

Monitoring costs and the mode of international investment

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Abstract

Our central proposition is that monitoring costs increase with physical distance, and hence, direct investments located further from the foreign investor's home base should be more likely formed as joint ventures. Tests on a data set of Taiwanese direct investments in Mainland China provide robust support to the hypothesis. A project that was located 1000 kilometers further away was 13–17% more likely to be formed as a joint venture.

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1. Introduction

Previous scholarship has shown that physical distance significantly affects organizational form and business strategy in various contexts, including national and international retailing (Brickley and Dark, 1987; Fladmoe-Lindquist and Jacque, 1995; Lafontaine and Slade, 1996), bank's loan portfolios (Laderman et al., 1991), investment portfolios (Coval and Moskowitz, 1999), and trucking (Hubbard, 2000). The results of all of these studies are consistent with the proposition that monitoring costs increase with physical distance.

Our paper extends this analysis to the mode of international direct investment. Where monitoring costs are high, it is relatively more attractive for a foreign investor to form a joint venture with a local partner to help in managing the investment (Kogut and Singh, 1988; Hennart, 1991; Hanson, 1995). Accordingly, to the extent that monitoring costs increase with physical distance, investments that are further from the foreign investor's home base should be more likely to be formed as joint ventures.

We test this hypothesis using a data set of 148 Taiwanese direct investments made in Mainland China between 1987–91. Owing to a peculiarity of Taiwanese law that we explain below, this data set is uniquely suited to the testing of the relation between physical distance and the mode of international investment. The empirical tests lend strong support to the hypothesis: an investment located 1000 kilometers further away was 14–17% more likely to be formed as a joint venture. This result was robust to a number of different specifications and modeling assumptions.

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2. Theoretical framework

An investor in unfamiliar territory, whether another city, another state, or another country, is potentially subject to opportunistic behavior at the hands of local authorities, suppliers, and customers. Generally, opportunistic behavior may be resolved through either ownership or contract (Grossman and Hart, 1986; Hart and Moore, 1990; Milgrom and Roberts, 1992, Chs. 6, 9, and 16).

The effectiveness of ownership depends on the potential extent for moral hazard with respect to the investment. A party that has a smaller share of the residual income from an asset will have relatively less incentive to invest time and effort in the asset.

The effectiveness of contract also depends on the 'contractability' of the potential opportunistic act, which in turn depends on the legal environment, including the laws and the enforcement system, the cost of monitoring compliance, and other factors. Some actions are relatively easier to contract upon than others; for instance, it is easier to monitor the quantity than the quality of production. If the court system is arbitrary and capricious, contracts will be less effective.

Accordingly, ownership will be the solution for opportunistic acts that present relatively less moral hazard on the part of the party taking reduced ownership and that are relatively difficult to contract upon. When, however, these factors weigh in the opposite direction, contract will be the solution (Grossman and Hart, 1986; Hart and Moore, 1990; Milgrom and Roberts, 1992, Chs. 6, 9, and 16).

In the case of international direct investment, the ownership/contract trade-off resolves to a choice between a joint venture and wholly (foreign) ownership. If a foreign investor relies on contract to resolve the potential for opportunistic behavior, it retains complete ownership of the investment (wholly foreign owned). By contrast, if the investor uses ownership to resolve the potential for opportunistic behavior, it forms a joint venture with local partners.

Previous scholarship into international direct investment has considered various economic and non-economic factors that influence the choice of investment mode. These include the nature of the industry being entered and the foreign investor's previous experience (Hennart, 1991), variability in the demand for the product (Hanson 1995), foreign investor and domestic partner sizes (Kogut and Singh, 1988), and the cultural distance between the countries of the foreign investor and investment (Kogut and Singh, 1988; Brouthers and Brouthers, 2001).

In this paper, we focus on the effect of a particular economic factor – physical distance – on the mode of international direct investment. This research is motivated by previous scholarship showing the significance of physical distance for organizational form and business strategy in several contexts.

In retailing, it is more costly for headquarters to monitor an outlet at a greater distance, and hence it is relatively more cost-effective to delegate management of the outlet to a franchisee. Consistent with this analysis, retail outlets more distant from corporate headquarters were relatively more likely to be franchised than company operated. This held true for both national (Brickley and Dark, 1987; Lafontaine and Slade, 1996) and international retail networks (Fladmoe-Lindquist and Jacque, 1995).

