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ABSTRACT

We study Japanese investments between 1980 and 1992 to assess the effectiveness of state promotion efforts in light of strong agglomeration economies in Japanese investment. Two policy variables are consistently shown to influence the location of investment - foreign trade zones and labor subsidies. We use simulations to explore the impact these policies had on the geographic distribution of Japanese investment. The simulations reveal that in aggregate promotion programs largely offset each other; however, unilateral withdrawal of promotion causes individual states to lose substantial amounts of foreign investment.

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I Introduction

State governments compete aggressively for new manufacturing plants by offering a variety of incentives. Investors are not unaware of these efforts, and press accounts suggest that investment incentives have come to be taken for granted.[1] While state officials often claim that tax and subsidy incentive packages are justified by future increases in employment and business taxes, some of these gains come at the expense of other states that would have received the investment if the incentives were not provided. Thus, it is possible that national welfare would be larger in the absence of interstate competition for investment.

The presence of agglomeration economies, local externalities that encourage related firms to locate in proximity to each other, provides a rationale for states to increase their subsidy efforts. If agglomeration economies are significant determinants of investment location, state policies that succeed in drawing investment will tend to realize additional long-run benefits associated with increased agglomeration. However, since agglomeration economies magnify initial differences between states, their presence implies that states with weak industrial bases may find it impossible to attract investment unless they provide very large subsidies. Hence, agglomeration effects may also provide a caveat that it may be in the best interest of many states to refrain from subsidy competition.

This paper explores the extent to which state governments' promotional programs influenced the location of Japanese manufacturing investment in the United States. Unlike previous papers examining investment location choice in the presence of tax and fiscal variables, our study estimates the impact of tax and fiscal variables while controlling for state (unmeasurable) fixed effects and industry specific agglomeration effects. We employ simulations to assess the impact

[1]The Financial Times (October 1991) reported that expected subsidies to new investors almost doubled in the decade due to the intensification of competition among states.

of policies on the distribution of Japanese investment. The results indicate that the provision of foreign trade zones and labor subsidies attracted Japanese investment. Policies designed to attract investment were often thwarted by emulation; however, we show that individual states would have lost significant investment had they not offered incentives when other states were offering them.

There are a large number of empirical studies exploring the influence of state fiscal variables on the location choice of investment using discrete choice models with either states or counties as the set of choices. Friedman et al (1992) provides a survey of research on foreign direct investment while Papke (1991), Bartik (1985), and Carlton (1983) are examples of research on U.S. domestic investment. This paper emphasizes the interaction between state policies and industry-level agglomeration externalities. We quantify the impact of incentives while controlling for the prior location pattern of U.S. and Japan-based establishments which Head, Ries, Swenson (1994) found to have a significant influence on location choices of Japanese investors in the United States. Another of this paper's contributions is our use of state-specific constants to control for unavailable or non-quantifiable state characteristics. This procedure avoids omitted variable biases that could arise from correlation between policy variables and fixed state effects that are not captured by other explanatory variables. Indeed, the inclusion of fixed effects increases the statistical significance of some variables while eliminating the significance of others that were previously thought to be important determinants of investment location.

Using estimated parameters, we conduct simulations to explore the effect of investment promotion policies on the geographic distribution of Japanese investment in the presence of agglomeration economies. Policy may have little impact if location choice is primarily determined by factor conditions and the industrial base. However, if policy attracts investment, agglomeration economies will tend to induce further investment in the future. This will magnify any

local welfare benefits associated with the receipt of foreign direct investment. The simulations should provide a more complete quantification of the economic significance of policy variables than has been previously available.

The paper is organized as follows. Section II reviews the evidence on the effects of investment promotion incentives on location decisions. We then specify the estimation method and regression equation in Section III. The data are discussed in section IV and estimation results analyzed in section V. Simulation results of promotion policy experiments follow in section VI. We offer some tentative policy implications in the concluding section.

II Theory and Evidence on Promotional Programs

The fiscal literature considering the use of tax and promotion instruments has yet to examine the efficacy of these instruments in the presence of agglomeration. In a related concern, Rauch (1993) has analyzed the role of industrial park developers in organizing agglomerated industries. In order to facilitate location shifts, the developer induces a handful of investors to begin operations in the industrial park. First movers receive subsidized land prices relative to later movers. This differential land pricing allows the developer to capture some of the profits associated with the agglomeration economies.[2]

The model of the industrial park is instructive in thinking about state subsidies; it shows that agglomeration externalities could motivate states to attempt to alter their configuration of industries. On the other hand, there are some strong contrasts between state development and Rauch's model of industrial parks. In Rauch's model the developer is a monopolist parsing out space over time in the industrial park. But states compete against each other and this may

[2] Followers are willing to pay a higher land price, since they are paying for the value of locating in proximity to the now clustering first movers as well as paying for the use of the land.

ultimately undercut the ability of any one state to reconfigure the system of industries within its borders. Our empirical tests will examine whether state inducements produced any measurable changes in investment location decisions.

Previous empirical work on the influence of state fiscal variables is mixed. Bartik (1985) and Coughlin, Terza and Arromdee (1991) have included taxes and concluded that they deterred investment. In contrast, Carlton (1983) and Wheeler and Mody (1992) find little evidence that tax variables exert any measurable effect on investment. In part, it is likely that these findings are mixed since it is difficult for broad fiscal indicators to adequately represent the broader spectrum of taxes and incentives offered to individual investors.[3]

Other authors have looked at state investment promotion efforts. Both Luger and Shetty (1985) and Woodward (1992) include an "effort index" to represent a state's intensity in seeking investments. The "effort index" provides a count of the number of state programs offered to potential investors. In studying Japanese investment Woodward concludes that state investment promotion offices in Japan provide a positive impetus, while there is no apparent boost created by effort as measured by the count index. The failure of this index does not necessarily imply that state promotion efforts are ineffectual. The "effort index" does not control for the magnitude of those efforts. If the number of offerings is positively correlated with the magnitude of those offerings, then the index would accurately capture state promotion efforts. On the other hand, all states might be spending comparable amounts of investment promotion monies, with some states focusing their efforts on a limited number of large programs while other states distributed their monies more thinly across a wider range of policies. We make use of more precise measurements

[3] An exception is Papke (1987, 1991) who studies industry-specific tax effects that result from the integrated effects of state and federal taxes. These more precise measures suggest that higher state taxes diminish new investment. Papke also includes measures of state expenditures on fire and police protection. This is important, since higher taxes will not necessarily deter investment if those taxes finance services that prospective investors value.

of state polices which are directly linked to the foreign investor's after-tax profit function.

