THE ROAD TO SUCCESS:

A RESOURCE-BASED VIEW OF JOINT VENTURE EVOLUTION IN CHINA'S AUTO INDUSTRY

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Submitted to the Graduate Faculty of

The Katz Graduate School of Business in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2004

University of Pittsburgh

Katz Graduate School of Business

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March 9, 2004

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In emerging markets, joint venture is a dominant form of competition for multinational corporations. Drawing from the resource-based view of the firm and evolutionary perspective, I developed a theoretical framework that synthesizes our knowledge regarding timing of joint venture formation, initial resource commitment and resource development beyond formation to fully understand the path of joint venture implementation and its economic impact on sustainable competitive advantage.

Life course data for 439 joint ventures in the Chinese auto industry (1983-2002) form a cohort-sequential longitudinal dataset. Employing Hierarchical Linear Modeling (HLM) allows me to isolate the economic consequences and developmental trend of the main and interaction effects of entry timing, initial resource commitment and resource development on joint venture performance over time.

The results of the study indicate that: 1). The sustainability of early mover advantage depends not only on the initial resource commitment, but also the effort in resource development over time. 2). Timing alone is significant in determining initial performance, but is not

significant for the long-term success. 3). Early movers with high initial resource commitment are more likely to succeed in the long run but may take some time to achieve profitability.

This study empirically explored the dynamics of resource accumulation and its impact on intra-firm performance variation through its life course and inter-firm performance variation overtime by integrating the resource-based view and entry order effect research. The results can help to reconcile the long time equivocal findings in entry order effect research. It can also provide a valuable contribution to the development of a dynamic resource base theory of the firm through the longitudinal analysis of IJVs life course development paths.

Methodologically, it is one of the first attempts to introduce HLM to international joint venture research where the important issue of parameter variation across firm or over time has not been effectively addressed. Furthermore, the results identified different pathways to success through the use of different entry strategies and advanced our knowledge of international joint venture operations at and beyond the formation stage.

ACKNOWLEDGEMENTS

I heard a sigh from Heaven.

It has been a long journey for me, my family and those who care for me. I could never walk on the road to success without their sincere help.

First of all, I am indebted to my dissertation committee for their long suffering forbearance. I want to express my deepest appreciation and respect to Doctor John E. Prescott, Chair of my dissertation committee for his faith, trust, and encouragement throughout my doctoral studies. His clarity of thought never failed to cut through the chaos to bring insight and wisdom to not only my work but also my professional life. Additionally, I am grateful to professor John Camillus, Ravi Madhavan, Sue McEvily, Mike Peng, and Chris Carr for serving as committee members and providing me with thoughtful guidance, helpful suggestions, and inspiring stimulations every step of the way.

I want to thank the extraordinary faculty at the Katz School, and particularly to Jake Birnberg, Ragu Nath, Dan Fogel, Bob Atkin, Larry Feick and Fritz Pil. They have been the sources of advice and help on my research, teaching and service work in Katz. Staffs in the doctoral office, especially Carrie Uzyak, had made my life at Katz an enjoyable one.

I also want to extend special thanks to Balaji Koka, Bongjin Kim, Kwangsoo Kim, Devi Gnyawali, Raja Roy, Emery Yao, Bill Lekse, Gaurab Bhardwaj, Mongxin Zhao, Weidong Xia, Yuanzhi Luo, Dang Xie, Natasha Mushi, my roommates in 251 Mervis Hall and many fellow

doctoral students for their friendship, gracious assistance, lively discussions, and morale support during my time at University of Pittsburgh.

Thanks to my new colleagues in Lehigh University for their understanding and creating a supportive environment for me, and particularly to Mike Kolchin, Mike Santoro, Dick Duran, “Siva”, Sue Sherer, Ted Shille and Bob Trent, who, in different ways, have given me an extra push when I needed it.

With loving gratitude, I wish to acknowledge my beloved family, my parents, Dali Tao and Yuehua Jin for their endless love, faith and hope in all that I am and in all that I do. To my God, my beloved Wei, and our unborn son, I look forward to life, love and happiness in our future.

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1.0 INTRODUCTION

1.1 Motivation of the Study

In emerging market economies such as China, international joint ventures (IJVs) have been the major market entry mode for multinational corporations[1]. According to the resource-based view of the firm, the rationale for alliance formation is the value creation potential of pooling unique, heterogeneous resources from two or more firms to achieve competitive advantages not possible through individual efforts (Das and Teng, 2000). However, multinational corporations differ significantly in their international joint venture performances. In order to be successful in an emerging market, managers make a series of nested strategic decisions on **when** to form a joint venture, **initial** resource commitments and **ongoing** investment decisions beyond the initial formation. How managers address these three nested questions form the basis for entry decisions and its long-term performance consequences are the focus of this dissertation. I am specifically interested in fluctuation of an alliance's performance since its founding and the persistence of performance differences among firms in the auto industry over time. My approach is consistent with the resource-based view's concern of why do firms in the same industry vary systematically in performance over time and how they can achieve and sustain competitive advantages.

[1] In China's automobile industry, joint venture is the required mode of entry for multinational corporations.

1.2 Research Questions, Theory and Hypotheses

1.2.1 Research Questions

Timing of foreign direct investment plays a critical role in multinational corporations' international market entry strategy (Luo and Peng, 1998). Numerous researchers have examined the relationship between timing of international market entry and its performance consequences (Luo and Peng, 1999; Lieberman and Montgomery, 1998; Luo, 1998; Mascarenhas, 1992; Buckley and Casson, 1981; Isobe, Makino, and Montgomery, 2000). However, the first-mover advantage (FMA) literature has provided a fuzzy picture about the existence and the magnitude of the pioneering effect (Lieberman and Montgomery, 1988; Kerin, Varadarajan and Peterson, 1992; Golder and Tellis, 1993). The majority of the literature used cross-sectional data sets and short time periods to measure the success and failure of the players in the market. This approach is not only subject to survivor bias but is also subject to observation time bias (Bergh and Fairbank, 2002). If we select two different years (or two different time period) in the same industry, we may see different results of the timing-performance relationship. Furthermore, the nature of sustainable competitive advantage calls for a longitudinal design for empirical testing of the timing-performance relationship.

The extant literature in joint venture formation and timing of market entry has yet to address how market entry timing and initial resources commitment together influence a joint venture's performance over its lifespan. Furthermore, little if any longitudinal research has been conducted to examine how the joint ventures evolve beyond the formation stage in terms of accumulating and developing their resources and capabilities.

As an evolutionary process, firms formed joint ventures at different times, with different initial resource commitment and continue to develop their resources over time through different level of new investment. Only by treating these three strategic decisions as interrelated and examining the entire life course history of joint ventures through longitudinal analysis can we reveal the underlying causes/mechanisms related to successes and failures in the market place.

Therefore, in this study, I try to explore the following question: What are the interaction effects of these three key nested strategic decisions on the performances of joint ventures over time? To answer this question, I need longitudinal evidences on the performance consequences of these strategic decisions. At the same time, I will also explore the direct effects of timing, initial resources commitment and the interaction effects of timing and initial resource commitment on IJV's performance growth trend.

1.2.2 Theory and Hypotheses

This study investigates international joint ventures in the auto industry in China's emerging economy by examining the impact of timing, initial resource commitment and ongoing resource development on IJV performance throughout their life course. To understand the path to success or failure of joint ventures, the study draws mainly upon the resource-based view of the firm (Barney, 1991; Das and Teng, 1999) and evolutionary perspective (Aldrich, 1999). RBV suggests that these differences in firm performances are the result of imperfect strategic factor market and/or various path-dependent, historical processes of learning and asset accumulation (Barney, 1991; Dierickx and Cool, 1989). Therefore, only a life history of an IJV's initial resource endowment and its further resource development can provide us with a complete picture

of asset accumulation and its eventual performance implications. Figure 1.1 demonstrates the conceptual framework on the life history of an IJV in China's auto market as well as the operationalization of the key constructs. Before an IJV is formed, managers in the parent firms decide when the IJV should be established and how much resources (initial investment) are needed by the new joint venture. In addition, the resource development plan/policy beyond the formation year is a topic of concern. While the timing and initial resource commitment are irreversible decisions once the IJV is formed, the ongoing resource development decision can be adjusted each year according to the market and other factors. As the initial condition at year t, the IJV is formed by two or more parent firms through "pooling" of both tangible and intangible resources. At year t+x, additional resources will "flow" into the cumulative resource "stock" of the IJV. RBV suggests that the cumulative resource stock should have a significant impact on the IJV's market performance.

Given that RBV is ultimately a theory about how to extract rent from resources (Peng, 2001), in an emerging market environment, those firm who can acquire a favorable initial resource position should be able to earn a early success, however, the sustainability of the early mover advantage should depend on both the initial resource and the cumulative new resources developed beyond the initial entry.

Based my theoretical model, I developed four sets of hypotheses. First set of hypothesis challenges the traditional cross-sectional approach to study entry order effects, which serves as the base for the use of new longitudinal methods in this research. The second set of hypothesis concerns the **fixed direct effects** of timing and initial resource commitment on IJV's initial performance and their performance growth trend. The third set of hypothesis explores the **fixed two-way interaction effects** of timing and initial resource commitment on IJV's initial

performance and performance growth trend. The fourth and the core hypothesis is the **three-way interaction effect** of timing, initial resource commitment and the time varying covariate resource development on IJVs' long-term performances (See table 1.1).

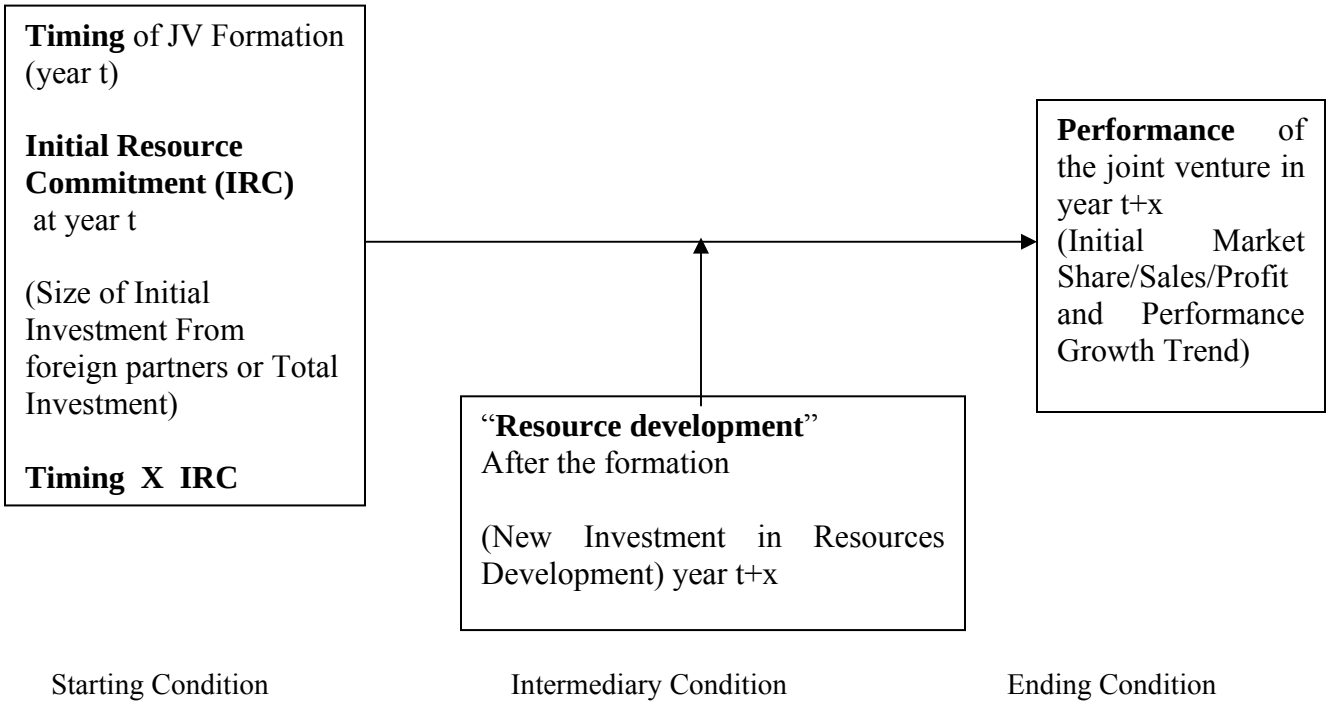

Figure 1.1. Conceptual Framework on Life History of an IJV in China's Auto Market

Note: Different IJVs started at different years, there are different number of IJV in the market at any given year (see Table 5.1 for data structure).

1.3 Summary of Research Methodology

To test my research questions, it was necessary to choose an appropriate research context. Foreign direct investment (FDI) activities, mainly in the mode of international joint ventures in the Chinese automobile industry provided the empirical research context for this study. To test the sustainability of entry order effect and avoid the deficiencies in the prior empirical research, I needed a research setting that recorded all the entry activities (with sufficient number of entries) from the very beginning and covered a sufficient long period of time. China's automobile market provided such a research setting, where hundreds of entries occurred during the past two decades of market development. Foreign firms form joint ventures with local partners at different time with many different levels of initial resource commitment and different resource development beyond the formation stage. They experienced different degree of initial success and subsequent performance growth trend in the evolving market.

In order to test my research hypotheses, I used an accelerated longitudinal design (cohort-sequential design). It covers all the main international joint ventures (439) in China's auto industry. The time span is from 1983 (the year when first IJV was established) to 2002, which covers the foreign direct investments in the auto industry from the beginning to date. For each observation (firm year), I have a series of industry data, firm level data including IJV characteristics and IJV performance.

Since IJVs were formed in different years, I have 19 cohorts of IJVs from 1981 to 2002. Within each cohort, the number of IJVs is different, ranging from 1 to 68. This data structure is best viewed in terms of observations nested within each IJV.

Given the nature of my hypotheses and the data set, hierarchical linear modeling (HLM) is an appropriate analytical tool. HLM can explicitly recognize and investigate systematic individual change patterns over time, it can provide for the estimation of both static and longitudinal performance parameters (i.e., intercept and slope), and it enables analysis of both within- and between-firm performance change patterns. HLM can incorporate both multiple fixed factors (timing, initial resource commitment, etc.) and time-varying covariates (resource development) in the model. Especially noteworthy is the possibility for both the number of observations per individual/case, and the spacing of these observations in time, to vary (Raudenbush and Bryk, 2002).

To demonstrate the inappropriateness in using cross-sectional date set to test the timing and performance relationship, I used OLS regression to test the effect's sensitivity to year selection.

1.4 Summary of Research Findings

First, I was able to demonstrate the inappropriateness in using cross-sectional data in the entry order effects research. It helps to explain some of the conflicting findings in existing literature.

Overall, the results of the HLM analysis provided strong support for the Resource-based View perspective. I present the results of this study by each hypothesis (see Table 1.1).

Hypothesis 1 and 2 examine the direct fixed effect of timing and initial resource commitment on IJV's initial performance and the subsequent performance trend. The result of HLM analysis indicated that timing effects does exist for the initial performance, but timing alone does not have significant impact on the performance growth trend beyond initial success.

The same is true for the initial resource commitment effect. The interesting conclusion here is that high initial resource commitment can help a firm achieve superior initial performance even it is late in market entry.

Hypothesis 3 examines the fixed two-way interaction effect of timing and initial resource commitment on the performance growth trend is significant and positive, indicating that moving early with high initial resource commitment will generally result in positive performance growth trend. This result is consistent with the assertion of resource-based view in that early movers are more likely to acquire superior resources and capabilities and facilitate the accumulation of resources. If combined with higher initial resource commitment, early movers can build up a stronger resource base for longer-term success.

When I treated timing and initial resource commitment as class variables, I was able to form distinctive groups of IJVs (see figure 1.2). They are committed early (early mover with high commitment), committed late (late mover with high commitment), tentative early (early mover with low commitment) and tentative late (late mover with low commitment). By plotting the group performance growth trend onto one figure, I was able to demonstrate the long-term implication of these four distinctive strategies adopted by four groups of IJVs. In terms of initial performance, committed late mover is dominating all other three alternatives; it is followed by tentative late, committed late and committed early. If we only focus on explaining the difference in initial performance, there is clearly a late mover advantage. However, what I am really trying to explain in this paper is which strategy can lead to a long-term sustainable advantage. In this regard, committed early mover is clearly the winner and followed by committed later mover, tentative early and tentative late movers.

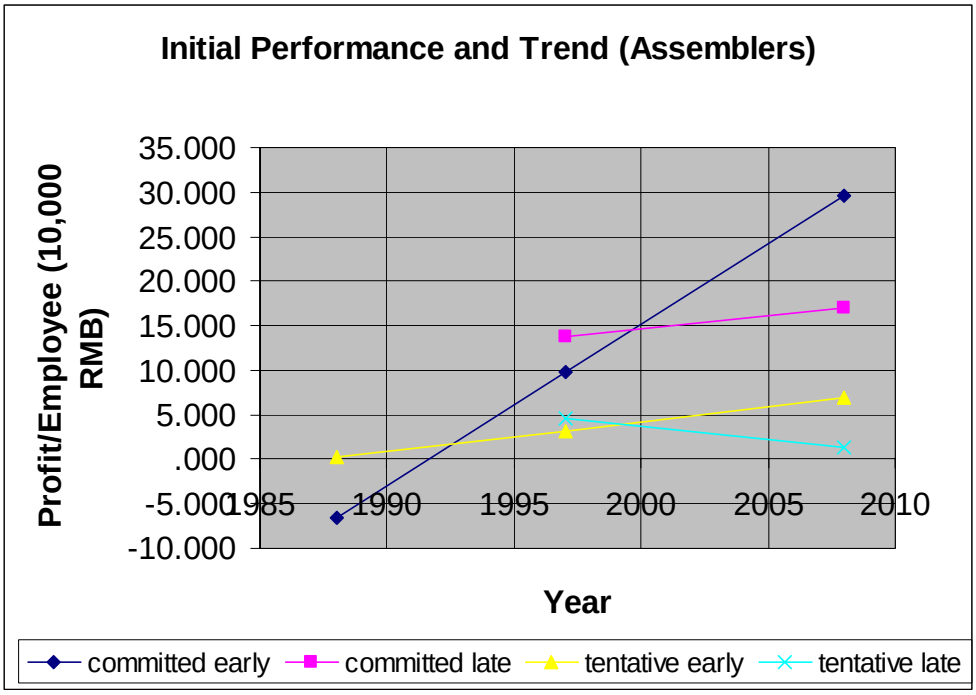

Figure 1.2 Result of Two-way Interaction between Timing and Initial Resource Commitment

Note: Timing and Initial Resource Commitment are treated as discrete or class variables here.

Hypothesis 4 examines the fixed three-way interaction effect of timing, initial resource commitment and the time varying covariate resource development on IJV's performance through their life course. The result of the HLM analysis indicated that there is a significant and positive three-way interaction, which confirms the main proposition of this research that the sustainability of early mover advantage depends not only on the initial resource commitment, but also the effort in resource development over time. Therefore, a true sustainable competitive advantage requires a base of established resources as well as the ability to continuously develop sets of new resources and capabilities that upgrade/enhance the existing resource base.

Table 1.1 Brief Summaries of Test Results of Research Hypotheses

Hypothesis 1	***Supported***	***H1 a: Early timing will lead to positive initial performance, ceteris paribus***
	Not Supported	***H1b: Early timing will lead to positive performance growth trend, ceteris paribus***
Hypothesis 2	***Supported***	***H2a: Higher initial resource commitment will lead to higher initial performance, ceteris paribus***
	Not Supported	***H2 b: Higher initial resource commitment will lead to positive performance growth trend, ceteris paribus***
Hypothesis 3	***Not Supported***	***H3a: Early movers with high initial resource commitment (committed early) will outperform all other strategies in initial performance, ceteris paribus***
	Supported	***H3b: Early movers with high initial resource commitment (committed early) will lead to positive performance growth trend, ceteris paribus***
	Supported	***H3c: Early movers with high initial resource commitment (committed early) will outperform all other strategies in the long run, ceteris paribus.***
	Supported	***H3d: Late movers with high initial resource commitment (committed late) will outperform tentative early mover in the long run, ceteris paribus.***
Hypothesis 4	***Supported***	***H4: Committed early movers with high resource development are more likely to be able to outperform all the other groups throughout the whole life course (positive three way interaction)***

1.5 Contributions and Implications

1.5.1 Theoretical Contributions

From a theory development standpoint, this study has contributed to the literature of entry order effects and the resource-base view. Investigating resource accumulation/evolution of joint ventures can contribute to identifying empirical regularities and reconciling irregularities in the supposed timing-performance relationship within entry order effect (first-mover advantage) literatures. To accomplish this, I draw on longitudinal, industry-wide, firm-specific data in our description of the market's evolution to provide a value added contribution to our knowledge of international joint venture operations at and beyond the formation stage. On the other hand, this research can contribute to the development of a resource-based theory of joint venture both theoretically and empirically. Few if any prior studies have explored the formation and evolution of the joint venture from the resource-based view. As Lieberman and Montgomery (1998) pointed out, the resource-based view has often been criticized for its lack of an empirical base, especially, of studies that consider how resources and capabilities evolve over time. I believe that this research is one step further toward filling the empirical gap.

Methodologically, I believe that the methods of individual growth modeling (HLM in this case) presents exciting opportunities in answering many of the development questions with which researchers in resource based theory and market entry (and many other areas) are concerned. These methods allow for the analysis of longitudinal data and thus facilitate the process of uncovering the various pathways along which development may occur. Such a pathways approach is essential for researchers who seek to study the course of firm strategic behavior throughout its life span.

1.5.2 Managerial Implications

From the viewpoint of a strategist who seeks to find the best strategy to succeed in international market entry and establish a sustainable competitive advantage, this study has several actionable implications. First, it is clear that moving fast will help one's initial success. On the other hand, committing substantial resources initially can also achieve good initial performance even when a firm is a later comer. Early movers who commit substantial resource initially will not see a quick success in a relatively uncertain environment; however, early movers with high initial resource commitment do have a better chance to succeed in the long run. Moving early or committing substantial resources initially alone will not give a firm sustainable competitive advantage. Finally, one important result from this study is the three-way interaction of timing, initial resource commitment and resource development. It shows that management has to carefully consider these key factors at the same time to form their entry and post-entry strategies. The sustainability of early mover advantage depends not only on the initial resource commitment, but also the effort in resource development over time.

1.6 Limitation

This study has a number of limitations. First, I use a one industry/market setting in one emerging market; generalization of the results to wider context should be with caution. China's auto industry has experienced a remarkable development in the last two decades and its institutional

environment is very different from a developed economy. However, the overall evolution from centralized economy to decentralized economy is a common phenomenon in many emerging markets and especially former planned economies, such as Czech, Poland, etc.

