# The Value of Waiting: Foreign Direct Investment with Uncertainty and Imperfect Local Knowledge

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## Abstract

This paper examines the role of uncertainty and imperfect local knowledge in foreign direct investment. The main idea comes from the literature on investment under uncertainty, such as Pindyck (1991) and Dixit and Pindyck (1994). We empirically test "the value of waiting" with a dataset on foreign direct investment (FDI). Many factors (e.g., political and economic regulations) as well as uncertainty and the risks due to imperfect local knowledge, determine the attractiveness of FDI. The uncertainty and irreversibility of FDI links the time interval between permission and actual execution of such FDI with explanatory variables, including information on foreign (home) countries and domestic industries. Common factors, such as regulatory change and external shocks, may affect the uncertainty when foreign investors make irreversible FDI decisions. We derive testable hypotheses from models of investment under uncertainty to determine those possible factors that induce delays in FDI, using Korean data over 1962 to 2001.



Keywords: Foreign Direct Investment, Irreversibility, Uncertainty, Imperfect information, Investment Delay

JEL CODE: F21, G31, O16

## I. Introduction

The attractiveness and actual disbursement of foreign direct investment (FDI) into a given country depends on many factors, including political and economic conditions both in the host country and in the rest of the world. In particular, irreversible investment decisions under uncertainty affect the actual deployment of FDI.

Recent work in options theory (Dixit, 1992; Dixit and Pindyck, 1994; Trigeorgis, 1996) show that the traditional net present value (NPV) approach to investment decisions ignores various embedded real options in such investment. In particular, this line of research demonstrates that uncertainty with irreversible investment makes delaying such investment valuable even with a positive NPV because the resolution of uncertainty provides a window of opportunity to improve the return on investment (Pindyck 1991). McDonald and Siegel (1986), Pindyck (1991), Dixit and Pindyck (1994), and Trigeorgis (1996) provide analyses of the value of waiting for more information before actual commitment in investment decisions.

Rivoli and Salorio (1996) extend the economics of uncertainty with an option theoretic application to foreign direct investment under uncertainty to examine the effect of irreversibility on the delay in foreign direct investment.[1] They conclude that less foreign direct investment occurs when it becomes either more delayable or less reversible under uncertainty. They enrich the existing theories of foreign direct investment by asking "when" the investment actually occurs.

Rajan and Marwah (1998) also examine the choice and timing of foreign direct investment, calculating the expected discounted profits from the various actions of the firm,

[1] Buckley and Tse (1996) also apply real options to existing foreign direct investment theories.

including the option to wait.[2] They conclude that the government should improve the credibility of its liberalization program and should reduce the cost of foreign firms investing in their domestic economy.

Bell and Campa (1997) and Campa (1994) employ real option modeling to examine the entry decision by firms. They examine whether increased volatility or uncertainty affects the entry decision.

We test the main propositions from this theoretical literature on foreign direct investment under uncertainty, utilizing a Korean data set from 1962 to 2001. The data importantly include not only the date of actual foreign direct investment, but also the date that the Korean government gave permission for that investment. In particular, we empirically examine the effect of uncertainty on the duration from permission to execution of irreversible FDI into Korea.[3] The dataset includes a variety of information such as investor identity, the share of foreign investor, the amount of FDI permitted, the host industry information, and the duration time between FDI permission and its disbursement.[4]

Pindyck (1991) developed a simple model to obtain possible conditions that influence the delay between FDI permission (now notification) and execution.[5] Acquiring permission from the Korean government represents an option to enter, because foreign firms cannot actually invest without governmental permission. Once permission occurs, foreign firms still have the option to not invest immediately. In other words, foreign firms own an option to delay the actual

[2] While they include the value (price) of the option in the calculation of the expected discounted profit for the firm, they do not explicitly specify the real option model to determine that value (price).

[3] Prior studies (Bell and Campa, 1997; Campa, 1994) were handicapped, since they did not possess information to calculate the duration.

[4] FDI occurs in Korea when a foreign investor holds more than 10 percent of equity capital with maturities of five years or more.

[5] The Ministry of Commerce, Industry and Energy records two measures of FDI in Korea.

investment. Compared with portfolio investment, foreign direct investment is irreversible, given that the salvage value of direct investment is so small due to the idiosyncratic nature of production equipment.

Our analysis indicates that irreversibility and uncertainty induce delays in FDI disbursement. We also discover several additional interesting results that support theories of investment under uncertainty. First, the permitted amount does not affect duration and uncertainty. Second, higher foreign ownership implies shorter duration time and, thus, lower uncertainty. Third, familiarity with the Korean environment reduces the uncertainty in performing FDI.[6] Thus, more experience implies shorter duration. Fourth, the permission date does not significantly shorten or lengthen duration. That is, neither the credibility of the Korean liberalization program nor the reputation of the policy makers responsible for that program experience any significant change over the sample period. Fifth, FDI from China and Japan[7] enjoys shorter duration, while FDI from U.S. experiences longer duration. Sixth, the Asian crisis significantly increases uncertainty and generates longer duration. Finally, variations in duration across industries exist.

Section 2 describes the basic theoretical model and examines the effect of uncertainty on FDI. Section 3 records the five phases of inward FDI development in Korea and the role of FDI in the Korean economy. Section 4 highlights the data on inward FDI, focusing, in detail, on the experience of the U.S., Japan, and China. Section 5 reports the formal duration analysis and one robustness check, and discusses the results. Section 6 concludes with policy implications.

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[6] The host country often signals its intentions by relaxing regulation and arranging other institutional favors. For example, China successfully attracted FDI, even though neighboring countries offered better deals.

[7] The Japanese dummy variable proves insignificant, but negative, in the duration analysis, although significantly negative in the sensitivity analysis. See later in the text and Table 3.

## II. Theoretical Framework: Investment under Uncertainty

Assume that a foreign firm gets permission from the local government for direct investment at time $0$. Now, the firm owns the rights to an investment project and the option to invest in that project at anytime. If the firm exercises the option at time $t(>0)$, then assume that the return to the firm from the initial investment of $I$ for the project equals $V_t$. More specifically, the investment project $V_t$ follows the geometric Brownian-motion process

$$dV = \mu V dt + \sigma V d\varepsilon , \qquad (1)$$

where $\mu$ and $\sigma$ equal constant parameters and $\varepsilon$ follows a Wiener process.

Once actual investment or disbursement occurs, the value of the project equals $V_t$ at time $t$. Prior to actual disbursement, the value of the real option to invest equals $F(V)$, where the current value of the project equals $V$. Therefore, define V* such that

$$F(V^*) = V^* - I , \qquad (2)$$

where $V^*$ equals the threshold value of the project that just supports the investment without further waiting. That is, the investment decision rule says that the foreign firm actually takes an irreversible action of disbursement, if and only if, $V_t$ exceeds $V^*$.[8]

Pindyck (1991) shows that $F(V)$ satisfies the following differential equation:

$$\frac{1}{2}\sigma^2 V^2 F(V)_{VV} + (r-\delta)VF(V)_V - rF(V) = 0, \qquad (3)$$

where subscripts denote partial derivatives, $r$ denotes the risk-free interest rate, and $\delta$ denotes the opportunity cost of delaying the actual investment. Together with the boundary conditions that $F(0) = 0$, $F(V^*) = V^* - I$, and $F_V(V^*) = 1$, equation (3) possesses a unique solution

[8] Note that the usual NPV rule that the (discounted) value of the investment must equal its cost now becomes that the (discounted) value of the investment must exceed its cost by at least the real option value for waiting

$$F(V) = (V^* - I)[\frac{V}{V^*}]^{\beta}, \text{ and} \quad (4)$$

$$V^* = \frac{\beta}{\beta - 1} I, \quad (5)$$

where $\beta = \frac{1}{2} - \frac{r-\delta}{\sigma^2} + \sqrt{\frac{2r}{\sigma^2} + (\frac{1}{2} - \frac{r-\delta}{\sigma^2})^2}$. Both $F(V)$ and $V^*$ increase, if $\sigma$ increases. In other words, uncertainty increases the value of a firm's investment opportunities, but decreases the amount of actual investing that the firm will does, since the threshold value, V*, rises.

Pindyck's (1991) analysis implies that higher uncertainty induces firms to invest less and to wait longer, on average. Intuitively, firms will wait when the benefit of waiting exceeds the cost of waiting. Likewise, firms will invest when the expected benefit exceeds the expected cost. More uncertainty makes additional investment less attractive. Thus, firms will invest less, given higher uncertainty.

Rivoli and Salorio (1996) and Trigeorgis (1996) show that competition alters the value of waiting. Firms will invest sooner, rather than later, if danger exists of preemption by competitors. In other words, firms without market power cannot enjoy the delay option, because competitive pressures make the cost of waiting higher. The prior discussion leads to the following hypothesis:

***Hypothesis 1: The more competition among foreign entrants, the more likely firms will invest sooner.***

If firms possess good information about the local host country, investing firms face less uncertainty and will accumulate less new information. In other words, the benefits of waiting fall for firms more familiar with the local host country. We hypothesize that the firms will wait less,

if previous investment into Korea already exists. We also hypothesize that firms will wait less, if the foreign firm opts for a higher ownership ratio. Previous investment into Korea proxies for familiarity with local conditions. Higher ownership implies a higher commitment by foreign firms under uncertainty. Higher commitment implies either that firms exhibit risk-seeking behavior or know something about the local host country. Since we do not assume any specific attitude of firms toward risk, we associate higher ownership with better local knowledge. This leads to our second hypothesis.