III The Location Choice Model

We begin with the decision facing a Japanese manufacturer who wishes to locate a facility in the United States. We assume that investor i selects the state that yields the highest expected value of after-tax profits. The firm considers the intrinsic characteristics of the state and any agglomeration benefits or subsidies available in state j.

While one can not directly observe investor valuations, one can, however, observe state characteristics at the time that investors select a site from the set of potential locations. Conditional logit estimation infers the value of state characteristics by estimating the extent to which they result in one state being chosen over the others. The conditional logit model stipulates that the attractiveness of state j to investor i can be decomposed into the sum of a measured term, denoted M, and unmeasured term, U. If U_{ij} is distributed according to the cumulative density $\exp[-\exp(-U_{ij})]$ then profit maximization implies that the probability any particular state is chosen out of a choice set denoted $\mathcal{J}$ will be an increasing S-shaped function of the measured attributes of that state as perceived by the investor.[4]

$$\text{Probability}(i \text{ chooses } j) = \frac{\exp(M_{ij})}{\sum_{j \in \mathcal{J}} \exp(M_{ij})}. \tag{1}$$

The remaining task is to parameterize the observable component of profitability, M_{ij}, as a function of available data.

Let profits in any state depend on the final goods price, P, and the prices of four inputs—

[4]This result, proved by McFadden (1974), seems to rely on a rather arbitrary assumption regarding the error term. However, it is simply a generalization of the standard logit model, since differences in profitability for two observably equal states depend on differences in U_{ij} which will, under the error term assumption made above, be distributed according to the logistic function, a reasonably close approximation of the normal distribution.

labor, capital, foreign and locally procured intermediate inputs—which we denote w, r, v_f, and v_ℓ. Profits will also depend on a location-specific efficiency parameter, μ. Hence, in the absence of government intervention, profits can be expressed as

$$\pi(\mu, P, w, r, v_f, v_\ell).$$

State governments influence profits through a number of mechanisms. First, most states levy corporate income taxes. Second, a number of states subsidize labor and/or the cost of plant construction for any new investment. Third, the price of imported inputs will tend to be lower in states with foreign trade zones (FTZs).[5] We denote the corporate tax rate as t_c, the wage subsidy rate as s_w, the capital subsidy rate as s_r, and the implied imported input subsidy rate caused by access to preferential tariffs as s_f.

$$(1 - t_c)\pi(\mu, P, w(1 - s_w), r(1 - s_r), v_f(1 - s_f), v_\ell).$$

For estimation purposes we need to express the profitability of each state in an expression that is linear in the parameters.

$$\mu + \ln(1 - t_c) + \beta_P \ln P + \beta_w \ln w(1 - s_w) + \beta_r \ln r(1 - s_r) + \beta_f \ln v_f(1 - s_f) + \beta_\ell \ln v_\ell.$$

This equation can be derived from profit maximization by a price-taking firm with a Cobb-Douglas production function or it may be seen as a local first-order logarithmic approximation of an arbitrary profit function. There is still some distance to be covered between the above expression and a formulation that we can estimate. The reason is that while we have good

[5] Section IV explains why this is the case.

measures of the tax and subsidy variables, we cannot directly observe the input and output prices relevant to foreign investors. And we have no direct information on the state-specific efficiency parameter. Instead we rely on three groupings of observable state characteristics—labor market conditions, proximity to markets, and agglomeration counts—which we believe to be the primitive variables which determine w, r, v_f, v_ℓ, P, and μ.

Labor market conditions affect the prices of local inputs including labor itself, as well as any locally supplied intermediate goods. Proximity to markets affects the delivered cost of foreign-produced inputs (intermediates and capital goods) as well as the price net of transportation costs received on final output. The specific variables we use to reflect proximity to markets and labor market conditions are discussed in the following section.

The presence or absence of agglomeration economies will exert an additional influence on the pattern of future investment. In the absence of agglomeration, increasing investment in a particular location ultimately leads to congestion; the clustering of investors in drives up local factor prices and reduces the desirability of the locale as a site for future investment. By way of contrast, if agglomeration economies are important, concentrated investment may actually create significant positive spillovers which reduce a locale's factor prices and costs of doing business. A site that held no particular attraction to investors in a certain industry could become increasingly attractive due to the accumulation of investments in that industry.[6]

As discussed in Marshall (1920) and formalized in Henderson (1974) and Krugman (1991), industry-level agglomeration effects can make a location more attractive via three mechanisms: knowledge spillovers, diversity and scale of local specialized input supply, and labor-pooling.[7] In

[6] Rauch (1993) and Krugman and Livas (1992) show that agglomeration creates the incentive for ongoing growth and concentration, but that this concentration of production is bounded by the rise in price of fixed factors such as land.

[7] See Head, Ries and Swenson (1994) for a review of these theoretical motivations behind agglomeration economies and their influence on investment. For the purposes of this paper we are less interested in the actual sources of agglomeration than in the effects of agglomeration on the potency of state investment promotion efforts.

the context of the above notation, the first mechanism works through increases in μ, the second through reductions in v_ℓ, and the third through reductions in the costs of skilled workers, w. Although the clustering of firms in one location arises in most models due to technological or pecuniary externalities, it may also arise through mechanisms which do not enhance productivity. DeCoster and Strange (1993) develop a model in which investors "imitate each other's location decisions because they fear denial of future credit if they make eccentric choices that do not work out." From the point of view of state governments this distinction may not matter, as attracting the "pioneering" investor will still make it easier to attract subsequent investments.