Physical distance has also influenced business strategy. The loan portfolios of rural banks had a higher percentage of agricultural loans than the portfolios of urban banks (Laderman et al., 1991). Investment managers invested disproportionately in locally headquartered companies (Coval and Moskowitz, 1999). Trucks operating at relatively

longer distances were more likely to be equipped with on-board monitoring equipment (Hubbard, 2000). All of these results are consistent with the costs of monitoring at greater distance being relatively higher.¹

Here, we extend this analysis to the mode of international direct investment. If monitoring costs are higher, it is relatively more attractive for a foreign investor to form a joint venture with a local partner to help in managing the investment. Supposing that monitoring costs increase with physical distance, our central proposition is that investments which are further from the foreign investor's home base are more likely to be structured as joint ventures.

We should note that monitoring costs might not simply be a linear function of physical distance. Monitoring may involve a certain degree of fixed costs. Further, in so far as monitoring involves travel, the actual cost of monitoring should be the lower of the costs of surface and air travel.

Below, we test our proposition using data for 148 Taiwanese investments in China over the period 1987–91.

3. Chinese investment environment

During the relevant period (1987–91), the Chinese Government recognized three modes for inward direct investment – wholly foreign-owned enterprise (WFO), equity joint venture (EJV), and cooperative joint venture (CJV).² These three modes were frequently called the *san zi qi ye* (three investment enterprises).

To establish an equity joint venture, the investors had to incorporate a limited liability company in China. The foreign equity percentage was required to be at least 25%.³ By contrast, a cooperative joint venture was just a contract between an inward investor and a domestic partner. It did not require the establishment of a separate Chinese company. There was no minimum foreign equity percentage, and, further, the partners could distribute the profits according to proportions that differed from the equity shares, if any.

Chinese Government policy towards wholly foreign-owned enterprises was relatively more restrictive. A wholly foreign-owned enterprise had either to use advanced technology or export at least 50% of its production. The Government prohibited wholly foreign-owned enterprises from specified sectors and restricted them in others.

All three modes of investment – wholly foreign-owned enterprises, equity joint ventures, and cooperative joint ventures – were subject to the same income tax at a combined central and local rate of 33%.

Several other features of the investment environment are worth highlighting. First, foreign investors encountered difficulties in enforcing their rights. In December 1982, China revised its constitution to guarantee protection of the lawful rights and interests of foreign-invested enterprises. Under Chinese law, disputes among participants of joint

1 Among foreign direct investments into the US manufacturing industry, Chung (2001) found that investments located further from incumbent manufacturers were associated with relatively larger decreases in the industry price-cost markup.

2 The following review of Chinese law and regulations is based, in part, on *China Business Law Guide*, Sections 25-010 to 26-900.

3 Equity joint ventures were legalized in July 1979, and the Chinese Government issued the corresponding regulations four years later (Nyaw, 1993, 16.21).

ventures had to be referred to arbitration before the China International Economic and Trade Arbitration Commission. However, some foreign investors had difficulty enforcing Commission awards against local entities (Nyaw, 1993, pp.16.25–16.26).

A related issue was hold up by government officials: '[officials] often made up taxes, rules, and regulations as they went along, rather than following any written policy' (*Time*, June 2, 1986). Abuse was so widespread that the Chinese Government published a regulation stirringly entitled, *Notice of the State Council on Resolutely Curbing the Indiscriminate Levy of Charges on Enterprises* (Nyaw, 1993, p. 16.23).⁴

Second, China particularly encouraged investment in Special Economic Zones (SEZs). Between 1980–88, the Chinese Government established five SEZs – in Shenzhen, Zhuhai, Shantou, Xiamen, and Hainan Province. These SEZs offered superior infrastructure, more favorable investment incentives, greater flexibility in approval of inward investments, and a preferential income tax rate of 15% (Cheng and Zhao, 1994).

