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Article

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Ownership changes of Japanese affiliates in China: lessons from the perspective of growth options exercising

Hongru Liu^{1*} and Qiaoying Zhu²

Abstract: Based on Real Options Theory and taking the perspective of growth options exercising, as well as Tobit model, this paper explores how Japanese enterprises adjust ownership structures in their affiliates as a portfolio in China. Empirical results show that: both demand uncertainty and industry growth opportunity in China enhance Japanese enterprises' ownership expansion in their affiliates as a real option portfolio; Industry competition and capability to control and coordinate the affiliates strengthen the roles of uncertainty and industry growth opportunity play in enhancing Japanese enterprises' ownership expansion within these affiliates as a portfolio. This paper enriches studies on growth options exercising and illustrates that the logic for real options establishing should not be simply and directly transplanted to real options exercising indiscriminately. Conclusions derived from this paper are of great significance for

ABOUT THE AUTHORS



Hongru Liu

Hongru Liu, is an associate professor at Henan Normal University, China, his research interest lies in International Business Strategy, International and Regional Economy. In recent years, he and the members of his team have been devoted to explore how MNEs deal with complex uncertainties confronted with in host countries based on Real Options Theory and the equally important theories, such as Institutional Theory, Transaction Cost Theory, and so on. Based on the perspective of real options portfolio, this paper puts lots of efforts to probe into a complex but significant question of how Japanese enterprises take advantage of uncertainty and opportunity after entering China and operating multiple affiliates according to economic condition changes, which is undoubtedly conducive to enriching international business researches.

Qiaoying Zhu belongs to Henan Normal University and is interested in International Business Strategy, and has been participating and devoting to improve the quality of this paper.

PUBLIC INTEREST STATEMENT

The question of how effective measures should be taken after establishing multiple affiliates in a host country is important for MNEs to accomplish optimal profits but still remains not well-answered due to most previous literature in international business realm paying too much attention to the entry stage. Real Options Theory offers the effective logic and tool for not only risk avoidance but also opportunity grasping. Based on the perspective of real option portfolio by regarding multiple affiliates operated by a Japanese enterprise in China as a real option portfolio, we tell a story of how Japanese enterprises adjust ownership structures according to changes of economic conditions when they operate multiple affiliates in the very host country. Readers, especially non-special ones, can get a basic understanding of Real Option Theory's logic for investing and how MNEs take positive actions in light of the favorable economic conditions in a host country.

MNEs' growth option exercising by adjusting ownership structures in their affiliates as a portfolio within a host country according to changes in the focal host market.

Subjects: Asian Business; Organizational Change; Strategic Management

Keywords: Uncertainty; growth opportunity; competition; control and coordination capability; ownership expansion

1 Introduction

When confronted with uncertainties in a host country, multinational enterprises (MNEs) tend to enter by establishing affiliates with local partners through minority ownership so as to constrain their potential loss to initial limited input, but retain real options to take further positive actions according to future favorable economic conditions in the host country (Bowman & Hurry, 1993; Kogut, 1991; Li & Li, 2010). Minority ownership of overseas affiliates is critical for MNEs to obtain growth option value because such an investment mode offers MNEs the toehold in the host country (Belderbos et al., 2019; Fisch, 2008b, 2011).

However, most previous studies have focused on “how MNEs should create growth options” in the face of host country uncertainties (Belderbos et al., 2019; Li & Li, 2010), but have not fully explored “whether MNEs actually exercised growth options and how” when economic conditions in a host country turn to be favorable (Nippa & Reuer, 2019). One nonneglectable phenomenon is that many MNEs operate more than one affiliate within a single host country, the multiple affiliates of an MNE in a host country should be seen as a portfolio of growth options and can be managed from the perspective of real options portfolio (Nachum & Song, 2011). However, the question of how MNEs manage their affiliates as a growth option portfolio according to economic condition in a host country still remains not well answered in the previous literature. Therefore, it is evident that there is a gap between theory and reality in terms of growth options exercising, exploring such an important question is undoubtedly conducive to making it clear how MNEs execute growth options to maximize profits according to economic environments within a host country.

Based on the view of real option portfolio, the focal paper explores how Japanese enterprises exercise growth options by adjusting ownership structures in their affiliates as a portfolio in China according to changes in market environments. From the perspective of real options, the decline of demand uncertainty in an industry means that corporate earnings are more stable, and industry growth opportunities are helpful to improve future earnings of enterprises, so that MNEs have motivations to exercise growth options by increasing ownership in their affiliates as the primary means in a host country (Brouters et al., 2008; Tong & Reuer, 2006), as well as investment augmenting.

Therefore, the focal paper takes the perspective of growth option portfolio to explore how Japanese enterprises implement ownership expansion in their affiliates located in China as a portfolio according to uncertainties and opportunities they are facing, because Japan is one of the most important and largest source countries of China's FDI, and China is one of the largest recipient countries all over the world. Empirical results show that Japanese enterprises tend to increase ownership in their affiliates as a portfolio when demand uncertainty or growth opportunity in an industry to which the affiliates belong is high; When competition in an industry is high, compared to establishing new affiliates, acquiring equity held by other partner(s) may be the relatively more effective and easier means for each partner to maximize own profit because of time and resource saving. Therefore, incentives of Japanese enterprises to increase ownership in their affiliates as a portfolio in China under condition of high growth opportunity in an industry are enhanced by competition in the every industry. Moreover, a Japanese enterprise's motivation to increase ownership in affiliates as a portfolio in China under conditions of high demand uncertainty

and growth opportunity in an industry are strengthened by capability to control and coordinate these affiliates, because adjusting ownership in an affiliate may need to change the equity in another one in favor of the target of the whole portfolio, inducing resistance from the one that will be reduced in terms of ownership or even be disinvested.

This paper contributes to real options research in several aspects. First, although the question that how growth options should be exercised after being established has been discussed quite frequently since the seminal work of Kogut (Kogut, 1991), the more critical and interesting question of how growth options are actually exercised remains not quite well answered. By exploring how Japanese enterprises adjust ownership structures in their affiliates located in China as a portfolio in light of demand uncertainty and industry growth opportunities they are confronted with, this paper provides evidence that how MNEs exercise growth options according to changes in a host market. Second, this paper further demonstrates that human resource management (HRM) practices in affiliates located in a host country play an important role in MNEs' growth options exercising according to changes in the host market (Belderbos et al., 2014), strengthening HRM practices of overseas affiliates in a host country, MNEs can make adjustment of ownership structures in these affiliates as a portfolio more smoothly. The most but not the last, this paper finds that the logic of Real Options Theory for options establishment stage (e.g., market entry) should not be indiscriminately simply and directly put use into the stage of options exercise (e.g., ownership adjustment or expansion). Previous literature almost always overestimate the negative aspect but underestimate the positive effect of uncertainty on MNEs' investing decisions. However, this paper demonstrates that, demand uncertainty, which is demonstrated to negatively affect taking majority ownership in overseas affiliates in previous studies on MNEs' foreign entry into China (Li & Li, 2010), is positively related to Japanese enterprises' ownership expansion in their affiliates as a portfolio in China. In this sense, this paper extends the application of Real Options Theory to how actually MNEs exercise their growth options embedded in their overseas affiliates as a portfolio within a host country, which is not well explored by any previous research based on Real Options Theory in the field of international business or management.

2 Theory and hypotheses

The concept of real options comes from the pioneering/seminal idea proposed by Myers (1996), that is, an enterprise's free investment opportunity in real assets can be viewed as a call option on real assets, just as financial options give option holders decision-making power over financial assets (Myers, 1977). In the case of financial options, an investor has the right to act to acquire a financial security as the underlying asset, but real options' underlying assets are "real" assets; the expiration date is the time that the investor can defer making the investment decision before the investment opportunity terminates (Myers, 1977; Trigeorgis, 1999), which gives the investor the right but not the obligation to take further actions on the real assets according to future information (Trigeorgis, 1996; Amram & Kulatilaka, 1999).