In the data section which follows we discuss the way we operationalize each grouping of variables. Since it is unlikely that the variables we use adequately capture all state characteristics which influence profitability, we will use alternative-specific constants to control for unmeasured state fixed effects. These may include climate, transportation networks, and any other stable influences on the average Japanese investor.[8] State fixed effect estimation will help avoid omitted variable bias and provide a better fit of the model to the data. The measured variables, together with the state-specific constants, constitute M in equation 1.

IV Data

We study a set of Japanese manufacturing establishments completed between 1980 and 1992 that are recorded by the Japan Economic Institute. For each investment we have information on the year of completion, the identity of the parent firm, the industry in which the investment occurred, and the number of workers employed. The location choices constitute our dependent variable. The independent variables are the characteristics of 34 states which received more than

[8] Since states actively altered promotion in the decade, promotion data varies across time and we can empirically distinguish their influence from state fixed effects.

two investments in the 1980s. Most state attributes vary according to the timing or product line of the investments. We now discuss each of the groups of variables introduced in the model section.

Labor Market Conditions

No single variable can adequately capture interstate differences in wage costs. The average manufacturing wage is the obvious candidate but it has several deficiencies. First, workers differ in skills and in complementary factors. Hence we use average labor productivity, measured as manufacturing value added per production worker to control for such differences. Unionization, measured as the percent of manufacturing workers who are members of unions, could deter investment by raising wages. After controlling for the wage, however, one would only expect a negative effect if unions insist on restrictive work rules which further raise labor costs. Finally, a high unemployment rate could increase the attractiveness of a state to foreign investors wishing to tap into a larger job applicant pool. Most location choice studies employ this set of explanatory variables (see, for instance, the summary of previous work in Friedman et al (1992)).

Proximity to Markets

Japanese-owned plants import substantial amounts of intermediate goods from the parent firm and traditional suppliers based in Japan. In many cases, they also export goods back to the Japanese market. Plant locations along the Pacific coast offer lower transport costs to and from Japan. To capture effects of transportation costs on imported input and final good prices we employ a Pacific Rim dummy variable which takes a value of one for California, Oregon, Washington, and Alaska (Hawaii did not meet the criteria to be included in the choice set). To represent proximity to U.S. demand we also include in-state income and bordering state income in the regression. Bordering state income sums the income of all states surrounding the

state that is under consideration. The rationale for including these variables is to estimate the value of locating near to demand, since we would expect that proximity to final demand would increase the final price net of transport costs received by the firm.

State Investment-Promotion Policies

States stepped up efforts to attract foreign investment in the 1980s. Many states opened investment offices in Japan as a means of disseminating information to potential investors and encouraging them to choose that state when they located in the United States. As Table 1 shows, only 11 states had such offices in 1982. In the next eight years, eight more states opened investment promotion offices in Japan. We employ a dummy variable indicating states with these offices. It should be positively related to investment if investment offices succeeded in biasing Japanese investors in favor of their state.

Over the same time interval, Table 1 also shows that 16 states who did not have foreign trade zones added them. The presence of a foreign trade zone lowers the tariff costs of imported intermediate goods via three mechanisms—payment delay, reexport, and reclassification. Payment delay is a benefit open to all users of foreign trade zones. Users of foreign trade zones do not have to pay any tariff duties until goods are shipped from the foreign trade zones to final market destinations in the United States. In addition, operation in a foreign trade zone enables the firm to avoid all tariffs on imported intermediate goods that are reexported in final products. Finally, reclassification reduces costs when goods assembled within the zones are subject to a lower tariff than are the component parts imported into the zone. Although the federal government ultimately approves each zone, all applications are made with the support of state and local governments. Hence, we consider the provision of FTZs as part of state promotional efforts.

We employ an indicator variable to measure the influence of the existence of a least one FTZ

Table 1: The Proliferation of Investment Promotion Offices and General Purpose Foreign Trade Zones.

State	Open by 1982 IPO	Open by 1982 FTZ	Open by 1990 IPO	Open by 1990 FTZ	State	Open by 1982 IPO	Open by 1982 FTZ	Open by 1990 IPO	Open by 1990 FTZ
Alabama	X		X	X	Missouri		X	X	X
Alaska				X	Montana			X	X
Arizona		X		X	Nebraska		X		X
Arkansas		X		X	Nevada				X
California		X		X	New Hampshire				X
Colorado				X	New Jersey		X		X
Connecticut				X	New Mexico				X
Delaware				X	New York	X	X	X	X
Florida	X	X	X	X	North Carolina	X		X	X
Georgia	X	X	X	X	North Dakota			X	X
Hawaii		X		X	Ohio	X	X	X	X
Illinois		X	X	X	Oklahoma		X		X
Indiana	X		X	X	Oregon		X		X
Iowa			X	X	Pennsylvania	X	X	X	X
Kansas		X		X	Rhode Island				X
Kentucky		X		X	South Carolina	X	X	X	X
Louisiana		X		X	Tennessee				X
Maine				X	Texas		X	X	X
Maryland	X		X	X	Utah		X		X
Massachusetts		X		X	Vermont		X		X
Michigan		X		X	Virginia	X	X	X	X
Minnesota		X		X	Washington		X		X
Mississippi				X	Wisconsin		X	X	X

Note: This table indicates all states offering foreign trade zones. Subzone activities are not included. Idaho, South Dakota and West Virginia did not have general purpose zones. Zone 133, Quad-City Iowa/Illinois, is marked in both states.

in a state. This variable takes a value of one for states with "general-purpose" zones as long as the investor manufactures a product which qualifies for automatic tariff treatment. General-purpose FTZs are open to use by multiple businesses in contrast to "subzones" which encompass single-user facilities. Products such as automobiles, auto parts, and televisions are considered "sensitive" industries which must apply for subzone status in order to obtain tariff reductions. This suggests that firms manufacturing such products would not be attracted by the presence of a general-purpose zone. We confine our analysis to general-purpose zones because such zones are accessible to new investors whereas subzones solely benefit existing plants.