Third, for political reasons, Taiwanese investors received preferential treatment in China. The Chinese Government considered Taiwan to be a province of China rather than a foreign country. Also, it was concerned to foster good relations with the Taiwan business community in order to advance the cause of eventual re-unification (Sung, 1992). Accordingly, the Chinese Government accorded special treatment to Taiwanese investors, including an unrestricted choice among equity and cooperative joint ventures and wholly foreign ownership, no limit on the duration of joint ventures, and no limitations on sectors of investment.⁵

4. Data

In 1949, Chiang Kai-shek's Nationalist Government retreated from (mainland) China to Taiwan. The victorious Communist Party established a new government of China. For 38 years, the Nationalist Government of Taiwan prohibited Taiwanese from investing in China. Then, in November 1987, the Taiwan Government lifted its long-standing ban (Kao et al., 1992, p. 217).

In September and October 1991, Kao et al. (1992) sent a detailed questionnaire to all registered Mainland investors.⁶ See the Appendix for details of the data set. Table 1 reports summary statistics. On average, the total capital employed when the factory was established was US\$2.285 million, and 23.5% of production was sold to the domestic Chinese market. These numbers are broadly consistent with general characterizations of Taiwanese investments in China at the time as being small export-oriented businesses in mature, labor-intensive, low-technology industries (Sung, 1992, p. 39; Nyaw, 1993, pp. 16.7–16.10).

Further, the average investment was located 1253 kilometers from Hong Kong. There was considerable variation in location, with the standard deviation of distance

4 Che and Qian (1998) and Litwack and Qian (1998) discuss various institutional solutions to the potential for expropriation by Chinese authorities.

5 *State Council Regulations to Encourage Investment by Taiwanese Businessmen*, July 1988.

6 Under Taiwanese law, all outbound foreign investors must get approval from the Investment Commission at the Ministry of Economic Affairs. Some Taiwanese investors, however, channeled investments through third territories such as Hong Kong and Singapore so as to avoid having to register as investing in Mainland China.

Table 1. Summary statistics

Variable (units)	N	Minimum	Maximum	Mean	Std. deviation
JV joint venture	148	0	1	0.3986	0.4913
DISTHK (000 kilometers) distance to Hong Kong	148	0.0720	5.724	1.253	1.216
ESTCAP (US\$ 10 million) capital at establishment	148	0	20.67	0.2285	1.701
<i>excluding outlier</i>	147	0	2.000	0.0894	0.1817
SALESPRC proportion of sales to Chinese market	148	0	1.0	0.2348	0.3341
SEZ Special Economic Zone	148	0	1	0.3197	0.4680
EARLY (months)	142	-10	242	21.58	23.08
FUJIAN Fujian Province	148	0	1	0.3451	0.4771
GDP per capita (US\$)	148	238.26	2064.59	852.66	500.88
PARCAP (US\$ 10 million) parent capital	123	0.002	4.151	0.1167	0.4077

being 1216 kilometers. Of the 148 investments, 47 were located in SEZs, and 51 in the province of Fujian.

Regarding the form of investment, 89 of the investments were wholly foreign (Taiwanese) owned, 52 were equity joint ventures, and only seven were cooperative joint ventures. Again, these numbers are consistent with Nyaw's (1993) broad characterization of foreign investment into China: 'EJVs have become increasingly important since 1985. The number of WFOs also surged after 1987 whereas CJVs... declined' (p. 16.7).⁷

This data set is particularly well-suited to testing the significance of monitoring costs for the mode of international direct investment. The investments were spread over many locations in China. Yet, owing to a peculiarity of Taiwanese law, it is possible to identify the cost of monitoring quite accurately with a single measure of physical distance. As Taiwanese law prohibited direct trade, transport, and communication with China, almost all travel and communication between Taiwan and China passed through Hong Kong. Since Taiwan itself is fairly small, we can identify the cost of monitoring an investment in China with the physical distance between Hong Kong and the location of the investment.

In December 1994, two Korean airlines – Asiana and Korean Airlines – initiated commercial air services between Seoul and Beijing, providing an alternative air route between Taiwan and China.⁸ Hence, it would be more problematic to measure the cost of monitoring Taiwanese investments in China made after December 1994.