***Hypothesis 2: The more local knowledge firms possess, the more likely firms will invest sooner.***

Rajan and Marwah (1998) also provide a theoretical discussion of the foreign direct investment decision, including the possibility of "wait-and-see" behavior. They consider three alternative cases: (1) invest in the foreign market immediately, (2) do not invest in the foreign market, but serve that market with exports, and (3) wait before investing in the foreign market. Of course, the last strategy involves two choices while the firm waits: (i) invest in liquid assets or (ii) serve the foreign market with exports. Rajan and Marwah (1998) calculate the expected discounted profits for each strategy and consider the conditions under which each strategy is chosen. The "wait-and-see" strategy requires the use of the value (price) of the real option to wait. They merely hypothesize the existence of the value (price) of the real option, but do not describe the method of determining that real option value (price), such as Pindyck (1991).[9]

Rajan and Marwah (1998) conclude that policy makers need to consider strategies to improve the credibility of their liberalization program[10] and to reduce the sunk costs that firms

[9] Although Rajan and Marwah (1998) identify a reduced-form estimating equation, they do not collect data or perform any econometric tests.

[10] We add that the policy makers need to improve their reputation of not trying to extract additional revenue from firms investing in the domestic economy. That is, a time-inconsistency problem exists such that the policy makers possess an incentive to change the rules after the foreign firm invests. The problem conforms to a version of the repeated "trust game," which we discuss latter in the text.

incur with foreign direct investment. We hypothesize that the Korean government accumulates credibility and reputation over time. Thus, we proxy for credibility and reputation by the date of foreign direct investment permission. The later the date of permission, the higher the credibility and reputation. We also proxy for the sunk cost by the permitted foreign direct investment. This discussion leads to two additional hypotheses as follows:

***Hypothesis 3:*** ***The more credible the liberalization program and the better the reputation of the policy makers responsible for implementing that liberalization program, the more likely firms will invest sooner.***

***Hypothesis 4:*** ***The higher the initial sunk cost (foreign direct investment), the more likely firms will invest later.***

## III. Foreign Direct Investment in Korean Economic Development

Korea attracts FDI due to convenient location for exporting into other, major Asian countries, well-established infrastructure, and skilled workers with strong educational background. Shortly after World War II, Korean policymakers did not view foreign direct investment favorably, perceiving that it exploited cheap land, labor, and raw materials for multinational corporations from industrialized countries. This attitude largely reflected the experience with Japanese colonization from 1910 to 1945. As a result, a variety of regulations were imposed to restrict FDI, creating a hostile environment for foreign investors.[11]

Korea's conversion to a friendlier environment for FDI initially resulted from external economic factors. The Korean government began liberalizing FDI regulations during the 1980s, when the Heavy and Chemical Industry Promotion Plan failed due to excessive reliance of *chaebols*, giant conglomerates of Korean business usually owned by a single family, on policy

[11] The appendix provides a detailed discussion of the evolution of Korean FDI regulation.

loans arranged by the government. The lifting of anti-FDI regulations continued through the 1990s. When Korea joined the OECD in 1996, the FDI regime needed to correspond to international norms and regulations. Nevertheless, during this period, the Korean government's stance toward FDI exhibited more tolerance than active promotion (Park, 2002).

Since the Asian financial crisis of 1997-98, the Korean economy accepted foreign direct investment under similar rules as other OECD countries and foreign and domestic companies received the same treatment.[12] FDI proved vital in growing the economy after the 1997 financial crisis, even though the inflow of foreign direct investment fell in 2001 largely as a result of the global economic slowdown (Kim, 2002).[13]

The process of liberalizing government regulation of FDI does not ensure success in promoting an investment boom. In simple terms, the situation represents a repeated "trust game," where the government (player 1) and individual firms (players 2) participate in the game.[14] That is, the firms must view the government's liberalization program as credible, while the government must establish a reputation that it will commit to the new policies and will not renege on them. As noted in footnote 8, the government possesses an incentive for time inconsistency, since they can experience a short-run gain by extracting more revenue from the foreign firms who have invested in the domestic economy. Since the "trust game" repeats itself, albeit with new firms, the firms who have received permission to invest can penalize the government by not investing. The government and the firms can reach a cooperative Nash

[12] The Asian financial crisis demonstrated to Korean policymakers that FDI possesses many advantages. Mainly, it secures long-term stable foreign capital instead of the short-term bank loans and other sources of foreign borrowing that Korea used before the crisis. Furthermore, the Korean government realized that FDI brings management expertise, new technology, and alliances with foreign partners. Consequently, the government enacted several investment promotion acts.

[13] Recently, China has competed vigorously with Korea to attract inward FDI.

[14] Rajan and Marwah (1998) also tell a game theory story, although their analysis uses the prisoner's dilemma model.

equilibrium when the threat of punishment imposes discounted costs higher than the potential discounted gains to the government. In sum, a credible government policy and reputable government policy makers can induce larger foreign direct investment with a shorter delay.

## IV. FDI Performance in Korea

Foreign direct investment into Korea increased steadily from 1980 to 2001 along with average foreign ownership. Comparing performed to unperformed FDI, the average amount and the average ownership of performed FDI projects consistently exceed those of unperformed projects, except for the initial years. The reverse occurred in 1988, the year of the Seoul Olympic Games, and in the year of the Asian crisis (i.e., 1997). That is, average unperformed FDI substantially surpassed that of performed FDI in those two years.[15] Unlike 1988, percentages of realized FDI in 1997, both in number of projects and in invested capital, reached their lowest levels. That outcome probably reflects the expected financial crisis, which actually unfolded at the end of 1997, scaring away big investors and causing the postponement or cancellation of many registered projects. After the Asian financial crisis, the highest inflow of capital occurred in 1998 with the percentage of realized capital soaring from 35.4 to 91 percent, and the realized number of projects increasing from 68.1 to 74.1 percent.[16]

Those industries that attracted a large number of projects also enjoyed a high percentage of realized capital, ranging from 91 to 96 percent. Wholesale trade exhibited the highest average ownership (over 92 percent), while the electrical machinery manufacture showed the lowest (about 55 percent). When sorting industries by realized capital, wholesale trade, while attracting

[15] Interestingly, the number of FDI projects approved by the Korean government increased sharply during two time periods, 1985 to 1987 and 1998 to 2000. While the percentage of performed FDI was over 97% during 1985 to 1987, it was below 80% during 1998 to 2000, on average.

[16] In general, the number of realized projects steadily increased over time, decreasing slightly from 1989 to 1992. The percentage of realized projects, however, have decreased since 1962 with an abrupt drop in 1997.

the largest number of projects, stands only in the tenth place. Chinese FDI concentrated in this industry, but most projects showed a relatively low value. Meanwhile, financial institutes rose from tenth to second place, sorting first by ownership and then by realized projects.

Three countries lead foreign investors in the number of projects -- Japan, U.S., and China. While Japan and the U.S. have retained their top positions since 1962, China draws much attention as a potential investor after entering Korea nearly 30 years later.[17]

## V. Empirical Results

We employ duration analysis to test the four hypotheses in Section 2. Duration analysis explains the time between the permission for FDI to its actual disbursement.[18] Most duration analyses must consider a key analytical problem called censoring, where the time between permission and disbursement is not complete (i.e., disbursement is censored). Generally, three reasons can cause censoring in our FDI analysis: (1) the investment is not executed before 2002, the ending point of the data; (2) the investment disbursement is not officially reported to the Korean government; and (3) the investment project withdraws after getting permission either due to uncertainty or some other internal reasons.

We denote the random variable for a duration time of each FDI project by T, which equals the time difference between the permission date and the execution (disbursement) date. The censoring variable, $\delta$, equals a dichotomous *(0, 1)* random variable, where $\delta = 1$, if a FDI project is executed before 2002, and $\delta = 0$, if it is not executed by the end of 2001. In other words, considering each FDI project, $\delta = 1$ means execution while $\delta = 0$ means censored.

[17] The appendix provides a more detailed discussion about the FDI performance of Japan, the U.S., and China.

[18] Usually economists refer to the time variable as survival time, because it gives the time that an individual has "survived" over some follow-up period. On the other hand, the event is referred to as "failure", because the kind of event of interest usually is death, disease incidence, or some other negative individual experience.

The duration model is usually written in terms of the hazard function.[19] The hazard function is of interest for the following reasons: (i) it gives insight about conditional failure (execution) rates, (ii) it can identify a specific parametric model form; and (iii) it provides the vehicle by which the mathematical modeling of duration data is carried out. The conditional hazard function $h(t|T_{i-1}\ldots..., T_0)$ equals the conditional risk of an event (execution) at time t. It gives the instantaneous expected rate per unit time for the event to occur, given that the event has not occurred up to $t_{i-1}$:

$$h(t|T_{i-1}\ldots..., T_0) = \lim_{\Delta t \to 0} \frac{\Pr ob(t \le T < t + \Delta t \mid T \ge t)}{\Delta t}. \qquad (6)$$

Even though various methods exist to assess goodness of fit, uncertainty still remains about the appropriateness of a given parametric specification.[20] Cox (1972) developed a nonparametric robust approach for duration models with covariates *X*, the Cox proportional hazards (Cox PH) model that closely approximates the results for the correct parametric specification. A baseline hazard function $h_0(t)$ is modified multiplicatively by covariates so that the hazard function for any individual case is as follows:

$$h(t, X) = h_0(t)\, exp[\beta' X]. \qquad (7)$$

We focus our interest on the proportional factors rather than the unspecified baseline hazard $h_0(t)$. We can estimate the parameter vector $\beta$ without requiring estimation of $h_0(t)$ by maximizing a partial, rather than a complete, likelihood function.[21] The term partial likelihood

[19] Hazard functions possess the following properties: nonnegative and no upper bound. Four types of hazard functions are the most popular: exponential, increasing Weibull, decreasing Weibull, and lognormal hazard functions (duration models).