Second, the waves of data collected are still limited. I could collect only limited waves of data on many joint ventures in their early stage of development, therefore, only the early part of their total life span is observed. I did try to incorporate a quadratic curve into the model, and it turned out to be insignificant in this date set.

Third, the measurement for resource in this study has not fully reflected the true complexity of the resource construct. The measurement for resource development is also still in early stage, another step forward may be to find multiple measures.

1.7 Future Research

A number of suggestions for future research can be made for this study. While this study has contributed several insights regarding the importance of using longitudinal data set and methodology in strategy and international market entry research, it has identified several interesting research tasks worth pursuing in the near future.

First, extending this research model to other industries or automobile industry in other emerging markets such as Czech, Mexico and Brazil where significant FDI activities can be found.

Second, measuring a firm's resource profile (position) and study its evolution is an intriguing area. My database on China's auto industry provides a good chance to explore this possibility with the help of sophisticated longitudinal methods.

Third, local firms in Chinese auto market experienced the evolutionary process of variation, selection, retention and struggle in the past two decades. A longitudinal study on their strategic behaviors in rapidly changing institutional environment and their performance/survival consequences can help us in answering the fundamental questions in the strategy field: What do firm differ? How do firms behave? What determines the international success or failure of firms? (Peng, 2000). Studying local firms can also avoid some of the limitations that I experienced in this study, since many local firms existed in the market for a long time, I will be able to build a larger longitudinal data set that have more waves of observations for each firm and allow me to explore more complex relationships.

Finally, a more close/detailed field study can be done in the future to further uncover other complex factors that are influencing the success and failure of IJVs in China's automobile industry.

1.8 Outline of Dissertation Document

Including this introduction chapter, this dissertation document contains seven chapters. The rest of the remaining six chapters are briefly introduced here. Chapter 2 introduces the timing effect (first mover advantage or entry order effect) literature and the resource based view on the topics of resource commitment and resource development. Chapter 3 describes the institutional

environment facing international joint ventures in China's auto market and the evolution of FDI in this industry. Chapter 4 develops the research hypotheses based on a conceptual framework (presented in Figure 1.1.) that guides this dissertation. Chapter 5 describes the research methodology including the choice of research setting, research design, samples, data collection, measurement of research constructs, and data analysis techniques. Chapter 6 reports the results of the statistical tests for the research hypotheses developed in this study. The last chapter, Chapter 7 presents a discussion of results, theoretical and practical implications and future research directions.

2.0 LITERATURE REVIEW

2.1 Introduction

To be successful in an emerging market, managers in multinational corporations make a series of nested strategic decisions on **when** to form a joint venture, **initial** resource commitments and **ongoing** investment decisions beyond the initial formation. How managers address these three nested questions form the basis for entry decisions and its long-term performance consequences are the focus of this dissertation.

Three streams of literatures will be reviewed in this chapter, research on entry order effects (timing); research on resource-based view of alliance formation (initial resource commitment); research on resource development/resource accumulation and empirical studies on predicting performance of International Joint ventures in China. I will try to identify and demonstrate the limitations and gaps in the existing literature when it comes to understanding the complex factors that explain the success and failure of IJVs. By addressing the deficiencies in the existing literature, this study strives to understand the dynamics of resource accumulation and its impact on intra-firm performance variation through its life course and inter-firm performance variation overtime by integrating the resource-based view and entry order effect research

2.2 Overview of Two Perspectives in Entry Order (First-Mover Advantage) Effects

First-mover advantage can be defined as the ability of pioneering firms to earn positive economic profits (Lieberman, and Montgomery, 1988). Former studies on first-mover advantages had equivocal results in providing theoretical explanations as well empirical documentation.

Two leading perspectives were offered to explain first-mover advantage: economic theory and behavioral theories.

2.2.1 Economics Perspective

When an industry has high economies of scale, high customer switching costs, or steep experience curves, competitors can be expected to try to establish early foot holds and a dominant market share, the firms that move early can then gain some advantage over those that move later. Hence, the pioneering firms set up a barrier to entry. A barrier to entry implies that additional resources must be expended by a nonpioneering firm to compete effectively in the marketplace relative to the first mover (Kerin, Varadarajan, and Peterson, 1992). The most often mentioned entry barriers are scale effects, experience effects, asymmetric information about the product quality and risk-averse buyers, difference in marginal effects of advertising, reputation effects, technological leadership, preemption of scare resources, and buyer switching costs (Karakaya, and Stahl, 1989), etc.

The lead-time that the first mover earns can bring monopolistic profit when there is no competition or a dominant market share and higher margins than latecomers. However, these economic arguments supportive of first-mover advantages have been oblivious to product-market

contingencies that moderate these sources of pioneering effects, such as concentration ratio, growth rate, and market potential (Green, Barclay and Ryans, 1995). Furthermore, game theorists have also shown analytically the conditions under which a firm may purposefully decide to be a first mover or later entrant (Gal-Or, 1987).

2.2.2 Behavioral Perspective

At the product or brand level, being first in the marketplace suggests a higher degree of consumer awareness, results in ongoing repurchase behavior to minimize consumer perceived risk and information costs. Once this pattern is established, consumers may be reluctant to switch brands upon later entry of other brands. Similar arguments derived from psychology literature suggest that the first product introduced received disproportionate attention in the consumer's mind. Late entrants must have a truly superior product, or else advertise more extensively than the incumbent in order to be noticed by the consumer (Lieberman, and Montgomery, 1988).

In terms of the role of learning in consumer preference formation, a first mover may be able to influence how attributes are valued, define the ideal attribute combination, when consumers know little about the product. In effect, through its marketing efforts, the first mover may be able to establish the perceptual structure of the market to its advantage (Carpenter and Nakamoto, 1990).

However, the behavioral perspective fails to represent reality adequately in certain aspects. The implicit assumptions behind this perspective are: the first mover can offer a high quality product, choose the correct positioning, and pursue the right competitive strategy. On the other hand, follower brands are assumed to attempt to be me-too brands (Kerin, Varadarajan, and

Peterson, 1992). It may ignore the possibility that a later entrant has the organizational skills and capabilities to attract the first mover's customers and those newly entering the market by offering a product of superior value.

2.2.3 Empirical Results

Kerin, Varadarajan, and Peterson (1992) examined 13 empirical studies on the first-mover advantage issue. They found that these studies did not provide strong support for the effect of the pioneering effect. Furthermore, these studies are flawed in their methodologies, such as 'survivor bias' and timing measurement.

While former research on first-mover advantage provided valuable insights into the mechanisms of the issue, they did not succeed in achieving compelling evidence that the pioneering effect do exist. Furthermore, most empirical studies up to now were conducted in mature market economies; few studies have been done in the emerging market economies where more chances are available for MNCs to explore the first-mover advantages. Finally, a key weakness in the existing literature is the use of cross-sectional data set that cannot avoid survivor bias and observation timing bias. I argue that though the importance of timing of entry is known for its association with organizational performance, the equivocal findings on the nature of the timing-performance relationship have somewhat limited its strategic value for managers. A key question to ask here is when I measure the performance, at the early stage of the entry when there are only a few players in the market or at the later stage of the entry when there are a lot of players in the market but some have not survived. The majority of the previous literature used

cross-sectional data sets where a short time period was taken to measure the success and failure of the players in the market. This approach is not only usually subject to survivor bias but also may be subject to timing bias. If one picks two different years (or two different time period) in the same industry, same market, we may see different results of the timing-performance relationship. Furthermore, the nature of sustainable competitive advantage calls for a longitudinal design of empirical testing the timing-performance relationship.

Lieberman and Montgomery (1998) summarized empirical work of FMA for the past decade and drew a number of general conclusions:

1. Entry order effects exist, especially with respect to market share, but they are better specified as interactions than as direct effects.
2. The magnitude of first-mover advantage varies greatly across product categories and geographic markets.
3. FMA dissipate over time but are enhanced by longer lead-time before competitive entry.
4. Entry order effects, although significant and robust, are weaker than "marketing mix" effects related to price and advertising. Later entrants can utilize this result to catch up to and surpass pioneers.

They also suggested that the RBV and FMA are related conceptual frameworks that can benefit from closer linkage. The findings of FMA studies on resource accumulation by early entrants can help to overcome the empirical deficit of RBV and the FMA research can be strengthened if positioned within the broad theoretical perspective of RBV. Moreover, they called for more international and cross-cultural studies to determine if the drivers of first-mover success and failure differ across countries.

Timing studies also suggest the need to go beyond timing to explain performance (e.g., Golder and Tellis, 1993; Green, Barclay, and Ryans, 1995). One of the key factors is the initial

resource commitment to the new venture. We will review the literatures of resource commitment as well as resource-base view of joint venture formation in next section.

2.3 Research on Resource Base View of Joint Venture Formation, Resource Commitment

Resource Commitment has long been an important construct in international market entry research (e.g. Vernon, 1979; Johanson and Valhne, 1990). It can be defined as the amount of dedicated visible and invisible assets that a MNC deploys in a specific country/market (Randoy and Dibrill, 2002). It has been operationalized in the literature as resource commitment to technology transfer (Isobe, Makino and Montgomery, 2000) or investment in dollar value (Luo, 2003).

At the enterprise level, Chandler (1990) argues that industrial success is due to investments in management, scale and scope, and distribution and marketing, he recognizes the importance of the magnitude and focus of early investment. Using the PIMS database, MacMillian and Day (1987) examine many investment options: plant size, relative sales promotion, sales force, advertising, price, quality, and service quality. For most options they find that higher investment resulted in higher returns on investment and market shares. Consistent with Chandler's (1987) study, McDougal (1987) found that scale of entry is one of the key decisions a firm must make when undertaking new ventures.

According to the resourced-based theory, strategic alliances are used to access other firm's resources and for enhancing knowledge in critical areas of functioning where the requisite level of knowledge is lacking and cannot be developed within an acceptable timeframe or cost

(Madhok, 1997). Therefore, partner selection determines an international joint venture's mix of skills, knowledge, and resources, its operating policies and it procedures, as well as its vulnerability to indigenous conditions, structures, and institutional changes. In China's emerging market, when a foreign firm looks for a local partner, it typically looks for local knowledge, market access, and low cost, locally scarce production factors such as labor force, capital or land. On the other hand, when a local firm looks for a foreign partner, it typically looks for foreign capital, technological capabilities, marketing capabilities and management expertise as well as other intangible resources (Luo, 2000; Hitt et al, 2000; Shenkar and Li, 1999). If we assume joint venture formation is a mutual selection process (dating?), and the selection criteria are along those dimensions we pointed out above, then it is logical to suggest that in order to get the best possible mix of the joint resources, several local firms will bid for the most attractive foreign partner; and vise versa several foreign firms will bid for the most attractive local partner. Hitt et al (2000) found that in emerging markets, financial assets and technical capabilities earn the highest priority in selecting joint venture partners by local firms. In the automobile industry's context, better offer in term of larger initial investment and higher commitment in technology transfer from the foreign partner side should lead to a more attractive local partner.

The resource-based theory views firms as unique collections of physical and intangible assets and capabilities. No two companies are alike because no two companies have had the same set of experiences, acquired the same assets and skills, or built the same organization cultures. These assets and capabilities determine how effectively and efficiently a company performs its functional activities (Collis and Montgomery, 1995). Following this logic, a company will be positioned to succeed if it has the best and most appropriate stocks of resources and capabilities.

Within an emerging market, especially China, the important resources that a potential partner can provide to the joint venture may include a marketing network (distribution network), *guanxi*, collaborative capacity, natural resources, local knowledge and important basic infrastructure, etc (Luo, 1998; Hitt, et al, 2000). These resources are not evenly distributed across an industry. Therefore, potential partners are heterogeneous in nature and only a few potential partners possess resources that are valuable, scarce and inimitable. They have resources that can not be easily copied or acquired through market because of several reasons: (1) physical uniqueness, which by definition cannot be copied, a unique real estate property, natural resources, patents simply can not be imitated. (2) path dependency, these resources are unique and, therefore, scarce because of all that has happened along the path taken in their accumulation. The competitors cannot go out and buy these resources instantaneously; they must be built over time in ways that are difficult to accelerate. (3) economic deterrence, a company can preempt its competitors by making a sizable investment in as asset (tangible or intangible). The competitor could replicate the resources but, because of limited market potential, choose not to (Gal-Or, 1987).

A resource-based view of joint venture suggests that the formation of a joint venture is about creating the most value out of one's existing resources by combining these with other's resources, provided, of course, that this combination results in optimal returns (Das and Teng, 2000). Competitive advantage can be ultimately attributed to the ownership of valuable resources that enable the company to perform activities better or cheaper than competitors. Competitive advantage will therefore be based on developing a distinct set of resources and deploying them in well-conceived strategy. Joint venture formation can be seen as a strategic move to get to the desirable position. Das and Teng (2000) argue that strategic alliances are essentially the result of

resource integration among firms. The very objective of forming alliances is to join forces with partners in order to pursue market opportunities that are otherwise beyond reach. All the partners involved in forming the joint venture can bring a certain set of resources to the joint venture. It is the combined resources that give the joint venture a competitive advantage over it competitors. Collective strengths describes the joint venture's overall resource endowments and capabilities, it should contribute to better or worse joint venture performance (Beamish, 1987). While collective strengths will change over a joint venture's life span, we will expect to see the joint venture's performance change accordingly.

Initial investment in a joint venture, though measured in monetary value, includes capital, technology, management know-how, international marketing network, etc. from the foreign company side. Combined with the complementary resources from the local partner side, which usually includes capital, production facility, local market knowledge, etc., a joint venture can create its initial resource profile to start the operation.

2. 4 Resource Development (Resources Accumulation)

It has been suggested in the strategy literature that it is the "stock" of accumulated resources and/or competencies that constitutes the real source of competitive advantages (Mehra, 1996). Therefore, while the initial resources/capabilities brought by all the partners to the joint venture is critical for the venture's early success in the market, it will not be able to guarantee sustainable competitive advantage in the long run without further development of the resources along with the evolution of the industry. MNCs need to continuously build and upgrade their capabilities and institutionalize innovation, learning, and information transfer (Luo, 2000). View from a

growth perspective, resource-base view is concerned with the origin, evolution, and sustainability of firm (Conner, 1991; Peteraf, 1993; Pettus, 2001). Yet resource development literature is still in its early stage of development and presents a significant literature gap in RBV research. It also has the potential to enhance RBV by providing a dynamic picture of resource evolution and accumulation. A recent development in the literature is Pettus's (2001) study in predicting the sequencing of a firm's resources that best provides for firm growth. It provided new knowledge on what resource decisions can lead to firm growth over time. However, the study still used a comparative, static approach to growth. The eventual consequences of alternative patterns of growth are compared in terms of aggregate change. Therefore, the measurement of growth lacks a time line, which encourages a static approach rather than a dynamic approach.

One important reason for the lack of development in resource development literature is the deficiency in research methodologies. First, it concerns the time period of analysis. The notion of sustainable competitive advantage strongly implies a need for longitudinal analysis, and this poses formidable challenges for researchers in terms of financial and time costs (Barney, 2001). Second, an appropriate tool for longitudinal analysis is also needed to deal with the often-unbalanced design of longitudinal data sets that are available to strategy researchers.

2.5 Chapter Summary

Previous literature has made a significant contribution to enhancing our knowledge of entry order effects and how resource-base view can inform the formation of international joint ventures. However, my literature review of the previous research on entry order effect and joint

venture formation reveal insufficient attention paid to post-entry performance and resource development beyond IJV formation. Conflicting results in entry order effects also calls for further investigation and a more sophisticated methodology and evaluate performance consequences in a firm's whole life course. In table 2.1, I summarize the limitation and deficiencies in existing literature in the explaining long-term performance variation within individual IJV and among different IJVs.

Table 2.1 Summary of Literature Review

Streams of Literature	Limitations and Deficiencies	How This Study Will Address these limitations
Entry Order Effects	Cross-sectional Data Set Survivor Bias Lack of Consideration of Key Nested Factors Needs More Sophisticated Design and Analytical Tools Market share as the main measure	Longitudinal Design Life Course History Interaction Effects RBV as Theory Base HLM Add Profit as a new measure
Initial Resource Commitment RBV and Joint Venture	Lack of Dynamic Change Lack of Strong Empirical Base	Longitudinal Analysis Combination of RBV and Entry Order Research
Resource Development	Underdeveloped in Literature Difficulty in Data Collection Difficulty in Data Analysis	Demonstrate the key role of Resource Development Unique dataset HLM as the Right Tool

3.0 THE EVOLUTION OF AUTO INDUSTRY IN CHINA (1981-2002)

3.1 Introduction

The research on evolution of international joint venture in Chinese auto industry is not context free; we have to know the change in the institutional environment as well as the market environment in order to understand the research background/use of control variables/operationalization of the key constructs and interpret the results. We will discuss the evolution of institutional environment in China's automobile industry and its impact on foreign direct investment activities. Furthermore, I will describe the development of the auto market through an evolutionary analysis over the last two-decade. Finally, I will track the foreign direct investment in the passenger car market to explore the sources of success and failure over the life course of those international joint ventures. China's entry to WTO and its impact for the future structure of the industry and its profitability trend will also be discussed.

3.2 The Evolution of Institutional Environment in China

As a typical planned economy, prior to 1978, the government through its industrial administration agencies in China solely did industrial planning, and there was no enterprise level planning. The communistic economy was characterized by the shortage of every consumer

product, while the mixed economy in 1990s is characterized by over-supply in most consumer products (Nath and Tao, 1998).

After 1979, there was a start of a movement in China to transform mandatory economic planning into guidelines operating through market instruments, with the decentralization of much residual planning to the local (provincial and metropolitan) level, although the central economic planning bodies were not abolished (Perkins, 1988). Since 1978 the proportion of capital investment controlled directly by the central government declined consistently in favor of local authority control. During the 1980s there was a steady shift away from the provision of investment funds via government grants in favor of loans from banks. Financial reforms also permitted, in principle, enterprises to use their own surplus funds for investment (Child and Lu, 1996). Therefore, there are three levels of players in the decision making process in the issue of international joint venture formation. Each player had its own perspective and interests to protect, while the central planner wanted the balanced development at the national level, the different local authorities were pursuing their regional economic development. The firms' concern was to compete for resources in terms of capital, technology and management know-how. The central government took a diminishing role in managing the sector's growth once the initial decisions to develop the auto industry were made in early 1980s (Harwit, 1996).

3.3 The Developing Auto Industry and Market

The auto industry in China is highly fragmented; there is the coexistence of firms with vast variation in technological sophistication, financial performance and above all, production scale.

By 1990, the Chinese automobile industry was composed of around 2600 manufacturers, including 117 assembly plants, of which only two (the FAW and the SAW) had annual output volume exceeding 100000 vehicles and another four (Beijing Jeeps, Beijing Light Commercials, Nanjing Auto and Shanghai Volkswagen) exceeding 10000. It is certainly far from a significant player in the world auto market. By 1992, the fixed assets of the entire industry were valued at 36 billion RMB (6.53 billion U.S. dollars), which is equivalent to just one-twelfth of that of General Motors of the USA, one-eighth of Japan's Toyota (Lo, 1996).

This stems from the peculiarity of China being an underdeveloped planned economy in the pre-reform era. In the face of severe resource constraints, yet constantly under the political-economic pressure of the world market, the state had to concentrate resources on building up strategic industries and projects. Meanwhile, the local authorities build up their own small and complete auto plants. This resulted in the coexistence of a small number of relatively large/advanced firms and a vast number of small/backward plants. Local authorities and enterprises along with the decentralization of decision power from central government have especially shaped the development of the auto industry in the reform era. The once complementary relationship between the centrally managed section and the locally managed sector has changed to one of competition. By gaining autonomy and with the marketization of operations, most large and medium sized enterprises, which traditionally formed the backbone of the centrally managed sector, have also gradually consolidated their own interests (Harwit, 1994; Yang, 1998). In this context, these economic agents have both the power and incentive to pursue high and quick return projects. The persistence of 'auto boom' in the domestic market and the availability of Western technology have further fuelled the expansion. Thus, these have been several nationwide drives to import technology from multinational corporations. At one point in

the mid-1980s, there were 17 Chinese parties simultaneously negotiating with Honda of Japan and 22 others with Ford of the USA to seek for the supply of technology for producing sedan cars (Huang, 1999). Therefore, it is not difficult to see that the autonomy and separated economic interests at the local level and firm level lead to the competition for foreign investment and foreign cooperation in the auto industry. The notion that every IJV in China really is a joint venture with the Chinese government as the in-country partner is invalid after 1978 when China decided to "reform", i.e., changing from planned economy to market economy.

3.4 The Evolution of Foreign Direct Investment

In the late 1970s, when Chinese leaders realized the need to economic reform and started to transform the planned economy to market economy, they also realized that China's urban streets and country roads were largely populated by inefficient, unattractive, and often unreliable passenger cars, automobiles designed in the early 1960s or even decades earlier (Harwit, 1994). On the other hand, import of large quantities of vehicles will be a major drain on the limited hard currency reserves. China saw the need to modernize its automobile industry and at a minimum, to develop a successful program of car and truck import substitution. However, they will have to depend on help from technologically advanced countries for technology, capital, and management, etc. By discarding self-reliance, the legitimacy for transferring foreign technology had been established and this paved the way for decentralization in foreign economic dealings. New legislation was introduced from 1979 on wards for handling contractual relationships with foreign businesses. These laws were followed by amendments written to target joint ventures in

the officially sanctioned policy enclaves or special economic zones. They allowed local government and enterprises to interpret broadly their decision-making authority in foreign dealings (Yang, 1998). Two municipal manufacturers under the jurisdiction of the Shanghai and Beijing governments spearheaded the joint venture experiment in 1983. Beijing Auto Works formed Beijing Jeep with American Motors, now Chrysler Corp., to launch knockdown assembly of four-wheel-drive Cherokees. Shanghai Tractor and Auto Corp. established Shanghai Volkswagen to assemble Santana with knockdown units from the German producer. Compared to Beijing Jeep in which the American assembler booked a minority stake with a total initial investment of 152 million dollar, Shanghai-VW was fifty percent owned by the German firm with 423 millions of total initial investment, reflecting higher initial resource commitment. Figure 3.1 presents a graphic summary of the location of major IJVs in passenger car assembly established from 1983 to 2002. Figure 3.2 presents the number of new joint venture established in each year (from 1983 to 2000) and the cumulative number of joint ventures each year (from 1983 to 2000).