5. Hypotheses

Our central proposition is that investments located at a greater distance are more likely to be structured as joint ventures. Owing to the Taiwan Government's prohibition

7 The data are publicly accessible at <http://www.comp.nus.edu.sg/~ipng/research/>.

8 Airline websites: <http://www.flyasiana.com/> and <http://www.koreanair.co.kr/>.

against direct trade, transport, and communication with China, the relevant measure of distance is from Hong Kong to the investment location. Following Cheng and Zhao (1994), we measure distances along straight lines from the relevant city or provincial capital to Hong Kong. Accordingly, we have:

H1: An investment further from Hong Kong would be more likely to be formed as a joint venture.

We also include several control variables that might influence the choice of investment mode. The first control variable is the size of the investment. The larger the required capital, the greater would be the risk, which has been shown to play a significant role in the choice of investment mode (Hanson, 1995). In addition, to the extent that the investment is immobile, the Taiwanese investor would be subject to opportunistic actions by local officials and businesses. Hence, the Taiwanese investor would prefer a Chinese partner. This motivates:

H2: A larger investment would be more likely to be formed as a joint venture.

The next two control variables are specific to the investment environment in China. Under Chinese law, a wholly foreign-owned enterprise must either use advanced technology or export at least 50% of its production. Even absent such a law, a Taiwanese investor targeting the domestic (Chinese) market would have relatively greater need of a local partner to assist with marketing. Accordingly, we expect that investments with a larger proportion of sales to the Chinese market would be more likely to be formed as joint ventures.

H3: An investment with a larger proportion of sales to the Chinese market would be more likely to be formed as a joint venture.

SEZs offered superior infrastructure, more favorable investment incentives and tax treatment, and easier investment approval (Cheng and Zhao, 1994). Further, the special status of SEZs has been interpreted as a commitment by the Chinese Government against official expropriation (Litwack and Qian, 1998). Accordingly,

H4: An investment in a SEZ would be less likely to be formed as a joint venture.

6. Empirical results

To operate the theory of investment mode, we propose a logistic discrete-choice model. We record investments in the form of either equity or cooperative joint ventures as $JV = 1$, and investments that were wholly owned by the Taiwanese investor as $JV = 0$. The basic independent variables are: distance from Hong Kong (DISTHK), capital at time of establishment (ESTCAP), proportion of sales to the Chinese market (SALESPRC), and location in a SEZ.

Table 2 reports correlations among the variables, while Table 3 reports the logistic regression results. Let us first review column (a). The coefficient of distance to Hong Kong (DISTHK) was positive and significant at the 99% confidence level. This was consistent with our central hypothesis H1 that, owing to the difficulty of monitoring

Table 2. Correlations

	JV	DISTHK	ESTCAP	SALESPRC	SEZ	EARLY	FUJIAN
JV	1.000	0.354***	-0.043	0.220***	-0.289***	-0.062	-0.202**
DISTHK	0.354***	1.000	0.105	0.072	-0.352***	0.038	-0.075
ESTCAP	-0.043	0.105	1.000	-0.047	-0.062	-0.053	-0.062
SALESPRC	0.220***	0.072	-0.047	1.000	-0.049	-0.165**	0.018
SEZ	-0.289***	-0.352***	-0.062	-0.049	1.000	0.099	0.341***
EARLY	-0.062	0.038	-0.053	-0.165*	0.099	1.000	0.137
FUJIAN	-0.202**	-0.075	-0.062	0.018	0.341***	0.137	1.000

***Significant at 99% level.

**Significant at 95% level.

investments in a more distant location, an investment located further away would be more likely to be formed as a joint venture.

The coefficient of the ESTCAP was not significant. This result was not consistent with the risk-sharing hypothesis H2 that investments involving larger amounts of capital would be more likely to be formed as joint ventures. Below, we explain how this result depended on an extreme data point.

The coefficient of the SALESPRC was positive and significant at the 95% level. This was consistent with the hypothesis H3 that, owing to Government restrictions on domestic sales by wholly foreign owned projects, investments with a higher proportion of sales to the Chinese market were more likely to be formed as joint ventures.

The coefficient of SEZ was negative and significant at the 95% level. This was consistent with hypothesis H4 that SEZs provided government commitment against holdup by local authorities.