We test the hypothesis that higher taxes deter investment by gathering data on the corporate tax rate and unitary taxation. The latter is a method of taxing firms based on a proportion of their worldwide profits rather than the accounting profits of the affiliate attributable to the state of operation. Foreign firms actively opposed the tax because it exposes them to the possibility of positive tax payments in states even if they earned no direct profits in that state of operation. As an attempt to attract more investment, many states rescinded or modified their unitary taxes during the 1980s. We add a variable measuring the corporate tax rate and a dummy variable indicating the presence of a unitary tax law to explore the impact of taxation on investment.[9]

States also utilized labor and capital subsidies to attract investment. Calculation of the subsidies required us to combine firm characteristics with specifics of the subsidy programs. In those cases where the program specified a rate, the rate was used. In cases where states provided a specified dollar inducement for each job created, we calculated a subsidy rate after determining the relevant wage costs for the firm.[10] The capital subsidies used by states in our

[9] Classifying the status of unitary taxation in California was complicated by a legislative change. California decided to allow firms two options. Firms could either continue under the unitary form of taxation, or they could elect to adopt a water's edge form of taxation. Making this election required a payment of $500,000, and the petition to adopt water's edge treatment could be rejected by the State of California. Since the cost of avoiding unitary tax seems prohibitive, we decided to maintain California's designation as a unitary tax state after this new law.

[10] We employed 2-digit industry wage data to calculate the expected wage that each investor would have to

sample were specified as a percentage of investment value.

Agglomeration variables

As discussed in the model section, agglomeration economies available in states may enhance profits through a number of avenues. The availability of diverse and efficient input suppliers may lead to lower input costs. Knowledge spillovers may directly improve plant efficiency, while benefits associated with labor pooling may be partly passed on to firms.

In order to capture localization effects, we matched each Japanese investment to three agglomeration variables: a count of U.S. establishments, a count of Japanese establishments, and a count of *keiretsu* affiliates. The former two measures are matched to investments in the same 4-digit SIC industry. We add the count of *keiretsu* affiliates to capture potential externalities that may exist between Japanese manufacturers and their supplier networks.[11] Parallel to our treatment of final demand, we also employ border-state sums for each of the three agglomeration variables.[12]

The selection of U.S. industry, Japan industry and Japan *keiretsu* measures of agglomeration draws from earlier work (Head, Ries and Swenson (1994)). That paper found a remarkable amount of stability in the agglomeration coefficients in estimations that varied the states in the choice set and the investors in the "chooser" sample. It appears impossible to identify whether the significance of the prior U.S. industrial pattern affects the Japanese because of agglomeration externalities or because it reveals the abundance of factors which are used intensively in particular industries. However, we believe the additional information contained in the Japanese

pay. The rate of labor subsidy was then computed as the lump-sum subsidy payment divided by the U.S. wage. This method implicitly assumes that Japanese firms pay the same amount for labor as U.S. firms in the same industry.

[11]Thus, we consider only manufacturer-centered (vertical) *keiretsu* and exclude bank-centered (horizontal) *keiretsu* affiliations.

[12]There is no reason to believe that the economic boundaries across which agglomeration operates will coincide with political boundaries. Our previous results show that both agglomeration within a state and in its bordering states positively affect the probability of receiving investment.

agglomeration variables strongly suggests the existence of localization externalities. In the policy simulations we will operate under the maintained assumption that the follow-the-leader pattern found in the data is a real phenomena but we will not speculate on its source.

V Estimation Results

The primary goal of our estimation is to assess the statistical significance of states' investment promotion efforts. We will then use simulations to explore the *economic* significance of policy. To obtain consistent estimates of the effects of promotion, we believe it is necessary to control for industry-level agglomeration effects as well as state-level fixed effects. Nevertheless we begin without these controls and estimate a baseline model that conforms with the specifications that have been performed by other authors.[13] The advantage of beginning with a specification that is similar to other estimates in the literature is that we can first check that there are no peculiarities in our sample of Japanese data that result in different estimated effects for regressors that have been found previously. Moreover, having begun from a common framework, we can determine the contribution that more precise agglomeration and promotion measures bring to the estimates.

The benchmark results displayed in column (1) of Table 2 appear to mirror those found in previous studies. As one would expect, states with lower wages or more productive workforces are more likely to attract investments than states who do not have these characteristics. The somewhat surprising result here is that higher rates of union membership appear to attract Japanese investors. This result has emerged in other investigations of investment decisions and, as will be explained below, appears to be the result of omitted variable bias. Similar to previous

[13] Our beginning specification is most similar to Friedman, Gerlowski, and Silberman (1992), but is based on independent variables that are common to many location choice models.

Table 2: Conditional Logit Results†

	Dependent Variable: State Choice		
	(1)	(2)	(3)
Labor Market Conditions			
Log of Mfg. Wage	-2.513**	-2.782**	-0.19
	(0.733)	(0.750)	(2.005)
Log of Mfg. Prod'y	0.663	1.746**	-2.597
	(0.590)	(0.588)	(2.495)
Unionization Rate	0.013*	-0.006	0.005
	(0.007)	(0.007)	(0.026)
Unemployment Rate	0.158**	0.159**	0.213**
	(0.035)	(0.037)	(0.061)
Proximity to Markets			
Pacific Rim Dummy	0.715**	0.705**	
	(0.151)	(0.164)	
Log of State Income	0.819**	0.231*	-3.653*
	(0.082)	(0.106)	(1.493)
Log of Adjacent St. Income	0.323**	-0.01	2.701
	(0.084)	(0.090)	(1.563)
State Policies			
Japan Office Dummy	-0.177	-0.005	-0.355
	(0.097)	(0.099)	(0.200)
FTZ Dummy	1.015**	0.951*	0.863*
	(0.372)	(0.374)	(0.411)
Log of (1-Corp. Tax Rate)	7.219**	7.953**	-14.457
	(1.688)	(1.696)	(9.924)
Unitary Tax Dummy	-0.097	-0.361*	-0.107
	(0.144)	(0.159)	(0.258)
Log (1-Labor Subsidy)	-6.289**	-3.395*	-11.673**
	(1.386)	(1.488)	(4.387)
Log (1-Capital Subsidy)	4.084**	2.65	-1.711
	(1.279)	(1.385)	(4.344)
Agglomeration Effects	Omitted	Included‡	Included‡
Fixed Effects	Omitted	Omitted	Included
Log-Likelihood	-2446.059	-2187.172	-2084.796