Real Options Theory (ROT) has produced important insights and empirical evidence on various topics, such as market entry timing, modes of entry, and organizational forms (e.g., joint ventures [JVs], acquisitions, etc.), foreign direct investment (FDI), MNE performance, cooperation versus competition trade-offs and so on (Trigeorgis & Reuer, 2017).

Table 1 offers five basic types of stand-alone real options in strategic management and international investments (Trigeorgis, 1996; Chi et al., 2019; Trigeorgis & Reuer, 2017): namely, (1) the option to defer or stage market entry when facing exogenous market demand uncertainty; (2) the option to grow; (3) the option to alter scale (e.g., expand or contract); (4) the option to switch inputs, outputs, suppliers; and (5) the option to abandon.

In fact, most firms possess a portfolio of same or different options from such five options. When it comes to international investments, it is necessary for MNEs to effectively manage, control, and coordinate their affiliates as a portfolio of options (Belderbos et al., 2014). This implies that

Table 1. Basic real options

Type of option	Investment choice/illustration
Defer or stage	Delay or stage market entry when facing demand uncertainty (A. K. Dixit & Pindyck, 1994; McDonald & Siegel, 1986). (e.g., a firm considering entry into an emerging product market or a host country)
Grow	Enter a new or foreign market (with option to partner) (Kulatilaka & Perotti, 1998). (e.g., a firm taking a partial equity stake in another company when entering a foreign market with the possibility of expanding at a later date)
Alter scale(expand)	Expand or contract plant or scale of outsourcing contract (Leiblein & Miller, 2003)
Switch	Switch inputs, outputs, suppliers or production across foreign subsidiaries (Huchzermeier & Cohen, 1996; Kogut & Kulatilaka, 1994). (e.g., an MNE is able to reallocate production across foreign subsidiaries in response to changes in exchange rates)
Abandon/exit	Exit market (or sell technology for salvage) if condition deteriorate (A. Dixit, 1989; Chi, 2000).

Source: adapted according to (Chi et al., 2019; Trigeorgis, 1996; Trigeorgis & Reuer, 2017).

practical decisions firms make on acquisition, maintenance, or exercise of such options can influence the value of other options, these interactions need to be accounted for when making such decisions (Anand et al., 2007; Trigeorgis, 1993; Vassolo et al., 2004). Proper management of the trade-off between commitment (e.g., making an irreversible or specific investment) and flexibility can determine firm competitive advantage, capitalizing on the opportunity set created by uncertainty and decision flexibility (Chi, 2000). This necessarily requires proper organizational systems, managerial attention, and efficient organizational use of limited resources (Barnett, 2008). In the case of shared options, such as growth options that are co-owned with competitors or cooperators, the claim that a firm owns on a future opportunity can be contestable and uncertain, and the risk of competitive erosion or even preemption can lead firms to commit early or in a larger scale, rather than to keep flexible by investing incrementally or waiting to see how a market evolves (Trigeorgis & Reuer, 2017).

2.1 Uncertainty and ownership expansion of Japanese enterprises in China

As implied in Real Options Theory, both deferral and growth options are embedded in uncertainty (Folta & O'Brien, 2004). However, when overemphasis is placed on deferral option granted by uncertainty to investment decision makers, it is easy to draw the conclusion that uncertainty negatively affects investment (Ogawa & Suzuki, 2000; von Kalckreuth, 2003; Y. Wang et al., 2014), and neglect the positive role plays by uncertainty in affecting the decision to invest aggressively.

In fact, uncertainty means risk arising from uncertain investment environment and contains opportunity that will emerge as time elapses after investment. Both deferral and growth options' value increases with uncertainty, but the value of growth options increases faster than that of deferral options with uncertainty (Folta & O'Brien, 2004). When making decisions to enter a host country, MNEs tend to maintain flexibility by establishing joint ventures with local partner(s) and taking minority ownership in the overseas affiliates under high uncertainty (Li & Li, 2010). The interaction between uncertainty in a host market and MNEs' incremental investment decisions determines whether MNEs can derive growth option value from their investment in the very host country (Belderbos et al., 2019). Holding a small equity stake in overseas affiliates and carrying out a small incremental investment strategy can enable MNEs to constrain loss to their initial limited investment when economic conditions in a host country are unfavorable, and to benefit from positive actions taken according to future favorable conditions in the host country (Cuyper &

Martin, 2010; Fisch, 2008b). Therefore, high uncertainty will prevent MNEs from implementing growth options (Fisch, 2008b) and further investing in their overseas affiliates (Fisch, 2011).

When uncertainty reduces in a host market, as the direct result of expanding ownership by acquiring other partners' equity stake in their affiliates, MNEs will account for larger income shares and encounter lower revenue volatility in the affiliates, in addition of risk dispersion (Belderbos et al., 2020). Therefore, when uncertainty in a host market declines, for the sake of making more benefits generated by the affiliates come under their own names, MNEs are motivated to more quickly respond to such a favorable change by adjusting ownership structures in their affiliates (Axarloglou & Kouvelis, 2007) as a portfolio. Many evidence shows that when ownership structures of joint ventures in China change, most of them are reflected in such a fact that part or all of the equities of Chinese partners are acquired by their MNE partner(s) (Cuypers & Martin, 2010). Moreover, with the extension of operation time in host markets, the performance of wholly owned subsidiaries of MNEs has been significantly improved compared to joint ventures formed with local partners (J. M. Wang & Shen, 2011), and as has been evidenced by the research on post-conversion performance of international joint ventures in China (S. Chang, 2019), which therefore naturally offers MNEs the motivation to exercise growth options by adjusting ownership structures in their affiliates located in a host country.

On the other hand, because the value of a growth option increases faster than that of a deferral option as uncertainty increases, MNEs often make entries in the face of high uncertainty in a host market through small investment or minority ownership in an overseas affiliate as a toehold (Kogut, 1991; Reuer & Tong, 2005; Tong et al., 2008). This offers MNEs an option that may enable MNEs to obtain a larger market share and higher profit potential due to gaining first mover advantage over later comers (Dykes & Kolev, 2018; Kulatilaka & Perotti, 1998; Wooster et al., 2016), leading uncertainty to have a positive impact on MNEs' decisions to enter the host market, which can be inferred from the arguments of the influences of the dual options to defer and to grow on firms' market entry (Folta & O'Brien, 2004). After the establishment of an affiliate, the deferral option value has been realized, but the host market uncertainty still has a positive effect on growth options value. In order to avoid more sharing growth option value with partners and to capture more of the future incremental earnings of affiliates created in the host market, MNEs are motivated to increase their ownership in the affiliates even when uncertainty is high. It is shown that options with a lower degree of exclusivity can be implemented much faster when uncertainty is higher (Folta & Miller, 2002). Based on the above arguments, this paper puts forward the following hypothesis.

H1: Japanese enterprises will positively conduct ownership expansion in their affiliates as a portfolio located in China when market uncertainty is high.

2.2 Industry growth opportunities and ownership expansion of Japanese enterprises in China

Minority ownership in affiliates provides MNEs toeholds and incremental investment options instead of one-time complete investment under the circumstance of lacking sufficient information about a host market (Cuypers & Martin, 2010; Song et al., 2014). With a deeper understanding of the local environment in a host country, MNEs can choose to acquire their partners' equity stake or sell their own equity according to operations of their affiliates/subsidiaries in the host country (Kumar, 2005). Minority ownership provides MNEs with hedging tools to refrain downside risks derived from environmental fluctuations and meanwhile, maintain upside potential. When industry growth opportunities in a host country are high, the probabilities for MNEs' affiliates in the host market to experience downside risk are lower, and the minority ownership in affiliates means that MNEs have to share the value of growth options and revenue created by these affiliates with partners to a greater extent. Under such circumstances, MNEs tend to pursue a higher NPV than to

remain flexible, i.e., they tend to exercise more quickly instead of keeping growth options so as to capture more benefits generated by the affiliates.