[20] Parametric approaches assume a parametric model for *T*, then estimate the unknown parameters for the survivor and the hazard functions such as exponential, gamma, Weibull, lognormal, Pareto distribution, and so on. For example, the Weibull hazard model takes the form $h(t, X) = \lambda t^{\alpha-1} exp[\beta' X]$, where *X* are covariates and the unknown parameters are $\lambda$, $\alpha$, and $\beta$. Note that for the Weibull model, a baseline hazard function, $h_0(t)$ is given parametrically by $\lambda t^{\alpha-1}$.

means that the likelihood formula considers probabilities for those subjects that are censored. An expression for the hazard rate (HR) emerges from the regression coefficients by substituting with the Cox model formula:

$$HR = \frac{h(t, X_1)}{h(t, X_2)} = \frac{h_0(t)\exp[\beta' X_1]}{h_0(t)\exp[\beta' X_2]} = \exp[\beta'(X_1 - X_2)]. \qquad (8)$$

The hazard ratio shows the shift of the baseline hazard. That is, if the hazard ratio equals one, no shift occurs in the baseline hazard and, thus, the explanatory variable does not affect the hazard ratio. If the hazard ratio exceeds (falls below) one, then the explanatory variable increases (decreases) the probability of failure and, thus, reduces (increases) duration.

Columns 1 to 3 of table 3 reports the findings. First, the FDI size does not associate with a significant hazard ratio, contrary to Hypothesis 4. Therefore, it does not influence duration and uncertainty. Our estimate in this case may contain bias, since we employ the FDI permitted rather than the FDI actually disbursed. If the disbursed FDI systematically falls below the permitted FDI, our finding may falsely reject a significant effect.

Second, higher ownership associates with a hazard ratio greater than one and, thus, with a higher probability of execution. Therefore, higher ownership implies shorter duration time and lower uncertainty.

Third, familiarity with the local environment positively affects the hazard function (or hazard ratio exceeds 1) and reduces uncertainty.[22] Thus, more experience in that industry from the same country implies shorter duration. These two results support Hypothesis 2.

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[21] The term partial likelihood is used because the likelihood formula considers probabilities for those subjects who are censored.

[22] The cumulative number of FDI projects carried out in previous years for each industry and investing country measures the local knowledge variable. For example, the experience from one country in one specific industry at the concerned time (e.g., year 2000) equals the cumulative number of performed FDI projects from 1962 up to that time (i.e., the end of 1999) for the same country within the same industry.

Fourth, the year of permission does not prove significant. That is, no evidence emerges that the credibility of the liberalization program or the reputation of the government to commit to that program improves or worsens over the sample period. This result does not support Hypothesis 3.

Fifth, FDI from China enjoys shorter duration, while FDI from U.S. experiences a longer duration. FDI from Japan may possess shorter duration, but it is insignificant.[23]

Sixth, the Asian crisis significantly increases the hazard rate above one, implying shorter duration. Before the crisis, the Korean government implemented its liberalization program in a cautious, piecemeal approach. After the crisis, the government adopted policies to boost the inflow of foreign capital as much as possible. Thus, the finding proves consistent with the view that Korean government policies worked effectively to attract more foreign direct investment. Another interpretation suggests that the regulatory and bureaucratic barriers that had delayed actual disbursements before the crisis collapsed after the crisis.

Finally, a large number of industry variations exist. The service sector represents the base industry in our regressions. Industries that require longer delay include fishing, manufacture of food products, basic metals, general construction, restaurants, hotels, and financial institutes. In contrast, industries that exhibit shorter delay include retail trade and wholesale-commission trade. Compared with other industries, the service industries in Korea traditionally encompass small- and medium-sized, labor-intensive, and not knowledge-intensive firms. In that sense, the retail trade and wholesale commission sectors probably experience more competition, explaining the shorter duration according to Hypothesis 1.

[23] The Japanese dummy variable becomes significantly negative in the sensitivity analysis. See below and Table 3.

We conduct one robustness check on the duration specification with a variation on the "wait-and-see" concept. That is, we construct a relative time span defined as individual duration relative to the industry-year average. This specification captures the possibility that a deviation from average may reflect the investor's strategic intent. We first calculate the industry-year average duration time. Then, we divide the actual months of individual durations by that industry's average value. Note that the variable does not measure duration, but proxies for "unusual delay", if it is larger than 1. This calculation incorporates differences coming from industry and time, a "relative wait-and-see" measure. Regression results, reported in the last two columns of Table 3 and adjusted by the Huber/White's heteroscedastic robust procedures, confirm our findings in duration analysis except that both the Asian crisis dummy and the time trend prove insignificant and the dummy for Japan is now not only negative, but also significant.

## VI. Conclusion

Foreign direct investment into Korea traveled through a variety of stages over the last 40 years, when the Korean economy opened to outside FDI investors. In particular, Korea attracted significant FDI after the Asian financial crisis. Swings in the number and size of inward FDI projects reflect uncertainty and lack of knowledge of local conditions by foreign investors.

We contribute to the existing literature on investment under uncertainty with an empirical duration analysis on hosting FDI, and derive the testable hypotheses to identify possible factors inducing the delay of FDI between permission time (more recently, notification time) and actual arrival time. The permission, representing the commitment of foreign investors to invest, can be withdrawn either partially or fully before actual investment, depending on the change of investment environment, which can signal uncertainty. Our findings show that, while the amount of investment does not affect duration time, higher ownership and better local knowledge possess

positive effects, reducing uncertainty and duration. Further, the date of permission for FDI does not cause significant shorter or longer duration, supporting that the Korean government's commitment to its liberalization program is credible and that the reputation of the policy makers responsible for that program is good.

We also examine country and crisis dummy variables -- China, the U.S., Japan, and the Asian crisis. We discover that the FDI projects from China and possibly Japan possess shorter duration while the U.S. possesses longer duration and that the Asian crisis shortened the period between project permission and execution times. Two possible reasons may explain why investment from China and Japan occur more quickly than those from the United States. First, cultural similarities may reduce uncertainty faced by Chinese and Japanese investors. In other words, the United States does not share cultural and geographical proximity. Cultural and geographic proximity may allow investors to acquire local information and knowledge more easily and quickly. Thus, cultural and geographic proximity reduces uncertainty.

Second, investors from the United States may face less fierce competition in Korea than China and Japan. Firms with market power can enjoy the option of delaying the decision while firms without market power must choose between "go now" or "don't go" rather than "go now" or "go later," because of possible preemption by competitors. From this perspective, longer waiting time implies less competitive pressure from the market. This interpretation implies that the firms from the United States enter Korea with superior technology, reputation, or other unique advantages that other competitors do not possess. On the other hand, firms from China, in particular, enter Korea mainly for "preemptive purposes" to acquire advanced technology or extend business networks earlier than other competitors.

Several important policy ramifications emerge from our analysis. First, the credibility of

policy signals from host-country government greatly affects the behavior of foreign investors. Uncertainty perceived by foreign investors discourages the final commitment to enter the host country. If foreign investors observe confused, ambiguous, and inconsistent policy announcement, then the effectiveness of liberalization efforts (e.g., tax and other incentives) is seriously damaged. Therefore, the policy makers must provide credible, consistent, and clear policy signals to induce foreign investment effectively, which the Korean government seems to have done.

Second, more competitive market environments provide a strong incentive for earlier investment for market preemption. Protected and non-competitive local markets provide limited incentives for foreign firms to enter early due to little competitive pressure. With a set of credible, consistent, and clear policy signals, the regulatory agencies must make the markets more open and competitive so that interested foreign investors feel the market pressure of early entry into the market.

