitative studies concentrate on examining the relationships between dynamic capabilities and other variables (Pezeshkan et al., 2016) rather than the nature of dynamic capabilities in highly dynamic markets, though making a significant contribution to our understanding of various aspects associated with the concept. A small number of qualitative studies, though narrowly focused, do investigate the nature of dynamic capabilities yet do not provide any measurement for the level of velocity of their chosen industries. Therefore, it is unclear whether the dynamic capabilities observed are in moderately or highly dynamic environments. We made the first attempt to explore the nature of dynamic capabilities in tightly defined diverse high-velocity markets using a qualitative multiple-case study designed to generate a more elaborate, but externally valid, theory (Eisenhardt, 1989; Langley, 1999; Yin, 2003).

On the theoretical front, our study spells out that dynamic capabilities increase in complexity and frequency in high-velocity markets, particularly for MNCs operating in environments where the sources of velocity are diverse, which has not been illuminated in previous models. Though existing research has found that dynamic capabilities in highly competitive environments rely on frequent sensing (Wilden & Gudergan, 2015; Williamson, 2016), it is unclear whether recurrent learning simplifies or complicates the firm’s responsive pattern in such environments. Moreover, although existing studies suggest the relevance of both existing resources and learning (e.g., Lichtenthaler & Lichtenthaler, 2009; Teece et al., 1997; Wang & Ahmed, 2007; Wu, 2007; Zollo & Winter, 2002), an “inseparably combined” knowledge base (not existing resources or new situation-specific knowledge alone)

has not previously been indisputably seen as a requirement for the existence of dynamic capabilities in highly dynamic environment (see inconsistent arguments shown in Table 1). We add to this line of the argument by demonstrating how global and local knowledge are inseparably combined by the MNCs to respond to market dynamics. We have also suggested that the “inseparably combined” attribute of dynamic capabilities is likely influenced by the degree of the MNC’s ownership advantages, which has not been explored in previous studies. In addition, our proposal indicates that patterns of dynamic capabilities vary with the level of market dynamic, sources of environmental velocity and the degree of the firm’s ownership advantages. Although Eisenhardt and Martin (2000) and other scholars (e.g., Aragón-Correa & Sharma, 2003; Rindova & Kotha, 2001) have explicitly recognized that patterns of dynamic capabilities vary with the level of market dynamism, they failed to examine the relationships between patterns of dynamic capabilities and other variables such as the sources of environmental velocity and the degree of the firm’s ownership advantages. Barreto (2010) points out that prior research on dynamic capabilities has not given due consideration to bounding assumptions related to environmental conditions and types of firms. We made a rare attempt to address the issue by proposing that patterns of dynamic capabilities of MNCs are likely influenced by diverse sources of environmental velocity and the degree of the firm’s ownership advantages. We have found that the analytic, strategically planned and high-frequency attribute of dynamic capabilities of MNCs is likely influenced by the diverse sources of environmental velocity. We have also discovered that the highly complex and “inseparably combined” attributes of dynamic capabilities of MNCs and their learning mechanism in high-velocity markets are likely influenced by the degree of their ownership advantages. The patterns of dynamic capabilities we observed challenge much of the works of Eisenhardt and Martin (2000) and other scholars (e.g., Aragón-Correa & Sharma, 2003; Rindova & Kotha, 2001) who portray dynamic capabilities in high-velocity markets as business processes and routines that are experiential, simple and less structured, and dependent extensively upon new situation-specific knowledge. Meanwhile, the relationships between patterns of dynamic capabilities and other variables we discovered provide a deeper understanding of the nature of dynamic capabilities in high-velocity markets.

A second contribution of our work is that it fills a gap in the literature by examining the concept of dynamic capabilities in one of the world’s fastest growing markets and the largest emerging economy, China, to explain how MNCs respond to the dynamic nature of the market to ensure success and minimize failure. Dynamic capabilities are arguably more relevant (and of more value) in the internationalization process (Ambrosini et al., 2009; Luo, 2000; Zahra et al., 2006), particularly of MNCs that operate in internationally competitive and dynamic markets (Teece, 2007, 2014; Williamson, 2016). Yet there is a scarcity of research on the nature of dynamic capabilities in such highly relevant contexts. This exploratory study was designed to fill the gap. Based on our direct empirical evidence, we made the first attempt to conceptualize dynamic capabilities of MNCs operating in high-velocity markets of an emerging economy. The conceptualization, along with the eight propositions, therefore broadens our understanding of dynamic capabilities and advances our knowledge of the MNC’s international business strategy.

5.2. Managerial implications

Our research provides specific suggestions for foreign investors to develop a competitive set of dynamic capabilities appropriate for their emerging markets, and China in particular. Our findings suggest that the markets in emerging economies can be highly dynamic and the sources of environmental velocity are often diverse. Firms that wish to exploit their home-based assets in emerging markets need to be aware of the highly dynamic nature of their new environments where real

information needed for effective strategic planning is invisible and difficult to get. They need to forge close ties with local governmental bodies to allow real information to emerge in less predictable situations. They must establish a viable routine to frequently sense potential changes in the market such as earlier development plans for their industry and benchmark their in-house research results with those of external bodies to ensure the validity of their information. They should take a “learning before doing” (Macher & Mowery, 2009) approach and avoid extensive and frequent use of “trial and error” (Eisenhardt & Martin, 2000; Zollo & Winter, 2002), a learning mechanism that is error-prone, thus making sure that they uphold their worldwide reputation in strategically important emerging markets such as China. They must also establish a high-frequency routine of strategic review and planning in their emerging markets and formulate quicker strategic responses than others.