Overall, the results in Table 3, column (a), provide strong support to the central hypothesis regarding the impact of physical distance, and some support to the control hypotheses regarding the impact of sales to the China market and location in a SEZ. We next consider why the results were not consistent with the hypothesis H2 regarding the size of the investment.

In terms of size, as measured by the capital at time of establishment, there was one extreme case. Referring to Table 1, the largest investment involved capital of US\$206.7 million. This was over 10 times larger than the next largest investment (US\$20 million capital) and 90 times larger than the average (US\$2.285 million capital). Accordingly, it is reasonable to consider the US\$206.7 investment as an outlier and exclude it from further analysis.⁹

In Table 3, column (b), we present the logistic regression, excluding the outlier. The effect of distance continued to be positive and significant at the 99% level. However, with the exclusion of the outlier, the coefficient of the ESTCAP became positive and significant. This was consistent with the risk-sharing hypothesis H2 that investments involving larger amounts of capital would be more likely formed as joint ventures. The

9 This outlier involved an investment was 12 standard deviations larger than the mean investment. Further, it was one of only two investments in the service sector. The overwhelming majority of investments (141 of 149) were in manufacturing.

Table 3. Investment mode: logit model. Dependent variable: joint venture

	(a) including outlier	(b)	(c)	(d)	(e)
Constant	-1.109*** (0.360)	-1.588*** (0.409)	-0.804*** (0.299)	-1.056*** (0.318)	-2.006*** (0.540)
DISTHK distance from Hong Kong	0.541*** (0.181)	0.532*** (0.187)		0.320 (0.269)	0.563*** (0.191)
ESTCAP Capital at establishment	-0.123 (0.169)	7.435*** (2.503)	7.711*** (2.523)	4.645 (3.623)	7.053*** (2.505)
SALESPRC Proportion of sales to China	1.269** (0.546)	1.008* (0.589)	1.054* (0.591)	1.034* (0.592)	1.007* (0.587)
SEZ Special Economic Zone	-0.982** (0.457)	-1.085** (0.481)	-1.253*** (0.474)	-1.055** (0.478)	-1.462*** (0.581)
Log(DISTHK)			0.381** (0.183)		
DISTHK × ESTCAP				3.401 (3.383)	
GDP per capita					0.000616 (0.000501)
EARLY					
FUJIAN					
PARCAP Parent capital					
No. of observations	148	147	147	147	147
Log likelihood	-84.00	-78.40	-80.96	-77.82	-77.64
LR statistic	31.05	41.22	36.11	42.37	42.75

Standard errors in parentheses; ***Significant at 99%; **Significant at 95%; *Significant at 90%.

	(f)	(g)	(h)	(i) Industry dummies [§]
Constant	-1.462*** (0.458)	-1.438*** (0.412)	-1.486*** (0.434)	-1.565*** (0.500)
DISTHK Distance from Hong Kong	0.455** (0.194)	0.561*** (0.196)	0.446** (0.189)	0.569*** (0.199)
ESTCAP Capital at establishment	7.710** (2.516)	7.481*** (2.516)	8.334*** (2.875)	8.316*** (2.713)
SALESPRC Proportion of sales to China	0.9132 (0.607)	1.000* (0.588)	0.916 (0.641)	0.990 (0.622)
SEZ Special Economic Zone	-1.077** (0.486)	-0.809 (0.505)	-0.960* (0.514)	-1.155** (0.507)
Log(DISTHK)				
DISTHK × ESTCAP				
GDP per capita				
EARLY	-0.00368 (0.0104)			
FUJIAN		-0.809* (0.454)		
PARCAP Parent capital			0.189 (0.644)	
No. of Observations	142	147	123	147
Log Likelihood	-76.09	-76.76	-83.78	-77.01
LR statistic	37.40	44.51	33.87	44.00

Standard errors in parentheses; ***Significant at 99%; **Significant at 95%; *Significant at 90%.

[§]For brevity, the industry dummy coefficients are not reported.

coefficient of SALES_{PRC} dropped in significance (from the 95% to the 90% level), while that of location in a SEZ continued to be significant at the 95% level.

In light of these results, it seemed reasonable to ignore the outlier in the subsequent analysis. From this point onward, we consider Table 3, column (b), to be the basic equation with which to compare other specifications.