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Table 1. Restrictions on FDI in Korea during pre-liberalization period

| Rationale of prohibition | Rationale of restriction | Categories of restricted industries |
|---|---|---|
| Public interests related business<br><br>- Water supply service industry<br>- Postal service industry<br>- Telegraph and telephone service industry<br>- Railway transportation service industry<br>- Tobacco producing industry<br>Industries harmful to health and sanitation of people and to preservation of environment<br>Industries harmful to laudable customs<br>Other industries that the related presidential decree prohibited<br>- Newspaper publishing industry<br>- Radio broadcasting industry<br>- Cereal grains producing industry | - Industries that are specially supported by the government<br>- Industries that are required to consume excessive amount of energy or imported raw materials<br>- Industries leading severe pollution<br>- Gamble industries<br>- Industries that affect the life style of farmers and fishermen<br>- Inducement industries that are admitted to need a government protection in the aspect of industrial policies for a period | - Industries peculiar to small or medium companies<br>- Industries systematizing small or medium companies<br>- Industries to be rationalized<br>- Telegraph and telephone service industry, Railway transportation service industry, Industries manufacturing a construction equipment, an internal combustion engine, Industries manufacturing a motorcycle, an industrial truck, a shipping device, and non life insurance Industries |

Table 2. Time trend of inward FDI in Korea

| | all cases | | | performed FDI | | | not performed FDI | | | % realized | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | count | average amount | Average Ownership | count | average amount | average ownership | count | average amount | average ownership | in no of project | realized capital |
| 1962 | 1 | 32899.0 | 14.00 | 1 | 32899.0 | 14.00 | | | | 100.00 | 100.00 |
| 1963 | 1 | 1682.0 | 21.00 | 1 | 1682.0 | 21.00 | | | | 100.00 | 100.00 |
| 1964 | 1 | 19190.0 | 50.00 | 1 | 19190.0 | 50.00 | | | | 100.00 | 100.00 |
| 1965 | 1 | 44.0 | 19.00 | 1 | 44.0 | 19.00 | | | | 100.00 | 100.00 |
| 1966 | 3 | 12372.7 | 75.00 | 2 | 18414.0 | 62.50 | 1 | 290.00 | 100.00 | 66.67 | 99.22 |
| 1967 | 8 | 35769.1 | 58.28 | 7 | 40837.7 | 66.29 | 1 | 289.00 | 2.20 | 87.50 | 99.90 |
| 1968 | 12 | 41362.6 | 69.95 | 11 | 45121.2 | 67.22 | 1 | 18.00 | 100.00 | 91.67 | 100.00 |
| 1969 | 12 | 26147.3 | 42.50 | 12 | 26147.3 | 42.50 | | | | 100.00 | 100.00 |
| 1970 | 23 | 7786.7 | 54.02 | 23 | 7786.7 | 54.02 | | | | 100.00 | 100.00 |
| 1971 | 15 | 7142.3 | 56.97 | 14 | 7345.8 | 58.21 | 1 | 4293.00 | 39.60 | 93.33 | 95.99 |
| 1972 | 52 | 7707.7 | 47.31 | 51 | 7622.8 | 47.37 | 1 | 12038.00 | 44.60 | 98.08 | 97.00 |
| 1973 | 68 | 12939.3 | 45.16 | 68 | 12939.3 | 45.16 | | | | 100.00 | 100.00 |
| 1974 | 35 | 11686.7 | 45.45 | 33 | 11410.8 | 43.86 | 2 | 16239.50 | 71.60 | 94.29 | 92.06 |
| 1975 | 14 | 8452.9 | 38.79 | 14 | 8452.9 | 38.79 | | | | 100.00 | 100.00 |
| 1976 | 14 | 1970.1 | 62.34 | 12 | 2242.3 | 62.94 | 2 | 337.00 | 58.70 | 85.71 | 97.56 |
| 1977 | 14 | 21012.4 | 44.25 | 13 | 19115.9 | 44.59 | 1 | 45667.00 | 39.80 | 92.86 | 84.48 |
| 1978 | 18 | 6270.1 | 59.11 | 18 | 6270.1 | 59.11 | | | | 100.00 | 100.00 |
| 1979 | 22 | 3839.2 | 49.39 | 21 | 4021.0 | 51.31 | 1 | 21.00 | 9.00 | 95.45 | 99.98 |
| 1980 | 18 | 12373.6 | 57.39 | 18 | 12373.6 | 57.39 | | | | 100.00 | 100.00 |
| 1981 | 19 | 2592.9 | 54.32 | 19 | 2592.9 | 54.32 | | | | 100.00 | 100.00 |
| 1982 | 25 | 32213.0 | 58.47 | 25 | 32213.0 | 58.47 | | | | 100.00 | 100.00 |
| 1983 | 37 | 22852.7 | 62.49 | 35 | 24138.8 | 63.28 | 2 | 346.50 | 48.75 | 94.59 | 99.92 |
| 1984 | 51 | 11754.5 | 67.17 | 51 | 11754.5 | 67.17 | | | | 100.00 | 100.00 |
| 1985 | 68 | 7545.1 | 59.89 | 67 | 7655.3 | 60.27 | 1 | 166.00 | 35.00 | 98.53 | 99.97 |
| 1986 | 119 | 5118.4 | 66.12 | 117 | 5204.1 | 66.28 | 2 | 104.50 | 56.65 | 98.32 | 99.97 |
| 1987 | 206 | 5671.1 | 59.46 | 200 | 5820.2 | 59.48 | 6 | 701.67 | 58.97 | 97.09 | 99.64 |
| 1988 | 213 | 7805.1 | 60.18 | 204 | 6625.2 | 60.51 | 9 | 34548.11 | 52.56 | 95.77 | 81.30 |
| 1989 | 209 | 4403.6 | 67.31 | 197 | 4591.4 | 68.18 | 12 | 1320.00 | 53.15 | 94.26 | 98.28 |
| 1990 | 214 | 2583.7 | 68.90 | 192 | 2747.9 | 70.19 | 22 | 1150.64 | 57.62 | 89.72 | 95.42 |
| 1991 | 227 | 6041.9 | 69.81 | 191 | 6755.8 | 72.57 | 36 | 2254.22 | 55.17 | 84.14 | 94.08 |
| 1992 | 204 | 4445.9 | 67.95 | 163 | 5309.1 | 69.94 | 41 | 1013.88 | 60.00 | 79.90 | 95.42 |
| 1993 | 238 | 7743.3 | 70.04 | 168 | 9479.7 | 73.63 | 70 | 3575.86 | 61.44 | 70.59 | 86.42 |
| 1994 | 355 | 1814.5 | 73.54 | 269 | 1633.3 | 75.53 | 86 | 2381.33 | 67.33 | 75.77 | 68.21 |
| 1995 | 491 | 2960.7 | 74.08 | 354 | 3009.3 | 76.33 | 137 | 2835.19 | 68.28 | 72.10 | 73.28 |
| 1996 | 545 | 4918.1 | 72.29 | 422 | 4975.0 | 74.26 | 123 | 4722.84 | 65.51 | 77.43 | 78.33 |
| 1997 | 596 | 5718.4 | 72.84 | 406 | 2969.5 | 74.40 | 190 | 11592.31 | 69.49 | 68.12 | 35.37 |
| 1998 | 760 | 10545.6 | 78.07 | 563 | 12962.4 | 79.85 | 197 | 3638.73 | 72.97 | 74.08 | 91.06 |
| 1999 | 1,426 | 7415.8 | 78.13 | 1,007 | 7554.3 | 78.48 | 419 | 7083.03 | 77.30 | 70.62 | 71.94 |
| 2000 | 3,009 | 2881.4 | 78.76 | 2,353 | 2294.0 | 80.95 | 656 | 4988.44 | 70.93 | 78.20 | 62.26 |
| 2001 | 1,354 | 3608.7 | 82.14 | 982 | 1566.0 | 83.48 | 372 | 9000.75 | 78.60 | 72.53 | 31.47 |
| | 10,698 | | | 8,306 | | | 2392 | | | | |

Table 3: Cox proportional hazard model and sensitivity analysis

| | Duration analysis | | | sensitivity analysis | |
|---|---|---|---|---|---|
| | hazard | std err | | (normalized duration) | |
| | ratio | for HR | p-value | coefficient | Robust t |
| Constant | | | | 2.950 | 0.59 |
| FDI permitted Amount | 1.000 | 0.000 | 0.293 | 0.000 | 1.03 |
| Ownership | 1.002 | 0.000 | 0.000 | -0.001 | -3.41 |
| Accumulated Acquaintance over Year and country | 1.000 | 0.000 | 0.000 | 0.000 | -2.20 |
| Dummy for Asian Crisis | 1.355 | 0.045 | 0.000 | 0.036 | 1.03 |
| Year of permission or registration | 0.999 | 0.003 | 0.645 | -0.001 | -0.38 |
| Dummy for China | 1.083 | 0.040 | 0.031 | -0.105 | -2.54 |
| Dummy for Japan | 1.032 | 0.034 | 0.330 | -0.096 | -2.81 |
| Dummy for U.S. | 0.806 | 0.026 | 0.000 | 0.110 | 3.23 |
| *Dummies for industries* | | | | | |
| Agriculture | 0.858 | 0.204 | 0.521 | 0.011 | 0.06 |
| Forestry | 0.907 | 0.288 | 0.758 | 0.047 | 0.21 |
| Fishing | 0.415 | 0.121 | 0.003 | 0.066 | 0.49 |
| Food products and beverages | 0.798 | 0.073 | 0.013 | 0.028 | 0.34 |
| Textiles | 1.041 | 0.090 | 0.646 | 0.015 | 0.16 |
| Wood, pulp, paper | 0.819 | 0.130 | 0.210 | -0.006 | -0.06 |
| Chemicals and Chemical products | 0.948 | 0.059 | 0.391 | 0.023 | 0.35 |
| Chemical fertilizer | 1.662 | 0.834 | 0.312 | -0.010 | -0.18 |
| Medical, precision and optical | 1.012 | 0.119 | 0.920 | -0.007 | -0.07 |
| Coke, Refined Petroleum products | 1.173 | 0.330 | 0.569 | -0.028 | -0.19 |
| Rubber and Plastic Products | 0.801 | 0.118 | 0.134 | 0.003 | 0.03 |
| Basic Metals | 0.560 | 0.059 | 0.000 | 0.014 | 0.19 |
| Fabricated metal products | 0.925 | 0.049 | 0.141 | 0.042 | 0.76 |
| Electrical machinery | 1.024 | 0.052 | 0.639 | -0.007 | -0.13 |
| Motor Vehicles | 0.978 | 0.090 | 0.812 | 0.001 | 0.01 |
| Electronic Components | 1.103 | 0.066 | 0.101 | 0.000 | 0.00 |
| Electricity, Gas, Steam | 0.739 | 0.214 | 0.297 | -0.055 | -0.32 |
| General Construction | 0.594 | 0.088 | 0.000 | 0.002 | 0.02 |
| Retail Trade | 1.149 | 0.061 | 0.009 | 0.035 | 0.63 |
| Wholesale and Commission Trade | 1.132 | 0.041 | 0.001 | 0.098 | 2.51 |
| Restaurants | 0.818 | 0.067 | 0.015 | 0.066 | 0.91 |
| Hotels | 0.365 | 0.051 | 0.000 | 0.006 | 0.11 |
| Transportation | 1.041 | 0.097 | 0.664 | 0.011 | 0.12 |
| Financial Institutes | 0.817 | 0.073 | 0.023 | -0.036 | -0.49 |
| Insurance and pension funding | 0.996 | 0.215 | 0.984 | -0.032 | -0.20 |
| Real Estate Activities | 0.749 | 0.119 | 0.069 | -0.022 | -0.18 |
| Observation | 10654 | | | 10654 | |
| R-squared | | | | 0.01 | |

