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Whether and how: Effects of international joint ventures on local innovation in an emerging economy

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ABSTRACT

Business groups in emerging economies frequently use international joint ventures (IJV) as a channel for knowledge acquisition and technology advancement. While IJVs provide a business group with access to new technology, how successful a group is in exploiting that new knowledge for innovative purposes depends on the groups' ability to recombine new knowledge with its existing pool of knowledge and resources. The more resources a group spends in forming IJVs with foreign partners, the less resources the group has in developing and sustaining organizational mechanisms that facilitate integration of existing ideas and resources. Following this theoretical duality, we view the IJV–innovation relationship not as an "either–or" question, but as a question of whether and how. Specifically, viewing business groups as networks of loosely coupled firms, we examine how intra-group network structure and evolving institutional environment moderates the IJV–patenting relationship in Taiwan between 1981 and 1998.

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1. Introduction

Technological linkages with foreign firms offer an important channel by which enterprises in developing economies can acquire technological capabilities and catch up with those in more advanced countries (Lall, 2002). However, such linkages can also turn collaborators into codependents (Miles and Snow, 1992; Singh and Mitchell, 1996), reducing emerging economy firms' incentives to innovate as these firms may find it easier to simply rely on foreign partners for new technology rather than developing their own proprietary technology base. Despite a general consensus that international ties such as licensing, joint ventures, and acquisitions are useful as means of technology transfer (Hobday, 1995), it is less clear how effective these foreign linkages are as catalysts for local innovation (Bell and Pavitt, 1993). Specifically, we are not sure *whether* and *how* such technological linkages facilitate or constrain innovation in emerging economies.

In explaining the microeconomic context for technological development in emerging economies, some prior studies have emphasized the social networks of the returning diasporas (Saxenian, 1999) while others highlighted the importance of strong state and policy incentives (Wade, 1990). With few notable exceptions (such as, Hobday, 1995; Mahmood and Mitchell, 2004; Chang et al., 2006a,b), however, scarce attention has been paid to the organizational actors which actually implemented the linkages and translated the linkages into innovation. Specifically, little empirical research with large sample data has been conducted on the role of business groups, the dominant organizational form in many latecomer economies (Amsden and Hikino, 1994; Khanna and Palepu, 1997). The widespread presence of business groups in emerging economies suggests that groups are likely to play an important role in the process of technology accumulation. While the extant literature recognizes that groups act as a conduit for technology transfer in many emerging economies (Amsden and Hikino, 1994; Kock and Guillén, 2001), it provides very little systematic evidence on the interface between international linkages and group innovativeness.

In this paper we address this lacuna by examining the role of business groups as a mediator of foreign technology and local innovation. In particular, we investigate *whether* and *how* international joint ventures (IJV) affect the innovative performance of business groups. Hobday (1995) noted that as emerging economy enterprises move up the technology ladder, joint ventures with foreign multinationals become increasingly important as a channel for accessing specialized knowledge. While equity joint ventures are more effective as conduits for the transfer of complex knowledge than contract-based alliances (Kogut, 1988; Mowery et al., 1996), we recognize that not all joint ventures are intended to facilitate knowledge flows (e.g. Gomes-Casseres et al., 2006). For example, many joint ventures in emerging economies may be motivated by distribution or cheaper manufacturing costs. Consequently, we

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focus on the international joint ventures specifically intended for promoting technological learning and facilitating access to new knowledge.

We examine how IJVs affect aggregate group innovativeness within 200 unique business groups in Taiwan between 1981 and 1998. Taiwan is a model for successful catch-up; it has transformed itself from being an exporter of labor intensive products in the 1970s to one of the most innovative countries in the world, ranking fourth globally in terms of number of US patents in 2003, surpassed only by the US, Japan and Germany. Taiwan is also a typical example of emerging markets where business groups play key roles (Hamilton and Biggart, 1988; Hamilton and Kao, 1990). The importance of international linkages in driving this transition (Gold, 1986) coupled with highly varied innovativeness of the groups makes Taiwan particularly interesting.

Contrary to the received wisdom, we find a negative effect of IJV on groups' innovative outputs where innovation is measured by domestic Taiwan patents. The 'innovative costs' of IJV, however, vary across groups with different internal structure and external institutional context. Specifically, the negative effect of IJV declines as affiliates within a group become more and more connected to each other through inter-firm ties (such as, director interlocks and equity ties) and/or as market-based institutions becomes more widespread over time. Our results are robust to both parametric and non-parametric estimation procedures.

2. Business groups, international linkages and local innovation

Business groups are a common type of multi-business firm in developing economies, frequently dominating a substantial fraction of a country's productive assets and strongly influencing technological development in their countries. Although groups vary across countries, the common definition is that business groups are sets of legally independent companies with activities in multiple industries, that are linked as affiliates through persistent informal links and formal relationships such as equity, director, and buyer–supplier ties (Hamilton and Biggart, 1988; Khanna and Rivkin, 2001).