†: Location choice model with 751 choosers and 34 choices. Estimated by maximum likelihood. Standard errors in parentheses. * and ** denote significance at the 5% and 1% levels.

‡: Agglomeration coefficients for columns (2) and (3) are reported in Table 3. Coefficients for state-specific fixed effects are not reported.

Table 3: Conditional Logit Results (cont'd)

Agglomeration Variables	(2)	(3)
Within-State Effects		
Log of U.S. Industry Count	0.503**	0.483**
	(0.058)	(0.060)
Log of Japan Ind'y Count	0.859**	0.585**
	(0.091)	(0.094)
Log of Keiretsu Count	0.951**	0.753**
	(0.130)	(0.129)
Adjacent-State Effects		
Log of U.S. Ind'y Count	0.283**	0.273**
	(0.068)	(0.072)
Log of Japan Ind'y Count	0.481**	0.391**
	(0.091)	(0.094)
Log of Keiretsu Count	0.399**	0.307*
	(0.139)	(0.141)
Log-Likelihood	-2187.172	-2084.796

Note: Standard errors in parentheses. Additional explanatory notes in Table 2.

research on Japanese investment, we find that Pacific Rim states, those states with high levels of income, and those states surrounded by other states with high levels of income were more likely to receive investments.[14] These findings suggest that transportation costs to final markets play a large role in determining the sites selected by investors.

Increased investment promotion by states suggests that they believe that promotion tools will successfully increase the investment they receive, or at a minimum, offset losses to competing states which offer investment programs. Estimates of the coefficients on the policy variables

[14]Most other studies (Friedman et al (1992), Woodward (1992)) measure the final demand in a location using the distance-weighted sum of income in all states. Our approach, while conceptually similar, explicitly estimates the relative importance of demand originating in the state versus demand from other states.

indicate that investment incentives have met with varying levels of success. To begin, state investment promotion offices in Japan have no apparent effect. This finding contrasts with Woodward's (1992) result that state investment promotion offices opened in Japan are positively correlated with investment. On the other hand, states who offered foreign trade zones within their borders attracted more investments.[15]

The corporate tax rate, which entered the regression as log(1-corporate tax rate) has a positive coefficient, which indicates that higher state tax rates appear to deter Japanese investors.[16] The unitary tax dummy variable enters with a negative, although insignificant, sign, suggesting that the presence of the unitary method of taxation at most weakly deterred Japanese investors.[17]

Our estimates of capital and labor subsidy effects are mixed in the baseline regression. In each case the subsidy is measured as log(1-subsidy rate), as this form follows from firms' maximization problems. A negative coefficient on the subsidy variables implies that states will garner increased investment if they increase their subsidies. While the baseline regression suggests that labor subsidies bolster investment, the regression estimates imply the reverse for the case of capital subsidies.

The second column of Table 2 displays coefficient estimates in a model that includes detailed

[15]The foreign trade zone variable that is displayed in Table 2 is set equal to 1 if a state had at least one general-purpose foreign trade zone, and the investor's industry of operation did not require application for subzone status. Alternate specifications were tested that directly entered the number of zones offered by each state or that measured the number of foreign trade zones divided by state land area. However, these specifications did not yield significant results. It appears that the ability to use a foreign trade zone is more important than the pervasiveness of foreign trade zones throughout the state either in absolute number or density. We also estimated the model assuming that all Japanese investors attach the same importance to FTZs, i.e. we did not restrict auto and television manufacturers to have no attraction to FTZs; this had no appreciable impact on the indicator variable's coefficient.

[16]The functional form employed for the corporate tax follows from the way the tax rate enters the profit function. However, we experimented with alternative specifications that used tax variables suggested by other works, such as average tax per capita, and property tax collections. The results with these variables were mostly insignificant and had negligible effects on the agglomeration and subsidy variables.

[17]In this specification as well as those to follow, the estimate is not sensitive to whether or not we consider California to continuously have a unitary tax.

measures of agglomeration. We find that inclusion of agglomeration measures provides more "sensible" estimates than the baseline specification. Productivity and unitary tax become significant and the estimated coefficient on unionization now has a negative (albeit insignificant) sign. The latter finding suggests that, in contrast to the inference from the baseline specification, unionization is not attractive to investors. Rather, states with a high level of agglomeration are frequently more unionized, and investors select these states due to their agglomeration benefits. While the perverse result on capital subsidies remains, the estimated coefficient is not significantly different from zero. Another notable change is that the implied value of in-state income and surrounding state income diminishes. The first set of results implied that demand conditions provided a rationale for locating firms near demand. However, in-state and bordering-state income are highly correlated with manufacturing activity, and appear to have picked up agglomeration effects in the baseline regression.

Table 3 reports coefficient estimates for the agglomeration variables. It reveals that counts of U.S. investments, Japanese investments and investment by *keiretsu* affiliates positively affect investors' likelihood of selecting a state. The effects are strongest for in-state counts of these variables, but bordering state counts also enter positively and significantly.