**Appendix:**

**The Evolution of Korean FDI Regulation**

The regulation of foreign direct investment in Korea underwent five stages of development: restricted FDI phase (1962-1972), massive inducement phase (1973-1978), selective inducement phase (1979-1983), pre-liberalization phase (1983-1991), and liberalization phase (1992-present).

During the restricted FDI phase (1962-1972), Korea experienced successful economic growth through two five-year plans. The Foreign Capital Inducement Act of 1960, regarding foreign direct investment, gave tax benefits to foreign direct investors. Actual foreign investment commitments into Korea rarely occurred, mainly due to political instability. That law was amended in 1961 to prohibit several categories of foreign direct investment.[24] Furthermore, the ownership ratio of investment by foreigners was required to exceed 25 percent of the total shares of the company. Remittances were first constrained and then abolished in 1966. Those promotional efforts by the Korean government precipitated the first inflows of foreign capital in 1962.[25]

The Korean government established the Masan Free Export Zone in 1970 to promote exports, increase employment, and improve technology transfer. In principle, only manufacturing companies qualified to reside in the zone, if foreign ownership exceeded 50 percent of the total shares of the company. Specific criteria for permission to enter the Free Export Zone induced significant improvements in international payments, advancements in technology, increases in

[24] These categories included investment that led to the squandering of foreign exchange reserves, disturbed the stability of the won, led to overproduction, and aimed at either temporary security or speculation. The industries where investment was prohibited included industries using atomic energy, munitions manufacturing industries, domestic shipping or air transportation industries, and monopoly business.

[25] Chemtex, an American company, invested U.S. $579,000 into the filament nylon business of Korean Nylon Co., Ltd., for example.

production, and developments in related industries. In particular, exports were strongly encouraged while domestic sales were not. Technological imports or transfers to local Korean partners were also encouraged through joint ventures of foreign investors with corresponding local partners.[26]

The massive inducement phase started in 1973, when the world economy experienced a recession and the first oil shock occurred. From late 1972, investment by Japanese companies increased remarkably, since Japanese investors became more interested in Korea than Taiwan after the normalization of diplomatic relations between Japan and China. With these environmental changes, 'provision for FDI' was established in February 1972.[27] This provision determined the minimum investment of U.S. $200,000 and specified a 50-50 ratio between domestic and foreign investors to increase domestic participation in management (non-voting right stocks on face value exceeding stocks can be issued to foreigners, if necessary).

The selective inducement phase (1979-1983) started after the second oil shock in late 1978, which worsened the world economy and efforts at protectionism. In June 1981, provision for FDI was again amended to reflect the new economic environment.[28] Now, the investment must exceed U.S. $100,000, while the related parties mutually agreed to the ownership ratio.

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[26] Partly due to governmental efforts along with fast economic development, foreign direct investment into Korea began to increase from 1970. Favored industries included export industries, such as meat processing, product processing, and TV manufacturing; and import-substitution industries, such as viscose rayon and chemistry pulp manufacturing industries. Restricted industries included legally prohibited industries, such as tobacco producing, legally restricted industries, such as shipping service, and politically prohibited industries, such as supply and transmission of electric power.

[27] In this phase, qualified industries for foreign investment included metalworking, machine and electronic industry, and large scale industries that face difficulties in establishing and operating capital, technologies, and management. Export industries that experienced difficulties and inefficiencies with securing their share of the international market also qualified.

[28] The qualifying businesses to receive FDI included large-scale processing industries that domestic firms find difficult to establish and operate, such as machine engineering, metalworking engineering, electronic engineering, electrical engineering, chemistry engineering, and energy business. It also included industries that contribute to the development and utilization of domestic natural resources, manufacturing industries, such as food and medicine,

A paradigm shift in Korean FDI policy occurred in 1983. The government changed the regulatory framework from a positive to a negative list system. The negative list system prohibited or restricted foreign investment in certain sectors (see Table 1).

During the pre-liberalization with negative list system phase, the government abolished the uniform fixed ceiling on foreign direct investment of 50 percent. If the ratio of FDI fell below 50 percent, the government automatically permitted the FDI. If the ratio of FDI exceeded 50 percent, the government investigated and evaluated the adequacy of the FDI, determining whether to permit it. In terms of tax exemption, foreign investors obtained tax exemption, including the corporation tax, the income tax, the property tax, the acquisition tax, and tariffs on capitals introduced for the purpose of foreign investment.

The liberalization phase started in 1992. FDI was permitted, in principle, by filling out the appropriate reports, making government approval for foreign investment exceptional. The following industries, however, were still restricted from acquiring foreign direct investment: public interest related business, industries harmful to health, sanitation, and the preservation of environment, industries harmful to laudable customs, and other industries prohibited by presidential decree.[29]

In particular, after the Asian financial crisis, the Korean government promoted FDI and gave it the utmost priority to overcome the economic crisis as well as to cope effectively with globalization. Under this new view, the government enacted epochal changes in the Foreign Investment Promotion Law, moving it from "control and regulation" to "promotion and support."

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distribution industry, service industry, and other industries that the Ministry of the Economic Planning Board considers necessities

[29] After Korea joined the OECD in December 1996, the government continued the liberalization process, moving toward the levels in advanced countries. The Foreign Capital Inducement Act was amended to become the Foreign Direct Investment and Foreign Capital Inducement Act in February 1997, which spelled out policies on FDI, M&A, and long-term loans.

Besides, to facilitate foreign direct investment, the Korean government also removed restrictions on the use of foreign exchange to permit unlimited access to foreign funding.

**Foreign Direct Investment in Korea by the U.S. Japan, and China: History**

Japan proved the largest FDI investor in Korea since 1962. Most investments occurred in industries that manufacture chemical products, basic metals, fabricated metal products and electrical machinery, in addition to retail and wholesale trade.[30] During the Asian financial crisis in 1997, Japan withdrew much capital from Korea, which caused the percentage of realized capital to fall to 49.8 percent. These withdrawals possessed average investment higher than those of performed projects. Only in 2000 did Japanese investors return to Korea by raising the percentage of realized capital to 88.7 percent, which equaled their performance in 1996, the year before the crisis. This outcome probably reflects the fact that Japan was heavily affected by the regional financial crisis, and it took time for Japan to recover.

As the second ranked Korean investor, the United States seemed to follow Japanese preferences on industries. The largest number of projects (more than 100) belonged to industries that manufacture basic metal, such as fabricated metal and motor vehicles, as well as retail and wholesale trade. U.S. ownership began high rates, but no ownership pattern existed over time. The U.S. shares usually exceeded 60 percent, generally higher than Japan. If investment values are considered, however, it is easier to see the influence of the Asian crisis on U.S. investors. The percentage of realized capital plummeted to 13 percent in 1997 from 66 percent in 1996, due to the withdrawals of large-scale projects. During these years, the majority of small projects were disbursed. In 1998, U.S. investment recovered, but dropped again in the years that follow. Note

[30] The average ownership seemed low in Japan from 1962 to 1969, but slightly increased from 1970 to 1985, stabilizing at around 50%, a balanced leverage. From 1986 to 2001, the ownership increased and consistently obtained the larger capital share in FDI projects. Fluctuations in the number of projects and the total value of invested capital existed throughout the years

that the U.S. did not directly participate in the whirl of the Asian crisis, which facilitated its return to the Korean market once some profits appeared probable.

Unlike the top two investors, China showed less variety in selecting industries, mainly concentrating on restaurants, and retail and wholesale trade (e.g., over 100 projects each). Note that wholesale trade accounted for about 60 percent of total registered FDI. Since 1989, FDI from China steadily increased both in number of projects and in total investment. China did not frequently exhibit a high percentage of realized FDI. During the Asian crisis, China also withdrew many projects, which made its relative realized number of projects plunge to the lowest level ever. Uniquely, China experienced only a small decline in total investment into Korea in 1997.[31]

[31] China is the only one out of the top three countries that saw the average value of realized projects higher than that of withdrawn projects during the crisis period.