Till the mid-1990s, the auto industry was still highly protected in China. China's 1994 "Industrial Policy for the Automobile Industry" showed its intention to develop and to consolidate China's indigenous auto industry. At the same time, the need for funds, technology and management to upgrade the greatly lagging industry, urged to authority to further attract foreign direct investment. However, the operational practices involve a set of limitation measures, such as high tariff and non-tariff barriers, screening, foreign equity limits and local content requirements, etc (Huang, 1999).

3.4.1 Geographical Origin of FDI

A recent study shows that 466 foreign firms from over 20 countries invested in China's automobile market from 1981 to 1996, amounting to $15.43 billion of total investment (Wang, Richet, and Wang, 2000). JVs with Hong Kong and some other Asian countries accounted for 57.3 percent of the number of JVs but 30 per cent of that in dollar volume. European countries representing only 10.5 per cent of JVs had the lion's share (30.5 per cent) in terms of dollar amount. On the base of average scale of investment, Europe was the largest, around $96.0 million, while those with the USA and Japan ranged from $49.6 million to $36.0 million. Joint ventures with Hong Kong were by far the smallest, with an average of $11.4 million, 7 times smaller than the European counterparts. Since the bulk of foreign investments came from Asian countries (regions), the average size of projects at aggregate level remained modest, or $33.1 million during the last one and a half decades.

Hong Kong and the other Asian regions and countries (mainly Taiwan, Macao, Singapore, Thailand, and Malaysia) were the main investors in the early stages of the foreign direct investment in China's automotive industry. Their technology is more labor-intensive and much easier to transfer for Chinese markets. Reviewing the investment by Asian countries, we can find that they mainly focus on simple components, motorcycle assembling, and specialty vehicles (ambulance, police car, or dumper etc.) in small quantities.

Figure 3.1 Geographic locations of Major IJVs in China Passenger Car Market

Adapter from China: Special Economic Zones, UT Austin Map Collection

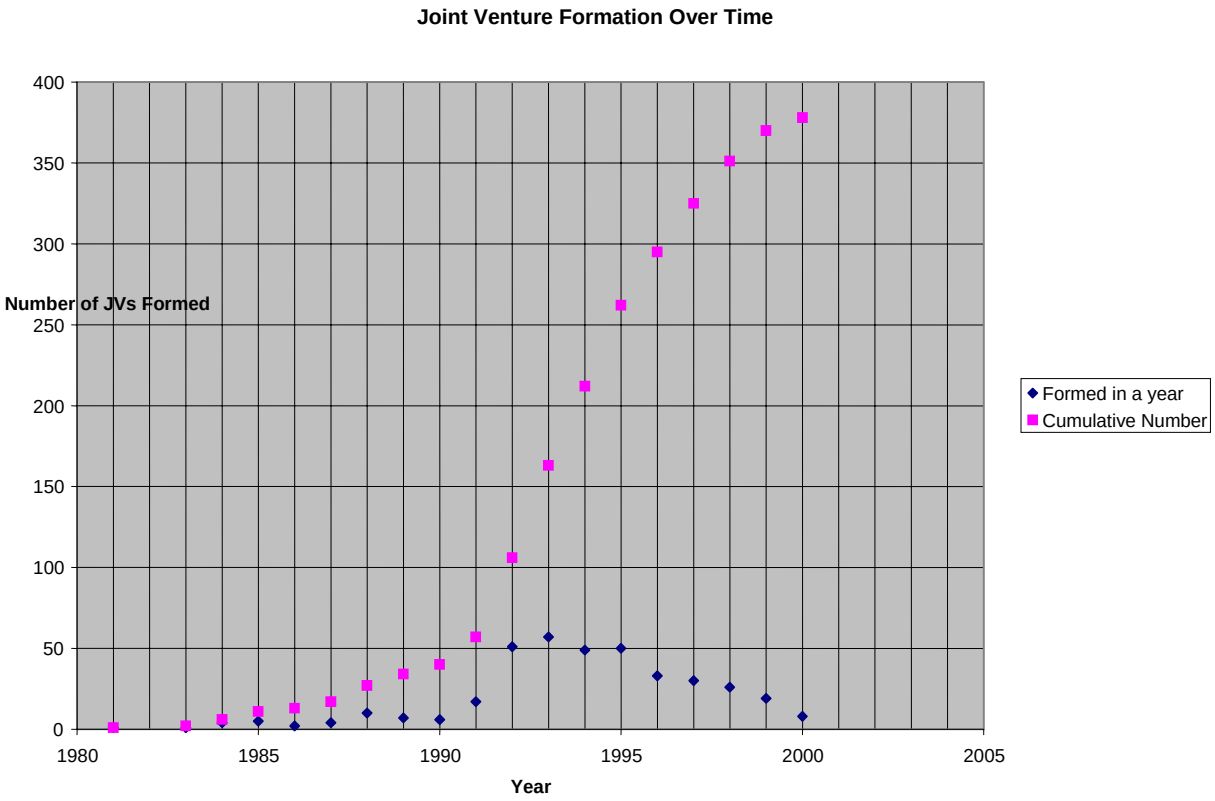

Figure 3.2 Joint Venture Formation by Year in China *

*** Source: *Summary & Guide of Foreign Enterprises in China Automotive Industry***

The European and American MNCs focused on the passenger car industry. They took an oligopolistic position thanks to industrial policy. To boast economies of scale, the number of manufacturers was restricted to six - the "big three plus small three" in the early 1990s. The former referring to the three Sino-foreign joint ventures of Shanghai Volkswagen, First Auto Works Volkswagen (FAW-VW) and Dongfeng Motor Citroen (DFM-Citroen), the latter being the two joint ventures of Beijing Jeep (AMC first, and now Chrysler) and Guangzhou Peugeot (which was substituted for by Guangzhou Honda in 1998) plus Tianjing Light Passenger Car which produces Daihatsu-designed cars under licensing agreement. In line with the principle of

specialization, two “mini” projects that produce Suzuki and Subaru-designed light passenger cars under Japanese license have been authorized. They are two SOEs named Chang'an Automobile and Guizhou Aviation respectively. These enterprises form the backbone of the car industry. In 1998, the sales of "big three, small three and mini two" represented 92 per cent of the market share, among which those joint ventures accounted for 69 per cent of the market share (CATRC, 1999).

3.4.2. Evolving Industrial Policies toward Globalization

Several important policies are important to understand the institutional environment for foreign direct investment in China’s automobile market. These are trade barriers, screening (project evaluation), foreign equity limit, and local content requirement.

Trade Barriers

Trade barrier is the most important item of import substitution strategy for the industry. The tariff rate on automobiles was set at 180-220 per cent before 1986. Concerning the non-tariff barriers, China applies restrictive import licensing to a number of product categories including motor vehicles, key parts for vehicles, crane lorries, vehicle tires, motorcycles, and key parts for motorcycles. The procedures and criteria for the licenses are not transparent. Some other regulations include foreign exchange controls, monopoly of state trading companies, and domestic marketing, as well as standard and technical requirements. Furthermore, only 6 ports in China have been designated for complete car imports (CATRC, 1995)

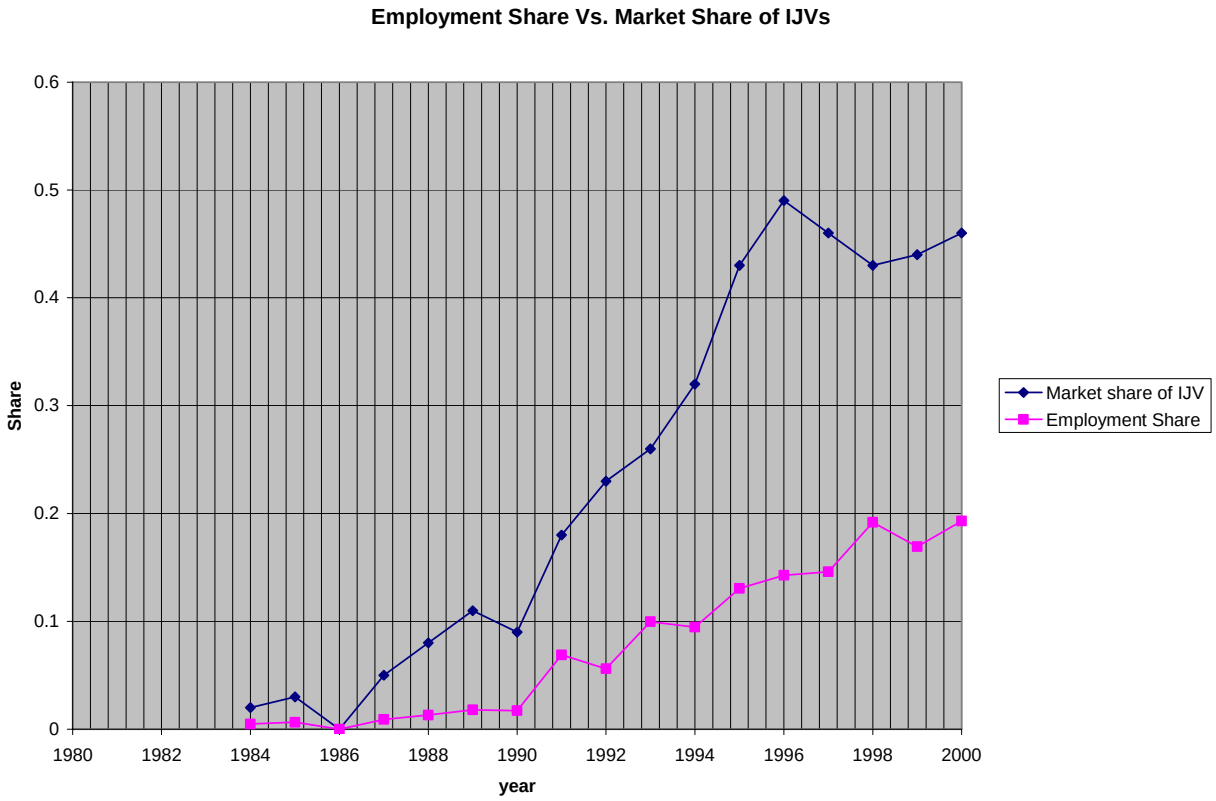

Figure 3.3 The Important Role of the IJVs in China's Automobile Industry

Source: China Auto Industry Database provided by CATRC

The protection measures have ballooned car prices. Enterprises, both domestic and foreign investors, have tended to reap short-term profits. Since the passenger car industry is dominated by the joint ventures, it is evident that foreign investors are sharing parts of the rents behind the high protection. In the case of joint venture Shanghai VW, the domestic sales price in 1993 was around 200 000 RMB per car (and the production cost around 85 000 RMB), which at the official exchange rate doubled the world price (Dic, 1997). Indicators such as the ratio of the after-tax profits to book value assets also revealed the unusually high profit of this protected industry. This ratio was three times that of the manufacturing sector as a whole in 1995. It is remarkable considering that the automotive sector is among the most heavily taxed sectors that

should normally have reduced the profit rate (Huang, 1997). Figure 3.4 presents the profitability trend of major car producers in China's market from 1984 to 2002.

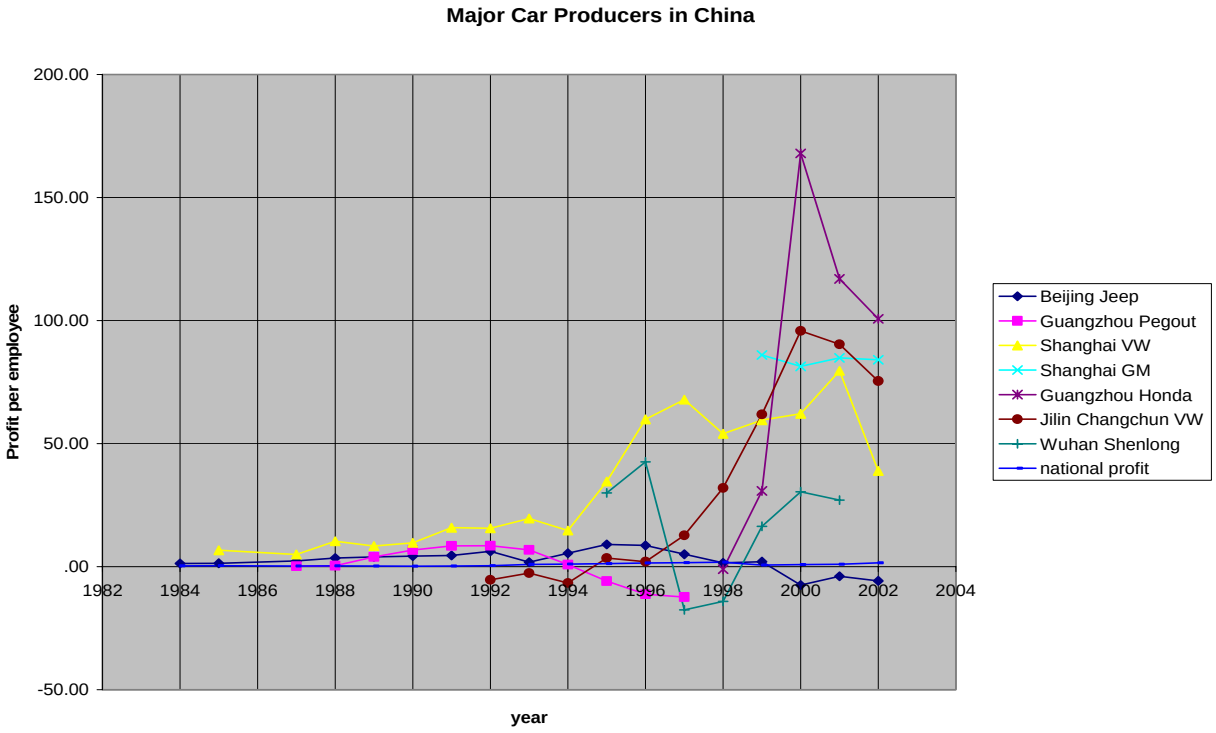

Figure3.4. Profitability Trend of Major Car Producers in China (1984-2002)

Source: China Automotive Industry Yearbook (1984-2001), China Auto Industry Database provided by CATRC

Note: Scale for profit/employee is 10,000 1990 constant RMB.

The protectionist regime has made the proliferation of shoddy car producers in China. The small-scale projects (mostly assembly plants that rely heavily on KD kits) became profitable. Economies of scale are no longer a necessary condition for their success. By 1998, there were

still 115 enterprises producing completely built up (CBU) vehicles, 525 factories refitting vehicles, and 1942 factories producing components and spare parts (including tire and glass).

For car production, counter to the "big three, small three and mini two" regulation, the number of producers had increased to, at least, 20 till the end of 1999. Most of those firms established themselves first and pressed the central government to grant approvals. Their products are outside the national auto catalogue, but can still be commercialized under the protected regional market (Table 3.1.).

Table 3.1. Timing, Initial Resource Commitment of Major Car Producers

Name of IJV	Timing of Formation	Initial Resource Commitment (Million Dollar in 1990)	Equity Ratio	Chinese Partner	Foreign Partner
Beijing Jeep	1983	223.93	42.4%	Beijing Auto Works	Chrysler
Shanghai VW	1985	263.41	50%	SAIC	VW
Guangzhou Peugeot	1985	131.4	22%	Guangzhou Auto Group	Peugeot
FAW VW	1990	901.84	40%	First Auto Works	VW
Wuhan Shenlong	1992	505.22	30%	Second Auto Works	Citroen
Shanghai GM	1997	604.94	50%	SAIC	GM
Guangzhou Honda	1998	887.22	50%	Guangzhou Auto Group	Honda

Source: China Automotive Industry Yearbook (1984-2001), China Auto Industry Database provided by CATRC

Screening (for FDI projects)

Foreign investment projects must go through a screening agency either at central or provincial government level, which depends on the nature and the size of the investment. Major passenger car assembly projects, key components projects, and all the investments over $30 million in capitalization are monitored by the State Planning Commission (SPC) and the Ministry of Foreign Trade and Economic Co-operation (MOFTEC). The latter is authorized to review all projects, regardless of size. During the process of decentralization alongside the economic reform, the provincial governments also possess significant controls to review and approve FDI projects below the thresholds of $30 million. The inter-jurisdictional competition for FDI among provinces (Oman, 2000) and between the central and provincial government (He and Yang, 1999) is one of the main features during the screening process in China. The present threshold of 30 million dollars and the different levels of hurdles between the central and local government have led to reinforcement of rent-seeking behavior of those world-class automakers and the miniaturization of the FDI projects.

Furthermore, cross-provincial protectionism is created under the combining force of MNCs and local government, both of which possess significant controls over the share of automobile joint ventures. For example, Shanghai Volkswagen has succeeded in making the Shanghai municipality forbids other cars from entering the Shanghai taxi market and government purchase plan. The same protection measures are taken by the other joint ventures over the local region. Therefore, the Chinese passenger car market is highly fragmented.

For most foreign investments, the screening process at provincial level is relatively simple and efficient thanks to the Chinese pattern of federalism. As studied by Qian and Weingast (1997), the decentralization from the control to local government - federalism - in China is a successful governance structure that increases governmental efficiency and preserves market incentives. Jurisdictional competition among local governments can increase efficiency through sorting and matching (Tiebout, 1956). It is also a necessary condition to create thriving markets in the transition economies (Jin, Qian and Weingast, 1999). Such an institutional arrangement has reduced the level of the overall regulatory hurdle against FDI inflows through deregulation (for example, by permitting FDI in restricted sectors) or circumvents the existing regulations when central supervision is lax (Huang, 1999). The vast majority of FDI projects are approved at the provincial level with the investment less than $30 million in capitalization. It is in contrast to the initial policy that emphasizes economies of scale. The situation of fragmentation and miniaturization is therefore reinforced by foreign investment.

Foreign equity limits

MNCs entering China's passenger car assembly project and the three key component projects (motors, air bags, and ABS) are limited to the maximum equal stakes of share holding (50%). On the other hand, foreign investors may prefer joint ventures for several reasons. They may find that, even without the institutional restraint, the joint venture is essential. Chinese partners are necessary to help to understand the functioning of the local market and the business norms so as to accomplish goals in the Chinese system. Managing the cross-cultural aspects of relationships is difficult if foreign firms want to exploit the market independently. This pattern of investment can also reduce initial risks. No evidence or at least no systematic studies show that the joint venture requirement frustrated the MNCs investment in the case of the Chinese

automotive industry. However, such requirement does not achieve the objective of management control and technology enhancement set by the policymakers. In reality, the majority ownership for a domestic partner does not mean the control of the JV, as shown by some empirical results in developing countries (Beamish, 1988). Nearly all the foreign investors have tremendous discretion on the operation of joint ventures, even though they only have minority equity share. Citroen, with 25 per cent of share holding in the joint venture, controls important management activities such as sales, purchasing, finances, as well as technology transfer, production control, and quality control. The same case can be found in most of the joint ventures in this sector. Different arrangement of ownership structure influences the behavior of foreign firms in the host country (Gedajlovic, 1993). According to Mansfield and Romero (1980), parent firms transfer technology to wholly owned subsidiaries in developing countries on- third faster, on average, than to joint ventures or licensees. That is to say, the technology transfer is relatively limited under the pattern of joint venture. A firm possessing superior assets will opt for a strategy that enables them to retain tight control over foreign operations in order to protect the value of those assets (Teece, 1981). Therefore, joint ventures purchase more components from parent companies. The foreign investors intend to prolong the purchasing period to maximize the profit generated from the transfer pricing. It is a big concern for the Chinese policymakers (Wu, 1996; Gan, 1997; Wan and Guo, 1998). Such phenomenon is wide spread throughout China. The average level of technology transfer via FDI is about two years more advanced than the existing Chinese technology base, while the "technology gap" between investing countries and China is commonly perceived to be 20 years (Yong and Lan, 1997; Huang, 1999).

Even though the foreign equity requirements have the perverse effects, there is no evidence to show that the Chinese authority will lax the control over the CBU vehicle projects

and key components projects. The trade-off is between the crowding out of the large local industrial groups and the up-to-date technology transfer. The first is crucial both economically and politically for the policymaker. The joint venture requirement can at least guarantee that domestic firms have half the stake of the market while the wholly owned foreign firms will most probably eliminate the domestic counterparts. Hence technology transfer becomes a secondary consideration.

Local Content Requirement

The local content and technology transfer requirements are imposed to pursue two of China's most important policy goals: a complex industrial development and self-reliance. Combined with a varied tariff rates, this policy intended to encourage increasing local contents of assembled vehicles. The tariff on KD kits reduced if local contents are increased. For passenger cars whose local contents exceeded 80 per cent, the tariff rate on imported parts and components is 40 per cent, and for local contents of 60-80 per cent and below 60 per cent, the tariff is 60 per cent and 75 per cent, respectively (Zhang, 1997). This policy is designed to create technological linkages to the component industry and to ensure the indigenous capabilities of the entire car sector instead of turning into an industry that only assembles foreign parts. There have been certain successes with this policy. In the early stage of localization, the progress in assimilating imported technology, within the exception of Shanghai VW, is unsatisfactory. It took five years for the local contents to reach 50 per cent, and ten years to reach 90 per cent. In the world market the product life cycle of a model is normally around 3-4 years. It is therefore, no wonder that most of the China produced cars are outdated models till the late 1990s.

The beneficial spillover effects of local content application manifested one and half decades later. The quality of products is generally improved. During the out-sourcing procedure,

most of the assemblers issue the Supplier Quality Assurance (SQA) handbooks to ensure the quality of the components. Shanghai Volkswagen formed the "Shanghai Santana Local Content Co-operative (SSLCC)" by bringing together the parts makers, banks, universities, and research institutes (Lee, 1997). Being a member of SSLCC means a long-term contract and steady supply of components, which are the key incentives for the component suppliers to execute continuous quality improvement. In the case of Dongfeng Citroen, 58.3 per cent of local component suppliers imported technologies. The part suppliers are getting integrated into a complete manufacturing system, improving the assembler-supplier communication with the standardized quality system. A modern industrial organization in China's automobile sector is emerging after decades of gradual industrial restructuring. Since 2000, most of the new CBU projects have locally provisioned 40 per cent of components in the first year of production that was the case of General Motors assembling Buick in Shanghai. This also helps to understand why some of the later comers to this market can quickly gain market share and be profitable.