When economic conditions in a host country are favorable, affiliates belonging to an identical MNE are less likely to be closed (Benito, 1997; Li, 1995), and MNEs tend to hold higher equity when entering by pattern of joint ventures. Many evidences show that high industry growth potential mitigates the negative impact of uncertainty on MNEs' entry into China through wholly owned subsidiaries (Li & Li, 2010). Therefore, when industry growth opportunities in a host country are high, in order to capture a greater share in the incremental returns created by the affiliates, MNEs will be of a higher incentive to exercise growth options by acquiring other partners' equity stake in the affiliates. Of course, for portfolios composed of two or more affiliates belonging to an identical MNE, increasing ownership in some affiliate(s) and reducing equity in some other one(s) should be viewed as the necessary means of achieving the strategy made by their headquarter for the portfolio, not only for simply accomplishing some single affiliate's goal. Thus, the following hypothesis is proposed.

H2: Japanese enterprises will positively conduct ownership expansion in their affiliates as a portfolio located in China when industry growth opportunities are high.

2.3 Moderation of competition in an industry

The outstanding characteristic of a growth option is that the option holder does not have the exclusive right compared to a financial option. Industry competition makes growth options shared among competitors, and reactions from competitors may have a negative impact on the growth opportunities of enterprises (Kulatilaka & Perotti, 1998), and reduce the value of growth options that can be obtained by all enterprises in an identical industry. When an industry can only accommodate N enterprises, the entry by one more enterprise will reduce the profits of all enterprises in the same industry to zero. Therefore, competition in an industry weakens investors' willingness to share growth options with competitors, and firms tend to exercise growth options with less exclusivity earlier compared to options with higher specificity (Folta & Miller, 2002). According to relevant real option studies, competition in an industry reduces the positive impact of uncertainty on entry mode of MNEs in form of joint ventures in China (Li & Li, 2010), that is, MNEs are more inclined to invest in China by means of wholly owned subsidiaries. Besides, setting up another new or more affiliates in a host market can definitely not successfully capture first mover advantages over competitors due to fierce competition, not to mention the time and resource consumption that may weaken or impair competitive advantage of an enterprise.

Under circumstances with high uncertainty, growth opportunities and competition, turning to ownership expansion in incumbent joint venture affiliates, may make MNEs capture a larger proportion of benefits created by their affiliates and may probably not incur any intense reactions or aggressive attacks by other competitors in the same host market at all. Because, any adjustment within an affiliate does not necessarily affect other competitors' benefits derived from market directly, thus leaving them little motivation to resist such ownership adjustment behavior made by any partner of a joint venture affiliate, which, in turn, may happen to cater the intention of the initiator of growth options exercising. Thus, the following two hypotheses are proposed based on the above arguments.

H3: The positive influence of uncertainty on Japanese enterprises' ownership expansion in their affiliates as a portfolio located in China is stronger due to competition in an industry.

H4: The positive influence of industry growth opportunity on Japanese enterprises' ownership expansion in their affiliates as a portfolio located in China is stronger due to competition in the industry.

2.4 Moderation of capability to control and coordinate the affiliates in a host Country

The capability to control and coordinate the affiliates located in a host country is crucial for MNEs to exercise growth options (Axaroglou & Kouvelis, 2007; Belderbos et al., 2014; Tong & Reuer, 2007). Differences in objectives, values, practices, and cultural backgrounds may lead to conflicts between foreign and local partners on strategic goals and business tactics for an affiliate located in a host country, and prevent MNEs from effectively controlling and coordinating the affiliates, especially when affiliates in a host country need to operate as a portfolio. Under such circumstances, ownership expansion negotiations between MNEs and local partners will become much more complicated, and the time and cost needed to put them into the negotiations will be augmented to much higher levels. Even worse, the case of pervasive resistance from those in which the ownership will be adjusted or sold out cannot be effectively dissolved or mitigated due to poor capability to control and coordinate the affiliates as a portfolio will arise. Because, for an affiliate that will be reduced in terms of ownership or be withdrawn from a host country, it may mean operation failure from the standpoint of outsiders, and the members of such an affiliate would not be willing to bear such a bad reputation.

Therefore, MNEs need sound capability to control and coordinate activities between affiliates located in a host country and headquarters outside or inside the host country, as well as activities between the affiliates, so that the interests of the affiliates and their parents keep in line (Fang et al., 2010). From the perspective of growth options exercising, the capability to control and coordinate the affiliates as a portfolio in a host country improves MNEs' integral perception of uncertainty and growth opportunities in the host country as well as their advantages over local partners in terms of ownership negotiations, which is conducive to time and cost saving regarding ownership adjustment negotiations. Therefore, no matter in the context of reduced/increased uncertainty or increased industry growth opportunities in a host country, the capability to effectively control and coordinate affiliates can help MNEs to more smoothly exercise growth options by adjusting ownership structures of the affiliates as a portfolio. Thus, the following hypotheses are proposed.

H5: Japanese enterprises' capability to control and coordinate their affiliates enhances the positive influence of uncertainty on their ownership expansion in these affiliates as a portfolio in China.

H6: Japanese enterprises' capability to control and coordinate their affiliates enhances the positive influence of industry growth opportunities on their ownership expansion in these affiliates as a portfolio in China.

3 Methodology

3.2 Data

Real option studies on overseas investment in MNEs often use data from manufacturing enterprises for empirical analysis (Fisch, 2008; Fisch, 2011; S. J. Chang & Singh, 2000; Tong & Reuer, 2006). This paper obtains information of Japanese manufacturing enterprises and their affiliates in China from Toyo Keizai, such as the establishment date, regions, and industries in which the affiliates operate, ownership held by Japanese partner(s) in the affiliates and proportion of Japanese expatriates in the number of employees in each affiliate, etc. Many existing studies on overseas investment of Japanese enterprises based on Real Options Theory and other theoretical perspectives have used the data from Toyo Keizai to conduct empirical test (Belderbos et al., 2011, 2014, 2019, 2020; Chen, 2008; Chung & Beamish, 2010; Gaur & Lu, 2007; Iriyama & Madhavan, 2014; Stallkamp et al., 2018). The initial sample in this paper consists of 823 Japanese enterprises and their 2,439 affiliates in China, with a total of 15,111 observations spanning the period 1989 to 2006. Those Japanese enterprises with only a single affiliate in China and only a single year information are excluded from the sample, and the two or more affiliates run by an identical

Japanese enterprise in China are considered as an affiliate portfolio. As a result, the final sample involves a total of 5,645 observations of 764 Japanese enterprises' affiliate portfolios in China.

In this paper, information on industries provided by Chinese Statistical Yearbook and industry information for Japanese enterprises and their affiliates in China provided by Toyo Keizai are matched, and the industry classification of Japanese enterprises' affiliates in China is carried out at two digit level subsectors of manufacturing industry.

3.3 Variables

3.3.1 Dependent variable

Ownership. Many Japanese enterprises have multiple affiliates in China, and ownership distribution between partners in these affiliates varies over time. Relevant studies show that MNEs control and coordinate multiple affiliates located in different locations from the perspective of option portfolio (Belderbos et al., 2014). Therefore, this paper takes affiliates by one Japanese MNE as a real option portfolio, and calculates the average equity stake held by a Japanese enterprise in all its affiliates in China, which represents the ownership taken by the focal enterprise in its affiliates as a real option portfolio in China.

3.3.2 Independent variables

Uncertainty. Real option studies on overseas investment by MNEs often focus on demand uncertainty, because demand uncertainty leads to price fluctuations, which in turn leads to volatility in corporate profitability (Brouthers et al., 2008; Li & Li, 2010). In this paper, demand in an industry in current year is regressed on the industry's demand of previous five years and a time trend at two digit level subsectors of manufacturing industry, and uncertainty is measured as the standard error of the predicted value of demand at every two-digit level subsector. Many calculation measures of uncertainty take this approach or a variation of it as the means of depicting uncertainty in markets that investors enter (Folta & O'Brien, 2004; Li & Li, 2010).

Growth Opportunity. Following previous research method (Li & Li, 2010), this paper measures industry growth opportunities by revenue growth rates at two-digit level manufacturing subsectors in China.