Appendix Table 1: Summary Statistics

| Variable | | Mean | Std.Dev | Min | Max |
|---|---|---|---|---|---|
| Durana | duration time in years = feasible time – registered time | 1.372 | 2.679 | .083 | 35.666 |
| Event | Censoring, =1 if performed or feasible, =0 if not performed | 0.779 | 0.415 | 0 | 1 |
| Amount | FDI permitted amount | 5269 | 46982 | 1 | 2961839 |
| Invratio | Ownership or the foreign investment ratio | 74.901 | 31.361 | 0.03 | 100 |
| Ryear | year of permission or registration | 1996.4 | 5.9 | 1962 | 2001 |
| china | dummy for China | 0.196 | 0.397 | 0 | 1 |
| japan | dummy for Japan | 0.241 | 0.428 | 0 | 1 |
| U.S. | dummy for U.S. | 0.214 | 0.410 | 0 | 1 |
| crisis | Asian Crisis, 1 if ryear>1997 | 0.611 | 0.487 | 0 | 1 |
| lagacq | accumulated acquaintance over | 152.6 | 246.7 | 0 | 1249 |
| | year by country, indcode | | | | |
| Ind1 | Agriculture | 0.002 | 0.048 | 0 | 1 |
| Ind2 | Forestry | 0.001 | 0.035 | 0 | 1 |
| Ind3 | Fishing | 0.002 | 0.045 | 0 | 1 |
| Ind4 | Manufacture of food products and beverages | 0.018 | 0.131 | 0 | 1 |
| Ind5 | Manufacture of textiles | 0.018 | 0.132 | 0 | 1 |
| Ind6 | Manufacture of wood, pulp, paper | 0.005 | 0.072 | 0 | 1 |
| Ind7 | Manufacture of Chemicals and Chemical products | 0.039 | 0.195 | 0 | 1 |
| Ind8 | Manufacture of Chemical fertilizer | 0.000 | 0.019 | 0 | 1 |
| Ind9 | Manufacture of medical, precision and optical | 0.008 | 0.092 | 0 | 1 |
| Ind10 | Manufacture of coke, Refined Petroleum products | 0.001 | 0.036 | 0 | 1 |
| Ind11 | Manufacture of Rubber and Plastic Products | 0.006 | 0.075 | 0 | 1 |
| Ind12 | Manufacture of Basic Metals | 0.016 | 0.124 | 0 | 1 |
| Ind13 | Manufacture of Fabricated metal products | 0.063 | 0.243 | 0 | 1 |
| Ind14 | Manufacture of Electrical machinery | 0.067 | 0.251 | 0 | 1 |
| Ind15 | Manufacture of Motor Vehicles | 0.014 | 0.119 | 0 | 1 |
| Ind16 | Manufacture of Electronic Components | 0.045 | 0.207 | 0 | 1 |
| Ind17 | Electricity, Gas, Steam and Hot Water Supply | 0.002 | 0.042 | 0 | 1 |
| Ind18 | General Construction | 0.008 | 0.090 | 0 | 1 |
| Ind19 | Retail Trade | 0.061 | 0.239 | 0 | 1 |
| Ind20 | Wholesale Trade and Commission Trade | 0.372 | 0.483 | 0 | 1 |
| Ind21 | Restaurants | 0.025 | 0.155 | 0 | 1 |
| Ind22 | Hotels | 0.012 | 0.108 | 0 | 1 |
| Ind23 | Transportation | 0.015 | 0.122 | 0 | 1 |
| Ind24 | Financial Institutes | 0.021 | 0.144 | 0 | 1 |
| Ind25 | Insurance and pension funding | 0.003 | 0.051 | 0 | 1 |
| Ind26 | Real Estate Activities | 0.006 | 0.080 | 0 | 1 |
| Ind27 | Service Sector | 0.169 | 0.375 | 0 | 1 |
| indcode | industry code | 18.716 | 5.902 | 1 | 27 |
| cid | country code | 38.516 | 21.263 | 0 | 99 |

Note: number of observation = 10657

Appendix Table 2: Summary statistics by year for Japan

| year | all cases | | | not performed FDI | | | performed FDI | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | avg amount | avg own | no | avg amount | avg own | No | avg amount | avg own | % realized no. of FDI | % realized capital |
| 1962 | 1 | 32899.0 | 14.0 | | | | 1 | 32899.0 | 14.0 | 100.0 | 100.0 |
| 1963 | 1 | 1682.0 | 21.0 | | | | 1 | 1682.0 | 21.0 | 100.0 | 100.0 |
| 1964 | | | | | | | | | | | |
| 1965 | | | | | | | | | | | |
| 1966 | | | | | | | | | | | |
| 1967 | 2 | 1436.5 | 32.0 | | | | 2 | 1436.5 | 32.0 | 100.0 | 100.0 |
| 1968 | 6 | 5195.5 | 88.3 | | | | 6 | 5195.5 | 88.3 | 100.0 | 100.0 |
| 1969 | 8 | 24786.8 | 28.8 | | | | 8 | 24786.8 | 28.8 | 100.0 | 100.0 |
| 1970 | 17 | 4155.8 | 50.4 | | | | 17 | 4155.8 | 50.4 | 100.0 | 100.0 |
| 1971 | 13 | 6466.5 | 50.4 | 1 | 4293.0 | 39.6 | 12 | 6647.7 | 51.3 | 92.3 | 94.9 |
| 1972 | 45 | 3628.3 | 45.7 | 1 | 12038.0 | 44.6 | 44 | 3437.2 | 45.7 | 97.8 | 92.6 |
| 1973 | 63 | 12853.8 | 45.0 | | | | 63 | 12853.8 | 45.0 | 100.0 | 100.0 |
| 1974 | 29 | 10469.1 | 41.1 | 1 | 1060.0 | 45.0 | 28 | 10805.2 | 40.9 | 96.6 | 99.7 |
| 1975 | 9 | 10615.7 | 26.2 | | | | 9 | 10615.7 | 26.2 | 100.0 | 100.0 |
| 1976 | 12 | 1852.8 | 60.3 | 2 | 337.0 | 58.7 | 10 | 2155.9 | 60.6 | 83.3 | 97.0 |
| 1977 | 6 | 5912.5 | 36.7 | | | | 6 | 5912.5 | 36.7 | 100.0 | 100.0 |
| 1978 | 12 | 6660.5 | 52.8 | | | | 12 | 6660.5 | 52.8 | 100.0 | 100.0 |
| 1979 | 15 | 1867.7 | 50.0 | 1 | 21.0 | 9.0 | 14 | 1999.6 | 52.9 | 93.3 | 99.9 |
| 1980 | 10 | 7494.3 | 49.4 | | | | 10 | 7494.3 | 49.4 | 100.0 | 100.0 |
| 1981 | 11 | 3934.8 | 49.5 | | | | 11 | 3934.8 | 49.5 | 100.0 | 100.0 |
| 1982 | 10 | 2995.7 | 60.3 | | | | 10 | 2995.7 | 60.3 | 100.0 | 100.0 |
| 1983 | 18 | 889.0 | 49.7 | 1 | 120.0 | 47.5 | 17 | 934.2 | 49.9 | 94.4 | 99.3 |
| 1984 | 24 | 15641.8 | 60.6 | | | | 24 | 15641.8 | 60.6 | 100.0 | 100.0 |
| 1985 | 31 | 1099.4 | 48.3 | 1 | 166.0 | 35.0 | 30 | 1130.5 | 48.8 | 96.8 | 99.5 |
| 1986 | 68 | 1776.3 | 62.5 | 2 | 104.5 | 56.7 | 66 | 1827.0 | 62.7 | 97.1 | 99.8 |
| 1987 | 123 | 3394.4 | 55.8 | 4 | 528.3 | 64.0 | 119 | 3490.7 | 55.5 | 96.7 | 99.5 |
| 1988 | 112 | 4032.7 | 54.7 | 6 | 51743.2 | 45.8 | 106 | 1332.2 | 55.2 | 94.6 | 31.3 |
| 1989 | 97 | 1521.5 | 52.3 | 5 | 618.6 | 64.8 | 92 | 1570.6 | 51.6 | 94.8 | 97.9 |
| 1990 | 100 | 887.0 | 56.0 | 15 | 1570.7 | 55.3 | 85 | 766.4 | 56.1 | 85.0 | 73.4 |
| 1991 | 92 | 3632.0 | 53.8 | 22 | 330.8 | 46.2 | 70 | 4669.5 | 56.2 | 76.1 | 97.8 |
| 1992 | 63 | 1093.0 | 53.1 | 20 | 1816.1 | 49.9 | 43 | 756.7 | 54.6 | 68.3 | 47.3 |
| 1993 | 75 | 2927.3 | 61.8 | 23 | 7074.1 | 56.1 | 52 | 1093.2 | 64.3 | 69.3 | 25.9 |
| 1994 | 111 | 1755.5 | 63.4 | 27 | 3562.4 | 52.4 | 84 | 1174.7 | 66.9 | 75.7 | 50.6 |
| 1995 | 150 | 2252.0 | 66.3 | 46 | 1938.1 | 59.3 | 104 | 2390.8 | 69.4 | 69.3 | 73.6 |
| 1996 | 141 | 990.6 | 66.4 | 26 | 593.4 | 60.6 | 115 | 1080.4 | 67.8 | 81.6 | 89.0 |
| 1997 | 124 | 1010.4 | 63.9 | 33 | 1907.3 | 65.4 | 91 | 685.1 | 63.3 | 73.4 | 49.8 |
| 1998 | 167 | 1153.3 | 72.9 | 30 | 2625.0 | 61.6 | 137 | 831.1 | 75.4 | 82.0 | 59.1 |
| 1999 | 231 | 6509.1 | 70.2 | 62 | 9569.6 | 69.5 | 169 | 5386.3 | 70.5 | 73.2 | 60.5 |
| 2000 | 406 | 4259.8 | 58.7 | 102 | 1924.0 | 55.1 | 304 | 5043.5 | 59.9 | 74.9 | 88.7 |
| 2001 | 177 | 1517.4 | 60.6 | 61 | 1118.8 | 61.5 | 116 | 1727.0 | 60.1 | 65.5 | 74.6 |