Our next specification adds state fixed effects. The third column of Table 2 indicates that inclusion of state fixed effects also strongly affects the results. First, the coefficient on average manufacturing wages remains negative, but the coefficient is now close to zero in magnitude and it is no longer significant. Likewise, productivity and the unionization rate are insignificant. The income variables that were interpreted earlier as indicators of demand no longer enter as expected. Bordering income is insignificant while in-state income now enters the specification with a negative sign. While we can only speculate about the cause of this perverse result, one explanation might be that states that experienced income growth also had rising land prices.

Our last variable that was used to proxy for a state's proximity to markets, the Pacific Rim dummy, must be omitted in this regression since time-invariant state characteristics can not be included in the presence of state fixed effects.

Tax effects become insignificant in the fixed effect regression. The new estimates find a weak positive relationship between state corporate tax rates and levels of Japanese investment. The coefficient on unitary taxation retains the expected sign but declines sharply in magnitude. The absence of a strong deterrent effect of taxes on investment is not necessarily surprising, given the dual layers of host and home taxation. The fact that Japanese investors face the worldwide system of taxation at home, rather than the territorial system, will presumably make them less sensitive to tax variations among states. When tax rates are higher at home than abroad, a reduction in state taxes may simply result in an equal sized increase in Japanese taxes that is due when after-tax profits are repatriated. In addition, if high taxes are correlated with greater government services, while worldwide taxation blunts Japanese sensitivity to state tax rates, then high taxes could even be associated with greater levels of investment. The limited sensitivity of Japanese investment to taxes exhibited in our study is consistent with Hines' (1993) empirical results that show that Japanese investment is less sensitive to interstate tax variations than is foreign investment from territorial taxation countries.

The estimate of the coefficient for the Japan office dummy variable remains insignificantly different from zero, indicating that states who used a Japan office to promote their state's positive features were no more successful in luring Japanese investments than were those states who did not set up an investment promotion office in Japan. Our result suggest that Japanese investors were well-informed regarding each state's characteristics, and that their perceptions were not swayed by promotional offices. The presence of FTZs continues to be significantly associated with investment increases. Moreover, state incentive policies to influence firms' input costs now

all enter as expected. Labor subsidies significantly increase the probability of receiving subsidies. Capital subsidies are also associated with greater investment but the relationship is not statistically significant. Finally, Table 3 shows that while the Japanese agglomeration coefficients are somewhat diminished in the presence of fixed effects, they remain quite significant.

Overall, our results indicate that state promotional efforts which lower the input costs of investors do provide a positive boost to investment. In particular, the provision of FTZs and labor subsidies raises investment significantly in all three specifications. The strong agglomeration we detect complements these state policies: Incentive programs that attract investment will be accompanied by additional investment in the future due to increased agglomeration. Finally, we find that the parameter estimates of variables specified in the baseline regression are sensitive to inclusion of agglomeration variables and state fixed effects, suggesting that the results of earlier empirical work on locational choice should be interpreted with caution.

VI Simulation Results

We turn to simulations to quantify the changes in the geographic distribution of the 751 Japanese investments that would have occurred if particular state incentive programs had been removed. The distribution of investment is first derived by calculating the probabilities that each investment will locate in each state under different realizations of the policy variables using Equation (1). The simulation is dynamic in that these probabilities depend on where the simulation predicts Japanese to locate in previous years. Thus, policies which raise current levels of Japanese investment raise the probability of subsequent investment through increased Japanese agglomeration.[18]

Two policy variables had a significant and robust statistical influence on the location choice

[18]The simulations treat U.S. industry counts as exogenous.

of Japanese investors—foreign trade zones and labor subsidies. We now consider in turn how each of these policies affected the distribution of investment. We then explore the consequences of wholesale elimination of promotional policies.

Table 4: The Proliferation of Foreign Trade Zones: Winners and Losers

Year	Number of States	Baseline (%)	Total Elimination (%)	Freeze in 1980 (%)
Pre-1981	23	77.8	76.4	87.7
1981	2	5.2	5.5	2.7
1983	6	15.4	16.2	8.6
1984	3	1.6	1.9	1

Explanation: Investment shares generated by dynamic simulation.

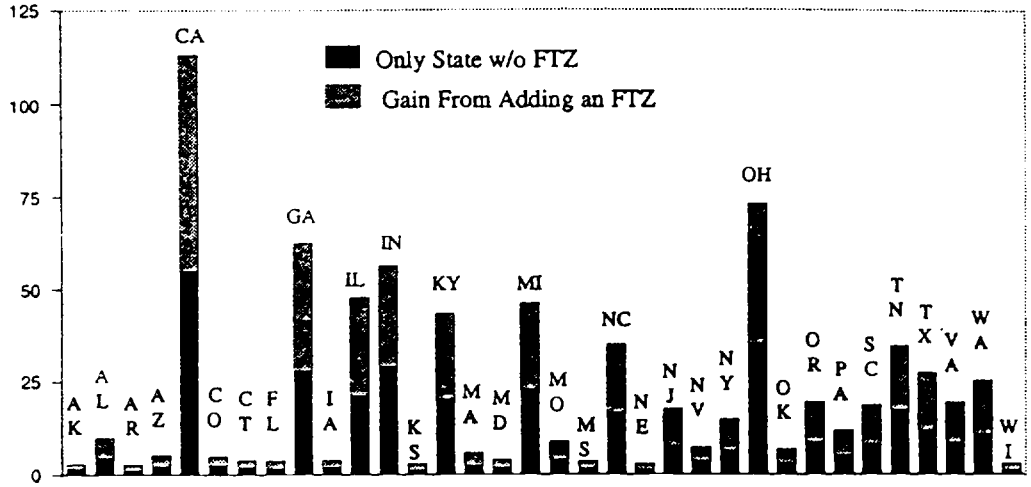
Table 4 groups states into four categories based on the year in which each state established its first general-purpose FTZ and describes each group's share of investment under different policy scenarios. All states in our sample eventually adopted FTZs. As shown in the table, 23 states in our sample had FTZs in 1980, with the remaining 11 implementing them according to the dates reported. The first column corresponds to the distribution of investment in a simulation where all policy variables are given their historic values, which we refer to as the baseline simulation.[19] The second column shows the distribution of investment that would have followed if all FTZs were eliminated in 1980. Comparing these shares to the baseline reveals that the system of FTZs had very little effect on the pattern of investment. Since all states had FTZs by 1984, at that time they were not a reason to prefer one state over another.