As we noted above, monitoring costs might not simply be a linear function of physical distance. To check this, we tried specifying distance from Hong Kong in logarithmic rather than absolute form. Table 3, column (c), reports the results. Consistent with the central proposition, the coefficient of the distance measure was positive and significant. However, the degree of significance (95% level) was lower than in the specification with absolute distance. Further, the likelihood ratio of the specification with logarithmic distance was lower than that with absolute distance.

We also checked the presence of fixed monitoring costs by including the interaction between distance from Hong Kong and capital at time of establishment ($DISTHK \times ESTCAP$). Table 3, column (d), reports the results. The interaction variable was not significant. However, as it was highly correlated with distance and capital, each of these variables also ceased to be significant. We conclude that the best specification was that with absolute distance (Table 3, column (b)).

It is also possible that distance from Hong Kong was a proxy for the degree of economic development of the location. To check this possibility, we included the provincial GDP per capita as an additional explanatory variable. Table 3, column (e), reports the results. The coefficient of per capita GDP was positive but not significant. The inclusion of this additional variable had only a slight effect on the coefficient of $DISTHK$ relative to the basic equation in Table 3, column (b). Accordingly, we infer that distance was *not* a proxy for the degree of economic development.

Our data set included investments made between 2–4 years after the Taiwan Government legalized direct investment in China. An interesting question is whether the mode of investment changed with time as Taiwanese investors accumulated experience. For instance, investors might have begun with joint ventures and, then having built up experience, switched to the wholly foreign-owned mode (Hennart, 1991). Further, opportunities for investment in China might have changed over time in a way that correlated with changes in investor perceptions of contractual difficulties.

To account for these possibilities, we included a new variable, *EARLY*, which measured the time in months from the investment until the survey date.¹⁰ Table 3, column (f), reports the results. The coefficient of *EARLY* was negative, which was inconsistent with the argument that early investments were more likely to be formed as joint ventures. Moreover, the coefficient was not significant. Thus the evidence was inconsistent with experience effects and a relation between changes in investment opportunities and contractual difficulties.

The inclusion of the *EARLY* variable reduced the magnitude of the coefficient of $DISTHK$. Referring to Table 2, *EARLY* and *JV* were negatively correlated while *EARLY* and $DISTHK$ were positively correlated. It seems puzzling that the inclusion of *EARLY* resulted in the coefficient of $DISTHK$ being lower than in the basic

¹⁰ Referring to Table 1, the data on date of investment may not be completely reliable. The minimum value of *EARLY* was –10 months, while the maximum was 242 months, which means that the investment preceded the legalization of Taiwanese investments in the Mainland by over 15 years.

equation in Table 3, column (b). The reason is that we did not have data on EARLY for five investments. If we had run the basic equation without these five records, then the coefficient of DISTHK would have been 0.445.

Another possible explanatory variable is cultural differences. Measuring cultural differences by Hofstede's (1991) national indexes, previous scholarship showed that, if the cultural distance between investor and investment location was greater, then the investment was more likely to be structured as a joint venture (Kogut and Singh, 1988; Brouthers and Brouthers, 2001). In our data, all investments were located in China, hence there was no variation in *national* culture. There were, however, differences at the *provincial* level. Specifically, Taiwan is relatively closer to Fujian province in the sense of sharing the Fujian and Fuzhou dialects as well as clan and family ties. This cultural closeness has already been cited as influencing the magnitude of investment (Sung, 1992, p. 7).

Table 3, column (f), reports the regression including the variable FUJIAN, which indicated investments located in Fujian province. The coefficient of FUJIAN was negative and marginally significant (at the 90% confidence level). This suggested that investments located in Fujian province were less likely to be formed as joint ventures. This was consistent with the hypothesis that joint ventures are less likely in culturally closer locations. The inclusion of the FUJIAN variable did not affect the performance of the other variables.