Appendix Table 3: Summary statistics by year for U.S.A

| year | all cases | | | not performed FDI | | | performed FDI | | | % realized capital | % realized no. of FDI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | avg amount | avg own | no | avg amount | avg own | no | avg amount | avg own | | |
| 1966 | 3 | 12372.7 | 75.0 | 1 | 290.0 | 100.0 | 2 | 18414.0 | 62.5 | 99.22 | 66.67 |
| 1967 | 3 | 73720.0 | 50.7 | 1 | 289.0 | 2.2 | 2 | 110435.5 | 75.0 | 99.87 | 66.67 |
| 1968 | 5 | 14557.6 | 59.4 | 1 | 18.0 | 100.0 | 4 | 18192.5 | 49.3 | 99.98 | 80.00 |
| 1969 | 3 | 24122.3 | 60.0 | | | | 3 | 24122.3 | 60.0 | 100.00 | 100.00 |
| 1970 | 4 | 1516.8 | 63.8 | | | | 4 | 1516.8 | 63.8 | 100.00 | 100.00 |
| 1971 | 2 | 11534.5 | 100.0 | | | | 2 | 11534.5 | 100.0 | 100.00 | 100.00 |
| 1972 | 1 | 60.0 | 35.0 | | | | 1 | 60.0 | 35.0 | 100.00 | 100.00 |
| 1973 | 3 | 19738.3 | 58.7 | | | | 3 | 19738.3 | 58.7 | 100.00 | 100.00 |
| 1974 | 4 | 22228.8 | 87.1 | 1 | 31419.0 | 98.2 | 3 | 19165.3 | 83.3 | 64.66 | 75.00 |
| 1975 | 2 | 777.0 | 28.5 | | | | 2 | 777.0 | 28.5 | 100.00 | 100.00 |
| 1976 | | | | | | | | | | | |
| 1977 | 2 | 60024.0 | 100.0 | | | | 2 | 60024.0 | 100.0 | 100.00 | 100.00 |
| 1978 | 2 | 6308.5 | 44.5 | | | | 2 | 6308.5 | 44.5 | 100.00 | 100.00 |
| 1979 | 2 | 4927.5 | 37.6 | | | | 2 | 4927.5 | 37.6 | 100.00 | 100.00 |
| 1980 | 4 | 6615.3 | 60.3 | | | | 4 | 6615.3 | 60.3 | 100.00 | 100.00 |
| 1981 | 6 | 368.5 | 64.8 | | | | 6 | 368.5 | 64.8 | 100.00 | 100.00 |
| 1982 | 8 | 17015.3 | 47.4 | | | | 8 | 17015.3 | 47.4 | 100.00 | 100.00 |
| 1983 | 11 | 67076.6 | 79.7 | | | | 11 | 67076.6 | 79.7 | 100.00 | 100.00 |
| 1984 | 14 | 6279.4 | 68.3 | | | | 14 | 6279.4 | 68.3 | 100.00 | 100.00 |
| 1985 | 22 | 6257.8 | 64.3 | | | | 22 | 6257.8 | 64.3 | 100.00 | 100.00 |
| 1986 | 23 | 11803.0 | 71.2 | | | | 23 | 11803.0 | 71.2 | 100.00 | 100.00 |
| 1987 | 36 | 2326.4 | 65.9 | | | | 36 | 2326.4 | 65.9 | 100.00 | 100.00 |
| 1988 | 60 | 4027.5 | 67.6 | 3 | 158.0 | 66.0 | 57 | 4231.1 | 67.6 | 99.80 | 95.00 |
| 1989 | 48 | 6267.1 | 83.5 | 1 | 293.0 | 21.8 | 47 | 6394.2 | 84.8 | 99.90 | 97.92 |
| 1990 | 52 | 3706.3 | 78.2 | 3 | 385.0 | 76.3 | 49 | 3909.7 | 78.3 | 99.40 | 94.23 |
| 1991 | 62 | 2793.9 | 83.9 | 8 | 2525.0 | 71.3 | 54 | 2833.7 | 85.8 | 88.34 | 87.10 |
| 1992 | 53 | 2762.6 | 76.7 | 10 | 283.0 | 72.9 | 43 | 3339.2 | 77.6 | 98.07 | 81.13 |
| 1993 | 57 | 2067.2 | 74.3 | 18 | 722.6 | 62.4 | 39 | 2687.8 | 79.8 | 88.96 | 68.42 |
| 1994 | 95 | 2768.5 | 79.2 | 23 | 3957.1 | 80.5 | 72 | 2388.8 | 78.7 | 65.40 | 75.79 |
| 1995 | 135 | 3864.9 | 78.6 | 36 | 4931.8 | 72.5 | 99 | 3476.9 | 80.8 | 65.97 | 73.33 |
| 1996 | 144 | 4117.6 | 76.3 | 35 | 5814.6 | 70.7 | 109 | 3572.6 | 78.1 | 65.68 | 75.69 |
| 1997 | 158 | 11655.3 | 76.0 | 52 | 30706.0 | 81.7 | 106 | 2309.6 | 73.2 | 13.29 | 67.09 |
| 1998 | 238 | 10901.9 | 78.5 | 69 | 6276.4 | 71.5 | 169 | 12790.4 | 81.4 | 83.31 | 71.01 |
| 1999 | 343 | 5371.7 | 74.0 | 128 | 8937.8 | 70.5 | 215 | 3248.7 | 76.1 | 37.91 | 62.68 |
| 2000 | 486 | 3722.1 | 62.7 | 169 | 7652.6 | 58.8 | 317 | 1626.7 | 64.8 | 28.51 | 65.23 |
| 2001 | 193 | 1613.4 | 70.3 | 75 | 2496.6 | 72.9 | 118 | 1052.1 | 68.7 | 39.87 | 61.14 |

Appendix Table 4: Summary statistics by year for China

| Year | all cases | | | not performed FDI | | | performed FDI | | | % realized capital | % realized no. of FDI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | avg amount | avg own | No | avg amount | avg own | no | avg amount | avg own | | |
| 1989 | 1 | 121.0 | 49.0 | | | | 1 | 121.0 | 49.0 | 100.0 | 100.0 |
| 1990 | 2 | 74.0 | 70.0 | | | | 2 | 74.0 | 70.0 | 100.0 | 100.0 |
| 1991 | 3 | 230.0 | 46.7 | | | | 3 | 230.0 | 46.7 | 100.0 | 100.0 |
| 1992 | 6 | 206.8 | 59.3 | 2 | 147.5 | 58.5 | 4 | 236.5 | 59.8 | 76.2 | 66.7 |
| 1993 | 27 | 204.9 | 65.6 | 10 | 371.9 | 62.8 | 17 | 106.6 | 67.2 | 32.8 | 63.0 |
| 1994 | 30 | 180.4 | 72.0 | 9 | 153.1 | 58.6 | 21 | 192.1 | 77.8 | 74.5 | 70.0 |
| 1995 | 40 | 262.5 | 80.9 | 18 | 329.4 | 85.3 | 22 | 207.8 | 77.2 | 43.5 | 55.0 |
| 1996 | 54 | 94.6 | 75.5 | 22 | 95.4 | 65.5 | 32 | 94.2 | 82.4 | 59.0 | 59.3 |
| 1997 | 64 | 105.9 | 69.8 | 36 | 82.2 | 58.6 | 28 | 136.5 | 84.2 | 56.4 | 43.8 |
| 1998 | 83 | 66.7 | 84.9 | 33 | 72.6 | 82.7 | 50 | 62.7 | 86.4 | 56.7 | 60.2 |
| 1999 | 292 | 105.6 | 89.7 | 80 | 156.7 | 88.1 | 212 | 86.4 | 90.3 | 59.4 | 72.6 |
| 2000 | 1,054 | 67.3 | 91.9 | 161 | 81.5 | 87.5 | 893 | 64.8 | 92.7 | 81.5 | 84.7 |
| 2001 | 455 | 72.4 | 91.0 | 77 | 142.1 | 92.9 | 378 | 58.2 | 90.6 | 66.8 | 83.1 |

Appendix Table 5: Ranking of investors in Korea by number of projects

| Name country | Country code | all cases | | | | performed FDI | | | | % realized in no. of project | % realized capital |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | count | Average Amount | Total Amount | average ownership | count | average amount | total amount | average ownership | | |
| Japan | 32 | 2,580 | 3439.5 | 8873845.5 | 59.90 | 2,088 | 3404.9 | 7109456.3 | 60.20 | 80.93 | 80.12 |
| U.S.A | 68 | 2,284 | 5760.8 | 13157655.8 | 72.44 | 1,650 | 4825.0 | 7961255.0 | 73.78 | 72.24 | 60.51 |
| China | 14 | 2,111 | 83.3 | 175838.0 | 89.02 | 1,663 | 72.4 | 120477.0 | 90.53 | 78.78 | 68.52 |
| Pakistan | 51 | 676 | 52.3 | 35330.0 | 99.07 | 528 | 51.6 | 27226.0 | 99.02 | 78.11 | 77.06 |
| Germany | 21 | 317 | 13413.4 | 4252041.5 | 79.20 | 265 | 15696.1 | 4159466.5 | 80.09 | 83.60 | 97.82 |
| Netherlands | 47 | 238 | 34103.7 | 8116685.4 | 84.08 | 214 | 36992.2 | 7916330.8 | 85.29 | 89.92 | 97.53 |