The proportion of joint ventures in the component industry had increased constantly during the end of the 1990s. Till 1996, 35 per cent of the local suppliers were joint ventures. The establishment of industrial complexes in China by the MNCs generated follow-the-leader effects. A lot of world-class auto parts suppliers are following the MNCs to the Chinese market: Delphi Automotive Systems, Bosch, Valeo, Siemens, Dana, Allied Signal, Lucas Varity, United Technologies, ITT, TRW, Rockwell, Tenneco, Cooper etc. They have found that it is necessary to invest in upstream and/or downstream industries in order to supply the complementary services. The Chinese auto component industry will be profoundly recomposed by the presence of foreign parts suppliers. The success of local content requirement fundamentally depends on the industrial infrastructure of the host country. In China, there are over 1900 factories producing

component and spare parts, double the Korean component enterprises. The domestic companies can supply most of the supplying materials such as resin, rubber and steel. A complete mechanical industry covering metalworking, machining, casting and forging provides a solid foundation for the automotive industry compared to the other developing countries. In other developing Asian Pacific countries, the absence of such a supporting industry is a major barrier to the localization of auto production (Fujita and Hill, 1997).

On the other side, the different reactions of the MNCs towards the local content requirement can also make the performance of joint ventures vary. A case in point is the comparison between the success of Shanghai VW and the failure of Guangzhou Peugeot which both started producing cars in the same year. To capture the short-term profitability, the latter preferred to import KD kits and assembly the car in China with little effort in developing local component suppliers. On the contrary, the Shanghai VW adopted a rigorous local content program together with the support from the local authority (Dic, 1997; Lee, 1997). Such program also means substantial further investment into the joint venture that will further build up the manufacturing capacity, research and development as well as supplier network development.

The achievement in local contents or mastering production techniques is just the first step in the indigenization of technology. The present spillover effect is still limited to the absorption of imported technology, instead of the promoting capability of independent R&D works. Most of domestic component and part suppliers tend to rely on further imports of technology to the Chinese market. The local research capabilities and institutions are weak that they may hinder the creation of indigenous technology capacity.

3.4.3 Winners and Losers in the Market (See Figure 3.4.)

Volkswagen

After long and difficult negotiations that began in 1978, Germany's Volkswagen entered a joint venture with Shanghai Automotive Corporation (SAIC), and Shanghai-VW was set up to produce the Santana model in 1984. After initial equipment set up, Shanghai-Volkswagen began trial production in 1985 (Peng, 2000). The VW-Santana went on to distinguish itself as China's first mass-produced modern passenger car. As a result, Volkswagen managed to establish a solid position in China's automotive sector. Four years later Volkswagen built on its 'first comer' advantage, and secured a second opening in the China market when the central authorities decided to establish two additional passenger car plants. After competing successfully against GM, Ford, Nissan, Renault, Peugeot, and Citroen, Volkswagen was selected to set up a second joint venture with First Auto Works (FAW) in Changchun in 1988 for CKD-assembly of the Audi 100 and the construction of a state of the art auto plant to produce the VW-Jetta in 1990.

Entering the China market, Volkswagen took a pro-active approach in spite of great potential economic risks and committed enormous resources. The German multinational not only committed enormous financial resources but also practiced a rather bold approach in its business dealings in China. This involved a great deal of high-level political interaction with China's central and local government authorities for which the German government frequently lent its official support (Peng, 2000). Moreover, Volkswagen was willing to avail the Chinese partners a broad array of technical and financial resources located in the company's worldwide organization. For example, in 1988 Volkswagen allowed FAW a 60 percent share in their joint venture while furnishing most of the manufacturing technology and equipment for its new FAW-

Volkswagen Jetta plant in Changchun. Moreover, Volkswagen has been extolled for assisting to raise the quality of local produced automotive components and parts. Undoubtedly, for the remainder of the 1980s and most of the 1990s Volkswagen reaped its 'first comer advantage' in China. With a market share of more than 50 percent for passenger cars, together with its Chinese partners, Volkswagen benefited considerably from the scarcity of passenger cars and persistence of a sellers' market that allowed for profitable joint operations with SAIC and FAW well into the 21st century (Arnold, 2003).

General Motors

On October 31, 1995, after a most arduous process, Shanghai Automotive Industry Corporation (SAIC) and GM signed a basic joint venture agreement for US $1.57 Billion to construct a Greenfield plant on a site in Shanghai's Jinqiao Export Processing Zone in Pudong. The new automotive plant was designed to produce 100,000 sedans per year, and it was decided to produce two Buick models modified for China. GM-Shanghai's Pudong facility became equipped with the latest automotive machinery and robotics and was furnished with process technology transferred from GM's worldwide operations. Initially, GM-Shanghai was exposed to a barrage of criticism about the huge size of its investment, and the significant commitments to transfer technology and design capabilities to China. These criticisms notwithstanding, GM management reiterated at numerous occasions in China and the United States that China was expected to become the biggest automotive market in the world within two decades and that China represented the single most important emerging market for GM. In 2004, GM has about 10,000 employees in China and operates six joint ventures and two wholly owned foreign enterprises. GM has participated in investment of over $2 billion in China. Boasting a

combined manufacturing capacity of 530,000 vehicles - which are sold under the Buick, Chevrolet and Wuling nameplates - GM and its joint ventures offer the widest portfolio of products among foreign manufacturers in China.

The Peugeot Story

Peugeot first came to China in 1985 when Guangzhou Peugeot Automotive Co (GPAC) was set up. The joint venture mainly produced the Peugeot 504 and 505, both out-of-date models of the 1970s. While many domestic users complained about the high fuel consumption, difficult maintenance and expensive parts of their Peugeot vehicles, the French car manufacturer netted huge short-term profits at about 4 billion Yuan ($480 million) by selling a large amount of auto parts.

Problems arises from the very beginning of the joint venture when French managers found the local managers and workers needed extensive training before they can put to work. Commitments to localize parts production posed additional stumbling blocks for GPAC. Though the joint venture contract called for GPAC vehicles to reach a 90 percent Chinese content level within 5 years of start up, the French partner found few suppliers of quality parts in Guangdong and was prohibited by Guangzhou officials from sourcing from other regions in China. Peugeot, for its part, was slow to establish its own joint venture parts manufacturers-a key to Volkswagen's success in Shanghai. GPAC thus had to assemble automobiles largely from imported kits, which proved costly when the French franc appreciated some 110 percent against the renminbi in the late 1980s (Harwit, 1997).

Among other things, some of Peugeot's management decisions also contributed to GPAC's competitive weaknesses. The company reportedly repatriated most of its profits and

made relatively few changes to its 1970s era products, whereas Volkswagen reinvested profits and refined its production, introducing a new "Santana 2000" model in the mid-1990s.

Around 1991, the Guangzhou Peugeot accounted for a nearly 16 per cent share of the domestic passenger car market, but it began to go into the red in 1994 with its losses amounting to some 2.9 billion Yuan ($349 million) by 1997, forcing Peugeot to retreat from the China market.

While the sour memories of the disappointing performance of its previous joint venture are still there, Peugeot (PSA Peugeot Citroen) decided to return to the battlefield in 2003. The Paris-based carmaker seems loaded with ambitious expectations to grab a slice of the country's increasingly appealing auto market, which has been further sparked by the country's entry to the World Trade Organization. One of its latest moves in China is an agreement announced in Beijing towards the end of last year under which PSA Peugeot Citroen will further its partnership with Hubei-based Dongfeng Motor Corp, one of China's top three automakers, to produce Peugeot vehicles in China. According to the new deal, a Peugeot production platform will be installed at the Wuhan plant of the two companies' joint venture, Dongfeng Citroen Automobile Co. Starting from this year, the new facility is expected to turn out car models tailored for domestic consumers, including the Peugeot 307, one of the most popular models in the European market since last year.

By 2004, the joint venture envisions six different models rolling off the Wuhan production lines, which will be sold alongside imported vehicles under the brands of Citroen and Peugeot. Two marketing joint ventures will be set up, which are to be responsible for sales and after-sales matters of homemade Citroen and Peugeot vehicles respectively. The construction of

the new Peugeot platform has been bolstered by a cash infusion of up to 1 billion Yuan ($121 million), including 630 million Yuan ($76 million) from PSA Peugeot Citroen and 370 million Yuan ($45 million) from Dongfeng Motors. Dongfeng Citroen expects to produce 75,000 vehicles this year, including Citroen Fukang passenger cars and Picasso multi-purpose vehicles, up from around 53,000 in 2001. Annual production will increase to 150,000 units by 2004, the company said.

Guangzhou Honda

Peugeot's pullout created a vacuum for foreign manufacturers seeking a share of China's automobile market, which include Daimler-Benz AG, General Motors, Opel Corp., and Honda Motors Co. Ltd., and Hyundai Motors.

Honda entered the fierce bidding war for the take over of an existing auto plant in Guangzhou of the defunct Guangzhou Peugeot Auto Corporation. In the end, Honda – Japan's No. 2 automaker, succeeded against stiff competition from GM's German Opel Division and South Korea's Hyundai. The partner selection had followed a familiar pattern; Beijing was pitting several foreign auto makers against each other to get hold of a maximum in capital, design, technology, and manufacturing capabilities, as well as the motor vehicle types deemed appropriate for the Chinese market. Honda pledged to invest US $ 200 million, and pilot assembly of the American version of the Honda Accord started in 1999 leading to full scale manufacturing in 2000. Two years later, Guangzhou Honda added assembly of the popular Odyssey MPV to its product mix. In less than two years, Honda had turned around the loss-making Peugeot facility into one of China's most successful passenger car joint ventures, an accomplishment that was widely noted by China's top automotive producers.

It is important to mention that already well before its joint venture with the Guangzhou

Auto Group, Honda had captured a significant market share with exports of the popular Honda Accord and a most effective network of dealerships, service and repair facilities to support its motor vehicles all over China. These measures helped Honda not only to attain an excellent reputation and brand recognition, but also strengthened Honda's bargaining power with the Guangzhou Auto Group (Arnold, 2003).

3.4.4 The Outlook for Roads Ahead

Looking ahead, the trade and non-trade barriers will gradually be removed after China's WTO entry. Increasing vehicle imports after trade liberalization will put pressure on the existing joint ventures who assembly cars in China, and will improve their global competitiveness. The MNCs who have already invested heavily in the Chinese market will confront with intensified competition with the late-comer if the locally produced vehicles have not any advantages as regards models, price, sales networks, components supply and client services. Trade liberalization will therefore speed up the technology transfer, model variety and price reduction. Vehicle imports and local production are two complementary measures instead of alternative aspects of competition (Huang, 1999).

The automotive industry in China has made remarkable progress in the past two decades. The trade, investment and industrial policies are undergoing gradual revision. The evolution from the previous version (1988) to the latter (1994) reflects the authorities' changing thinking about regulation failure, the role of state intervention and the prospect for the development of the industry. Under the opening-up policy and the interaction between foreign investors and policymakers, the central government has been pushed for deregulation. However, compared to

other industries, the automotive sector continuously receives high protection, which may perpetuate the inefficiencies in this sector.

There are two distinctive phases of FDI activities in China automobile industry, the first phase is from early 1980s to early 1990s; the second phase is from mid-1990 to present.

During the first phase, the Chinese auto market is relatively small, the market prospect was not very clear, many major multinational firms are hesitate to move in early or reluctant to commit large amount of resources into the newly formed joint ventures. From modest amounts in the 1980s, around 20 joint ventures till the end of 1989, FDI flows in Chinese automobile industry started to accelerate sharply from 1992. The accumulated number of foreign invested enterprises was 120 in 1993 and skyrocked to 604 in 1998 with the cumulated investment reaching $20.9 billion.

The boom of the auto market, especially the market of early 1990s, brought significant profit to almost all of the early movers, such as Shanghai VW and Beijing Jeep. The production was barely meeting the demand in the market. This situation reaches its peak in 1992.

The bright prospect of a booming auto market had attracted more multinational corporations to invest. This new wave of investment had resulted in the overcapacity (due to the sharp drop in demand from 1994 to 1998) in the auto market. Combined with changing customer base from public ownership to private buyers, the auto market had turned into a truly competitive arena. In 1994, China announced its second auto industry policy, which put a brake on establishing new passenger car joint ventures, limiting assembly projects and promoting components cooperative projects. The WTO entry in 2000 further intensify the competition in the market place as the government regulation is weakening, more multinational corporations have fought their way in and secured the last few available local partners. As of 2002, almost all

of the major Chinese assemblers in car, truck and bus, have set up joint ventures with foreign firms.

China's automobile production volume reached 3.25 million units in 2002---a 38.5% increase over the same period of 2001. This increase represents the first growth peak in the last 10 years, with China ranked fifth in the world for production volume in 2002. Passenger car production numbers surpassed the one million mark for the first time and reached 1.09 million units—a 55% increase over the same period of 2001. The growth rate of production and volume of China's automobile industry during the past 10 years are shown in table 3.2 and figure 3.5.

Current trends suggest that China could become the world's second largest market for new motor vehicles (after North America) in the medium-term future. In November 1999, Chinese leaders endorsed an agreement with the United States under which the U.S. would support China's entry into the World Trade Organization in the 2000.

Table 3.2 Growth Rate of Production Volume (1992-2002)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Output (Millions)	1.062	1.297	1.353	1.453	1.475	1.585	1.629	1.832	2.068	2.347	3.251
Growth rate (%)	49.8	22.1	4.3	7.4	1.5	7.5	2.8	12.5	12.9	13.2	38.5

Source: Yearbook of China's Automobile Industry (1992-2002).

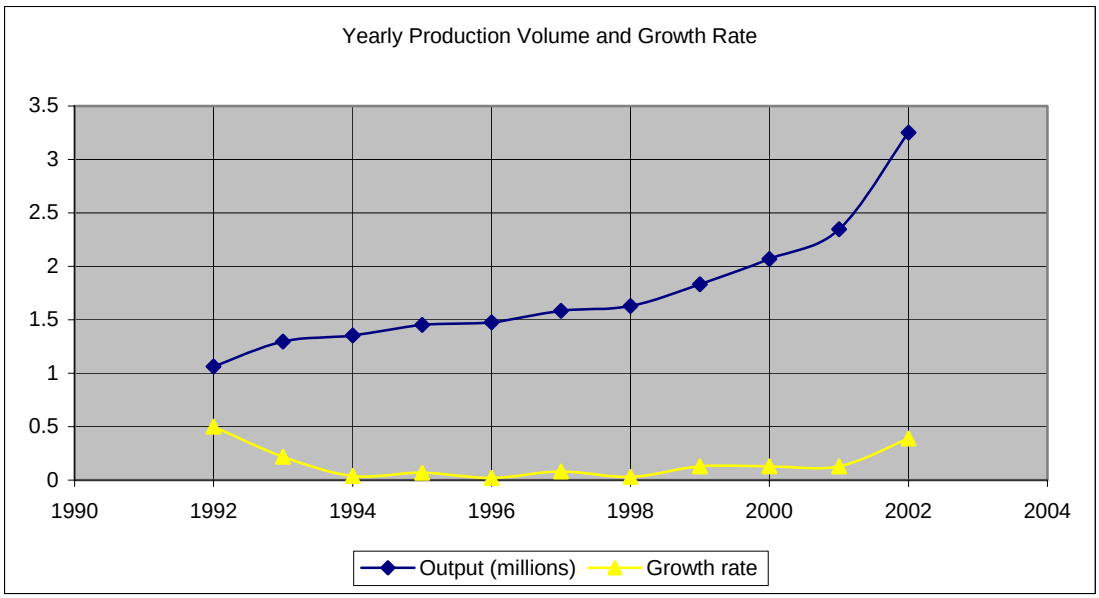

Figure 3.5. Growth Rate of Yearly Production Volume

The WTO agreement includes an explicit commitment by the Chinese government to substantially liberalize the restrictions it has imposed on automobile imports and on the operation of foreign manufacturers in China. Over the next three to six years, the institutional environment and the competitive environment in which both domestic and foreign-affiliated manufacturers have operated will change in fundamental ways. This will have a significant impact on the strategies that may lead to success in China's automobile market.

Chinese consumers have accumulated its potential purchasing power over the two decades of economic development, its potential is still to be fully realized, and therefore, the automobile industry will likely to maintain a rapid growth rate over the next three to five years. Given that vehicle imports will not exceed 8% of the market share for the next few years, China's automobile industry, which is mainly based on the domestic market, still has much room

for future development and will maintain a high growth rate of 20% (Zeng and Peng, 2003). The growth rate for major automobile firms could be even higher. On the other hand, according to China's WTO agreement, China will eliminate import quota and import licensing for imported vehicles in 2005. Imported products will present a definite impact on domestic production. Manufacturers will face heavier pressure from imported products on price reduction and model range offered. In the long run, as the domestic market grows slowly, there will be fiercer market competition and industry consolidation. The entry barrier to the market will be higher and higher; resource development will be crucial to the sustainability of the competitive advantage in the market. In order to survive and maintain healthy and stable growth, and if they have already established themselves solidly in the domestic market, China's automobile companies must be able to offer its own products that are competitive in the global market.

3.5 Chapter Summary

This chapter presented an institutional environment in China's automobile industry; it also provides the historical development context of foreign direct investment in the market. It provides an important context in understanding the sources of success and failure in this emerging and promising market. 1992 is an important year that can separate late movers from early mover due to the dramatic change in market situation. This will be used in the methodology section. The unique institutional environment of this market also helped to control for industry and the market entry mode. The availability of performance data from the very beginning of a

joint venture to its current status is crucial for me to capture the life course history of a single IJV as well as many cohorts of IJV from 1983 to 2002.

4.0 RESEARCH MODEL

4.1. Introduction

This chapter introduces the conceptual research model that forms the theoretical foundation for this research. Section 4.2. presents the research model. Section 4.3. defines various constructs, identifies interrelationships among these concepts, and develops research hypotheses. Section 4.4. provides a summary of research hypotheses.

4.2. Research Model

This study investigates international joint ventures in the auto industry in China's emerging economy by examining the impact of timing, initial resource commitment and ongoing resource development on IJV performance throughout their life course. To understand the path to success or failure of joint ventures, the study draws mainly upon the resource-based view of the firm and evolutionary perspective (Aldrich, 1999). RBV suggests that these differences are the result of imperfect strategic factor market and/or various path-dependent, historical processes of learning and asset accumulation (Barney 1991, Dierickx and Cool 1989). Therefore, only a life history of an IJV's initial resource endowment and its further resource development can provide us with a

complete picture of asset accumulation and its eventual performance implications. Figure 1 demonstrates the conceptual framework on the life history of an IJV in China's auto market. Before an IJV is formed, managers in the parent firms decide when the IJV should be established and how much resources (initial investment) are needed by the new joint venture. In addition, the resource development plan/policy beyond the formation year is a topic of concern. While the timing and initial resource commitment are irreversible (fixed) decisions once the IJV is formed, the ongoing resource development decision can be adjusted each year (time varying) according to the market and other factors. As the initial condition at year t, an IJV is formed by two or more parent firms through "pooling" of both tangible and intangible resources. At year t+x, additional resources will "flow" into the cumulative resource "stock" of the IJV. RBV suggests that the cumulative resource stock should have a significant impact on the IJV's market performance.

Given that RBV is ultimately a theory about how to extract rent from resources (Peng, 2001), in an emerging market environment, those firm who can acquire a favorable initial resource position should be able to earn a early success, however, the sustainability of the early mover advantage should depend on both the initial resource and the cumulative new resources developed beyond the initial entry.

The Resource-base View on IJV

The resource-based view of the firm views companies as unique collections of physical and intangible assets and capabilities. These assets and capabilities determine how effectively and efficiently a company performs its functional activities (Collis and Montgomery, 1995). Following this logic, a company will be positioned to succeed if it has the best and most appropriate stocks of resources and capabilities. A resource-based view of joint venture suggests that the formation of a joint venture is about creating the most value out of one's existing

resources by combining these with other's resources, provided, of course, that this combination results in optimal returns (Das and Teng, 2000). All the partners involved in forming the joint venture can bring a certain set of resources to the joint venture. It is the combined resources that give the joint venture a competitive advantage over it competitors. Collective strength describes the joint venture's overall resource endowments and capabilities and it should contribute to better or worse joint venture performance (Beamish, 1987). When collective strength changes over a joint venture's life span, we will expect to see the joint venture's performance change accordingly.

Resource Commitment

According to resource-based view, resource commitment and deployment determine the sustainability of a firm's competitive advantages (Prahalad and Hamel, 1990). In this research, we define resource commitment as the size of resources (initial investment) that the foreign partners bring into the joint venture. Awadi (1987) argued, "the more resources a firm can contribute to a joint venture, the greater the likelihood that it would be selected as a partner". If we assume the joint venture formation is a mutual selection process among potential partners, it is logical to expect that the foreign firm with higher resource commitment can select a better local partner or be selected by a better local partner. Initial investment in a joint venture, though measured in monetary value, includes capital, technology, management know-how, international marketing network, etc. from the foreign company side. Combined with the complementary resources from the local partner side, which usually includes capital, production facility, local market knowledge, etc., a joint venture can create its initial resource profile to start the operation.

Resource Development and Resource Accumulation

The resource-based view holds that firms can earn sustainable competitive advantages if and only if they have superior resources, and those resources are protected by some form of isolating mechanism that prevents their diffusion throughout industry (Knott, Bryce and Posen, 2003). Valuable resource positions are developed over long periods of time (Dierickx and Cool 1989; Teece et al. 1997), and that they are inherently inimitable because would-be imitators need to replicate the entire accumulation path to achieve the same resource position.

Dierickx and Cool (1989) provide the most fully articulated model of intangible asset accumulation, from which they conclude that relative resource positions are sustainable. The sustainability arises from asset mass efficiencies and time compression diseconomies. Asset mass efficiencies imply that the more assets a firm has, the lower the marginal cost of producing further additions to the asset stock. Time compression diseconomies imply that asset accumulation can't be rushed. Even if an entrant invests in one year the total sum of the incumbent investments made over several years, it won't achieve the same resource position.

Resource accumulation theory is appealing because it both identifies a role for managers and appears to explain persistent heterogeneity of firms. Further, it provides intuition for the general tendency of incumbents to prevail (Lieberman and Montgomery, 1998). However, the theory is challenged by evidence that entrants in some instances have outperformed incumbents. A recent research found that the asset accumulation process itself cannot deter rivals, because asset stocks reach steady state rather than quickly. Entrants can achieve an incumbent's intangible asset stock merely by matching its investment until steady state. Thus, it concludes

that the accumulation process per se is not an isolating mechanism (Knott, Bryce and Posen, 2003). In the case of Chinese automobile industry, we saw several later movers (such as Honda and GM) to the market were able to build up their resource position in a short period of time and were able to surpass early movers in their market as well as financial performances.