Next, we explored another aspect of the need to share risk. Smaller firms would have fewer resources to monitor foreign investments, hence should be more likely to enter into joint ventures. Hence, we checked whether investment mode varied systematically with the capital of the Taiwanese parent company. Table 3, column (h), reports the regression including the Taiwanese parent capital, PARCAP. The coefficient of PARCAP was not significant.¹¹

The insignificance of the parent capital was surprising especially as the investments were quite large relative to their parent capital: by Table 1, the mean investment required capital at establishment of US\$0.894 million, as compared with the mean Taiwanese parent capital of US\$1.167 million. There are two possible reasons why Taiwanese parent capital was not significant. One is that the Taiwanese investors had access to other sources of investment funds, including their personal wealth. Another reason is that the Taiwanese 'parent' might itself be a subsidiary of a larger group with more substantial capital.¹²

The inclusion of the PARCAP variable did not much affect the performance of the distance and capital variables. However, the proportion of sales to China and location in a SEZ dropped in statistical significance. This might be explained by reduced degrees of freedom: we did not have data on capital for 24 firms.

Finally, we explored whether investment mode varied systematically with the industry in which the investment was made. Investment mode might vary with industry

11 We also tried another regression with the capital at establishment, ESTCAP, replaced by a relative measure, ESTCAP/PARCAP. In this regression, the measure of relative capital requirement was significant only at the 90% level and the fit was substantially worse than our basic regression, Table 3, column (b). For brevity, we do not report this regression.

12 For instance, the parent capital for the outlier US\$206.7 million investment was just \$10,377. We understand that the Taiwanese investor was a large group which probably incorporated a separate company to carry out the Mainland China investment.

Table 4. Investment mode: logit model. Dependent variable: equity joint venture

	(a)	(b)	(c)	(d)
Constant	-1.704*** (0.426)	0.953*** -(0.310)	-1.047* (0.574)	-1.532*** (0.428)
DISTHK Distance from Hong Kong	0.509*** (0.192)		0.464** (0.210)	0.537*** (0.200)
ESTCAP Capital at establishment	7.293*** (2.588)	7.602*** (2.607)	7.567*** (2.616)	7.317*** (2.593)
SALESPRC Proportion of sales to China	1.189** (0.605)	1.216** (0.604)	0.901 (0.627)	1.154* (0.606)
SEZ Special Economic Zone	-1.134** (0.507)	-1.318*** (0.500)	-1.075** (0.518)	-0.851 (0.531)
Log(DISTHK)		0.332* (0.188)		
EARLY			-0.0333 (0.0228)	
FUJIAN				-0.868* (0.476)
No. of observations	140	140	135	140
Log likelihood	-73.09	-75.56	-69.34	-71.35
LR statistic	38.54	33.59	37.04	42.01

Standard errors in parentheses.

***Significant at 99%.

**Significant at 95%.

*Significant at 90%.

for various reasons. First, the Chinese Government restricted wholly owned businesses from some sectors. While it did not impose such restrictions on Taiwanese investments, the restrictions would still have affected Taiwanese investors entering China through or together with entities from third jurisdictions such as Singapore. Second, investments in some sectors involve a higher degree of sunk costs, hence are more vulnerable to expropriation. Finally, it might just be that more distant investments are disproportionately in industries for which joint ventures are particularly favored.

To account for these possibilities, we included a set of variables to indicate the industries with more than five investments each – porcelain, sporting goods, shoes, metalwork, and electrical goods. Table 3, column (i), reports the results. None of the industry indicators were significant, which suggests that investment mode did not systematically vary with industry. The inclusion of the industry indicators did not affect the performance of the other variables, except proportion of sales to China, which ceased to be significant.

From our empirical investigations, we conclude that there is strong support for our central proposition, that investments located further from the foreign investor's home base are more likely to be formed as joint ventures. This result was robust to a number of alternative specifications. In the various specifications, the coefficient of the DISTHK ranged from 0.446 to 0.569 (Table 3, columns (b) and (e)–(i)). By Table 1, the mean proportion of joint ventures was 0.3986 and the mean DISTHK was 1.253 (in thousands of kilometers). Accordingly, the estimates suggest that if an investment were

1000 kilometers more distant from Hong Kong, it would be 13.4% to 17.1% more likely formed as a joint venture.¹³

To further check the robustness of our results, we repeated the logistic regressions to include only equity joint ventures. In this case, an investment was considered to be a joint venture only if it was an equity joint venture. As shown in Table 4, the results were essentially similar to those reported in Table 3. The coefficient of DISTHK ranged from 0.464 to 0.537, which was contained within the range of coefficients of DISTHK in Table 3.