3.3.3 Moderators

Competition. The degree of industry competition is usually measured by building a "Herfindahl-Hirschman Index (HHI)" based on market shares (i.e., the proportion of sales of an enterprise in total sales of the industry) of all enterprises or top 5 or 10 enterprises in an industry in terms of sales. Since it is difficult to obtain data at enterprise level in earlier periods in China, this paper constructs the average market share of enterprises at two-digit level manufacturing subsectors as the proxy for industry competition, which has been used as a sound approach in the previous research on Japanese enterprises' divestments from China based on Real Options Theory (Liu et al., 2015).

Control Coordinate Capability. From the view of real options exercising, adjusting ownership structures in a portfolio composed of multiple affiliates is more difficult than in a single one located in a host country. Japanese enterprises often assign personnel to senior management positions in their affiliates overseas to strengthen their capability to control and coordinate these affiliates as portfolios, with the final aim to keep in line between headquarters' global strategic goal and affiliates' tactic goals (Belderbos & Sleuwaegen, 2005; Belderbos et al., 2014; Tao et al., 2009). This paper makes use of the average proportion of expatriates of a Japanese enterprise in total employees in its affiliates in China to measure its capability to control and coordinate the affiliates as a portfolio.

3.3.4 Control Variables

Exchange Rate. Exchange rate influences the relative cost of production and operation of MNEs in their home and host countries (Qiu, 2007; Takagi & Shi, 2011), and affects MNEs' adjustment of ownership strategy in overseas affiliates (Axaroglou & Kouvelis, 2007). Therefore, this paper controls the exchange rate between Japan and China. In order to illustrate the impact of China's overall economic development on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China, this paper controls China's **GDP Growth** rate.

This paper controls the **Parent Size** of the affiliates as a portfolio of a Japanese enterprise in China, measured through total assets of the enterprise. This paper controls **Slack Resources** of Japanese enterprises to measure the impact of human, material, and financial resources on their ownership expansion in their affiliates as a portfolio in China. **Tobin's q** of Japanese enterprises is controlled to reflect the impact of firm growth potential (Morck & Yeung, 1992) on their ownership expansion in their affiliates as a portfolio in China.

Each Japanese enterprise's **Average Sale** in all affiliates within a portfolio in China is controlled to reflect the influence of affiliate portfolio profitability on its ownership expansion. The number of affiliates in a portfolio that each Japanese enterprise owns in China is controlled to reflect the influence of **Network Scale** of the affiliate portfolio on its ownership expansion. The regional scope spanned by a Japanese enterprise's affiliates as a portfolio in China may increase the control and coordination costs of their headquarters, no matter the headquarters are located in home or host countries. Therefore, this paper controls the regional scope spanned by the affiliates as a portfolio of a Japanese enterprise in China, which reflects the **Portfolio Breadth** of a Japanese enterprise in China, measured as the number of provinces covered by the affiliates as a portfolio. In order to reflect whether there is "**Herd Behavior**" in ownership expansion of Japanese enterprises in China, this paper controls the number of Japanese enterprises other than the focal Japanese enterprise that implement ownership expansion in their affiliate portfolios in China. No matter who implements ownership expansion in an affiliate, the partner who indeed does so has to bear an additional proportion of the irreversible investment to be made in the affiliate, in addition to the irreversible investment made already, which definitely increases the difficulty to disinvest in the future for the growth option exercising partner of the affiliate. Therefore, **Investment Irreversibility** is measured as the proportion of fixed assets in total assets at two-digit level manufacturing industries (Li & Li, 2010). **International Experience** is helpful for MNEs to effectively evaluate market information in a host country and make more accurate forecast for the future of affiliate(s) in the host country (Fisch, 2008b). Therefore, this paper controls the international experience of Japanese enterprises, as is measured by the number of all their overseas host countries.

To offer quick reference to the meanings of the variables, the variables with meanings are listed in Table 2.

3.3 Econometric model

There are great differences in the time and number of established affiliates of different Japanese enterprises in China. The ownership structures of all affiliates of some Japanese enterprises in China have been changing dynamically over time, while the ownership distributions of all affiliates of some other Japanese enterprises in China have not changed at all. In international joint venture literature, it is generally believed that when a partner holds less than 5% or 10% of the ownership in a joint venture, the partner will be viewed as having withdrawn from the joint venture and no longer a partner of the joint venture. Moreover, in the early period of the course of Reform and Opening up in China, Chinese government set floor/lower and ceiling/upper limits on foreign ownership in joint ventures established with local partners in China. However, the equity constraints for MNEs' entry into the Chinese market have been gradually relaxed or abolished as China is committed to establishing a socialist market economy, especially after China being a member of WTO in 2001. Therefore, the environment in China confers MNEs, including but not limited to Japanese MNEs, the opportunity to

Table 2. Variables and meanings

Variables	Explanation for variables
dependent	
<i>Ownership</i>	average equity stake held by a Japanese enterprise in all its affiliates in China
independents	
<i>Uncertainty</i>	measured as the standard error of the predicted demand at every two digit level manufacturing subsectors
<i>GrowthOpportunity</i>	revenue growth rate at two digit level manufacturing subsectors in China
Moderators	
<i>Competition</i>	degree of industry competition according to Herfindahl-Hirschman Index
<i>ControlCoordinateCapability</i>	average proportion of expatriates of a Japanese enterprise in total employees in its affiliates as a portfolio in China
Controls	
<i>ExchangeRate</i>	exchange rate between China and Japan
<i>GDPGrowth</i>	China's GDP growth rate
<i>ParentSize</i>	size of Japanese enterprises measured by total assets
<i>SlackResources</i>	residual resources of Japanese enterprises
<i>Tobin'q</i>	reflect the impact of firm growth potential
<i>AverageSale</i>	each Japanese enterprise's average sale in all affiliates within a portfolio in China
<i>NetworkScale</i>	the number of affiliates each Japanese enterprise owns in China
<i>PortfolioBreadth</i>	regions spanned by a Japanese enterprise's affiliates as a portfolio in China
<i>HerdBehavior</i>	the number of Japanese enterprises other than the focal Japanese enterprise that implement ownership expansion in their affiliate portfolios in China
<i>InvestmentIrreversibility</i>	measured by the proportion of fixed assets in total assets at two digit level manufacturing subsectors
<i>InternationalExperience</i>	measured by the number of host countries in which a Japanese operates affiliates

exercise growth options by ownership expansion in their affiliates as a portfolio. In order to investigate ownership adjustments of Japanese enterprises in their affiliates as a portfolio in China, the influence of corner solutions has to be considered (Li & Li, 2010). Tobit model is suitable for empirical analysis when the outcome variable is censored (Wooldridge, 2010), which definitely caters the empirical environment in this paper. The econometric model is presented as follows.

$$\begin{aligned}
 \text{Ownership} = & a_0 + a_1 \text{Uncertainty} + a_2 \text{Growth Opportunity} \\
 & + a_3 \text{Uncertainty} \times \text{Competition} \\
 & + a_4 \text{Growth Opportunity} \times \text{Competition} \\
 & + a_5 \text{Uncertainty} \times \text{Control Coordinate Capability} \\
 & + a_6 \text{Growth Opportunity} \times \text{Control Coordinate Capability} \\
 & + a_7 \text{Competition} + a_8 \text{Control Coordinate Capability} + \lambda X + \varepsilon
 \end{aligned}$$

In the econometric model, *Uncertainty* × *Competition* represents the interaction between uncertainty and industry competition, *GrowthOpportunity* × *Competition* represents the interaction between industry growth opportunity and industry competition, and *Uncertainty* × *ControlCoordinateCapability* represents the interaction between uncertainty and Japanese enterprises' capability to control and coordinate their

affiliates within an identical portfolio in China. $GrowthOpportunity \times ControlCoordinateCapability$ represents the interaction between industry growth opportunity and Japanese enterprises' capability to control and coordinate their affiliates as a portfolio in China. X represents a vector for control variables, and ε is the random disturbance.