On the other hand, our research suggests that, though being dynamic, emerging markets do not demand new business processes and structures that differ significantly from those of MNCs practiced at home. The MNC’s “ownership advantages” (Hymer, 1976) such as home-based technology and management practices are relevant for their emerging markets and often highly valued by their host-country customers and governments. Therefore, it is not necessary for foreign investors to develop any special business models for emerging markets. Rather, they should integrate local situation-specific knowledge to existing structures over time to maintain a “dynamic” balance. In this regard, AVM’s higher-frequency strategic planning process implemented in China offers a typical example of how a dynamic component based on local knowledge can be integrated to its original planning routine practiced at home. By doing so, foreign investors can build on their existing strengths yet are still able to respond to market dynamics in emerging markets. It is important to understand that, though local knowledge is critical to the success of MNCs operating in high-velocity markets, it is not a single component that explains their ability to survive in those unpredictable environments. Successful MNCs are those who can establish viable routines which are based on general principles developed at home but adapted carefully to suit local situations, routines that are based on both global and local knowledge and, though complex, can trigger more strategic actions in high-velocity markets.

5.3. Limitations and future directions

The limitations of this research provide anchors for future research. First, this research was based on data gathered from ten leading MNCs, a small number of cases, which were not randomly selected. Although the multiple-case approach employed in this study allows greater validity and generalizability (Eisenhardt, 1989), the empirical data collected are potentially liable to systematic bias. Extending our empirical base to include more MNCs, unsuccessful companies in particular, and smaller sized foreign investors from all backgrounds should allow wider test of our findings generated from this study and produce more generalized results. For example, an interesting extension along this line would be to examine the patterns of dynamic capabilities of MNCs of various degree of ownership advantages to find out whether there is a linear association between the level of complexity of dynamic capabilities and the degree of the MNC’s ownership advantages.

Second, although our multiple-case study was carried out in diverse industries, the findings may not reflect certain industry differences that could affect the observed pattern due to the small size of the sample. The discrepancy between our findings and those of Williamson (2016) and Eisenhardt and Martin (2000) may reflect inter-industry differences. Research on environmental velocity argues that industry differences may play an important role in explaining inconsistency in management research (Judge & Miller, 1991; McCarthy et al., 2010). Therefore, additional empirical research examining the degree of differences in dynamic capabilities among high-velocity industries is

needed (Wu, 2010).

Finally, our empirical evidence suggests that Western markets, the relatively moderate dynamic world, are increasingly influenced by the dynamics of China. As a result, the MNC's business environment as a whole is increasing in velocity. Although our "ideal" informants had multiple professional roles in China and at home and thus were the right knowledge holders who could compare the MNC's dynamic capabilities in China and those in Western markets, further observations of dynamic capabilities in their less dynamic home markets would allow us to follow the emergence of evolutionary patterns of dynamic capabilities in different markets over time, and thus help us better understand whether there is a tendency for dynamic capabilities to increasingly exhibit patterns discovered in the high-velocity markets of China. Our study suggests that the nature of dynamic capabilities is likely influenced by diverse sources of environmental velocity (Proposition 1b). A comparative study on the nature of dynamic capabilities in high-velocity markets of various sources of velocity would allow greater

understanding of the concept and its evolutionary pattern.

Nevertheless, we hope that our findings and the empirically-based conceptualization, the first of its kind, will foster a continuing dialogue among colleagues who struggle to understand the nature of dynamic capabilities in high-velocity markets, particularly for MNCs operating in emerging markets such as China, which will lead to modification and refinement of this abstract concept over time.

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Appendix A. Velocity dimensions of ten organizational populations – industry growth

Organizational populations	Industry growth		
	Compound annual sales/output growth ^b 1995–2004		
	China	The world	
Insurance	~8% ^a	3% ^{a,e}	From almost non-exist before 1990 to the 11th globally in 2005
Chemicals	13.2%	6.1%	Increase in share of global turnover: from 3.6% in 1995 to 7.7% in 2004 - the fourth largest maker
Powertrain systems	22.7% ^b	~3% ^b	From almost non-exist before 1985 to the world second largest car maker in 2006
Telecom	36.2%	< 6%	From almost non-exist to the largest telecom market since 2002
Industrial components and systems	14.4% ^{i,c}	0.8% ^{i,c,f}	The largest in steel production since 1996. It was about 4 times the size of the US steel industry in 2006.
Logistics	~30% ^{a,d}	~10% ^{a,d}	From a closed-door economy to the largest container shipping market since 2003.
Life science	25%	3–4%	Since 1980 it has been the world fastest growing pharmaceutical market and the eighth largest by sales since 2003.
Electronics and equipment	13.5% ⁱ	5% ⁱ	Increase in share of global output: from 10% in 2000 to 20% in 2004, making it the first world producer of a large number of mass-market electronic products.
Banking	~17% ^a	14.3% ^{a,g}	From only one state-owned bank before 1980 to about 30,000 institutions and over 180 foreign banks in 2006. In 2006, there were 25 domestic banks on the list of global top 1000 banks and 3 banks were listed in the top 25 of the 1000. Several Chinese banking giants made the Fortune 500 list in 2006.
Airlines	> 16% ^a	4.8% ^a	From a closed-door economy to the fastest growing outbound tourism market on the planet and the largest commercial aviation market outside the US since 2004.

^a This value represents the industry's annual growth measured by its sector specific measure.

^b The powertrain sector is measured by its annual sales in auto components.

^c The industrial components industry is measured by its annual output in steel.

^d The logistics industry is measured by its annual growth in container throughputs.

^e This value is derived from data of industrialized nations.

^f This value is derived from data of the world without China.

^g This value is derived from data of the world top 1000 banks.

^h This value represents each industry's annual growth in compound sales or output or annual growth measured by sector-specific measures.

ⁱ This value represents the output of the industry.

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