In contrary to the traditional external emphasis, the resource-based view stresses the internal aspects of a firm. It suggests that sustained firm resource heterogeneity can become a possible source of competitive advantage, which then leads to economic rents, or above normal returns (Das and Teng, 2000). However, the benefits from the superior resources can eventually level off and even turn negative without the development of new resources and capabilities. Hitt, Hoskisson and Kim (1997) showed the effect in their work on international diversification of multinational corporations. Therefore, a true sustainable competitive advantage requires a strong base of established resources as well as the ability to continuously develop sets of new resources and capabilities and upgrade/enhance the existing resource base. New resource development requires investment in all areas of the resource profile of a firm as well as building new resources. Dierickx and Cool (1989) pointed out the distinction between stock and flow of firm resources and argued that strategic asset stocks are accumulated by choosing appropriate time paths of flows over a period of time. Therefore, a firm's competitive position and its potential profitability are determined by the level of its stocks (resource profile at the time of performance evaluation).

4.3 Development of Hypotheses

4.3.1 The Direct Effect of Timing

Timing or order of entry is a critical decision in international expansion; this is especially true in the context of emerging market economies (Luo and Peng, 1998). Many researchers have suggested that foreign investors should seek to obtain first mover advantage since the competition in the market will intensify over time (Luo, 1995; Shenkar, 1990). When entering an emerging market, early movers can exercise technological leadership, have preemptive investment opportunities and set up higher entry barrier for late entrants.

On the other hand, another stream of research supports the wait-and-see approach, arguing that the followers can benefit from early mover's efforts in learning and environment-stabilization. Therefore the late movers are in a better position to be successful in the market (Luo, 1998). Given the long-lasting theoretical debate between the two camps, we need to go back to the empirical evidences and look for some answer or ways to address the problem. According to Lieberman and Montgomery (1998), there are several general conclusions from the empirical work of the past decade: (1) Entry Order effects exist, especially with respect to market share, but they are better specified as interactions (with marketing mix?) than as direct effects. (2) The magnitude of first mover advantages varies greatly across product categories (industries) and geographic markets. (3) First-mover advantage dissipates over time but is enhanced by longer lead-time before competitive entry. (4) Entry order effects, although significant and robust, are weaker than "marketing mix" effects related to price and advertising. Later entrants can utilize this result to catch up to and surpass pioneers.

Resource base view suggests early movers are more likely to acquire rare, valuable and difficult to imitate resources in the market (Lieberman and Montgomery, 1998). In China's auto industry, early movers like Beijing Jeep, Shanghai VW were able to receive strong support from central and local governments in establishing supplier network, hard currency access, etc. These preferential treatments were not readily available to later movers like Honda and Toyota.

H1a: Early timing will lead to positive initial performance, ceteris paribus

H1b: Early timing will lead to positive performance growth trend, ceteris paribus

4.3.2 The Direct Effect of Initial Resource Commitment

According to resource-based view, resource commitment and deployment determine the sustainability of a firm's competitive advantages (Prahalad and Hamel, 1990). In this research, we define initial resource commitment as the size of resources (initial investment) that the foreign partner brings to the joint venture. Initial investment in a joint venture, though measured in monetary value, includes capital, technology, management know-how, international marketing network, etc. from the foreign company side (Hitt, Levitas, Arregle and Borza, 2000). Combined with the complementary resources from the local partner side, which usually includes capital, production facility, local market knowledge, etc., a joint venture creates its initial resource profile to start the operation.

When entering a new market, managers have to decide when to enter as well as the level of resources to commit to the entry (Mascarenhas, 1997). Large-scale entry with more resources signals commitment to a market, it can also overcome entry barriers associated with absolute cost or scale economies. This is especially true in a manufacturing industry such as automobile. Furthermore, as an industry evolves over time toward maturity, demand becomes price-sensitive,

and production becomes more efficient, small firms are more likely to fail when competing against the large firms (Olleros, 1986).

Studies have mostly shown that large-scale entry in domestic market leads to higher performance (MacMillan and Day, 1987; Hobson and Morrison, 1983). Dunne, Roberts, and Samuelson (1989) found that small entrants into United States' manufacturing industries had higher failure rates. However, several arguments suggest that large-scale entry may not be the right strategy in an international market. International markets are typically smaller, less familiar and more uncertain; this is especially true when it comes to an emerging market environment such as China. Root (1994) point out that higher international resource commitment translates into higher exposure to risks, including political risks, longer payback periods, and the difficulty of disinvestments in the event of a failure. Mascarenhas (1997) finds that larger initial resource commitments do not result in higher market share and market survival in international markets. First entrants typically commit fewer resources, suggesting that firms with limited resources can pursue this strategy. However, the author did not specify the entry mode of those firms; it is not clear whether such result may hold for those entering the market through joint venture (which is the dominant mode in emerging markets) rather than wholly owned foreign enterprise. A strong local partner with substantial resources usually can significantly lower the risk of the joint venture. In China's auto market, foreign partners cannot own more than 50% of the joint venture equity. Therefore, higher initial resource commitment from a foreign partner will lead to a stronger local partner and eventually a stronger resource profile of the joint venture.

H2a: Higher initial resource commitment will lead to higher initial performance, ceteris paribus

H2b: Higher initial resource commitment will lead to positive performance growth trend, ceteris paribus

4.3.3 The Fixed Interaction Effects of Timing and Initial Resource Commitment

Timing and initial resource commitment are two strategic factors in market entry decision and they are usually considered at the same time and are not independent of each other (Mascarenhas, 1997). If we combine the argument from the direct effects of timing and initial resource commitment, we would conclude that early movers with high initial resource commitment will be more likely to receive preferential treatment from central and local government and own a stronger resource profile to start with and have more potential to earn superior profitability and market share in its life course (see figure 4.1.).

H3a: Early movers with high initial resource commitment (committed early) will outperform all other strategies in initial performance, ceteris paribus

H3b: Early movers with high initial resource commitment (committed early) will lead to positive performance trend, ceteris paribus

H3c: Early movers with high initial resource commitment (committed early) will outperform all other strategies in the long run, ceteris paribus.

H3d: Late movers with high initial resource commitment (committed late) will outperform tentative early mover in the long run, ceteris paribus.

While we have explored the direct influences of the timing and initial resource commitment on an IJV's performance; we must realize that these decisions are usually not made independently but nested both concurrently as well as sequentially over time. One has to decide how much to invest initially as well as post-entry investments after the timing decision is made. Resource base view suggests that the sustainability of a first mover advantage will be determined not only by initial resources endowment, but also the subsequently developed resources over time.

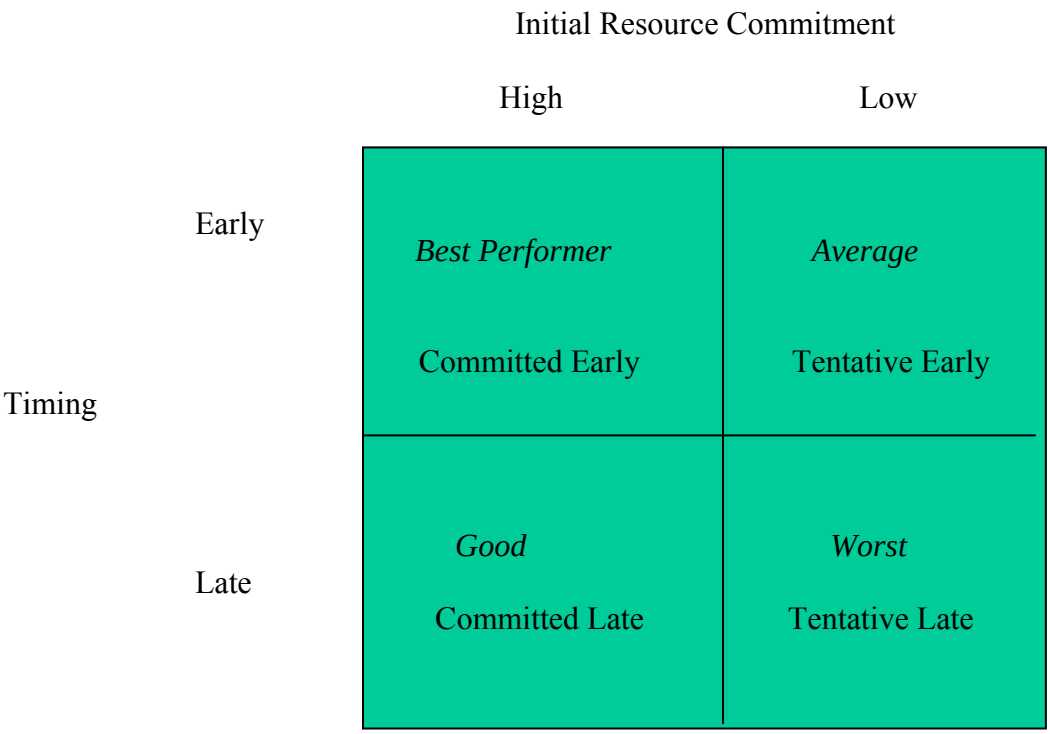

Figure 4.1. Possible Two-way Interactions and their impact on the trend of performance.

4.3.4 The Interaction Effects of Timing, Initial Resource Commitment and Resource Development

Resource Development (further building of the resources/capabilities)

The benefits from superior resource positions can eventually level off and even turn negative without the ongoing development of resources and capabilities. Hitt, Hoskisson and Kim (1997) showed this effect in their work on international diversification of multinational corporations. Therefore, a true sustainable competitive advantage requires a base of established resources as well as the ability to continuously develop sets of new resources and capabilities that upgrade/enhance the existing resource base. New resource development requires investment in a

variety of areas of the resource profile of an IJV as well as building new resources. Dierickx and Cool (1989) discussed the distinction between stock and flow of firm resources and argued that strategic asset stocks are accumulated by choosing appropriate time paths of resource flows. A firm's competitive position and its potential profitability are determined by the level of its stocks (resource profile at the time of performance evaluation). When a firm makes a capital investment in a piece of production equipment, the firm could be investing in the capability to achieve lower production costs from economies of scale that result from the increased capacity. On the other hand, it could be investing in a new technological capability to enable it to produce a new product. In other words, capital investment in a physical asset can also be an investment/building of an organizational capability (Maritan, 2001).

Although the initial resources/capabilities brought by all the partners to the joint venture is critical for the venture's early success in the market, it will not be able to guarantee sustainable competitive advantage in the long run without further development of the resources consistent with the evolution of the industry. MNCs need to continuously build and upgrade their capabilities and institutionalize innovation, learning, and information transfer (Luo, 2000). Therefore, subsequent investment from both partners after the joint venture formation stage is critical not only in terms of better utilizing the existing resources/capabilities of the joint venture, but also in building new resources/capabilities to deal with a changing market environment. Those who fail to appropriately reinvest in developing resources/capabilities of the joint venture will likely see their initial advantage gradually disappear. On the other hand, those who invest appropriately beyond the formation stage of the joint venture will be able to gain a stronger position (resource profile) over time. Initial resource commitment can be seen as the initial asset stock a joint venture obtained from the strategic factor market, and the following investment in

resource development (asset accumulation) can be seen as the "flow" and building of a firm's strategic asset stock (Dierickx and Cool, 1989). They also suggested that strategic asset stocks are accumulated by choosing appropriate time paths of flows over a period of time. Given this discussion, figure 4.2 and the following set of hypothesis are developed.

	Initial Resource Commitment			
	High		Low	
	High Dev	Low Dev	High Dev	Low Dev
Early	*Sustainable CA* Committed Early	*Weakening* Committed Early	*Strengthening* Tentative Early	*Weakening* Tentative Early
Late	*Strengthening* Committed Late	*Weakening* Committed Late	*Weak/Improving* Tentative Late	*Consistently Weak* Tentative Late

Figure 4.2. Possible Three-way Interactions and their impact on the trend of performance.

H4: Committed early movers with high resource development are more likely to be able to outperform all the other groups throughout the whole life course (positive three way interaction)

4.4 Summary of Hypotheses

This chapter has articulated and presented the theoretical foundation for the current study into relationship among three key strategic market entry decisions and their performance consequences. Building on resource base theory, I presented a research model that postulates certain relationship among timing of IJV formation, initial resource commitment, resource development, initial performance and performance trend beyond formation. Six research hypotheses developed in this study are summarized in Table 4.1. The research model and hypotheses become the main focus of the empirical analysis described in this dissertation.

Table 4.1 Summaries of Research Hypotheses

Hypothesis 1	***H1 a: Early timing will lead to positive initial performance, ceteris paribus*** ***H1b: Early timing will lead to positive performance trend, ceteris paribus***
Hypothesis 2	***H2a: Higher initial resource commitment will lead to higher initial performance, ceteris paribus*** ***H2 b: Higher initial resource commitment will lead to positive performance trend, ceteris paribus***
Hypothesis 3	***H3a: Early movers with high initial resource commitment (committed early) will outperform all other strategies in initial performance, ceteris paribus*** ***H3b: Early movers with high initial resource commitment (committed early) will lead to positive performance trend, ceteris paribus*** ***H3c: Early movers with high initial resource commitment (committed early) will outperform all other strategies in the long run, ceteris paribus.*** ***H3d: Late movers with high initial resource commitment (committed late) will outperform tentative early mover in the long run, ceteris paribus.***
Hypothesis 4	***H4: Committed early movers with high resource development are more likely to be able to outperform all the other groups throughout the whole life course (positive three way interaction)***

5.0 RESEARCH METHODOLOGY

5.1 Introduction

This chapter describes the choices made with regard to research population, research design, data collection, operationalization, and data analytical methods. Section 5.2. covers the choice of the Chinese automobile industry as empirical domain. Section 5.3. discusses the measurement of various research constructs, which involves operationalization of various constructs, and describes the employment of control measures. Section 5.5. describes the statistical methods utilized to test the hypotheses developed in this study.

5.2 Research Population

5.2.1 International Joint Ventures in the Chinese Auto Industry

As stated by Hitt and etc. (2001), the challenge in testing the resource-based view of the firm is identifying the most critical resources of firms. It is helpful to focus on a single industry in which critical resources are evident and measurable. China's auto industry has become one of the most attractive industries to foreign investors after 20 years' development (Peng, 2000) and the contracted foreign capital in this industry has surpassed US$5 billion. By the end of 2000, the

auto industry in China has established over 600 joint ventures with foreign investors from more than 20 countries and regions since it first utilized foreign capital in 1983. I have selected these international joint ventures in China's automobile industry as the population, including all the major assemblers and parts as well as components providers. The current sample size is 439; the total number of observations is 2085 (firm/year).

5.2.2 Research Design

The theoretical model of my study calls for a longitudinal design where the same subjects (IJV) are followed at successive points in time. The subjects (IJVs) are measured repeatedly on a number of variables relevant to the phenomenon of interest. This type of design is suitable for investigating matters of intra-individual (the resource development-performance path of an IJV) as well as inter-individual change (the different resource development-performance paths among IJVs in the industry). Therefore, it is appropriate to explore the evolution of resource development and performances of firms over time. For each joint venture, its evolution of performance is captured by an initial performance and its growth trend beyond that.

5.3 Data Collection

To understand the dynamics in joint venture evolution, I not only studied extant literature in the areas of strategic alliances and firm evolution but also supplemented this knowledge with fieldwork in a few international joint ventures (Shanghai GM, Delphi Shanghai, Shanghai Yanfeng, etc) as well as archival date on China's auto industry from 1981 to 2002. A substantial

amount of other sources were used to verify and understand the industry context and firm behaviors, such as case studies, trade journals, newspapers and interviews with experts in the auto industry.

5.3.1 Sources of Data

Many secondary data sources were used to obtain data and cross verify the reliability of the data:

(1). Online database for China's auto industry (1997-2002);
---China Auto Technology Research Center (CATRC)

(2). Directory of FDI in China (1984-1996); ---China Business Review

(3). Chinese Auto Industry Year Book (1983, 1985, 1987, 1989-2001); ----CATRC

(4). Directory of FDI in China's auto industry (1996, 2000-2001 version);
---China Automobile Industry Association

(5). Internal documents on automobile manufacturers (1982, 1983-1984, 1986-1988, 1989, 1991, 1995, 1996, 1999), CATRV, China Automobile Industry Association.

(6). Other sources such as trade journals, newspapers, books, etc. ---China Business Update

5.3.2 Collection Process

The data collection effort started in 1999 and has been going on ever since. Three trips covered Shanghai, Beijing, Tianjin and Shenyang in 2000, 2001 and 2002. The editors of the yearbooks and databases were directly contacted to ensure the accurate interpretation of the parameters. The latest 2002 data was procured in September 2003.

5.4 Measures of Research Constructs

5.4.1 Timing of Joint Venture Formation

Timing of joint venture formation: 2002 minus the year of joint venture formation

There are two approaches in measuring competitive market entry, the categorical or continuous. The categorical approach assesses entry order in terms of strategy types, such as first (early) mover, second mover and late movers (Luo, 1998). This approach is often used for analyzing an oligopolistic industry or a market segment. The continuous approach sees entry as a degree of earlier/later; it measures timing by using the time difference in entry date and a specific date (it can be the date when the first mover came in). I am using this approach because it fits better with a competitive market with many firms. I am also considering using the order of entry at the market segment level at later stage, for example, who is the first mover at passenger car market, who is the second mover at car engine market, etc. It may be more appropriate to compare car manufacturers with car manufacturers.

Another way of studying the entry timing is to measure it by years elapsed since try to the market and see it as a time varying variable (Sinha and Noble, 1997), for a nine year panel, a firm entering at year 1 is coded as 1, 2, 3, 4, 5, 6, 7, 8, 9.; a firm entering at year 4 is coded as 0,0,0,1,2,3,4,5,6. But this method is really measuring the age of the firm. It is not appropriate since we will use age at level 1 of the HLM analysis to depict the development trend over time.

5.4.2 Initial Resource Commitment

Initial Resource Commitment: Initial Investment from the foreign partner

The initial investment from the foreign partner usually includes not only capital investment but also the technology and management expertise, the latter two were typically factored in the total investment figure at the negotiation stage. This measure can also be seen as the size of entry as used by Mascarenhas (1997).

5.4.3 Resource Development

Resource Development: The amount of new investment into the JV in the given year

There is no prior literature base for this measure to my knowledge. This measure captures the investment both in basic infrastructure such as plant expansion and technological improvement by the joint venture.

5.4.4 Performances of International Joint Ventures

How to predict and evaluate performance of IJVs has been a challenging issue for both practitioners and researchers (Child and Yan, 2003; Beamish and Delios, 1997). This challenge is particularly relevant when it comes to the context of China. Among all the emerging market economies, China has attracted the largest amount of foreign direct investment and formed the largest number of IJVs since the beginning of its economic reform in 1978. Further more, the performance records of Sino-foreign joint ventures is highly variable. While highly successful IJVs are widely acknowledged, such as Motorola, Shanghai Volkswagen, etc.; there are plenty of example of failures such as Guangzhou Peugeot. External forces such as uncertain regulatory and

tax environment, and price competition have been used to explain the difficulties that face China-based IJV as a whole. These forces do not necessarily account for variations in performances among the IJVs (Child and Yan, 2003). The firm-level factors are more likely to offer the explanation power.

In the entry order research, market share has been used widely as a good measure to show the existence of the effect (Kerin, Varadarajan, and Peterson, 1992). Here, I used annual sales as the equivalent of market share. On the other hand, Lieberman, and Montgomery (1998) and other researchers called for using profitability measures to test the rigor of entry order effect. I used net profit per employee in this study. These two measures are also the two most used objective performance measures in strategy literature as well as the international joint venture literature (Geringer and Hebert, 1990).

5.4.5 Control Variables

Entry Mode

International market entry literature suggests that entry mode can influence the extent of the resource commitment, the degree of the project's local dependence (Luo, 1998; Beamish and Banks, 1987). Therefore it could affect the relationship that I am examining. Since joint venture is the dominant form of FDI in China's auto industry and all the firms in my sample are joint ventures, Entry mode has been controlled.

Equity Ratio

Equity ratio of the foreign partner is treated as a control variable in this study because it also represents a firm's resource commitment level to the joint venture and may influence its relative power, the extent of control over the IJV operation (Luo, 1997; Shan, 1991)

Size of the joint venture (number of employees)

Consistent with previous studies (e.g. Gomes and Ramaswamy, 1999; Luo, 1997) firm size is employed as a control variable. Firm size is measure by number of employees in a joint venture each year-end. It is used to control for potential effect of scale economy effects.

Key Events

1992 is a special year in China auto market. Deng went for his famous southern tour this year and China announced the adoption of market economy in its 14th People's Congress. The demand for new cars increased significantly over the last decade. I used 1992 as the dividing point between early and late movers.

5.5 Data Analysis Techniques

5.5.1 Data Structure

The data set can be viewed as an accelerated longitudinal design (cohort-sequential design). It covers all the main international joint ventures in China's auto industry. The time span is from 1983 (the year when first IJV was established) to 2002, which covers the foreign direct investments in the auto industry from the beginning to date. For each observation (firm year), I have a series of industry data, firm level data including IJV characteristics and IJV performance. Since IJVs are formed in different years, we have 19 cohorts of IJVs from 1981 to 2000. Within

each cohort, the number of IJVs is different, ranging from 1 to 68 (Table 5.1). This data structure is best viewed in terms of observations nested within each IJV.

Table 5.1 Date Structure

Time of Formation (Cohort)	Number of Observations	Number of New IJVs	Total Investment (1990 $ millions)
1981		1	2.82
1983		1	195.65
1984	2	4	765.01
1985	4	5	898.31
1986	2	2	9.41
1987	5	4	121.78
1988	11	10	524.12
1989	14	6	59.34
1990	15	7	2352.58
1991	33	18	487.78
1992	30	56	1276.38
1993	54	63	1468.55
1994	87	53	1036.37
1995	141	68	1371.28
1996	182	36	2703.87
1997	237	40	1744.35
1998	296	30	2144.37
1999	321	26	115.16
2000	306	7	77.99
2001	274		
2002	270		

5.5.2 Hierarchical Linear Modeling

Latent Growth Models and HLM

Latent Growth Models are applicable to data where individuals are measured repeatedly over a period of time. The questions of interest focus on the trajectory or pattern of change (or

growth). Parameters of the trajectory, such as the slope, can then be related to other participant characteristics. In growth models there are two levels of analysis. At level 1, the unit of analysis is the repeated observations within a subject. The Level 2 units are the participants themselves. In Latent Growth Curve methodology, a structural equation modeling (SEM) approach is often used to estimate the parameters of the growth model. This approach capitalizes on the measurement model aspects of SEM to specify the Level 1 model, and on the structural model aspect of SEM to specify the Level 2 models. Growth models may also be analyzed within the context of hierarchical or multilevel models (e.g., Bryk & Raudenbush, 1992; Goldstein, 1995). Each approach has certain advantages and limitations. One key distinction is that the values for the time variable are part of the date set when using a multilevel program such as HLM or when using PROC MIXED in SAS. Thus the value of time need not be constant across participants. However, the time values become the fixed loadings in the measurement model for the latent slope when analyzing the data using SEM software such as LISREL. Therefore, time of measurement must be constant across participants when using many SEM programs for latent growth modeling. This is a limitation of the SEM approach for situations where the design of the study does not permit manipulation of the time variable. In this study, IJVs are formed in different years; therefore, time of measurement is not constant across participants (IJVs in this case). Given the nature of my hypotheses and the data set, hierarchical linear modeling (HLM) is an appropriate analytical tool.