4 Results

4.1 Descriptive statistics and correlations

Table 3 presents the mean value, standard deviation of each variable and correlations between variables involved in empirical analyses of this paper. Table 3 shows that each variable has an obvious change relative to its mean. As can be seen from Table 3, the two independent variables, *Uncertainty* and *GrowthOpportunity*, both are positively correlated with the dependent variable *Ownership*; Besides, the two moderators, *Competition* and *ontrolCoordinateCapability* are all positively related to *Ownership*. Therefore, the results in Table 3 offer us preliminary evidence on the relationship between industry environment and Japanese enterprises' behaviors carried out in their affiliates as a portfolio in China.

Problems will arise in regression when the predictors are highly correlated. In this situation, there may be a significant change in the regression coefficients if an independent variable is added or deleted. The estimated standard errors of the fitted coefficients are inflated, or the estimated coefficients may not be statistically significant even though a statistical relation exists between the dependent and independent variables. There is evidence of multicollinearity if the largest VIF is greater than 10 (some choose a more conservative threshold value of 30) and the mean of all the VIFs is considerably larger than 1 (Puntanen, 2013)

Multicollinearity test in this paper shows that the VIF value of each variable is much less than 10, which is far lower than the-thumb-rule for the symptom of multicollinearity between variables involved in an empirical analysis, indicating that the multicollinearity between variables is not a concern in this paper.

Besides, it is shown that the correlations between most variables in Table 3 are less than 0.1, only a few correlations are a little bit large, which means the variables in this paper are less likely to cause multicollinearity. Additionally, in the following regression results presented in Table 4, almost no variable changes fiercely in magnitude and significance due to multicollinearity, except the changes according to Real Options Theory's prediction, which again demonstrates no clear evidence that there is any strong multicollinearity in the analysis in this paper.

4.2 Estimation results

This paper takes the recursive way to implement the empirical analysis, and the estimation results are reported in Table 4.

Model 1 in Table 4 reports regression results containing only control variables. Model 2 adds independent variables *Uncertainty* and *Growth Opportunity* on the basis of Model 1. The results of Model 2 show that *Uncertainty* is significantly positive ($p < 0.001$), which strongly supports Hypothesis 1, indicating that when other conditions remain unchanged, the higher the uncertainty, the more inclined Japanese enterprises are to increase the average ownership held in their affiliates as a portfolio in China. The coefficient of *Growth Opportunity* is significantly positive ($p < 0.001$), which strongly supports Hypothesis 2, indicating that, holding other conditions constant, the greater the growth opportunity in an industry, the more prone Japanese enterprises are to increase the average ownership held in their affiliates as a portfolio in China. Based on Hypothesis 1 and Hypothesis 2, this paper will further investigate the moderating effects of industry competition and Japanese enterprises' capability to control and coordinate their affiliates as a portfolio in China, so, Model 2 acts as the benchmark model in this paper.

Table 3. Descriptive statistics and correlations for variables

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ownership	0.667	0.253	1														
ExchangeRate	7.220	0.562	-0.023	1													
GDPGrowth	0.133	0.033	-0.098	0.047	1												
ParentSize	0.005	0.014	-0.073	0.004	0.015	1											
SlackResources	0.372	0.193	0.085	-0.015	0.012	0.021	1										
Tobin'q	1.212	0.598	0.114	0.089	0.095	0.023	0.111	1									
AverageSale	0.0001	0.0008	0.000	-0.018	0.004	0.028	0.015	0.023	1								
NetworkScale	0.560	0.693	-0.081	-0.026	-0.031	0.391	-0.014	0.010	0.072	1							
PortfolioBreadth	0.392	0.534	-0.097	-0.017	-0.017	0.358	-0.024	0.015	0.068	0.902	1						
HerdBehavior	19.116	5.672	0.108	-0.449	-0.613	-0.019	-0.017	-0.097	0.009	0.040	0.028	1					
InvestmentIrreversibility	0.639	0.264	-0.254	0.090	0.701	0.011	0.047	0.045	-0.041	-0.095	-0.070	-0.519	1				
InternationalExperience	4.417	3.550	-0.121	0.008	0.041	0.526	-0.069	0.049	0.063	0.522	0.529	-0.041	0.088	1			
Competition	0.002	0.012	0.019	-0.028	-0.168	-0.010	-0.016	-0.026	-0.002	0.013	0.014	0.253	-0.010	0.018	1		
ControlCoordinate Capability	0.048	0.103	0.183	0.003	-0.015	-0.046	0.025	0.025	-0.032	-0.066	-0.071	0.02	-0.032	-0.084	0.016	1	
Uncertainty	0.749	0.166	0.176	-0.026	0.042	-0.006	0.072	0.089	0.011	0.040	0.033	0.010	-0.227	-0.072	0.0004	0.071	1
GrowthOpportunity	0.213	0.125	0.216	0.332	-0.338	0.005	-0.058	0.005	0.026	0.084	0.075	0.138	-0.545	-0.037	0.097	0.049	0.131

Table 4. Regression results for Japanese enterprises' ownership expansion in affiliate portfolios in China

DV: Ownership	Model 1	model 2	model 3	model 4	model 5	model 6	model 7
ExchangeRate	0.001	-.012**	-.013***	-.012**	-.013***	-.013***	-.013***
GDPGrowth	.756***	.400***	.388***	.412***	.409***	.402***	.391***
ParentSize	-0.795	-0.688	-0.700	-0.645	-0.694	-0.654	-0.629
SlackResources	.051*	.061*	.061*	.062*	.061*	.062*	.062*
Tobin'q	.015**	.016***	.016**	.015**	.016***	.016***	.016**
AverageSale	-1.108	-1.190	-1.271	-1.212	-1.192	-1.252	-1.367
NetworkScale	.033***	.025**	.025**	.0241**	.025**	.025**	.023*
PortfolioBreadth	0.008	0.007	0.008	0.008	0.007	0.007	0.008
HerdBehavior	0.001	0.001	0.001	0.001	0.001	0.001	0.001
InvestmentIrreversibility	-.212***	-.120***	-.123***	-.123***	-.119***	-.120***	-.128***
InternationalExperience	-0.001	0.0004	0.001	0.0003	0.0004	0.0005	0.0005
Competition	.473**	.424**	.496**	.440**	.838***	.419**	0.234
ControlCoordinateCapability	.222***	.224***	.225***	.255***	.225***	.246***	.275***
Uncertainty		.123***	.152***	.130***	.124***	.124***	.167***
GrowthOpportunity		.154***	.145***	.152***	.151***	.164***	.152***
Uncertainty×Competition			13.800***				18.323**
Uncertainty×ControlCoordinateCapability				.871***			.822***
GrowthOpportunity×Competition					-3.851*		2.751
GrowthOpportunity×ControlCoordinateCapability						.740***	.651**
Cons	.599***	.566***	.555***	.561***	.566***	.564***	.545***
F test	880.9***	1006.8***	1023.0***	1018.6***	1012.1***	1016.5**	1043.9***
LR test			13.36***	15.27***	4.42*	11.15***	38.80***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Based on Model 2, the interaction term **Uncertainty × Competition** is added in Model 3, Model 4 adds the interaction term **Uncertainty × Control Coordinate Capability**. In order to mitigate the possible concern of multicollinearity induced by the introduction of an interaction term to the estimation model, variables in the interaction items are all centralized. The results of Model 3 show that the coefficient of **Uncertainty × Competition** is significantly positive ($p < 0.001$), which strongly supports Hypothesis 3, indicating that, ceteris paribus, the higher the degree of industry competition, the stronger the positive impact of uncertainty on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China. Likelihood ratio test shows that Model 3 is significantly improved over Model 2 ($p < 0.001$). The results of Model 4 show that the coefficient of **Uncertainty × Control Coordinate Capability** is significantly positive ($p < 0.001$), which strongly supports Hypothesis 5. It indicates that keeping other conditions constant, the stronger the capability of Japanese enterprises to control and coordinate their affiliates as a portfolio in China, the stronger the positive influence of uncertainty on their ownership expansion in these affiliates as a portfolio in China. Likelihood ratio test shows that Model 4 is significantly improved over Model 2 ($p < 0.001$).