We also repeated the tests using the probit instead of the logistic regression. As the results were essentially similar, we omit them here.

7. Concluding remarks

Our central hypothesis was that monitoring costs increase with physical distance, and hence, direct investments at a greater distance would be more likely to be formed as joint ventures. We tested this hypothesis on a data set of 148 Taiwanese direct investments in Mainland China between 1987–91. The results lend strong support to the hypothesis. A project that was located 1000 kilometers further from Hong Kong was 13–17% more likely to be formed as a joint venture.

Our results also bear specifically on the character of international investment into China. Many studies have observed that China's southern coastal provinces and SEZs have drawn relatively more investment than inland locations (Nyaw, 1993; Cheng and Zhao, 1994). Here, we show that proximity to Hong Kong and location in a SEZ also had a significant effect on the *mode* of investment. Accordingly, the same factors that affect the *quantity* of investment also influence the *mode* of investment. Previous scholarship has shown that cultural distance affects the performance of foreign investments in China (Li et al., 2001). Here we found some evidence that cultural distance also affects the mode of investment.

The principal limitation of our study is that monitoring costs may be imperfectly correlated with distance. Realistically, the cost of travel is the minimum of the costs of surface and air travel, hence the relation between distance and travel cost might not be linear. A richer data set is needed to investigate the impact of monitoring costs on the mode of investment more precisely.

It would also be interesting to investigate other implications of monitoring costs for the character of international investment. For instance, where monitoring costs are high, the foreign investor will avoid sunk investments, which implies that foreign investors will target businesses that are relatively less intensive in specific worker training, capital, and technology. To the extent that monitoring costs are correlated with physical distance, we would expect to find that the more distant investments to be relatively less intensive in specific worker training, capital, and technology.

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13 To illustrate the calculation of the semi-elasticity, $0.3986 \times (1 - 0.3986) \times 0.446 \times 1.253 = 13.4\%$.

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Appendix: The Kao et al. data set

To collect information about the characteristics of Taiwanese investors and investments in China, Kao et al. (1992) sent a detailed questionnaire to investors that had registered with Taiwan's

Ministry of Economic Affairs up to October 1991. Each investor was sent only one questionnaire, regardless of the number of investments it had made in China. The data set consisted of 337 records.

Item II.3 of the questionnaire asked respondents to check their mode of investment from four alternatives – processing and assembly facility, wholly foreign-owned enterprise (WFO), equity joint venture (EJV), and cooperative joint venture (CJV). WFO, EJV, and CJV are mutually exclusive modes of direct investment.¹⁴ By contrast, a processing and assembly facility is an enterprise that is eligible to import materials and semi-finished products free of tariffs or restrictions. Such a facility may be owned by a wholly foreign-owned entity, or a joint venture. Accordingly, it is not an investment mode.

Twenty-eight respondents did not answer the question on investment mode, 73 checked only processing and assembly facility, while 11 checked more than one of the three investment modes, WFO, EJV, and CJV.¹⁵ We deleted these 112 records. A further 41 respondents checked processing and assembly facility as well as one of the three modes. We assigned each of these 41 to their respective mode.

We had to delete a further 77 records that did not include data on location, sales to the Chinese market, capital, or Taiwanese equity percentage (for joint ventures). After accounting for all of these discrepancies, we had 148 records. Of these, 89 were Taiwanese owned WFOs, 52 were EJVs, and seven were CJVs.

ESTCAP, the total capital employed when the factory was established, was calculated as follows. If the enterprise was wholly-owned, then we set ESTCAP equal to the respondent's reported investment when the factory was established. If the enterprise was a joint venture, we calculated ESTCAP as the respondent's reported investment when the factory was established divided by the (Taiwanese) respondent's equity percentage.

Kao et al. (1992) collected the capital of the Taiwanese parent in New Taiwan dollars. We converted the data at the exchange rate of 26.02 New Taiwan dollars to US\$1, which is the average of the exchange rates for October and November, 1991.

14 The following review of Chinese regulations is based, in part, on *China Business Law Guide*, Sections 25-010 to 26-900, and 83-610 to 83-724.

15 These 11 might possibly have made multiple investments in China.