HLM can explicitly recognize and investigate systematic individual change patterns over time, it can provide for the estimation of both static and longitudinal performance parameters (i.e., intercept and slope), and it enables analysis of both within- and between-firm performance change patterns. HLM can incorporate both multiple fixed factors (timing, initial resource

commitment, etc.) and time-varying covariates (resource development) in the model. Especially noteworthy is the possibility for both the number of observations per individual, and the spacing of these observations in time, to vary (Raudenbush and Bryk, 2002).

HLM allows for the investigation of both within-and between group effects on an individual-level dependent variable through an empirical Bayesian estimation process in which two different models are estimated iteratively. A within group or "level 1" analysis is used to estimate two separate parameters describing the relationship between the predictors and the focal dependent variable within each group (i.e. within-group intercepts and slope). These intercept and slope parameters obtained from the level-1 analysis serve as the dependent variables in equations used for a between-group or "level-2" analysis. A group-level or contextual effect is suggested by the presence of a significant parameter estimate (gamma coefficient, γ) for level-2 predictors of the level-1 intercepts. This provides the operational test for our hypothesis. Further more, a significant gamma associated with a level-2 predictor in an equation modeling variance in the slope estimates indicates that the variable moderates the relationship between level-1 independent and dependent variables. This provides the operational test for my hypotheses 1 through 5.

Almost all longitudinal investigations conducted by organizational scientists are hierarchical in nature. The nested nature of these data would include multiple observations within a unit and a sample of multiple units. Thus, one would have within unit level 1 model, and a between unit level-2 model. From a theoretical perspective, one is essentially investigating inter-unit differences in intro-unit change (Hofmann, 1997). While several researchers have discussed and demonstrated the hierarchical, nested nature of longitudinal data (Hofmann, Jacobs and Baratta, 1993), the use of HLM or other multilevel methods in management field is

still very limited. To my knowledge, this study will be the first systematic application of HLM in the strategic alliance and market entry domain.

5.6 Chapter Summary

This chapter presented the choices made with regard to research population, research design, sample and data collection, measurement and as well as data analytical methods. The next chapter presents the results of testing research hypotheses developed in chapter 4.

Note: Multilevel model can be summarized in equation format; some software (HLM) has two separate levels, other software (MLWin) use one equation.

For HLM:

Level-1 Model
Y = B0 + B1*(AGE) + B2*(AINEWINV) + R

Level-2 Model
B0 = G00 + G01*(TIMING) + G02*(REALIM) + G03*(TXIM) + G04*(EQUITY_R) +U0
B1 = G10 + G11*(TIMING) + G12*(REALIM) + G13*(TXIM) + G14*(EQUITY_R) +U1
B2 = G20 + G21*(TIMING) + G22*(REALIM) + G23*(TXIM) + G24*(EQUITY_R) +U2

For MLWin:

Y= G00 + G01*(TIMING) + G02*(REALIM) + G03*(TXIM) + G04*(EQUITY_R) +U0
+AGE*G10 +AGE*G11*(TIMING) + AGE*G12*(REALIM) + AGE*G13*(TXIM)
+AGE* G14*(EQUITY_R) +AGE*U1) + (AINEWINV)*G20 +
(AINEWINV)*G21*(TIMING) + (AINEWINV)*G22*(REALIM) +
(AINEWINV)*G23*(TXIM) + (AINEWINV)*G24*(EQUITY_R) + (AINEWINV)*U2

6.0 TESTS OF RESEARCH HYPOTHESES AND RESULTS

6.1 Introduction

This chapter presents the results of the research hypotheses developed in this study. Section 6.2 reports the test results of the ordinary least squares (OLS) regression analysis of the 19 cohorts of joint ventures for testing the sensitivity of the result to time selection. Section 6.3 reports the test results of longitudinal analysis using Hierarchical Linear Modeling (HLM) for testing hypotheses 1a through 4. This section includes the tests for direct effects of timing, initial resource commitment, two-way interaction effects of timing and initial resource commitment, and the three-way interaction of timing, initial resource commitment and resource development. Section 6.4 summaries the test results of all the hypotheses.

6.2 Sensitivity Test of Cross-sectional Analysis of the Timing Effects

One of the most critical limitations of empirical research on entry order effects is the use of cross-sectional data rather than longitudinal data. The environment in an emerging market is characterized as unstable and ever changing, therefore, the relationship between timing and performance should be studied from a dynamic perspective. The result of empirical tests will be

sensitive to the year chosen to evaluate the timing—performance relationship under this assumption. To demonstrate this, we will use our data set as several cross-sectional data and test the relation separately. Previous timing studies also suggest the need to go beyond timing to explain performance (e.g., Golder and Tellis, 1993; Green, Barclay, and Ryans, 1995). Along this line of argument, more factors will emerge when time passes, therefore the timing effect should be expected to diminish gradually.

In testing the effectiveness of the new multilevel (HLM) method, I need to test whether the widely used multivariable regression with cross-sectional data can provide a consistent result on the entry order/timing effect on performance. The current longitudinal dataset can be seen as 19 cross-sectional data sets. I conducted a multivariate regression with each data set and observe the consistence and trend of timing effect over time. Initial investment and the interaction of timing and initial investment were also used as independent variables in the model; the dependent variable is profit/per employee.

The following table 6.1 is a summary of the results from 13 OLS regression tests. The data prior to 1991 were pooled due to small sample size. The results shows that the timing effect is not stable over time, in 5 out 13 tests, the effect was not statistically significant. **Hypothesis 1a** was supported. Therefore, the selection of time to evaluate the phenomenon became critical to the detection of such effect. The result supports the use of a longitudinal approach that can capture the whole life course of the phenomenon. On the other hand, two interesting observations call for some attention. First, the coefficients are all positive except year 2001 and 2002, it seems to suggest basically early timing has a consistent positive effect on performance till 2001 and 2002. Second, the coefficients are declining over time may suggest that the timing effect is stronger at the early stage of the industry life cycle, and getting weaker (diminishing) when the

industry/market gets mature. At the end, it actually became a liability. It partially supports Hypothesis 1b that expect the timing effect to diminish over time.

Table 6.1. Results on sensitivity of timing effects to the choice of year

	Standardized Timing Coefficient	T Statistics	F Statistics
Pre 1991	.254	1.83	.074
1991	.263	1.86	.074
1992	.286	1.31	.204
1993	.336	2.67	.010 **
1994	.114	0.293	.771
1995	.273	3.09	.002 ***
1996	.187	2.48	.014 **
1997	.127	1.49	.137
1998	.133	2.29	.022 **
1999	.106	2.36	.019 **
2000	.035	0.80	.424
2001	-.126	-2.088	.038 **
2002	-.152	-2.45	.015 **

The above cross-sectional results show the sensitivity of the timing effect to the choice of year. With multilevel analysis (longitudinal), we may be able to get a more convincing test for the timing effect on performance throughout a joint venture's life course.

6.3. Test Results of Longitudinal Analysis Using Hierarchical Linear Modeling (HLM)

There are 439 IJVs in the full sample and among them 113 are assemblers, the rest 326 IJVs are suppliers. There are two performance measures, profitability and sales. First, I test the full sample with sales as the dependent variable. Second, I tested the full sample with profitability as

the dependent variable. The third test is for assemblers with profitability as the dependent variable. The fourth test is for assemblers with sales as the dependent variable. These four tests will help me ensure the robustness of the result and also see if assemblers are a better sub-sample in detecting the expected effects. Initially I included Age Square to test the possible quadratic growth curve, it turns out it is not significant in all four tests, so I left it out in the final tests.

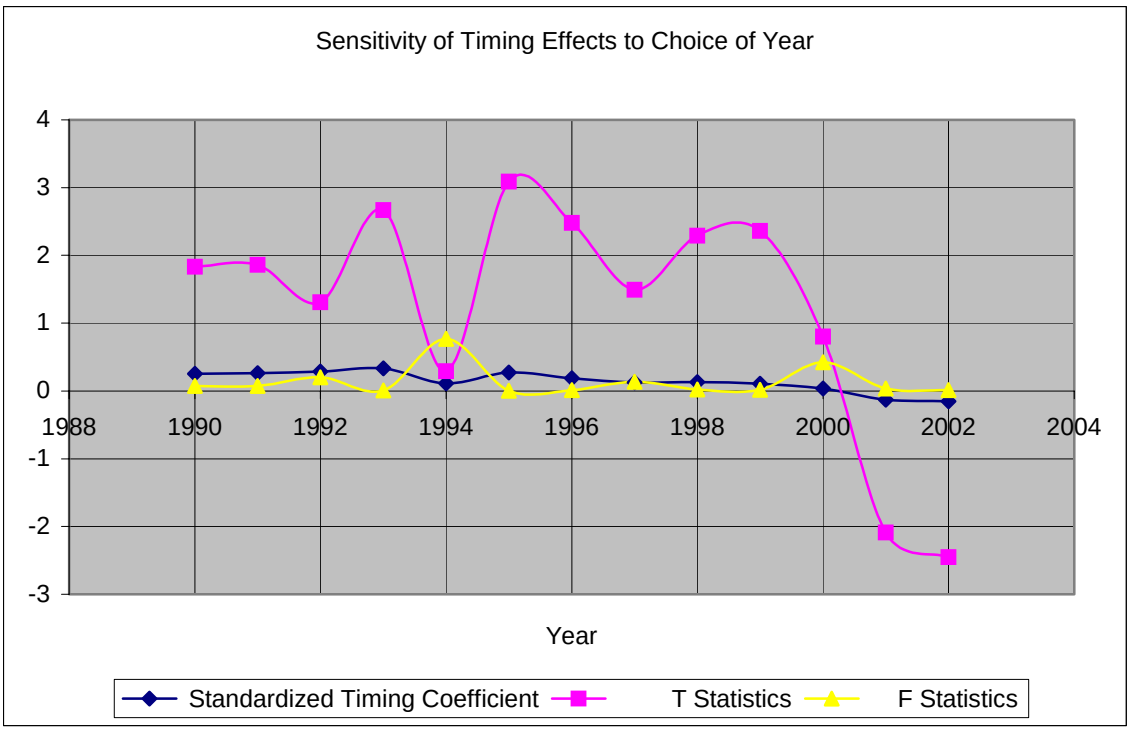

Figure 6.1. Results on Sensitivity of Timing effect to Choice of Year

In order to identify different paths of success, I treated Timing and Initial Resource Commitment as Discrete/Class variables, so that I could divide the whole sample into 4 groups

that represent four distinctive pathways or strategies at the time of market entry. These 4 groups are Committed Early, Committed Late, Tentative Early and Tentative late (see figure 4.1.).

Given the two measures for performance and the differences between assemblers and full sample, I conducted eight separate tests for the two-way interaction effects on initial performance and performance growth trend (see figure 6.2., figure 6.3, figure 6.4, figure 6.5.). Two-level HLM was used to obtain the initial performance (intercept) and performance growth trend (slope).

Test 1: Full Sample with Sales as Dependent Variable

Descriptive Statistics and Model Explanation

Table 6.1 presents the number of observations, means, standard deviation and minimum, maximum value of level variables. Table 6.2 presents the same descriptive statistics for level-2 variables. All the numbers are in constant 1990 RMB.

Table 6.2 Level -1 Descriptive Statistics for all study Variables (all IJVs)

Variable Name	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Age	1954	6.40	3.39	1.00	20.00
Resource Development	1954	40.33	173.46	-142.36	3213.23
Sales	1954	574.87	2280.95	0	35665.96

Table 6.3 Level -2 Descriptive Statistics for all study Variables (all IJVs)

Variable Name	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Timing	433	7.89	3.20	2.00	21.00
Initial Resource Commitment	433	17.41	75.47	0.03	901.84
Timing X Initial Resource Commitment	433	151.12	682.04	0.11	10822.08
Equity Ratio	433	45.06	17.21	2.00	95.00

Summary of the model specified (In equation format)

Level-1 Model
Y = B0 + B1*(AGE) + B2*(AINEWINV) + R

Level-2 Model
B0 = G00 + G01*(TIMING) + G02*(REALIM) + G03*(TXIM) + G04*(EQUITY_R) +U0
B1 = G10 + G11*(TIMING) + G12*(REALIM) + G13*(TXIM) + G14*(EQUITY_R) +U1
B2 = G20 + G21*(TIMING) + G22*(REALIM) + G23*(TXIM) + G24*(EQUITY_R) +U2

Note:
The outcome variable Y is Sales measured by year-end sales
AGE is the age of the IJV at the time of evaluation
AINEWINV is resource development (new investment each year in 1990 constant RMB)
TIMING is timing
REALIM is initial investment in millions (1990 constant RMB)
TXIM is the interaction term of timing and initial investment
EQUITY_R is the equity ratio of foreign partner
B0 is the sales at the end of first year (age 0)
B1 is the slope of the sales growth line
B2 is the slope of the resource development
G01 tests the effect of timing on initial performance
G02 tests the effect of Initial resource commitment on initial performance
G03 tests the interaction effect of timing and initial resource commitment on initial performance
G11 tests the effect of timing on performance growth trend
G12 tests the effect of Initial resource commitment on performance growth trend
G13 tests the interaction effect of timing and initial resource commitment on performance growth trend
G23 tests the three-way interaction effect on performance.

Hypothesis 1a predicts direct positive effect of timing on initial performance. The effect coefficient G01 is positive and significant, thus H1a receive strong support.

Hypothesis 1b predicts positive impact of timing on performance growth trend. The effect coefficient G11 is negative and insignificant. Thus, H1b is not supported.

Hypothesis 2a predicts direct positive effect of initial resource commitment on initial performance. The effect coefficient G02 is positive and significant, thus H2a receive full support.

Hypothesis 2b predicts positive impact of initial resource commitment on performance growth trend. The effect coefficient G12 is positive and significant. Thus, H2b is supported.

Hypothesis 3a predicts positive interaction effects of timing and initial resources commitment on initial performance. The effect coefficient G03 is negative and significant, thus H3a was not supported in the expected direction.

Hypothesis 3b predicts positive interaction effects of timing and initial resources commitment on performance growth trend. The effect coefficient G13 is positive and significant, thus H3b receive strong support.

Hypothesis 4 predicts positive three way interaction effects of timing, initial resource commitment and resource development on IJV performance. The effect coefficient G 23 is positive but marginally significant ($p=0.06$). Therefore, H4 is marginally supported.

Table 6.4. Result of HLM analysis (full sample with sales)

The outcome variable is ASALES
Final estimation of fixed effects:

Fixed Effect	Standard Coefficient	Error	Approx. T-ratio	d.f.	P-value	
For INTRCPT1, B0						
INTRCPT2, G00	-641.470502	255.411238	-2.512	428	0.012	
TIMING, G01	70.361593	20.094537	3.502	428	0.001	***
REALIM, G02	14.211585	1.629153	8.723	428	0.000	***
TXIM, G03	-2.853938	0.183234	-15.575	428	0.000	***
EQUITY_R, G04	3.879233	3.621030	1.071	428	0.284	
For AGE slope, B1						
INTRCPT2, G10	129.777571	46.449784	2.794	428	0.006	
TIMING, G11	-5.468003	3.539827	-1.545	428	0.122	
REALIM, G12	1.334535	0.328651	4.061	428	0.000	***
TXIM, G13	0.210898	0.032658	6.458	428	0.000	***
EQUITY_R, G14	-0.892691	0.633068	-1.410	428	0.159	
For AINEWINV slope, B2						
INTRCPT2, G20	-2.736810	2.301135	-1.189	428	0.235	
TIMING, G21	0.159777	0.164968	0.969	428	0.333	
REALIM, G22	-0.011835	0.005220	-2.267	428	0.023	*
TXIM, G23	0.001128	0.000602	1.873	428	0.061	
EQUITY_R, G24	0.053861	0.032719	1.646	428	0.099	

Notes: ***p < .001 *p < .05

Test 2: Full Sample with Profitability as Dependent Variable (see APENDIX C)

Hypothesis 1a predicts direct positive effect of timing on initial performance. The effect coefficient G01 is negative and insignificant, thus H1a is not supported.

Hypothesis 1b predicts positive impact of timing on performance growth trend. The effect coefficient G11 is negative and significant. Thus, H1b is not supported.

Hypothesis 2a predicts direct positive effect of initial resource commitment on initial performance. The effect coefficient G02 is positive and significant, thus H2a receive full support.

Hypothesis 2b predicts positive impact of initial resource commitment on performance growth trend. The effect coefficient G12 is positive but insignificant. Thus, H2b is not supported.

Hypothesis 3a predicts positive interaction effects of timing and initial resources commitment on initial performance. The effect coefficient G03 is negative and significant, thus H3a was not supported in the expected direction.

Hypothesis 3b predicts positive interaction effects of timing and initial resources commitment on performance growth trend. The effect coefficient G13 is positive but insignificant, thus H3b is not supported.

Hypothesis 4 predicts positive three way interaction effects of timing, initial resource commitment and resource development on IJV performance. The effect coefficient G 23 is negative and statistically insignificant. Therefore, H4 is not supported.

Table 6.5. Result of HLM analysis (full sample with Profitability)

The outcome variable is APROFIT

Final estimation of fixed effects (with robust standard errors)

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	
For INTRCPT1, B0						
INTRCPT2, G00	6.759030	4.853455	1.393	422	0.164	
TIMING, G01	-0.374190	0.428943	-0.872	422	0.383	
REALIM, G02	0.125372	0.026930	4.655	422	0.000	***
TXIM, G03	-0.013256	0.003720	-3.563	422	0.001	***
EQUITY_R, G04	-0.021119	0.036409	-0.580	422	0.561	
For AGE slope, B1						
INTRCPT2, G10	1.411410	0.530046	2.663	422	0.008	
TIMING, G11	-0.090966	0.040966	-2.221	422	0.026	*
REALIM, G12	0.001523	0.005994	0.254	422	0.799	
TXIM, G13	0.000700	0.000529	1.322	422	0.186	
EQUITY_R, G14	-0.000160	0.005818	-0.027	422	0.978	
For AINEWINV slope, B2						
INTRCPT2, G20	-0.046105	0.382002	-0.121	422	0.904	
TIMING, G21	0.005641	0.031827	0.177	422	0.860	
REALIM, G22	0.001048	0.000853	1.228	422	0.220	
TXIM, G23	-0.000049	0.000079	-0.622	422	0.534	
EQUITY_R, G24	-0.003903	0.002998	-1.302	422	0.193	

Notes: ***p < .001 *p < .05

Test 3: Assemblers with Profitability as Dependent Variable (see APENDIX A)

Descriptive Statistics and Model Explanation

Table 6.6 presents the number of observations, means, standard deviation and minimum, maximum value of level variables. Table 6.7 presents the same descriptive statistics for level-2 variables. All the numbers are in constant 1990 RMB.

Table 6.6 Level -1 Descriptive Statistics for all study Variables (assemblers)

Variable Name	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Age	701	6.65	3.75	1.00	20.00
Resource Development	701	89.20	276.89	-142.36	3213.23
Profitability	701	5.30	15.41	-39.26	167.96

Table 6.7 Level -2 Descriptive Statistics for all study Variables (assemblers)

Variable Name	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Timing	113	8.49	3.48	2.00	19.00
Initial Resource Commitment	113	44.89	142.65	0.10	901.84
Timing X Initial Resource Commitment	113	413.13	1291.28	0.34	10822.08
Equity Ratio	113	43.95	18.5	5.00	95.00

Table 6.8. Result of HLM analysis (assemblers with profitability)

The outcome variable is APROFIT

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	
For INTRCPT1, B0						
INTRCPT2, G00	-2.753013	3.527598	-0.780	109	0.435	
TIMING, G01	0.860739	0.385636	2.232	109	0.026	*
REALIM, G02	0.141274	0.018971	7.447	109	0.000	***
TXIM, G03	-0.016161	0.002070	-7.808	109	0.000	***
For AGE slope, B1						
INTRCPT2, G10	0.482555	0.551962	0.874	109	0.382	
TIMING, G11	-0.056794	0.055078	-1.031	109	0.303	
REALIM, G12	0.000768	0.003464	0.222	109	0.825	
TXIM, G13	0.000862	0.000319	2.700	109	0.007	***
For AINEWINV slope, B2						
INTRCPT2, G20	0.000656	0.017754	0.037	109	0.971	
TIMING, G21	-0.000308	0.001677	-0.184	109	0.855	
REALIM, G22	-0.000162	0.000046	-3.501	109	0.001	***
TXIM, G23	0.000014	0.000005	2.764	109	0.006	**

Notes: ***p < .001 **p<.01 *p < .05

Hypothesis 1a predicts direct positive effect of timing on initial performance. The effect coefficient G01 is positive and significant, thus H1a receive strong support.

Hypothesis 1b predicts positive impact of timing on performance growth trend. The effect coefficient G11 is negative and insignificant. Thus, H1b is not supported.

Hypothesis 2a predicts direct positive effect of initial resource commitment on initial performance. The effect coefficient G02 is positive and significant, thus H2a receive full support.

Hypothesis 2b predicts positive impact of initial resource commitment on performance growth trend. The effect coefficient G12 is positive and significant. Thus, H2b is supported.

Hypothesis 3a predicts positive interaction effects of timing and initial resources commitment on initial performance. The effect coefficient G03 is negative and significant, thus H3a was not supported in the expected direction.

Hypothesis 3b predicts positive interaction effects of timing and initial resources commitment on performance growth trend. The effect coefficient G13 is positive and significant, thus H3b receive strong support.

Hypothesis 4 predicts positive three way interaction effects of timing, initial resource commitment and resource development on IJV performance. The effect coefficient G 23 is positive and statistically significant. Therefore, H4 is supported.

Test 4: Assemblers with Sales as Dependent Variable (see APENDIX B)

Hypothesis 1a predicts direct positive effect of timing on initial performance. The effect coefficient G01 is positive and significant, thus H1a receive strong support.

Hypothesis 1b predicts positive impact of timing on performance growth trend. The effect coefficient G11 is negative and insignificant. Thus, H1b is not supported.

Hypothesis 2a predicts direct positive effect of initial resource commitment on initial performance. The effect coefficient G02 is positive and significant, thus H2a receive full support.

Hypothesis 2b predicts positive impact of initial resource commitment on performance growth trend. The effect coefficient G12 is positive and significant. Thus, H2b is supported.