On the basis of Model 2, the interaction term **Growth Opportunity × Competition** is added to Model 5, and the interaction term **Growth Opportunity × Control Coordinate Capability** is added to Model 6. Again, variables in the interaction items are all centralized to mitigate the concern about multicollinearity. The coefficient of **Growth Opportunity × Competition** in model 5 is significantly negative ($p < 0.05$), indicating that when other conditions remain unchanged, the higher the degree of industry competition, the weaker the positive influence of industry growth opportunity on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China. Although the likelihood ratio test shows that Model 5 is significantly improved over Model 2 ($p < 0.05$), the results of Model 5 lends little support to Hypothesis 4. The results of Model 6 show that the coefficient of **Growth Opportunity × Control Coordinate Capability** is significantly positive ($p < 0.001$), which strongly supports Hypothesis 6, indicating that ceteris paribus, Japanese enterprises' stronger capability to control and coordinate strengthens the positive influence of industry growth opportunity on their ownership expansion in the affiliates as a portfolio in China. Likelihood ratio test shows that Model 6 is significantly improved over Model 2 ($p < 0.001$).

Model 7 is the full model that involves independent variables, moderators, interactions between independent variables and moderators, and all control variables. The results in model 7 show that **Uncertainty** is significantly positive ($p < 0.001$), which supports hypothesis 1. It indicates that after affiliates being set up in China, even if uncertainty is high, Japanese enterprises tend to capture net present value (NPV) created by the affiliates more and quickly by increasing their ownership in these affiliates as a portfolio in China, instead of continuing holding growth options portfolio. **Growth Opportunity** is significantly positive ($p < 0.001$), indicating that higher industry growth opportunity will encourage Japanese enterprises to increase their ownership in their affiliates as a portfolio in China, thus supporting Hypothesis 2. Therefore, this offers the evidence of a Real Option perspective, namely, exercising growth option by acquiring ownership from other partner(s) turns out to be the better alternative under such a circumstance. This supports such a viewpoint, that is, the higher the growth opportunity in an industry in a host country, the greater the incremental revenue created by affiliates of MNEs in the industry, and therefore the less attractive it is for MNEs to remain flexible (namely, holding growth options) in these affiliates as a portfolio in the host country. After exercising growth options by acquiring other partners' ownership, the acquiring party can occupy a greater proportion of the net present value (NPV) created in these affiliates as a portfolio in the host country.

In Model 7, the interaction term **Uncertainty × Competition** is significantly positive ($p < 0.001$), which strongly supports Hypothesis 3, indicating that industry competition strengthens the positive influence of uncertainty on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China as the means of exercising growth option. Meanwhile, the interaction term **Uncertainty × Control Coordinate Capability** is also significantly positive ($p < 0.001$), which strongly supports Hypothesis 5, indicating that the stronger Japanese enterprises' capability to control and

coordinate their affiliates as a portfolio in China, the more conducive it is to exercising growth options under uncertainty, that is, to implementing ownership expansion in their affiliates as a portfolio in China. The coefficient of **Growth Opportunity × Competition** is positive, but not significant. Therefore, Hypothesis 4 is not supported. The results of Model 7 show that the coefficient of **Growth Opportunity × Control Coordinate Capability** is significantly positive ($p < 0.001$). Therefore, Hypothesis 6 is strongly supported, indicating that Japanese enterprises' capability to control and coordinate their affiliates enhances the positive influence of industry growth opportunity on their ownership expansion in these affiliates as a portfolio in China. Likelihood ratio test shows that Model 7 is significantly improved over Model 2 ($p < 0.001$).

Control variables in this paper also offer some interesting results. From Model 2 to Model 7, **Exchange Rate** is significantly negative ($p < 0.01$), indicating that exchange rate between China and Japan has a significant negative impact on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China. As expected, **GDP Growth** has a significant positive impact on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China ($p < 0.001$), meaning that high GDP growth in China offers Japanese enterprises better growth opportunity and developing environment.

The coefficient of **Parent Size** is not significant and shows a negative sign. The possible reason is that the larger an MNE, the greater the inertia, and the more difficult is to make adjustment decisions timely and properly. This can be seen in Table 3 from the correlations between Japanese enterprises' size and the properties of their affiliates as a portfolio on scale and scope in China. Namely, the larger the size of a Japanese enterprise, the larger the number of its affiliates as a portfolio in China, which is embodied in the portfolio's scale and scope. **Slack Resources** is significantly positive from Model 2 to Model 7 ($p < 0.05$), indicating that more residual resources are helpful for Japanese enterprises to provide resource support for ownership expansion in their affiliates in China. As expected, **Tobin's q** has a significantly positive impact on ownership expansion of Japanese enterprises in their affiliates as a portfolio in China ($p < 0.01$).

From Model 2 to Model 7, the coefficient of **Average Sale** is negative but not significant. The possible reason is that, the better the sales status of the affiliates as a portfolio, the more conducive it is for Japanese enterprises to obtaining stable profit from the portfolio, and ownership expansion in the affiliates means having to undertake additional time and negotiation costs, thus reducing Japanese enterprises' incentives to expand ownership in their existing affiliates in China. From Model 2 to Model 7, **Network Scale** is significantly positive ($p < 0.05$), indicating that the larger the number of affiliates as a portfolio, the easier it is for Japanese enterprises to choose one or more affiliates to adjust ownership. **Portfolio Breadth** is not significant from Model 2 to Model 7, indicating that affiliates' geographical range in China is not a significant reason for Japanese enterprises' ownership expansion in these affiliates as a portfolio. The possible reason may be that the development of information technology has improved the communication efficiency of enterprises and lowered the necessity to control and coordinate their affiliates in China through majority ownership. Another possible reason may be that, with the constraints set by Chinese government for MNEs in terms of ownership when entering China market having been relaxed, many Japanese enterprises take wholly owned subsidiaries as the entry mode, thus reducing their propensity to adjust ownership in the affiliates that all have been operating in China. **Herd Behavior** has an expected positive sign, but not significant, indicating that Japanese enterprises' ownership expansion in China may have "herd behavior" but at the same time tend to take a cautious approach. **Investment Irreversibility** is significantly negative ($p < 0.001$), indicating that increasing ownership in affiliates requires to undertake a larger proportion of irreversible investment that has been made and to be made, thus reducing Japanese enterprises' incentives to make ownership expansion in these affiliates as a portfolio. From Model 2 to Model 7, **International Experience** has the expected positive sign, although not significant, which means international experience may be helpful for offering beneficial reference value, but not necessarily a dominating factor.

5 Discussion and conclusion

As a tool for explaining the mechanisms of MNEs' investing overseas, studies based on Real Options Theory have been mainly devoted to the stages of option establishing (Belderbos et al., 2020; Li & Li, 2010), switch (Belderbos et al., 2014), or abandonment (Belderbos & Zou, 2009; Liu et al., 2015). However, the stage of option exercising has been in short of exploring and lack of empirical evidences, and researches based on the view of real options portfolio are particularly lacking (Chung et al., 2010; Fisch & Zschoche, 2012; Song, 2017). This paper focuses on how growth options are exercised according to changes in a host country based on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China. Empirical results show that uncertainty and industry growth opportunity promote ownership expansion of Japanese enterprises in their affiliates as a portfolio in China; Moreover, industry competition and Japanese enterprises' capability to control and coordinate their affiliates as a portfolio in China strengthen the positive effects of uncertainty and industry growth opportunity on their ownership expansion.

This paper is of great significance for real option research on multinational enterprises. First, few prior real option studies on MNEs go beyond the stage of option establishing to explore the question of how MNEs exercise real options based on the fact that multiple affiliates belonging to an identical MNE are located in an identical host country from the perspective of option portfolio. This paper extends real option studies from option establishing stage to option exercising stage by demonstrating how Japanese enterprises expand ownership in their affiliates as a portfolio according to changes of economic conditions in China, thus enriching documents of growth option exercising that has been lack of being emphasized until now. Second, the results of this paper are helpful to understand the effective human resource management practices for controlling and coordinating multiple affiliates as a portfolio. Capability to control and coordinate affiliates located in a host country is a prerequisite or an important condition for exercising growth options as a portfolio, as well as for implementing switch options between different countries (Belderbos et al., 2014). Therefore, this paper is of managerial significance for MNEs to obtain more economic benefits by responding to market uncertainty and industry growth opportunities in a host country through optimizing ownership structures in their affiliates as a portfolio. Third, it is shown in this paper that the logic for real options' establishing is not fully consistent with that for real options' exercising, meaning that the former should not be simply and directly applied to the latter indiscriminately. Specifically, the empirical evidence that demand uncertainty plays a positive role in the stage of growth options exercising means that simply and directly transplanting the mechanism applicable in the former decision stage indiscriminately to later decision making may lead to missing profit opportunities under high demand uncertainty within a host country.