Like conglomerates, a group provides a corporate financial structure that controls autonomous businesses in multiple industries (Williamson, 1985). On the other hand, groups are similar to multidivisional form, in which businesses within a corporation operate with greater interdependence (Chandler, 1997). Yet groups also differ from conglomerate and multidivisional corporations. Groups are more stable and coordinated than conglomerates, while being less centralized than their multidivisional counterparts (Granovetter, 1995). Member firms in groups have separate legal status and governance systems. While they coordinate business with each other, they also are responsible to their own governance bodies such as shareholders, directors, and auditors.

Thus, groups are neither pure conglomerates nor pure multidivisional firms. Instead, groups in emerging economies are more like networks of loosely coupled firms linked by formal and informal ties (Granovetter, 1995). In this study, we focus on three types of *formal* intra-group ties: buyer–supplier ties, director ties, and investment ties. Buyer–supplier ties arise when affiliates engage in buyer–supplier relations. Director ties arise when an individual sits on the board of multiple affiliates. The third type of ties is investment ties, which arise when affiliates own equity stakes in each other through cross-shareholding.

To the extent that groups act as networks, we argue that the innovative benefits of IJVs will depend on the *structural* patterns of ties that bind various affiliates within a group to each other; specifically, on the density of network ties. Central to our arguments is the recognition that innovation requires two things: an access to new ideas as well as well as an ability to integrate those ideas with existing resources and ideas (Eisenhardt and Martin, 2000). While external linkages offer a way to access ideas from outside a group's boundary, a group's ability to integrate those ideas is shaped by the level of intra-group network density. To the extent that innovation requires both new ideas as well as integration of ideas and resources, we hypothesize that the most innovative groups are those where external ties coincide with a relatively dense network of intra-group ties.

As a second set of contingency, we examine how the innovative impacts of IJVs might vary across different institutional contexts. To the extent that foreign firms' willingness to share new ideas as well as local groups' incentives to develop their own technology base is likely to depend on the quality of intellectual property rights, a group's ability benefit from IJVs will be shaped by level of institutional development of the local economy. While the proponents of the national innovation systems (Lundvall, 1998) observe that the form of organization ideal for conducting innovation vary across countries and over time, relatively little attention has been paid to understanding how institutional infrastructures moderate the effects of external ties on innovation in emerging economies.

2.1. Group-level innovation and IJV: the benefits and constraints

Most business groups in emerging economies did not start out with a set of core proprietary technologies (Amsden and Chu, 2003). Groups such as Hyundai in Korea, Tata in India, or Acer in Taiwan had to rely on linkages including licensing, joint ventures, or alliances with foreign firms as a way to move up the technology ladder (Hobday, 1995). Recent innovative success of Korea and Taiwan, however, poses an intriguing paradox: the faster an emerging country catches up with the developed economies, the sooner it needs to make the transition from being an imitator to an innovator. The mechanisms that allow business groups to succeed as imitators might not be the same mechanisms that make them successful as innovators.

While licensing is often very useful for acquiring basic designs and blueprints (Amsden, 1989), the technology transferred through such contractual agreements tend to be relatively old, making licensing less effective as a catalyst for innovation (Bell and Pavitt, 1993). As the need for innovation grows, other forms of linkages become more relevant as conduits for the transfer of complex knowledge than contract-based alliances (Kogut, 1988; Mowery et al., 1996). Hobday (1995) also noted that as enterprises from Korea and Taiwan moved up the technology ladder, instead of focusing on acquiring generic technologies through licensing, the more successful enterprises attempted to access specialized knowledge through joint ventures or outright acquisition of technologically sophisticated firms in developed economies. For instance, consider the case of Acer Group, Taiwan's largest personal computer maker. In 1989, Acer allied with Texas Instruments (TI) and forged a joint venture based in Hsin-chu Science Park, Texas Instruments-Acer (TI-Acer). Although TI contributed only about 26% capital to the joint venture, it transferred its 4M DRAM technology into the joint venture and brought Acer's IC technology into the mainstream and up to world-class industry standard. TI-Acer eventually became one of the major sources of profit for Acer Group in 1995.

While international joint ventures facilitate a firm's *search* for new ideas originating outside the firm's organizational boundary, IJVs can as well inhibit a group's innovative performance. It is because maintaining IJVs incurs costs. The resources spent in maintaining external ties constrain a group's ability to develop its own organizational routines that facilitate the integration of existing ideas and resources. For example, as the number of collaborative projects rises, firms encounter increasing management cost, duplication and knowledge-transfer costs (Ahuja, 1996). Instead of

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