Hypothesis 3a predicts positive interaction effects of timing and initial resources commitment on initial performance. The effect coefficient G03 is negative and significant, thus H3a was not supported in the expected direction.

Hypothesis 3b predicts positive interaction effects of timing and initial resources commitment on performance growth trend. The effect coefficient G13 is positive and significant, thus H3b receive strong support.

Hypothesis 4 predicts positive three way interaction effects of timing, initial resource commitment and resource development on IJV performance. The effect coefficient G 23 is positive and statistically significant. Therefore, H4 is supported.

Table 6.9. Result of HLM analysis (assemblers with sales)

The outcome variable is ASALES

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	
For INTRCPT1, B0						
INTRCPT2, G00	-1416.114475	573.382389	-2.470	109	0.014	
TIMING, G01	178.034407	63.326273	2.811	109	0.005	**
REALIM, G02	16.394529	3.007940	5.450	109	0.000	***
TXIM, G03	-3.263373	0.347198	-9.399	109	0.000	***
For AGE slope, B1						
INTRCPT2, G10	230.542987	109.118132	2.113	109	0.034	
TIMING, G11	-12.170951	11.438825	-1.064	109	0.288	
REALIM, G12	1.140065	0.599716	1.901	109	0.057	*
TXIM, G13	0.240834	0.061873	3.892	109	0.000	***
For AINEWINV slope, B2						
INTRCPT2, G20	1.106062	1.610224	0.687	109	0.492	
TIMING, G21	0.006141	0.143320	0.043	109	0.966	
REALIM, G22	-0.013128	0.003862	-3.400	109	0.001	***
TXIM, G23	0.001233	0.000398	3.100	109	0.002	**

Notes: ***p < .001 **p<.01 *p < .05

Test 5 through Test 12: Identifying the Paths to Success

Test 5 through 12 covered the two-way interaction effect on profit/sales using the assembler/full sample data. I plotted the results in Figure 6.2, Figure 6.3, Figure 6.4. and Figure 6.5. So I can get a visual demonstration of different paths. Please see Appendix E for a detailed result from HLM analysis.

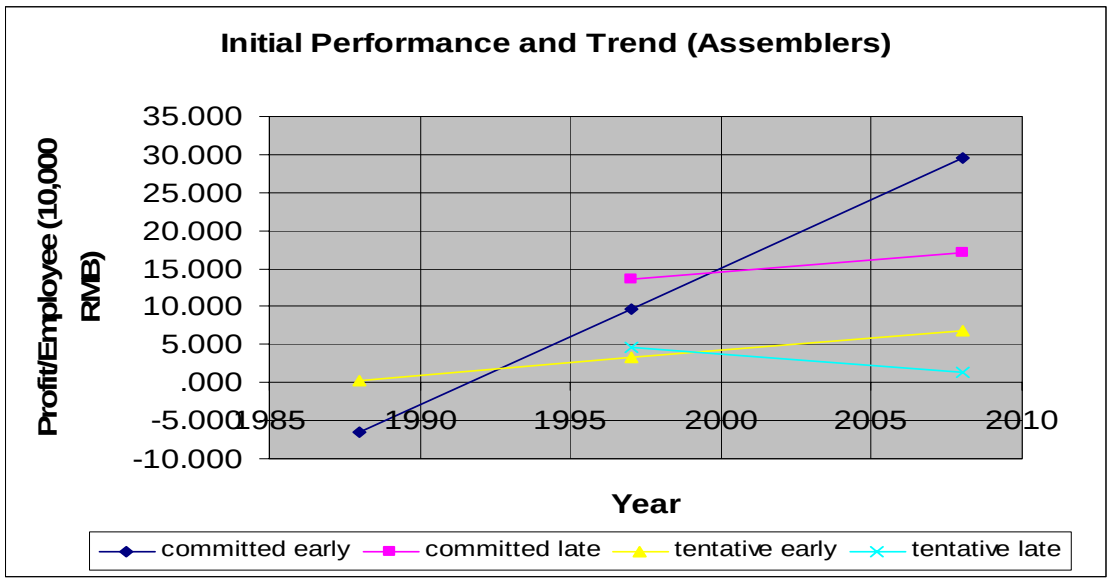

Figure 6.2. Two-way Interaction Effects on Profit (with assemblers)

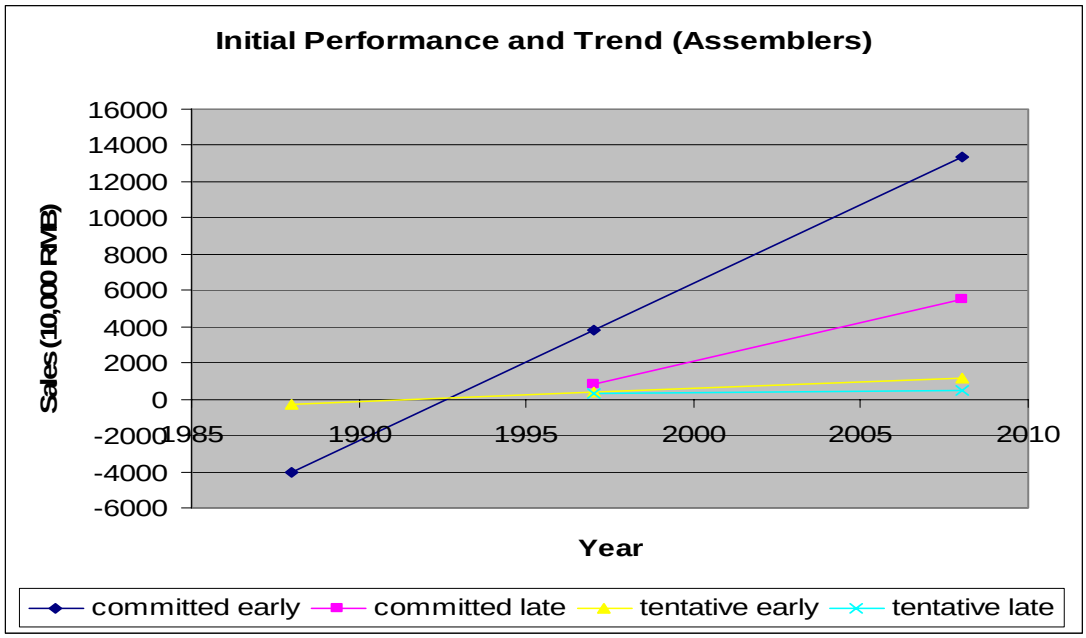

Figure 6.3. Two-way Interaction Effects on Sales (with assemblers)

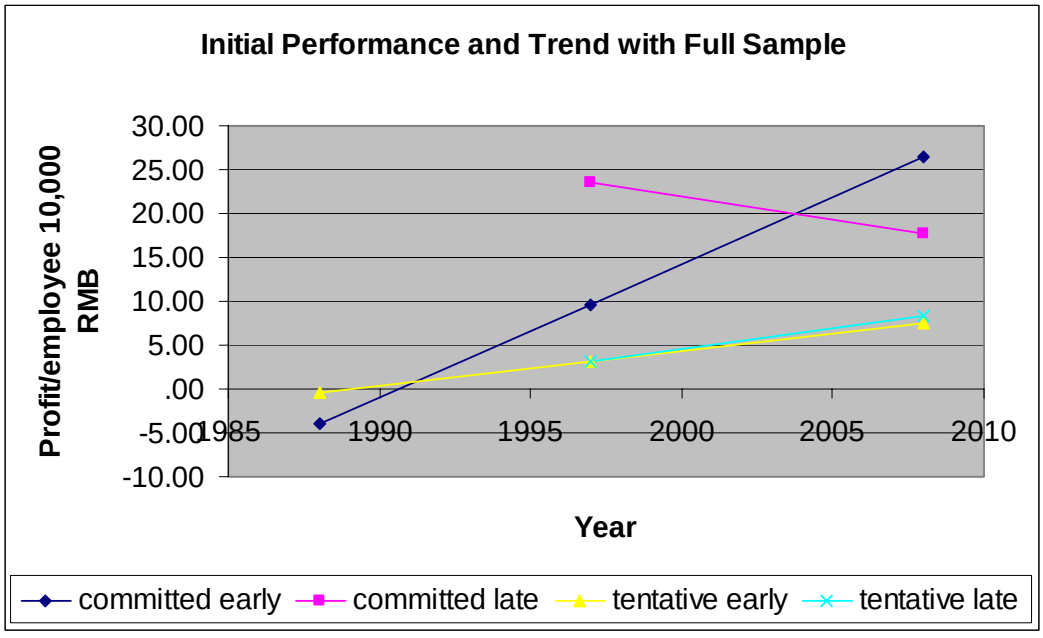

Figure 6.4. Two-way Interaction Effects on Profit (with full sample)

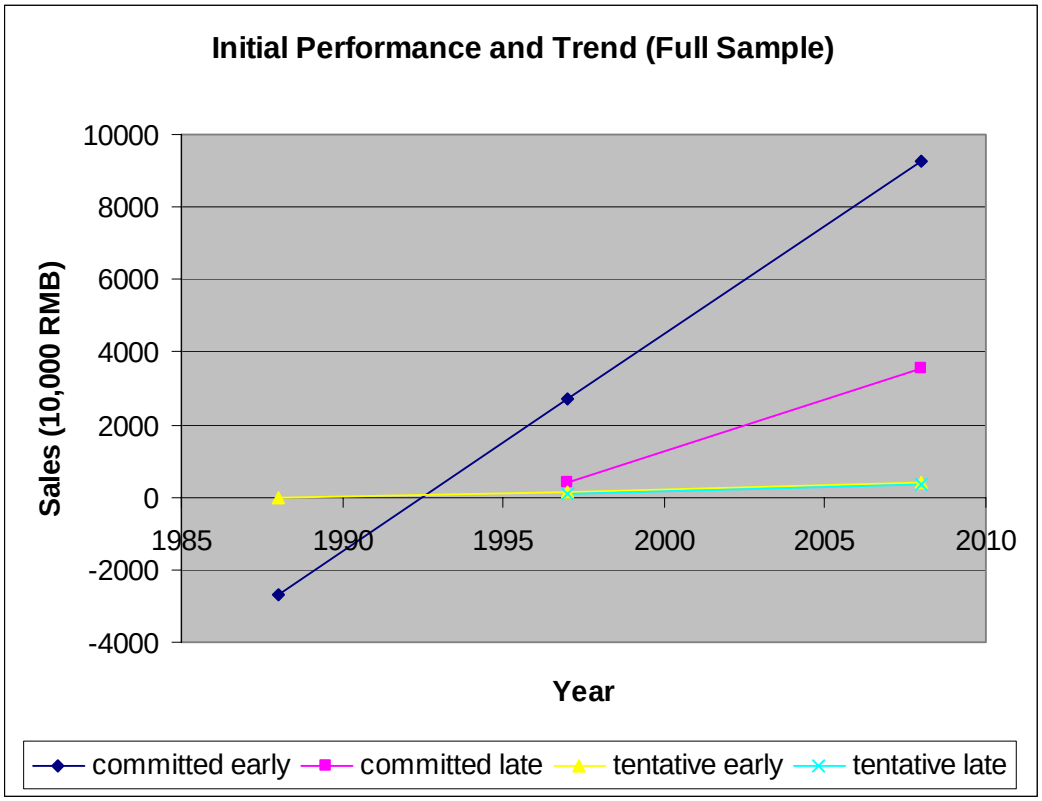

Figure 6.5. Two-way Interaction Effects on Sales (with full sample)

Note: For Early Movers, I assume they started in 1988, the mean between 1983 and 1992

I used 1992 as the dividing point for early or late, due to the historic change

For Later Mover, I assume they started in 1997, the mean between 1992 and 2002.

Test 5 through 12 intended to deal with Hypothesis 3c and Hypothesis 3d.

Hypothesis 3c predicts committed early mover will outperform all other IJVs following different strategies. This was supported across all the 8 tests. Therefore moving early with high initial commitment is the best strategy for firms entering Chinese automobile market.

Hypothesis 3d predicts committed late mover will outperform tentative early mover in the long run. This was again support across all 8 tests. This result is interesting because it points out alternative path to success and also explains why some late movers can outperform early movers.

6.4. Additional Tests with Alternative Measures

To test the stability of the current results, I used different measures in additional HLM analysis. First, **Market Share** is used as the measure for market performance instead of **Sales**, so that the size of the total market for each year is controlled. Second, **Total investment** from all the partners are used as the measure for initial resource commitment instead of **investment from only the foreign partner**, so that the commitment from all the relevant partners is considered. The tests are done for both assemblers and the full sample. Therefore, 6 additional tests were conducted.

Test 6. full sample with profit as dependent variable using total investment (See Appendix F)

Test 7. full sample with market share as dependent variable using total investment(See Appendix G)

Test 8. full sample with sales as dependent variable using total investment (See Appendix H)

Test 9. assembler with profit as dependent variable using total investment (See Appendix I)

Test 10. assembler with market share as dependent variable using total investment(See Appendix J)

Test 11. assembler with sales as dependent variable using total investment (See Appendix K)

The 6 additional tests confirmed the stability of the previous 5 tests; therefore, the overall HLM analysis results are not subject to the change of performance measures as well as the change of independent variables. The results are not surprising due the high correlation between sales and market share (0.887 at 0.01 level), and between total investment and foreign investment (0.984 at 0.01 level).

6.5. Chapter Summary

This chapter has presented the results of testing Hypotheses 1a through 4, which appear to provide strong support for the central assertions of this study. Table 6.10 summarizes the test results for each hypothesis. In chapter 7, these results are discussed and interpreted, and their theoretical as well as managerial implications are explored.

Table 6.10 Summary of Additional Test Results of Research Hypotheses

	Test 6 Profit as DV Full sample	**Test 7** Market Share as DV Full Sample	**Test 8** Sales as DV Full Sample	**Test 8** Profit as DV Assembler	**Test 9** Market Share as DV Assembler	**Test 11** Sales as DV Assembler
H1a	**Not Supported (insignificant-)**	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**
H1b	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**
H2a	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**
H2b.	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant-)**	**Not Supported (insignificant+)**	**Not Supported (insignificant-)**	**Supported**
H3a.	**Not Supported (Significant -)**	**Supported**	**Not Supported (insignificant +)**	**Not Supported (Significant -)**	**Not Supported (insignificant +)**	**Not Supported (Significant -)**
H3b.	**Not Supported (insignificant+)**	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**
H4	**Not Supported (insignificant-)**	**Not Supported (insignificant +)**	**Not Supported (insignificant+)**	**Supported**	**Not Supported (insignificant -)**	**Supported**

Table 6.11 Summary of Test Results of Research Hypotheses

Hypothesis 1	***Supported***	***H1 a: Early timing will lead to positive initial performance, ceteris paribus***
	Not Supported	***H1b: Early timing will lead to positive performance trend, ceteris paribus***
Hypothesis 2	***Supported***	***H2a: Higher initial resource commitment will lead to higher initial performance, ceteris paribus***
	Not Supported	***H2 b: Higher initial resource commitment will lead to positive performance trend, ceteris paribus***
Hypothesis 3	***Not Supported***	***H3a: Early movers with high initial resource commitment (committed early) will outperform all other strategies in initial performance, ceteris paribus***
	Supported	***H3b: Early movers with high initial resource commitment (committed early) will lead to positive performance growth trend, ceteris paribus***
	Supported	***H3c: Early movers with high initial resource commitment (committed early) will outperform all other strategies in the long run, ceteris paribus.***
	Supported	***H3d: Late movers with high initial resource commitment (committed late) will outperform tentative early mover in the long run, ceteris paribus.***
Hypothesis 4	***Moderately Supported***	***H4: Committed early movers with high resource development are more likely to be able to outperform all the other groups throughout the whole life course (positive three way interaction)***

7.0 DISCUSSION AND CONCLUSIONS

7.1 Introduction

In this chapter, I discuss and interpret the results of the study. A number of limitations are also explained. I will also explore key implications of the results for researchers and practitioners. Furthermore, I provide the areas for future research and conclude my dissertation with a restatement of the research goals accomplished in this study.

7.2 Discussion of Results

This study examined the direct and interaction effects of timing, initial resource commitment on international joint venture performance over its life course. Furthermore, I examined the three interaction effects of timing, initial resource commitment and resource development on international joint venture performance over its life course. A unique longitudinal database was established to capture the evolution process of international joint ventures in China's automobile industry. Hierarchical Linear Modeling was used to analyze this data set. To be consistent with the previous literature, sales (market share) was used as one of the performance measures. Profitability was used as another new measure in entry order effect research as Lieberman and

Montgomery (1998) called for. Four separate tests were done to see the robustness of the results. Before I proceeded to HLM analysis, I conducted 13 OLS regression analysis to test whether observation time can significantly influence the timing-performance relationship using cross-sectional methods. The result of the tests showed that the selection of time to evaluate the phenomenon became critical to the detection of such effect. The result supports the use of a longitudinal approach that can capture the whole life course of the phenomenon. On the other hand, two interesting observations call for some attention. First, all the coefficients are positive except year 2001 and 2002, it suggests that basically early timing has a consistent positive effect on performance till 2001 and 2002. Second, the coefficients rising slightly first then declining over time may suggest that the timing effect is stronger at the early stage of the industry life cycle, and got weaker (diminishing) when the industry/market gets mature. At the end, it actually became a liability. The result suggests somewhat of an inverted U shape. It also showed that the timing effect to diminish over time.

Hypothesis 1a predicts direct positive effect of timing on initial performance. The effect coefficient G01 is positive and significant in Test 1, 3, and 4, thus H1a receive strong support.

Hypothesis 1b predicts positive impact of timing on performance growth trend. The effect coefficient G11 is negative and insignificant. Thus, H1b is not supported. The result is consistent in all tests. This result is consistent with the previous empirical results that suggesting no or even negative timing effects.

Hypothesis 2a predicts direct positive effect of initial resource commitment on initial performance. The effect coefficient G02 is positive and significant in all tests, thus H2a received full support. The result supports the resource-based view in that a strong resource base can lead to superior performance.

Hypothesis 2b predicts positive impact of initial resource commitment on performance growth trend. The effect coefficient G12 is positive in all tests but only significant in test 1 and marginally significant in test 4 (with sales as performance measure). Thus, H2b is not supported. It can interpreted that high initial resource commitment alone cannot guarantee a sustainable competitive advantage. However, it helps.

Hypothesis 3a predicts positive interaction effects of timing and initial resources commitment on initial performance. The effect coefficient G03 is negative and significant in all 4 tests, thus H3a was not supported in the expected direction. This result is interesting in that, committed early movers may face larger risks initially in an emerging market like China. It may take some time for the market to grow large enough to absorb a big player.

Hypothesis 3b predicts positive interaction effects of timing and initial resources commitment on performance growth trend. The effect coefficient G13 is positive in all 4 tests and significant in all test 1, 3, and 4, thus H3b receive strong support. Combined with the result of hypothesis 3a, we can draw an interesting conclusion. While early mover with high initial investment usually cannot achieve immediate success in China's auto market, the strategy does give an IJV a stronger resource base to succeed in the long run.

Hypothesis 4 predicts positive three way interaction effects of timing, initial resource commitment and resource development on IJV performance. The effect coefficient G 23 is positive and statistically significant in test 1, 3 and 4. Therefore, H4 is supported. This is an important result that demonstrates the interrelatedness of these three key strategic factors in market entry strategies. It also demonstrates the need to continuously develop one's resources beyond the formation stage of a firm to maintain competitive advantage in a competitive market.

Hypothesis 3c and 3d yielded more interesting results that show the promise of using longitudinal analysis to identify different paths to success and failure.

Hypothesis 3c predicts committed early mover will outperform all other IJVs following different strategies. This was supported across all the 8 tests. Therefore moving early with high initial commitment is the best strategy for firms entering Chinese automobile market.

Hypothesis 3d predicts committed late mover will outperform tentative early mover in the long run. This was again support across all 8 tests. This result is interesting because it points out alternative path to success and also explains why some late movers can outperform early movers.

7.3 Limitations/Boundary Conditions

Before discussing the theoretical and practical implications of the results in the next section, it is appropriate to note some of the study's limitations.

This study has a number of limitations. First, I use a one industry/market setting in one emerging market; generalization of the results to wider context should be with caution. China's auto industry has experienced a remarkable development in the last two decades and its institutional environment is very different from a developed economy. However, the overall evolution from centralized economy to decentralized economy is a common phenomenon in many emerging markets and especially former planned economies, such as Czech Republic, Poland, etc.

Second, the waves of data collected are still limited. Since I could collect only limited waves of data on many joint ventures in their early stage of development, therefore, only a selected portion of their total life span is observed. I incorporated a quadratic curve into the

model, and it turned out to be insignificant in this date set. In the case of measuring change, the adoption of a linear individual growth model, with its pair of intercept and slope parameters, requires that at least three waves of data be collected from each firm under study. More complex growth models increase the data requirements—a quadratic model requires at least four waves, cubic models at least five. Parameter estimation will always be improved if further waves of data are added to the design.

Third, the measurement for resource in this study is not able to fully reflect the true complexity of the resource construct. The measurement for resource development is also still in early stage, another step forward may be to find multiple measures.

Fourth, the sample size limited my ability to break it down further into 8 groups to match the 8 cells in the three-way interaction among timing, initial resource commitment and resource development. Otherwise, some more distinctive paths to success and failure can be identified and demonstrated.

7.4 Implications

The discussion of implications of this dissertation research is presented in this section. The discussion is divided into two parts. First, the theoretical implications are presented, followed by a consideration of the managerial implications.

7.4.1 Theoretical Implications

From a theory development standpoint, this study has contributed to the literature of entry order effects and resource-based view. Investigating resource accumulation/evolution of joint ventures can contribute to identifying empirical regularities and reconciling irregularities in the supposed timing-performance relationship within entry order effect (first-mover advantage) literatures. On the other hand, this research can contribute to the development of a resource-based theory of joint venture both theoretically and empirically. As Lieberman and Montgomery (1998) pointed out, the resource-based view has often been criticized for its lack of an empirical base, especially, of studies that consider how resources and capabilities evolve over time. Difficulties in operationalizing the firm's resource pool/profile may help to explain the low level of empirical research within the domain of RBV. I believe that this research is one step closer in understanding the dynamic resource development/accumulation process that is critical for a sustainable competitive advantage.

Methodologically, I believe that the methods of individual growth modeling (HLM in this case) presents exciting opportunities in answering many of the development questions with which researchers in resource based theory and market entry (and many other areas) are concerned. These methods allow for the analysis of longitudinal data and thus facilitate the process of uncovering the various pathways along which development may occur. Such a pathways approach is essential for researchers who seek to study the course of firm strategic behavior throughout its life span. The method outlined in this study allow for the incorporation of any number of predictors of development, including important contextual predictors such as industry environment, thus provide researcher with the tools both to study the range of outcomes

that may be associated with a particular set of predictors (multifinality) and to explore how similar outcomes may result from a variety of contexts (equifinality).