This paper is not without limitations, however. First, Japanese enterprises operate a multitude of affiliates all over the world, and this paper pays attention to how Japanese enterprises exercise growth options based on the view of real option portfolio, empirical results derived from analyzing Japanese enterprises' adjustment of ownership structures in their affiliates as a portfolio in China will inevitably affect the generality of the research conclusions. Second, this paper focuses on the impact of demand uncertainty on Japanese enterprises' ownership expansion in their affiliates as a portfolio in China, but fails to control more uncertainties from other sources, such as those caused by conflicts on strategic objectives of the affiliates between partners, which may augment hindrance for growth options exercising through ownership adjustment. Third, this paper does not explain the influences of culture, values and Sino-Japanese historical relations on Japanese enterprises' adjustments of ownership structures in affiliates as a portfolio in China because of the complex historical relations between the two countries, especially the very distant psychological distance of Chinese people from Japan due to invasion of Japan into China during 1930–1940s. Future research can use a variety of information sources and field investigations to more scientifically investigate the influences of culture, values, Sino-Japanese historical relations and Chinese people psychological distance from Japan on Japanese enterprises' investing in China.

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Correction

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References

- Amram, M., & Kulatilaka, N. (1999). *Real Options: Managing strategic investment in an Uncertain World*. Harvard Business School Press Boston.
- Anand, J., Oriani, R., & Vassolo, R. S. (2007). Managing a Portfolio of Real Options. *Advances in Strategic Management*, 24, 275–303.
- Axaroglou, K., & Kouvelis, P. (2007). Hysteresis in adjusting the ownership structure of foreign subsidiaries. *International Business Review*, 16(4), 494–506. <https://doi.org/10.1016/j.ibusrev.2007.01.007>
- Barnett, M. L. (2008). An attention-based view of real options reasoning. *Academy of Management Review*, 33(3), 606–628. <https://doi.org/10.5465/amr.2008.32465698>
- Belderbos, R., Olfen, W. V., & Zou, J. (2011). Generic and specific social learning mechanisms in foreign entry location choice. *Strategic Management Journal*, 32(12), 1309–1330. <https://doi.org/10.1002/smj.938>
- Belderbos, R., & Sleuwaegen, L. (2005). Competitive drivers and international plant configuration strategies: A product-level test. *Strategic Management Journal*, 26(6), 577–593. <https://doi.org/10.1002/smj.466>
- Belderbos, R., Tong, T. W., & Wu, S. (2014). Multinationality and downside risk: The roles of option portfolio and organization. *Strategic Management Journal*, 35(1), 88–106. <https://doi.org/10.1002/smj.2087>
- Belderbos, R., Tong, T. W., & Wu, S. (2019). Multinational investment and the value of growth options: Alignment of incremental strategy to environmental uncertainty. *Strategic Management Journal*, 40(1), 127–152. <https://doi.org/10.1002/smj.2969>
- Belderbos, R., Tong, T. W., & Wu, S. (2020). Portfolio configuration and foreign entry decisions: A juxtaposition of real options and risk diversification theories. *Strategic Management Journal*, 41(7), 1191–1209. <https://doi.org/10.1002/smj.3151>
- Belderbos, R., & Zou, J. (2009). Real options and foreign affiliate divestments: A portfolio perspective. *Journal of International Business Studies*, 40(4), 600–620. <https://doi.org/10.1057/jibs.2008.108>
- Benito, G. R. (1997). Divestment of foreign production operations. *Applied Economics*, 29(10), 1365–1378. <https://doi.org/10.1080/00036849700000027>
- Bowman, E. H., & Hurry, D. (1993). Strategy through the option lens: An integrated view of resource investments and the incremental-choice process. *Academy of Management Review*, 18(4), 760–782. <https://doi.org/10.2307/258597>
- Brothers, K. D., Brothers, L. E., & Werner, S. (2008). Real options, international entry mode choice and performance. *Journal of Management Studies*, 45(5), 936–960. <https://doi.org/10.1111/j.1467-6486.2007.00753.x>
- Chang, S. (2019). When to go it alone. *Journal of International Business Studies*, 50(6), 998–1020. <https://doi.org/10.1057/s41267-018-00211-7>
- Chang, S. J., & Singh, H. (2000). Corporate and industry effects on business unit competitive position. *Strategic Management Journal*, 21(7), 739–752. <https://www.jstor.org/stable/3094406>
- Chen, S. S. (2008). The motives for international acquisitions: Capability procurements, strategic considerations, and the role of ownership structures. *Journal of International Business Studies*, 39(3), 454–471. <https://doi.org/10.1057/palgrave.jibs.8400357>
- Chi, T. (2000). Option to acquire or divest a joint venture. *Strategic Management Journal*, 21(6), 665–687. <https://www.jstor.org/stable/3094305>
- Chi, T., Li, J., Trigeorgis, L. G., & Tsekrekos, A. E. (2019). Real options theory in international business. *Journal of International Business Studies*, 50(4), 525–553. <https://doi.org/10.1057/s41267-019-00222-y>
- Chung, C. C., & Beamish, P. W. (2010). The trap of continual ownership change in international equity joint ventures. *Organization Science*, 21(5), 995–1015. <https://doi.org/10.1287/orsc.1090.0489>
- Chung, C. C., Lee, S., Beamish, P. W., & Isobe, T. (2010). Subsidiary expansion/contraction during times of economic crisis. *Journal of International Business Studies*, 41(3), 500–516. <https://doi.org/10.1057/jibs.2009.72>
- Cuyper, I. R., & Martin, X. (2010). What makes and what does not make a real option? A study of equity shares in international joint ventures. *Journal of International Business Studies*, 41(1), 47–69. <https://doi.org/10.1057/jibs.2009.17>
- Dixit, A. (1989). Entry and exit decisions under uncertainty. *Journal of Political Economy*, 97(3), 620–638. <https://doi.org/10.1086/261619>
- Dixit, A. K., & Pindyck, R. (1994). *Investment under Uncertainty*. Princeton university press.
- Dykes, B. J., & Kolev, K. D. (2018). Entry timing in foreign markets: A meta-analytic review and critique. *Journal of International Management*, 24(4), 404–416. <https://doi.org/10.1016/j.intman.2018.05.001>
- Fang, Y., Jiang, G. L. F., Makino, S., & Beamish, P. W. (2010). Multinational firm knowledge, use of expatriates, and foreign subsidiary performance. *Journal of Management Studies*, 47(1), 27–54. <https://doi.org/10.1111/j.1467-6486.2009.00850.x>
- Fisch, J. H. (2008b). Investment in new foreign subsidiaries under receding perception of uncertainty. *Journal of International Business Studies*, 39(3), 370–386.
- Fisch, J. H. (2011). Real call options to enlarge foreign subsidiaries—the moderating effect of irreversibility on the influence of economic volatility and political instability on subsequent Fdi. *Journal of World*