[19] We consider this approach to be superior to the alternative of using the actual distribution as the basis of comparison. While our estimated coefficients replicate the actual distribution of investment when we employ the historic values for all variables, it does not fit perfectly when the stock of Japanese agglomeration variables are predicted by the simulation. We do not want our policy effects confounded by deviations attributable to the lack of exact fit of the model to the data.

The third column measures the effect of a policy "freeze", where FTZs exist only for the 23 states that had them by 1980. The column reveals that these states' share of total investment increases from 77.8% in the baseline to 87.7%. This gain, of course, comes at the expense of the 11 states who do not introduce FTZs in this simulation. Their share of investment declines by about one-half. This experiment reveals that while FTZs had little effect on the total distribution, if states who did not offer FTZs in 1980 had not subsequently adopted them, they would have received much less Japanese investment in the following decade. This illustrates the prisoner's dilemma aspect of FTZ creation and is reinforced by results of additional simulations displayed in Figure 1. This simulation shows the number of investments each state receives in the baseline and how much each state would have received if it unilaterally eliminated FTZs throughout the sample period. The figure indicates that each state would have lost about 50% of its investment if it had not kept pace with competing states by providing foreign trade zones.

The next set of simulations considers labor subsidies. Unlike FTZs which eventually existed in all states, only 10 states adopted labor subsidies for some period during our sample. Table 5 displays the effects of unilateral removal of subsidy programs by each of these states. The first column lists the employment by Japanese plants in the baseline simulation where all states offered their historic set of subsidies. The second column indicates the employment that would have been lost had each state unilaterally removed its subsidy. The states are ordered according to the ratio of employment changes over baseline employment. The table reveals that these programs had strong effects on investment in certain states. Two-thirds of the employment received by Indiana and Iowa, both of whom implemented jobs creation credits that paid up to 10% of the first year wage bill in new plants, is attributable to the programs. For other states the results are less dramatic because they offered small subsidies, often a small nominal inducement for each job created.

Figure 1: Consequences of Unilateral Removal of Foreign Trade Zone*



*: The combined stack shows the number of investments each state receives in the baseline simulation designed to replicate historical policy. The solid bar reports the number of investments each state receives in the simulation where it alone eliminates the FTZ.

The third column shows the additional employment attributable the the labour subsidies per job paid for by the state, which we call the impact. The numerator of this statistic is column 2, the employment increase attributable to the subsidy. The denominator multiplies the subsidy rate by column 1, the estimated number of employees in the baseline simulation, to yield a measure of the total number of employees in Japanese plants that were paid for through the subsidy program. The impact statistic ranges from 7 to 12. Thus, on average, for every one employee paid for entirely by a state, employment in Japanese plants increased by 10. While states that offered lower subsidies received the greatest increase in Japanese employment per job paid for by the state, these states generated relatively few jobs through these programs.

Finally, we consider the overall impact of promotional policies of states. While FTZ programs largely offset each other in the simulations, states simultaneously pursued a number of other

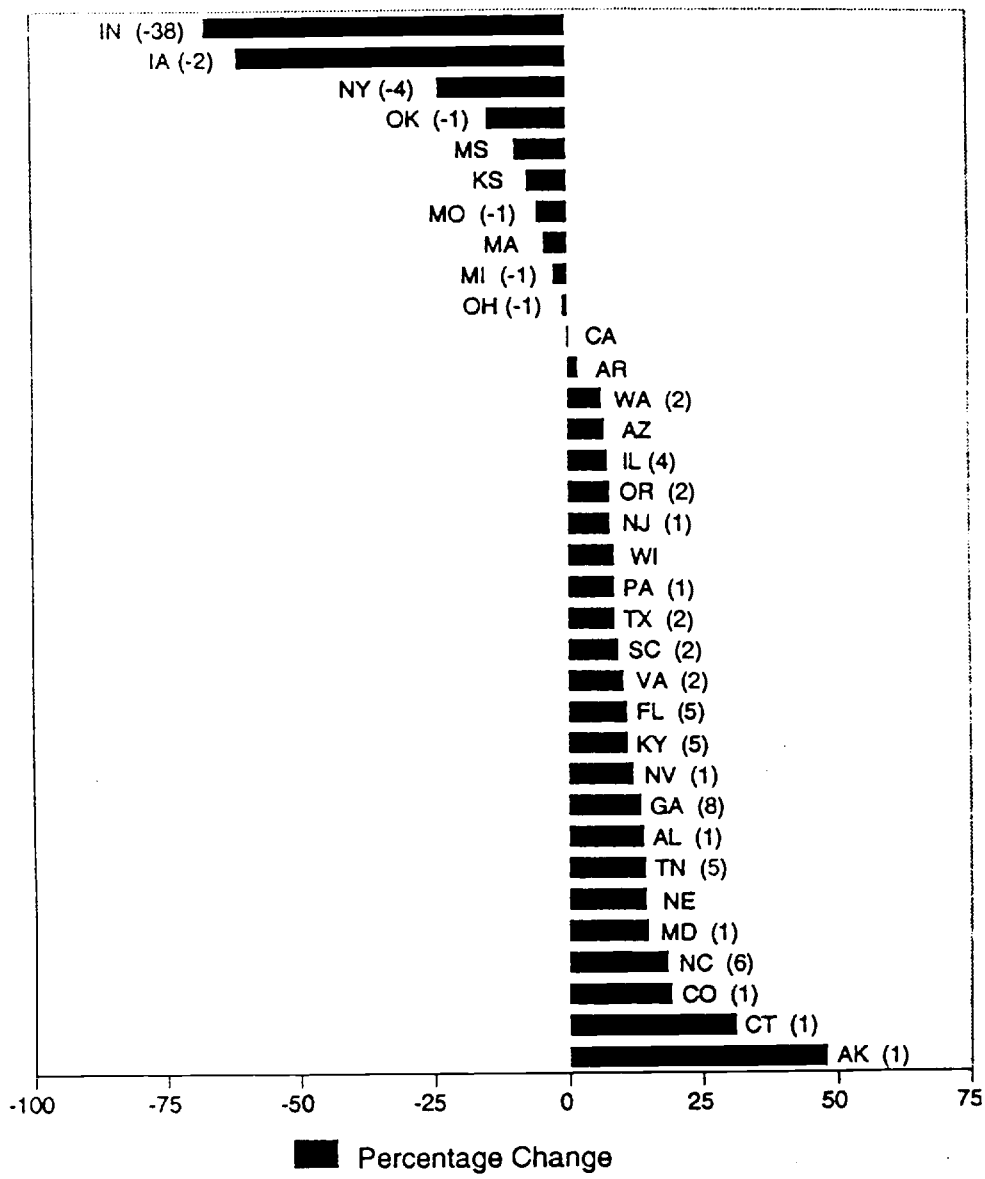
Table 5: The Impact of Unilateral Removal of Labor Subsidies on State Employment

