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STATE GOVERNMENT EFFECTS ON THE LOCATION OF FOREIGN DIRECT INVESTMENT

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Introduction

Two topics that have generated much economic and political controversy in recent years are the effects of taxes and the increasing foreign ownership of assets in the United States.[1] At the level of individual states, the present study explores one aspect where these topics overlap: the impact of taxes and incentive programs on the location throughout the United States of manufacturing foreign direct investment.

The effect of taxes on business location decisions is an unsettled question.[2] The continued use of tax and fiscal inducements suggests that policy makers believe that taxes can affect business location, but recent econometric evidence is mixed. For example, Carlton [6] concludes that taxes and state incentive programs do not have major effects on the location of new branch plants across standard metropolitan statistical areas. On the other hand, Bartik [3] finds that state taxes deter the location of new branch plants at the state level.[3]

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[1]See Ott [15] for a review of the controversy of the transformation of the United States from a creditor to a debtor nation and the economic implications of the increasing foreign ownership of assets in the United States.

[2]This conclusion was reached in a recent literature review by Newman and Sullivan [13]. In an earlier review of the literature, Wasylenko [22] concludes that taxes have little effect on interregional business location decisions.

[3]Recent studies by Steinnes [17], Helms [10], Wasylenko and McGuire [23], and Benson and Johnson [4] examine the effect of fiscal policy at the state and local level on economic growth. A standard criticism of studies that conclude taxes do not matter is that because they are cross-section studies they are unable to estimate the impact of a tax change on a particular region over time. The aforementioned studies address this criticism and, excluding Steinnes, conclude that taxes deter growth.

The effect of taxes and incentive programs on the location of manufacturing foreign direct investment also must be viewed as an unsettled question. The stock of foreign direct investment in U.S. manufacturing increased from $11.4 billion in 1975 to $91.0 billion in 1987.[4] Hartman [9] demonstrates theoretically and empirically that federal tax policy has a substantial effect on foreign direct investment in the United States. To date, only Luger and Shetty [11], Glickman and Woodward [8], and Coughlin *et al.* [7] have provided econometric evidence concerning state government effects on the location of foreign direct investment.[5]

Coughlin *et al.* finds that state government actions have influenced the distribution of foreign direct investment. Specifically, the general level of taxation and the use of unitary taxation deter foreign direct investment, while there is a positive association between foreign direct investment and promotion expenditures by state governments. The basic model, whose complete derivation is found in Coughlin *et al.*, is used as a foundation for the present research. Additional tax and incentive variables are examined in a systematic manner in an attempt to produce a generalization concerning the impact of taxes and fiscal incentives on the location of foreign direct investment.

Summary of the Model

A conditional logit model is used to examine statistically the potential determinants of the frequency distribution of manufacturing foreign direct investment transactions across the 50 states for 1981.[6]

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[4]The figure for 1975 was taken from *Selected Data on Foreign Direct Investment in the United States, 1950-79* and is based on 1974 benchmark data. The figure for 1987 was taken from an article in the *Survey of Current Business*, "Foreign Direct Investment in the United States: Detail for Position and Balance of Payments Flows, 1987," and is based on 1980 benchmark data. The estimates are sensitive to the benchmarks, but for present purposes the figures are not so sensitive as to raise doubts about the rapid increase in foreign direct investment in the United States.

[5]Despite the increasing importance of foreign direct investment for economic development at the state level, literature reviews by Ó hUallacháin [14] and Arpan *et al.* [2] reveal that there has been virtually no economic analysis of the spatial distribution of foreign direct investment across all states.

[6]The Department of Commerce [21] defines foreign direct investment as the direct or indirect ownership by a foreign entity of 10 percent or more of the voting securities of an incorporated business enterprise or an equivalent interest in an unincorporated business enterprise. A foreign direct investment transaction in manufacturing could involve an acquisition, a merger, an equity increase, a joint venture, a new plant, or a plant extension. In 1981 there were 274

It is assumed that a foreign firm will choose to invest in a particular state if, and only if, doing so will maximize profit. Formally, the j^{th} state is chosen by the i^{th} firm if and only if

$$(1) \qquad \Pi^*_{ij} = \max (\Pi^*_{im}; m = 1, \ldots, 50)$$

where Π^*_{ij} denotes the profit of the i^{th} firm given that it locates in the j^{th} state ($j = 1, \ldots, 50$).

Following Carlton [6], it is assumed that

$$(2) \qquad \Pi_{ij} = C + X_j\beta + \varepsilon_{ij}$$

where

Π_{ij} = $\ln \Pi^*_{ij}/\theta$;
C = an unknown constant;
X_j = $[\ln X^*_{j1}, \ldots, \ln X^*_{jk}]$;
X^*_j = $[X^*_{j1}, \ldots, X^*_{jk}]$ = a vector of observable characteristics for the j^{th} state;
β = a vector of unknown coefficients to be estimated;
ε_{ij} = the random term denoting the unobservable (by the researcher) unique profit advantages to the i^{th} firm from locating in the j^{th} state; and
θ = the exponent of the random term in the untransformed version of the profit function. (See Carlton [6, p. 441].)