- Business*, 46(4), 517–526. <https://doi.org/10.1016/j.jwb.2010.10.012>
- Fisch, J. H., & Zschoche, M. (2012). The role of operational flexibility in the expansion of international production networks. *Strategic Management Journal*, 33(13), 1540–1556. <https://doi.org/10.1002/smj.1999>
- Folta, T. B., & Miller, K. D. (2002). Real Options in Equity Partnerships. *Strategic Management Journal*, 23(1), 77–88. <https://doi.org/10.1002/smj.209>
- Folta, T. B., & O'Brien, J. P. (2004). Entry in the presence of dueling options. *Strategic Management Journal*, 25(2), 121–138. <https://doi.org/10.1002/smj.368>
- Gaur, A. S., & Lu, J. W. (2007). Ownership strategies and survival of foreign subsidiaries: Impacts of institutional distance and experience. *Journal of Management*, 33(1), 84–110. <https://doi.org/10.1177/0149206306295203>
- Huchzermeier, A., & Cohen, M. A. (1996). Valuing operational flexibility under exchange rate risk. *Operations Research*, 44(1), 100–113. <https://doi.org/10.1287/opre.44.1.100>
- Iriyama, A., & Madhavan, R. (2014). Post-formation inter-partner equity transfers in international joint ventures: The role of experience. *Global Strategy Journal*, 4(4), 331–348. <https://doi.org/10.1002/gsj.1086>
- Kogut, B. (1991). Joint ventures and the option to expand and acquire. *Management Science*, 37(1), 19–33. <https://doi.org/10.1287/mnsc.37.1.19>
- Kogut, B., & Kulatilaka, N. (1994). Operating flexibility, global manufacturing, and the option value of a multinational network. *Management Science*, 40(1), 123–139. <https://doi.org/10.1287/mnsc.40.1.123>
- Kulatilaka, N., & Perotti, E. C. (1998). Strategic growth options. *Management Science*, 44(8), 1021–1031. <https://doi.org/10.1287/mnsc.44.8.1021>
- Kumar, S. (2005). The value from acquiring and divesting a joint venture. *Strategic Management Journal*, 26(4), 321–331. <https://doi.org/10.1002/smj.449>
- Leiblein, M. J., & Miller, D. J. (2003). An empirical examination of transaction-and firm-level influences on the vertical boundaries of the firm. *Strategic Management Journal*, 24(9), 839–859. <https://doi.org/10.1002/smj.340>
- Li, J. (1995). Foreign entry and survival. *Strategic Management Journal*, 16(5), 333–351. <https://doi.org/10.1002/smj.4250160502>
- Li, J., & Li, Y. (2010). Flexibility versus commitment: MNEs' ownership strategy in China. *Journal of International Business Studies*, 41(9), 1550–1571. <https://doi.org/10.1057/jibs.2010.25>
- Liu, H., Xie, J., & Jie, M. (2015). On divestment hysteresis of MNEs from China from a Perspective of Real Options: Evidence from Divestments of Japanese MNEs from China. *Journal of Finance and Economics*, 41(11), 71–82.
- McDonald, R., & Siegel, D. (1986). The Value of Waiting to Invest. *Quarterly Journal of Economics*, 101(4), 707–727. <https://doi.org/10.2307/1884175>
- Morck, R., & Yeung, B. (1992). Internalization: An event study test. *Journal of International Economics*, 33(1), 41–56. [https://doi.org/10.1016/0022-1996\(92\)90049-P](https://doi.org/10.1016/0022-1996(92)90049-P)
- Myers, S. C. Determinants of corporate borrowing. (1996). *Journal of Financial Economics*, 5(2), 147–175. 1977. [https://doi.org/10.1016/0304-405X\(77\)90015-0](https://doi.org/10.1016/0304-405X(77)90015-0)
- Nachum, L., & Song, S. (2011). The MNE as a portfolio: Interdependencies in MNE growth trajectory. *Journal of International Business Studies*, 42(3), 381–405. <https://doi.org/10.1057/jibs.2010.60>
- Nippa, M., & Reuer, J. J. (2019). On the future of international joint venture research. *Journal of International Business Studies*, 50(4), 555–597. <https://doi.org/10.1057/s41267-019-00212-0>
- Ogawa, K., & Suzuki, K. (2000). Uncertainty and investment: Some evidence from the panel data of Japanese manufacturing firms. *The Japanese Economic Review*, 51(2), 170–192. <https://doi.org/10.1111/1468-5876.00145>
- Puntanen, S. (2013). Regression analysis by example, fifth edition by samprit Chatterjee, Ali S. Hadi. *International Statistical Review*, 81(2), 308. https://doi.org/10.1111/insr.12020_2
- Qiu, L. (2007). The effects of real exchange rate on equity structure of TNCs' Foreign Subsidiaries: Empirical study based on corporations' data. *Nankai Economic Studies*, 04, 82–89.
- Reuer, J. J., & Tong, T. W. (2005). Real options in international joint ventures. *Journal of Management*, 31(3), 403–423. <https://doi.org/10.1177/0149206304272184>
- Song, S. (2017). Ownership increase in international joint ventures: The within- and across-country flexibility perspective. *Management International Review*, 57(1), 1–28. <https://doi.org/10.1007/s11575-016-0296-5>
- Song, S., Makhija, M., & Lee, S. H. (2014). Within-country Growth options versus across-country switching options in foreign direct investment. *Global Strategy Journal*, 4(2), 127–142. <https://doi.org/10.1111/j.2042-5805.2014.1073.x>
- Stallkamp, M., Pinkham, B. C., Schotter, A. P. J., & Buchel, O. (2018). Core or periphery? The effects of country-of-origin agglomerations on the within-country expansion of MNEs. *Journal of International Business Studies*, 49(8), 942–966. <https://doi.org/10.1057/s41267-016-0060-x>
- Takagi, S., & Shi, Z. (2011). Exchange rate movements and foreign direct investment (FDI): Japanese investment in Asia, 1987–2008. *Japan and the World Economy*, 23(4), 265–272. <https://doi.org/10.1016/j.japwor.2011.08.001>
- Tao, F., Meng, W., & Tao, Y. (2009). The staffing theory on oversea subsidiaries in China and its empirical study. *Science Research Management*, 30(5), 103–110.
- Tong, T. W., & Reuer, J. J. (2006). Firm and industry influences on the value of growth options. *Strategic Organization*, 4(1), 71–95. <https://doi.org/10.1177/1476127006061033>
- Tong, T. W., & Reuer, J. J. (2007). Real options in multinational corporations: Organizational challenges and risk implications. *Journal of International Business Studies*, 38(2), 215–230. <https://doi.org/10.1057/palgrave.jibs.8400260>
- Tong, T. W., Reuer, J. J., & Peng, M. W. (2008). International joint ventures and the value of growth options. *Academy of Management Journal*, 51(5), 1014–1029. <https://doi.org/10.5465/amj.2008.34789680>
- Trigeorgis, L. (1993). The nature of option interactions and the valuation of investments with multiple real options. *The Journal of Financial and Quantitative Analysis*, 28(1), 1–20. <https://doi.org/10.2307/2331148>
- Trigeorgis, L. (1999). *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. The MIT Press.
- Trigeorgis, L., & Reuer, J. J. (2017). Real Options Theory in strategic management. *Strategic Management Journal*, 38(1), 42–63. <https://doi.org/10.1002/smj.2593>
- Vassolo, R. S., Anand, J., & Folta, T. B. (2004). Non-additivity in portfolios of exploration activities: A real options-based analysis of equity alliances in

- biotechnology. *Strategic Management Journal*, 25 (11), 1045–1061. <https://doi.org/10.1002/smj.414>
- von Kalckreuth, U. (2003). Exploring the role of uncertainty for corporate investment decisions in Germany. *Swiss Journal of Economics and Statistics*, 139(II), 173–206. <https://doi.org/10.2139/ssrn.299484>
- Wang, Y., Msong, F., Economics, S. O., University, Z., Economics, S. O., & University, P. (2014). Macroeconomic uncertainty, demand for financing and corporate investment. *Economic Research Journal*, (2), 4–17.
- Wang, J. M., & Shen, Z. Y. (2011). Do wholly foreign-owned operations have a higher profitability than equity joint ventures in China?—Empirical analysis based on panel data from IJVs. *Economic Management Journal*.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.
- Wooster, R. B., Blanco, L., & Sawyer, W. C. (2016). Equity commitment under uncertainty. *International Business Review*, 25(1, Part B), 382–394. <https://doi.org/10.1016/j.ibusrev.2015.07.006>