Appendix Table 6: Ranking of investors in Korea by investment value of projects

| country Name | Country code | all cases | | | | performed FDI | | | | % realized in no of project | % realized capital |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | count | average amount | Total Amount | average ownership | count | average amount | total amount | average ownership | | |
| U.S.A | 68 | 2,284 | 5760.8 | 13157655.8 | 72.44 | 1,650 | 4825.0 | 7961255.0 | 73.78 | 72.24 | 60.51 |
| Japan | 32 | 2,580 | 3439.5 | 8873845.5 | 59.90 | 2,088 | 3404.9 | 7109456.3 | 60.20 | 80.93 | 80.12 |
| Netherlands | 47 | 238 | 34103.7 | 8116685.4 | 84.08 | 214 | 36992.2 | 7916330.8 | 85.29 | 89.92 | 97.53 |
| Malaysia | 41 | 211 | 20437.7 | 4312352.6 | 49.15 | 159 | 21633.6 | 3439742.4 | 50.49 | 75.36 | 79.76 |
| Germany | 21 | 317 | 13413.4 | 4252041.5 | 79.20 | 265 | 15696.1 | 4159466.5 | 80.09 | 83.60 | 97.82 |

Appendix Table 7: The industries that attract the number of projects larger than 100 from Japan

| Industry code | All approved cases | | | | performed FDI | | | | % performed Capital |
|---|---|---|---|---|---|---|---|---|---|
| | **No.** | avg amount | tamount | avg own | No. | avg amount | tamount | avg own | |
| 27 | 414 | 1825.3 | 755685.8 | 57.5 | 322 | 1688.3 | 543645.2 | 59.3 | 71.94 |
| 13 | 367 | 1273.2 | 467265.1 | 55.6 | 304 | 1456.1 | 442668.1 | 55.7 | 94.74 |
| 20 | 357 | 784.7 | 280152.0 | 79.4 | 287 | 950.2 | 272699.0 | 81.2 | 97.34 |
| 14 | 265 | 3680.5 | 975323.0 | 53.8 | 241 | 3926.2 | 946217.1 | 54.3 | 97.02 |
| 16 | 202 | 984.2 | 198817.0 | 52.1 | 167 | 1118.4 | 186778.0 | 52.3 | 93.94 |
| 7 | 182 | 5012.6 | 912293.9 | 50.1 | 163 | 5488.9 | 894689.1 | 49.3 | 98.07 |
| 19 | 165 | 881.4 | 145432.0 | 75.8 | 131 | 1030.3 | 134968.0 | 74.4 | 92.80 |

Note: See Appendix Table 1 for names of industries

Appendix Table 8: The industries that attract the biggest total amount of foreign investment from Japan

| Industry code | all approved cases | | | | performed FDI | | | | % Realized Capital |
|---|---|---|---|---|---|---|---|---|---|
| | No | avg amount | total amount | Avg Own | no | avg amount | Tamount | avg own | |
| 22 | 51 | 48773.3 | 2487438.8 | 71.5 | 26 | 62984.3 | 1637591.0 | 67.3 | 65.83 |
| 14 | 265 | 3680.5 | 975323.0 | 53.8 | 241 | 3926.2 | 946217.1 | 54.3 | 97.02 |
| 7 | 182 | 5012.6 | 912293.9 | 50.1 | 163 | 5488.9 | 894689.1 | 49.3 | 98.07 |
| 23 | 30 | 27065.3 | 811958.1 | 67.9 | 22 | 25495.3 | 560897.0 | 68.0 | 69.08 |
| 27 | 414 | 1825.3 | 755685.8 | 57.5 | 322 | 1688.3 | 543645.2 | 59.3 | 71.94 |
| 24 | 34 | 13891.0 | 472293.0 | 42.0 | 26 | 16391.0 | 426165.0 | 44.3 | 90.23 |
| 13 | 367 | 1273.2 | 467265.1 | 55.6 | 304 | 1456.1 | 442668.1 | 55.7 | 94.74 |

Appendix Table 9: The industries attract most projects and capitals from U.S.A

| Industry code | all cases | | | | performed FDI | | | | % Realized capital |
|---|---|---|---|---|---|---|---|---|---|
| | No. | avg amount | tamount | avg own | No. | avg amount | tamount | Avg Own | |
| 27 | 689 | 3651.3 | 2515776.7 | 72.5 | 499 | 2033.3 | 1014616.2 | 74.2 | 40.33 |
| 20 | 431 | 715.1 | 308195.0 | 86.6 | 333 | 866.4 | 288497.0 | 86.9 | 93.61 |
| 13 | 217 | 7403.4 | 1606533.0 | 63.1 | 157 | 9441.7 | 1482340.0 | 63.9 | 92.27 |
| 19 | 150 | 8580.9 | 1287140.1 | 83.4 | 107 | 11071.0 | 1184594.9 | 83.4 | 92.03 |
| 15 | 127 | 1092.1 | 138694.0 | 58.3 | 93 | 1298.1 | 120724.0 | 58.1 | 87.04 |
| 12 | 111 | 3401.7 | 377585.0 | 65.4 | 91 | 2652.8 | 241404.0 | 68.1 | 63.93 |

Appendix Table 10: The industries attracting most projects and capitals from China

| Industry code | all cases | | | | | performed FDI | | | % |
|---|---|---|---|---|---|---|---|---|---|
| | No | Avg Amount | tamount | avg own | no | avg amount | tamount | avg own | actual capital |
| 20 | 1,621 | 63.7 | 103306.0 | 93.8 | 1,341 | 62.4 | 83662.0 | 94.1 | 80.98 |
| 21 | 119 | 104.8 | 12466.0 | 77.0 | 78 | 106.4 | 8301.0 | 77.7 | 66.59 |
| 19 | 103 | 59.8 | 6161.0 | 86.3 | 78 | 60.0 | 4682.0 | 89.6 | 75.99 |
| 27 | 96 | 156.5 | 15025.0 | 75.4 | 65 | 160.3 | 10422.0 | 75.6 | 69.36 |

Note: See Appendix Table 1 for names of industries

Appendix Table 11: Summary statistics by industry, sorting by the number of realized projects

| Industry code | all cases | | | | performed FDI | | | | % realized | % |
|---|---|---|---|---|---|---|---|---|---|---|
| | count | Average Amount | total Amount | average ownership | count | average amount | total amount | average ownership | in no of projects | realized capital |
| 20 | 3,986 | 429.1 | 1710532.9 | 91.55 | 3,203 | 496.9 | 1591587.0 | 92.03 | 80.36 | 93.05 |
| 27 | 1,806 | 5529.9 | 9987069.8 | 68.92 | 1,364 | 2929.8 | 3996278.6 | 70.39 | 75.53 | 40.01 |
| 14 | 723 | 7477.5 | 5406249.1 | 54.73 | 589 | 8522.1 | 5019521.6 | 55.09 | 81.47 | 92.85 |
| 13 | 671 | 4918.5 | 3300290.7 | 60.62 | 551 | 5490.7 | 3025359.7 | 61.12 | 82.12 | 91.67 |
| 19 | 651 | 5372.0 | 3497181.1 | 81.88 | 506 | 6447.8 | 3262573.1 | 82.89 | 77.73 | 93.29 |
| 16 | 480 | 2463.3 | 1182375.8 | 55.04 | 369 | 3074.5 | 1134504.2 | 55.28 | 76.88 | 95.95 |
| 7 | 421 | 9335.4 | 3930200.0 | 63.62 | 352 | 10404.6 | 3662401.6 | 64.01 | 83.61 | 93.19 |

Appendix Table 12: Summary statistics by industry, sorting by total amount of invested capital

| Industry code | all cases | | | | performed FDI | | | | % realized | % |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | average amount | Total amount | average ownership | count | average amount | total amount | average ownership | in no of projects | realized capital |
| 14 | 723 | 7477.5 | 5406249.1 | 54.73 | 589 | 8522.1 | 5019521.6 | 55.09 | 81.47 | 92.85 |
| 24 | 226 | 24881.7 | 5623268.7 | 58.38 | 143 | 30470.3 | 4357255.8 | 59.02 | 63.27 | 77.49 |
| 27 | 1,806 | 5529.9 | 9987069.8 | 68.92 | 1,364 | 2929.8 | 3996278.6 | 70.39 | 75.53 | 40.01 |
| 7 | 421 | 9335.4 | 3930200.0 | 63.62 | 352 | 10404.6 | 3662401.6 | 64.01 | 83.61 | 93.19 |
| 19 | 651 | 5372.0 | 3497181.1 | 81.88 | 506 | 6447.8 | 3262573.1 | 82.89 | 77.73 | 93.29 |
| 13 | 671 | 4918.5 | 3300290.7 | 60.62 | 551 | 5490.7 | 3025359.7 | 61.12 | 82.12 | 91.67 |
| 4 | 188 | 13810.5 | 2596364.6 | 59.95 | 136 | 18146.4 | 2467910.4 | 60.96 | 72.34 | 95.05 |