Assuming that the ε_{ij}'s are independent log-Weibull distributed, McFadden [12] shows that

$$(3) \qquad P_j = \exp(X_j\beta) / \sum_{k=1}^{50} \exp (X_k\beta)$$

where P_j denotes the population relative frequency of locating in state j.[7] From equation (3) it follows that

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manufacturing foreign direct investment transactions in the U.S. A more recent year could have been chosen, but the data on state expenditures to attract foreign direct investment are not as complete for recent years and unitary taxation has become less frequent in recent years.

[7]Estimates of the vector of unknown coefficients, β, may be generated using maximum likelihood; however, as discussed in Coughlin *et al.* [7], the minimum chi-square estimator was developed for two reasons. First, the sample is small and the maximum likelihood estimation bias in small samples may be substantial. Second, as the number of states having no investment increases, the performance of maximum likelihood relative to minimum chi-square estimation in terms of mean square error diminishes. In the sample year, 1981, 20 percent of the states had no foreign direct investment.

(4) $\ln(P_j/P_1) = Z_j\beta$

where $Z_j = X_j - X_1$.

Because P_j, the population relative frequency, cannot be observed, equation (4) is made operational by replacing P_j with p_j, the observed investment frequencies for the 50 states for a particular year. This substitution, however, brings the possibility that the left side of equation (4) will be undefined, as some states may be observed with zero investment frequencies. One way to correct this problem is by substituting some arbitrarily small constant for the null observed frequencies. It is shown in Coughlin *et al.* [7] that the theoretically correct value is 1/2n and that

(5) $\ln[(p_j + (1/2n))/(p_1 + (1/2n))] = \ln[p_j/p_1] + e_j = Z_j\beta + e_j \qquad (j = 1, \ldots, 49)$

where

n = the total number of observed investments in the sample; and
e_j = the stochastic term such that $E[e_j] = 0$ except for terms of order smaller than n^{-1} in probability.

Rewriting equation (5) in matrix notation yields

(6) $y = Z\beta + e$

where

y = 49 x 1 vector whose j^{th} element is the logarithm of the adjusted odds ratio as expressed on the left side of equation (5);
Z = 49 x K matrix whose j^{th} row is Z_j; and
e = 49 x 1 vector whose j^{th} element is e_j.

To exploit efficiency gains, the following minimum chi-square estimator, $\tilde{\beta}$, is applied to equation (6)

(7) $\tilde{\beta} = (Z'\hat{\Omega}^{-1} Z)^{-1} Z'\hat{\Omega}^{-1} y$

where

$\hat{\Omega}$ = a matrix containing estimates of the elements of the covariance matrix of e.

$\tilde{\beta}$ is consistent and asymptotically normal with covariance matrix $(Z'\hat{\Omega}^{-1} Z)^{-1}$. Furthermore, $(Z'\hat{\Omega}^{-1} Z)^{-1}$ is a consistent estimator for $(Z'\Omega^{-1}Z)^{-1}$.

Previous Results and Additional Tax and Incentive Variables

The probability of selecting a specific state for a foreign direct investment transaction depends on the levels of its characteristics that affect profits relative to the levels of these characteristics in other states. In addition, the probability of a manufacturing foreign direct investment transaction in a state depends on the number of potential sites for locating the investment. Coughlin *et al.* [7] identifies a number of statistically significant determinants of the number of foreign direct investments by state. Aside from taxes, six determinants were the number of potential sites (LAND), state per capita income (PINC), manufacturing density (MANL), average state wage of production workers in manufacturing (WAGE), state unemployment rate (UNEM), and state promotional expenditures to attract foreign direct investment (PROM). The definitions of these and other variables used in the present study are provided in Table 1.

Empirical results associated with the six variables are listed at the beginning of Table 2. The results are consistent with expectations. The proxy for the number of sites, per capita income, manufacturing density, unemployment, and promotional expenditures are positive, statistically significant determinants of the location of foreign direct investment, while the wage rate is a negative, statistically significant determinant of the location of foreign direct investment.

Given the preceding determinants, seven tax and three incentive variables are examined to see if there is any evidence that state tax and incentive policies affect the location decisions of foreign investors. In other words, is there any systematic evidence that taxes deter foreign direct investments or that state incentives attract foreign direct investments?