7.4.2 Managerial Implications

From the viewpoint of a strategist who seeks to find the best strategy to succeed in international market entry and establish a sustainable competitive advantage, this study has several actionable implications. First, it is clear that moving fast will help one's initial success. On the other hand, committing substantial resources initially can also achieve good initial performance even when a firm is a later comer. Early movers who commit substantial resource initially will not see a quick success in a relatively uncertain environment; however, early movers with high initial resource commitment do have a better chance to succeed in the long run. Moving early or committing substantial resources initially alone will not give a firm sustainable competitive advantage. Finally, one important result from this study is the three-way interaction of timing, initial resource commitment and resource development. It shows that management has to carefully consider these key factors at the same time to form their entry and post-entry strategies. The sustainability of early mover advantage depends not only on the initial resource commitment, but also the effort in resource development over time.

7.5 Future Research

A number of suggestions for future research can be made for this study. While this study has contributed several insights regarding the importance of using longitudinal data set and methodology in strategy and international market entry research, it has identified several interesting research tasks worth pursuing in the near future.

First, extending this research model to other industries or automobile industry in other emerging markets such as Czech, Mexico and Brazil where significant FDI activities can be found.

Second, measuring a firm's resource profile (position) and study its evolution is an intriguing area. My database on China's auto industry provides a good chance to explore this possibility with the help of sophisticated longitudinal methods.

Third, local firms in Chinese auto market experienced the evolutionary process of variation, selection, retention and struggle in the past two decades. A longitudinal study on their strategic behaviors in rapidly changing institutional environment and their performance/survival consequences can help us in answering the fundamental questions in the strategy field: What do firm differ? How do firms behave? What determines the international success or failure of firms? (Peng, 2000). Studying local firms can also avoid some of the limitations that I experienced in this study, since many local firms existed in the market for a long time, I will be able to build a larger longitudinal data set that have more waves of observations for each firm and allow me to explore more complex relationships such as a quadratic growth model and incorporating more time varying variables (industry growth rate, concentration ratio, etc) at industry level.

7.6 Conclusions

This dissertation strives to make a number of contributions to the existing international joint venture and strategic management literature. First, this was the first attempt to apply resource-based view of the firm and evolutionary perspective to examine the resource development/evolution of the joint ventures in their whole life course. Second, by examining the interaction effects of timing, initial resource commitment and resource development, this research can contribute to reconcile the long lasting irregularities in the timing-performance relationship within the first-mover advantage literature. To accomplish this, I introduced HLM to international joint venture resource for the first time to address the unique, longitudinal, industry-wide, firm-specific dataset covering the complete life course history of international joint ventures in Chinese auto industry. The results will provide a value added contribution to our knowledge of international joint venture operations beyond the formation stage. Furthermore, this research can contribute to the development of a resource-based theory of joint venture both theoretically and empirically. As Lieberman and Montgomery (1998) pointed out, the resource-based view has often been criticized for its lack of an empirical base, especially, of studies that consider how resources and capabilities evolve over time. This research is one step further toward filling the empirical gap.

7.7 Chapter Summary

The focal point of this chapter was to discuss and interpret the results of the analyses presented in chapter 6. Several key implications of this study were explored for both theories and

management practices in international market entry, international joint venture formation, etc, and areas of future research were presented. Finally, conclusions of this dissertation were provided.

APPENDIX A

HLM 5.04 OUTPUT
(assembly with Profit/employee)

```
 SPECIFICATIONS FOR THIS HLM2 RUN                    Wed Nov 19 22:56:31 2003

---------------------------------------------------------------------------

 Problem Title: TEST 1119 WITH ASSEM

 The data source for this run  = test 1119 with assem
 The command file for this run = C:\My Music\autoindustry\test 1119 with assem.hlm
 Output file name              = C:\My Music\autoindustry\test 1119 with assem.out
 The maximum number of level-2 units = 113
 The maximum number of iterations = 100
 Method of estimation: restricted maximum likelihood

The outcome variable is  APROFIT
Final estimation of fixed effects:
---------------------------------------------------------------------------
                                    Standard                      Approx.
   Fixed Effect           Coefficient   Error       T-ratio    d.f.     P-value
---------------------------------------------------------------------------
For       INTRCPT1, B0
   INTRCPT2, G00          -2.753013   3.527598    -0.780       109     0.435
     TIMING, G01           0.860739   0.385636     2.232       109     0.026
     REALIM, G02           0.141274   0.018971     7.447       109     0.000
       TXIM, G03          -0.016161   0.002070    -7.808       109     0.000
For      AGE slope, B1
   INTRCPT2, G10           0.482555   0.551962     0.874       109     0.382
     TIMING, G11          -0.056794   0.055078    -1.031       109     0.303
     REALIM, G12           0.000768   0.003464     0.222       109     0.825
       TXIM, G13           0.000862   0.000319     2.700       109     0.007
For AINEWINV slope, B2
   INTRCPT2, G20           0.000656   0.017754     0.037       109     0.971
     TIMING, G21          -0.000308   0.001677    -0.184       109     0.855
     REALIM, G22          -0.000162   0.000046    -3.501       109     0.001
       TXIM, G23           0.000014   0.000005     2.764       109     0.006
---------------------------------------------------------------------------
```

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	10.19976	104.03520	87	191.14960	0.000
AGE slope,	U1	1.18840	1.41229	87	265.44629	0.000
AINEWINV slope,	U2	0.02229	0.00050	87	83.00403	>.500
level-1,	R	6.65016	44.22462			

Note: The chi-square statistics reported above are based on only 91 of 113 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance	= 5086.945517
Number of estimated parameters	= 7

APPENDIX B.

HLM 5.04 OUTPUT
(assembly with sales)

The outcome variable is ASALES
Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-1416.114475	573.382389	-2.470	109	0.014
TIMING, G01	178.034407	63.326273	2.811	109	0.005
REALIM, G02	16.394529	3.007940	5.450	109	0.000
TXIM, G03	-3.263373	0.347198	-9.399	109	0.000
For AGE slope, B1					
INTRCPT2, G10	230.542987	109.118132	2.113	109	0.034
TIMING, G11	-12.170951	11.438825	-1.064	109	0.288
REALIM, G12	1.140065	0.599716	1.901	109	0.057
TXIM, G13	0.240834	0.061873	3.892	109	0.000
For AINEWINV slope, B2					
INTRCPT2, G20	1.106062	1.610224	0.687	109	0.492
TIMING, G21	0.006141	0.143320	0.043	109	0.966
REALIM, G22	-0.013128	0.003862	-3.400	109	0.001
TXIM, G23	0.001233	0.000398	3.100	109	0.002

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	1742.21084	3035298.62194	86	500.71764	0.000
AGE slope,	U1	300.19810	90118.89873	86	1188.54293	0.000
AINEWINV slope,	U2	1.50388	2.26166	86	40.73185	>.500
level-1,	R	759.18836	576366.95928			

Note: The chi-square statistics reported above are based on only 90 of 113 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = 10419.497835
Number of estimated parameters = 7

APPENDIX C.

HLM 5.04 OUTPUT
(full sample with profitability as dependent variable)

The outcome variable is APROFIT
Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	6.759030	5.134423	1.316	422	0.188
TIMING, G01	-0.374190	0.405826	-0.922	422	0.357
REALIM, G02	0.125372	0.032314	3.880	422	0.000
TXIM, G03	-0.013256	0.003605	-3.677	422	0.000
EQUITY_R, G04	-0.021119	0.071569	-0.295	422	0.768
For AGE slope, B1					
INTRCPT2, G10	1.411410	0.523884	2.694	422	0.007
TIMING, G11	-0.090966	0.039376	-2.310	422	0.021
REALIM, G12	0.001523	0.003444	0.442	422	0.658
TXIM, G13	0.000700	0.000329	2.128	422	0.033
EQUITY_R, G14	-0.000160	0.007021	-0.023	422	0.982
For AINEWINV slope, B2					
INTRCPT2, G20	-0.046105	0.349106	-0.132	422	0.895
TIMING, G21	0.005641	0.027538	0.205	422	0.838
REALIM, G22	0.001048	0.001834	0.571	422	0.567
TXIM, G23	-0.000049	0.000209	-0.235	422	0.815
EQUITY_R, G24	-0.003903	0.004535	-0.861	422	0.390

The outcome variable is APROFIT

Final estimation of fixed effects
(with robust standard errors)

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	6.759030	4.853455	1.393	422	0.164
TIMING, G01	-0.374190	0.428943	-0.872	422	0.383
REALIM, G02	0.125372	0.026930	4.655	422	0.000
TXIM, G03	-0.013256	0.003720	-3.563	422	0.001
EQUITY_R, G04	-0.021119	0.036409	-0.580	422	0.561
For AGE slope, B1					
INTRCPT2, G10	1.411410	0.530046	2.663	422	0.008
TIMING, G11	-0.090966	0.040966	-2.221	422	0.026
REALIM, G12	0.001523	0.005994	0.254	422	0.799
TXIM, G13	0.000700	0.000529	1.322	422	0.186
EQUITY_R, G14	-0.000160	0.005818	-0.027	422	0.978
For AINEWINV slope, B2					
INTRCPT2, G20	-0.046105	0.382002	-0.121	422	0.904
TIMING, G21	0.005641	0.031827	0.177	422	0.860
REALIM, G22	0.001048	0.000853	1.228	422	0.220
TXIM, G23	-0.000049	0.000079	-0.622	422	0.534
EQUITY_R, G24	-0.003903	0.002998	-1.302	422	0.193

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	22.37536	500.65669	287	710.57637	0.000
AGE slope,	U1	1.60090	2.56288	287	837.27837	0.000
AINEWINV slope,	U2	1.31129	1.71947	287	2914.71541	0.000
level-1,	R	5.55791	30.89034			

Note: The chi-square statistics reported above are based on only 292 of 427 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Number of estimated parameters = 7

APPENDIX D.

HLM 5.04 OUTPUT
(full sample with sales as dependent variable)

The outcome variable is ASALES

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-641.470502	255.411238	-2.512	428	0.012
TIMING, G01	70.361593	20.094537	3.502	428	0.001
REALIM, G02	14.211585	1.629153	8.723	428	0.000
TXIM, G03	-2.853938	0.183234	-15.575	428	0.000
EQUITY_R, G04	3.879233	3.621030	1.071	428	0.284
For AGE slope, B1					
INTRCPT2, G10	129.777571	46.449784	2.794	428	0.006
TIMING, G11	-5.468003	3.539827	-1.545	428	0.122
REALIM, G12	1.334535	0.328651	4.061	428	0.000
TXIM, G13	0.210898	0.032658	6.458	428	0.000
EQUITY_R, G14	-0.892691	0.633068	-1.410	428	0.159
For AINEWINV slope, B2					
INTRCPT2, G20	-2.736810	2.301135	-1.189	428	0.235
TIMING, G21	0.159777	0.164968	0.969	428	0.333
REALIM, G22	-0.011835	0.005220	-2.267	428	0.023
TXIM, G23	0.001128	0.000602	1.873	428	0.061
EQUITY_R, G24	0.053861	0.032719	1.646	428	0.099

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	987.39337	974945.66773	294	1517.05526	0.000
AGE slope,	U1	170.60347	29105.54324	294	3372.24112	0.000
AINEWINV slope,	U2	3.06628	9.40208	294	158.06854	>.500
level-1,	R	461.44985	212935.96246			

Note: The chi-square statistics reported above are based on only 299 of 433 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = 30968.882655
Number of estimated parameters = 7

APPENDIX E.

HLM 5.04 OUTPUT Test 5
(assemblers with profit as dependent variable)

The outcome variable is APROFIT

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-6.566621	8.207479	-0.800	7	0.450
For AGE slope, B1					
INTRCPT2, G10	1.810943	1.520889	1.191	7	0.273
For AINEWINV slope, B2					
INTRCPT2, G20	0.001208	0.003314	0.364	7	0.726

The outcome variable is APROFIT

Final estimation of fixed effects
(with robust standard errors)

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-6.566621	7.609537	-0.863	7	0.417
For AGE slope, B1					
INTRCPT2, G10	1.810943	1.420694	1.275	7	0.243
For AINEWINV slope, B2					
INTRCPT2, G20	0.001208	0.002707	0.446	7	0.669

The robust standard errors are appropriate for datasets having a moderate to

large number of level 2 units. These data do not meet this criterion.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	22.62606	511.93872	4	32.95587	0.000
AGE slope,	U1	4.26535	18.19321	4	118.92569	0.000
AINEWINV slope,	U2	0.00781	0.00006	4	6.67246	0.153
level-1,	R	7.57923	57.44466			

Note: The chi-square statistics reported above are based on only 5 of 8 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

```
Deviance                  = 811.846270
Number of estimated parameters = 7
```

APPENDIX F

HLM 5.04 OUTPUT
(full sample with profit as dependent variable using total investment)

The outcome variable is APROFIT

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	6.757676	3.862781	1.749	420	0.080
TIMING, G01	-0.430239	0.466338	-0.923	420	0.357
REALTOTL, G02	0.057087	0.017867	3.195	420	0.002
TXT, G03	-0.005876	0.001845	-3.184	420	0.002
For AGE slope, B1					
INTRCPT2, G10	1.146801	0.418837	2.738	420	0.007
TIMING, G11	-0.068896	0.045216	-1.524	420	0.127
REALTOTL, G12	0.001376	0.001877	0.733	420	0.464
TXT, G13	0.000217	0.000175	1.240	420	0.215
For AINEWINV slope, B2					
INTRCPT2, G20	-0.202517	0.243249	-0.833	420	0.405
TIMING, G21	0.000509	0.027944	0.018	420	0.986
REALTOTL, G22	0.000446	0.000880	0.506	420	0.612
TXT, G23	-0.000015	0.000091	-0.165	420	0.869

The outcome variable is APROFIT

Final estimation of fixed effects
(with robust standard errors)

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	6.757676	4.874593	1.386	420	0.166
TIMING, G01	-0.430239	0.485760	-0.886	420	0.376
REALTOTL, G02	0.057087	0.014453	3.950	420	0.000
TXT, G03	-0.005876	0.002060	-2.853	420	0.005
For AGE slope, B1					
INTRCPT2, G10	1.146801	0.470147	2.439	420	0.015
TIMING, G11	-0.068896	0.044514	-1.548	420	0.121
REALTOTL, G12	0.001376	0.003016	0.456	420	0.648
TXT, G13	0.000217	0.000277	0.782	420	0.434
For AINEWINV slope, B2					
INTRCPT2, G20	-0.202517	0.313136	-0.647	420	0.518
TIMING, G21	0.000509	0.030680	0.017	420	0.987
REALTOTL, G22	0.000446	0.000378	1.177	420	0.240
TXT, G23	-0.000015	0.000034	-0.441	420	0.659

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	26.06787	679.53376	276	647.99531	0.000
AGE slope,	U1	2.02717	4.10941	276	682.44795	0.000
AINEWINV slope,	U2	1.31329	1.72474	276	2679.69735	0.000
level-1,	R	5.73015	32.83467			

Note: The chi-square statistics reported above are based on only 280 of 424 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = 14474.726874

Number of estimated parameters = 7

APPENDIX G

HLM 5.04 OUTPUT
(full sample with market share as dependent variable using total investment)

The outcome variable is MARKET_S

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-0.000503	0.000528	-0.954	420	0.340
TIMING, G01	0.000292	0.000063	4.608	420	0.000
REALTOTL, G02	0.000006	0.000002	2.705	420	0.007
TXT, G03	0.000000	0.000000	2.017	420	0.043
For AGE slope, B1					
INTRCPT2, G10	-0.000011	0.000107	-0.102	420	0.920
TIMING, G11	-0.000010	0.000011	-0.946	420	0.345
REALTOTL, G12	-0.000000	0.000001	-0.712	420	0.476
TXT, G13	0.000000	0.000000	1.893	420	0.058
For AINEWINV slope, B2					
INTRCPT2, G20	-0.000009	0.000007	-1.318	420	0.188
TIMING, G21	0.000001	0.000001	1.948	420	0.051
REALTOTL, G22	-0.000000	0.000000	-1.785	420	0.074
TXT, G23	0.000000	0.000000	1.108	420	0.268

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	0.00209	0.00000	276	262.06723	>.500
AGE slope,	U1	0.00038	0.00000	276	326.76067	0.019
AINEWINV slope,	U2	0.00001	0.00000	276	89.51242	>.500
level-1,	R	0.00253	0.00001			

Note: The chi-square statistics reported above are based on only 280 of 424 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = -15642.585252
Number of estimated parameters = 7

APPENDIX H

HLM 5.04 OUTPUT
(full sample with sales as dependent variable using total investment)

The outcome variable is ASALES

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-428.288959	178.940690	-2.393	420	0.017
TIMING, G01	68.738547	21.533378	3.192	420	0.002
REALTOTL, G02	5.264122	0.836584	6.292	420	0.000
TXT, G03	-1.077618	0.085846	-12.553	420	0.000
For AGE slope, B1					
INTRCPT2, G10	71.803682	34.462649	2.084	420	0.037
TIMING, G11	-3.587747	3.773555	-0.951	420	0.342
REALTOTL, G12	0.964272	0.166757	5.782	420	0.000
TXT, G13	0.045700	0.015490	2.950	420	0.004
For AINEWINV slope, B2					
INTRCPT2, G20	-0.242283	1.821237	-0.133	420	0.895
TIMING, G21	0.131529	0.192471	0.683	420	0.494
REALTOTL, G22	-0.004987	0.003056	-1.632	420	0.102
TXT, G23	0.000437	0.000328	1.333	420	0.183

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	1071.67680	1148491.16621	276	1275.36217	0.000
AGE slope,	U1	181.85938	33072.83342	276	2254.58363	0.000
AINEWINV slope,	U2	3.70823	13.75095	276	194.41370	>.500
level-1,	R	478.77814	229228.50688			

Note: The chi-square statistics reported above are based on only 280 of 424 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = 29207.237579
Number of estimated parameters = 7

APPENDIX I

HLM 5.04 OUTPUT
(Assembler with profit as dependent variable using total investment)

The outcome variable is APROFIT

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-2.640700	4.061152	-0.650	110	0.515
TIMING, G01	1.090440	0.448364	2.432	110	0.015
REALTOTL, G02	0.086862	0.011347	7.655	110	0.000
TXT, G03	-0.008406	0.001164	-7.222	110	0.000
For AGE slope, B1					
INTRCPT2, G10	0.286309	0.642960	0.445	110	0.656
TIMING, G11	-0.055227	0.063724	-0.867	110	0.386
REALTOTL, G12	0.001281	0.001823	0.702	110	0.482
TXT, G13	0.000279	0.000163	1.707	110	0.087
For AINEWINV slope, B2					
INTRCPT2, G20	-0.006333	0.019572	-0.324	110	0.746
TIMING, G21	0.000397	0.001932	0.205	110	0.838
REALTOTL, G22	-0.000062	0.000023	-2.706	110	0.007
TXT, G23	0.000004	0.000002	1.807	110	0.070

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	10.36622	107.45862	84	146.39400	0.000
AGE slope,	U1	1.22267	1.49491	84	170.91084	0.000
AINEWINV slope,	U2	0.02204	0.00049	84	64.57505	>.500
level-1,	R	7.05322	49.74785			

Note: The chi-square statistics reported above are based on only 88 of 114 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance	= 4468.917236
Number of estimated parameters	= 7

APPENDIX J

HLM 5.04 OUTPUT
(Assembler with Market share as dependent variable using total investment)

The outcome variable is MARKET_S

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-0.000042	0.001454	-0.029	110	0.977
TIMING, G01	0.000565	0.000161	3.515	110	0.001
REALIM, G02	0.000026	0.000010	2.571	110	0.010
TXIM, G03	0.000001	0.000001	1.055	110	0.292
For AGE slope, B1					
INTRCPT2, G10	-0.000080	0.000315	-0.255	110	0.799
TIMING, G11	-0.000023	0.000031	-0.738	110	0.461
REALIM, G12	-0.000003	0.000002	-1.308	110	0.191
TXIM, G13	0.000000	0.000000	2.065	110	0.039
For AINEWINV slope, B2					
INTRCPT2, G20	0.000001	0.000010	0.119	110	0.906
TIMING, G21	0.000001	0.000001	1.242	110	0.214
REALIM, G22	-0.000000	0.000000	-1.463	110	0.143
TXIM, G23	-0.000000	0.000000	-0.053	110	0.958

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	0.00120	0.00000	84	37.93723	>.500
AGE slope,	U1	0.00056	0.00000	84	97.49546	0.149
AINEWINV slope,	U2	0.00001	0.00000	84	39.68820	>.500
level-1,	R	0.00438	0.00002			

Note: The chi-square statistics reported above are based on only 88 of 114 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = -4334.710283
Number of estimated parameters = 7

APPENDIX K

HLM 5.04 OUTPUT
(Assembler with sales as dependent variable using total investment)

The outcome variable is ASALES

Final estimation of fixed effects:

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	-1485.852485	595.224670	-2.496	110	0.013
TIMING, G01	182.246168	65.666252	2.775	110	0.006
REALTOTL, G02	7.034999	1.613881	4.359	110	0.000
TXT, G03	-1.276868	0.164346	-7.769	110	0.000
For AGE slope, B1					
INTRCPT2, G10	216.985028	123.982340	1.750	110	0.080
TIMING, G11	-10.819345	13.050402	-0.829	110	0.407
REALTOTL, G12	0.956970	0.313050	3.057	110	0.003
TXT, G13	0.053468	0.030216	1.770	110	0.076
For AINEWINV slope, B2					
INTRCPT2, G20	2.129955	2.227427	0.956	110	0.339
TIMING, G21	-0.007775	0.214755	-0.036	110	0.971
REALTOTL, G22	-0.005948	0.002529	-2.352	110	0.019
TXT, G23	0.000437	0.000261	1.675	110	0.094

The robust standard errors cannot be computed for this model.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	1693.41272	2867646.65177	84	326.78911	0.000
AGE slope,	U1	335.19531	112355.89910	84	755.77111	0.000
AINEWINV slope,	U2	2.31407	5.35493	84	45.82841	>.500
level-1,	R	793.73162	630009.88043			

Note: The chi-square statistics reported above are based on only 88 of 114 units that had sufficient data for computation. Fixed effects and variance components are based on all the data.

Statistics for current covariance components model

Deviance = 10090.140627
Number of estimated parameters = 7

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