State	Baseline Employment	Employment Losses	Impact*
Iowa	544	384	7
Indiana	8223	5800	8
California	26243	6279	10
Mississippi	442	83	7
New York	1878	189	9
Missouri	1221	67	12
Oklahoma	741	34	11
Kansas	345	14	11
Colorado	725	20	12
Illinois	6636	119	10

*: Employment attributable to subsidies per job subsidized, see explanation in text.

incentive programs. Did state efforts offset each other through their combined labor and capital subsidies, foreign trade zones and taxes? To examine this question, Figure 2 compares the number of Japanese plants predicted in baseline simulation to those predicted by a simulation where no states offered FTZs, labor subsidies, capital subsidies, or unitary taxation. We refer to the latter simulation as the cooperative scenario. The bars show the percentage change in the number of plants from the baseline case to the cooperative case while the numbers in parenthesis represent the difference in absolute numbers of plants. With the exception of Indiana, the numbers do not appear to be large. Indiana loses a large number of plants under cooperation primarily because they lose the benefits of their larger than average labor subsidy. For the same reason Iowa loses under cooperation, but their losses are more moderate since they only netted four investment in the baseline case. It appears that, with the exception of Indiana's labor subsidy, incentive programs either offset one another or otherwise had little impact on the distribution of Japanese investment.

Figure 2: Quantifying the Individual Gains from Cooperation Between State Governments*



*: Absolute change in the number of investments is shown in parenthesis if the simulation predicts gain or loss of at least 0.5 investments.

VII Conclusions

Agglomeration theory argues that investment in related activities is self-reinforcing. Locations which receive initial investment gain a subsequent advantage. The theory does not predict where the initial investors will locate. The possibility that tax breaks and investment subsidies might shift the starting point and enable future dynamic gains could motivate states to try to influence the location decisions of new investors. Our results suggest that state promotion efforts significantly affected the location decisions of Japanese manufacturers. We find that states are more likely to attract investment if they have at least one general purpose foreign trade zone in their boundaries and that state subsidies for labor also appear to sharply increase the probability that a state will lure in new investments. Our simulations showed that if any state had unilaterally eliminated its FTZs it would have lost approximately half its Japanese investments. Unilateral removal of labor subsidies would have had a drastic effect on the few states which offered substantial rewards tied to employment creation.

However, partly because of the proliferation of offsetting programs, the overall impact of investment promotion by state governments appears fairly small. For example, by the middle of the 1980's almost all states had at least one foreign trade zone, diminishing the advantage of one state over the others. Given the history of the FTZs, we would expect that an expansion of labor subsidy programs by other states would undercut the effectiveness of any one state's programs.

The picture which emerges from the simulations is that unilateral promotional effort can yield a state large numbers of foreign manufacturing plants, but due to widespread emulation by other states, the aggregate pattern of investment remains virtually unaltered. This suggests the potential for states to reach a pareto-superior outcome if they could bind themselves not to offer investment inducements. Recall, however, that our simulations predict the distribution of

Japanese investment while holding the total amount of investment constant. State promotion policies may have raised aggregate foreign direct investment in the U.S.. The examination of this issue and the related welfare consequences are important topics for future research.

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Data Sources

Japanese manufacturing establishments are recorded in the Japan Economic Institute 1990 Updated Survey. State income, the corporate tax rate, wages, union membership, and unemployment rates were collected from the 1982, 1986 and 1991 editions of the State and Metropolitan Data Book. Each Japanese investment is matched to the data that corresponds most closely to the year the plant began operations. Japanese ventures beginning between 1980 and 1983 were connected to the 1982 data, ventures completed between 1984 and 1988 were attached to the 1986 data, and the remaining ventures were linked to the 1991 data. Data on the unitary tax were collected from Tannenwald (1984) and from the Wall Street Journal and New York Times. Manufacturing value added per production worker and manufacturing establishment counts in the United States are calculated from the 1982 and 1987 Census of Manufacturing. Investments completed from 1980-1984 are matched to 1982 Census data while later investments are matched to the 1987 Census data. Data on foreign trade zones is collected from the Foreign Trade Zones Board at the U.S. Department of Commerce.

The Japan investment promotion office data and Labor and capital subsidy program information were gathered from the Directory of Incentives for Business Investment and Development in the United States, which is assembled by the National Association of State Development Agencies (NASDA). NASDA published volumes in 1983, 1986 and 1991. The program data were attached to the data set in the same fashion as the data from the State and Metropolitan Data Book. The 2-digit industry wage data required to translate lump-sum labor subsidies to rates were extracted from the Current Population Survey. We computed *keiretsu* counts based on affiliations found in Kigyo Keiretsu Soran, a publication the Toyo Keizai company.

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