The measurement of state tax burdens is complex. Identifying the incidence of a tax, the possibility that taxes are financing goods and services desired by business, and the use of tax incentives complicate the assessment of whether taxes affect business location decisions. Several tax measures are examined. Two standard measures are state and local taxes per capita (PTAX) and state and local taxes as a percentage of personal income (TAXSPI). Future tax liabilities also may be a deterrent. State long-term debt per capita (PDEBT) is used as a proxy for future tax liabilities.

In addition to the preceding general measures of state tax burdens, two dummy variables to measure taxes related directly to business are examined. The first is the existence of a state corporate income tax (TCORP). The second business tax measure pertains to a tax issue associated with foreign direct investment. The use of unitary taxation (TUNIT) has generated numerous objections from multinational corporations (Tannenwald, [18]). A state using unitary taxation taxes a fraction of a multinational corporation's worldwide income rather than the income earned in the state. Multinational corporations have objected to unitary taxation on the grounds that they are subject to double taxation and are forced to bear additional accounting costs. On the other hand, state tax officials argue that unitary taxation is the only method that prevents multinational corporations from reallocating profits from high tax areas to low tax areas via transfer pricing.

Empirical evidence on the effects of unitary taxation on the location of foreign direct investment is limited to Glickman and Woodward [8] and Coughlin *et al.* [7] The former finds that states with unitary taxation experience relatively lower employment growth of firm-owned firms, while the latter finds that states using unitary taxation have relatively smaller numbers of foreign direct investments.

In addition to the tax variables, the impacts of three incentive variables are examined. Comprehensive information on the use of investment incentives to attract foreign direct investment is limited A survey by Berry and Mussen (1980) generated useful data on whether particular states used various incentives to attract foreign direct investment in 1980. The survey revealed the use of numerous programs and services that could be characterized as incentives. In the present study, the impacts of tax incentives (TAXASS), financial assistance (FINASS), and employment assistance (EMPASS) are examined. Tax incentives (e.g., property tax reductions) were used by 17 states, financial assistance (e.g., low interest loans) was provided by 23 states, and employment assistance (e.g., training and recruitment of employees) was available in 38 states. Due to the difficulty of quantifying these incentives, a dummy variable is used for each type of incentive.

The only previous econometric evidence on the role of incentives in attracting foreign direct investment is found in Luger and Shetty [11]. Using an efforts index to summarize the various state programs to encourage foreign direct investment for three industries, the authors find a positive, but not always statistically significant, relationship between their index and foreign direct investment.[8]

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[8]Survey evidence cited by Arpan [1] suggests that foreign investors are influenced by special incentives to a much smaller extent than by the characteristics of the labor force (e.g., wage rates,

Results

The results using the tax and incentive variables are summarized in Table 2. To avoid repetition and conserve space, the results concerning the number of potential sites, per capita income, wage rates, unemployment rates, promotion expenditures, and energy costs are listed only one time.[9] It is sufficient to note that the signs of the estimated coefficients remain unchanged across all variants and that the statistical significance generally is unaffected.

The reported regressions can be divided into two groups for discussion purposes. Variants #1 through #7 show the results of appending the tax variables to what may be called the basic model. Variant #1 reveals that per capita state and local taxes is a negative, statistically significant determinant of the location of foreign direct investment. An identical comment, although the result is not reported, is appropriate when taxation as a percentage of personal income is used as the measure of state tax burden. Variant #2 shows a surprising result. Per capita state long-term debt, a proxy for future tax liabilities, is a positive, statistically significant determinant. Variants #3 and #4 reveal that the tax measures related directly to business taxation perform as expected. Variant #3 shows that the existence of a corporate income tax deters foreign direct investment in a state, while variant #4 shows a similar result for unitary taxation.

Variants #5 through #7 explored the possibility that different taxes could have separate deterrent effects. In variant #5, per capita state and local taxes is no longer statistically significant when the dummy variable for unitary taxation is included. Separable effects, however, were found for per capita state and local taxes and the existence of a corporate income tax in variant #6 and for the existence of a corporate income tax and the use of unitary taxation in variant #7.

The second group of reported models, variants #8 through #10, highlight the results of appending each of the three incentive variables, along with per capita state and local taxes, to the basic model. None of the incentive variables are statistically significant, and the dummy variable for financial assistance in variant #9 is negatively signed. To explore this issue further, other regressions were run. First, the incentive variables were appended to the basic model. Second, the incentive variables were appended to the corporate income tax variable.

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availability, skill levels), the transportation infrastructure, and energy costs.

[9]Complete results are available upon request from Coughlin.

Both sets of regressions yielded results for the incentive variables identical to the reported results.[10]

Conclusion

The effect of taxes and incentive programs on the location of foreign direct investment remains an unsettled issue; however, the present analysis provides some noteworthy findings. For 1981, it is clear that taxes, measured in various ways, have negative effects on the location of foreign direct investment. Second, states providing tax incentives, financial assistance, and employment assistance did not receive larger numbers of foreign direct investments. Admittedly, the use of dummy variables for these incentive variables is far from ideal and could have affected the results. The fact that the analysis is restricted to one year is another reason that the results should be viewed with caution.

In conjunction with the previous finding that state promotional expenditures to attract foreign direct investment were related positively to foreign direct investment, the current findings suggest that state government fiscal policies can have a significant impact on the location of foreign direct investment. These findings can be used as the foundation to explore the many issues surrounding state government and foreign direct investment. A possible reason for the frequent finding that taxes have little effect on interregional business location decisions is that the taxes are financing the provision of goods and services valued by business. In view of the statistical significance of the tax variables, the current study reveals the deterrent effects of taxes without controlling for public expenditures (other than the promotional expenditures). Nonetheless, future studies could control for different types of public expenditures.[11] There are also numerous efficiency questions arising from the involvement by state

[10] In some preliminary estimations, the incentive variables were found to be positive, statistically significant determinants of the spatial distribution of foreign direct investment. If the basic model is altered by replacing manufacturing density with a proxy for energy costs, then the incentive variables are positive, statistically significant determinants.

[11] Bartik [3] shows that improved public services can affect business location decisions. A related finding by Helms [10] is that increases in state and local taxes to fund transfer payments retard state economic growth; however, when the revenues are used to finance public services, the positive growth effects of these public services may more than offset the disincentive effects of the increased taxes. The finding that taxes, to the extent they are redistributive, deter economic growth also has been demonstrated by Romans and Sabrahmanyan [16]. Wasylenko and McGuire [23] also find that increased spending on a public service such as education can mitigate the adverse growth consequences of higher taxes.

governments. In addition, there are numerous questions concerning the impacts of these fiscal policies upon different industries and source countries.

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Table 1
Definitions and Expected Impacts of Independent Variables

LAND	- natural logarithm of 1981 state land area excluding federal land (+)
PINC	- natural logarithm of 1981 state per capita income (+)
MANL	- natural logarithm of 1981 state manufacturing employment per square mile of state land excluding federal land (+)
WAGE	- natural logarithm of 1981 average state wage of production workers in manufacturing (-)
UNEM	- natural logarithm of 1981 state unemployment rate (+)
PROM	- natural logarithm of 1980 state expenditures on reverse-investment promotion (+)
PTAX	- natural logarithm of 1981 state and local taxes per capita (-)
TAXSPI	- natural logarithm of 1981 state and local taxes as a percentage of state personal income (-)
PDEBT	- natural logarithm of 1981 state long-term debt per capita (-)
TCORP	- dummy variable equal to one if a state has a corporate income tax in 1981 and zero otherwise (-)
TUNIT	- dummy variable equal to one if a state has total worldwide combination unitary taxation in 1981 and zero otherwise (-)
TAXASS	- dummy variable equal to one if a state provides tax incentives for foreign direct investment in 1980 and zero otherwise (+)
FINASS	- dummy variable equal to one if a state provides financial assistance for foreign direct investment in 1980 and zero otherwise (+)
EMPASS	- dummy variable equal to one if a single state provides employment assistance for foreign direct investment in 1980 and zero otherwise (+)

Table 2
Minimum Chi-Square Estimates

Independent Variables	LAND	PINC	MANL	WAGE	UNEM	PROM	R^2_{ADJ}
Coefficient Estimates	0.604[a]	8.280[a]	0.218[a]	-8.693[a]	1.974[a]	0.135[a]	0.59
(t-ratios)	(8.02)	(10.73)	(4.81)	(-5.88)	(5.93)	(3.84)	

Table 2 (continued)
Minimum Chi-Square Estimates

Variant	Independent Variables	Coefficient Estimates (t-ratios)	R^2_{ADJ}
#1	PTAX	-0.697[a] (2.66)	0.62
#2	PDEBT	0.364[a] (3.49)	0.61
#3	TCORP	-1.131[a] (-4.20)	0.63
#4	TUNIT	-0.992[a] (-4.03)	0.66
#5	PTAX	0.101 (0.33)	0.65
	TUNIT	-1.025[a] (-3.65)	
#6	PTAX	-0.628[b] (-2.33)	0.64
	TCORP	-1.026[a] (-3.74)	
#7	TCORP	-0.797[a] (-2.83)	0.67
	TUNIT	-0.842[a] (-3.29)	
#8	PTAX	-0.685[b] (-2.60)	0.61
	TAXASS	0.032 (0.27)	
#9	PTAX	-0.708[a] (-2.62)	0.61
	FINASS	-0.048 (-0.30)	
#10	PTAX	-0.683[a] (-2.63)	0.59
	EMPASS	0.283 (1.02)	

a statistically significant at the .01 level (two sided)
b statistically significant at the .05 level (two sided)