Incentives, Agglomeration and the Location of Greenfield Foreign Investment

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Abstract

This study examines the location of manufacturing foreign direct investment (FDI) in the United States, focusing on taxes and incentives relative to agglomeration as determinants. Using a panel Poisson regression with random effects, we model the probability of site selection in U.S. states and counties. The results reveal that localization and urban agglomeration economies clearly exert the most influence on FDI location. The localization estimate, as captured by the number of domestic manufacturing establishments, has an elasticity of 0.92. Urbanization economies, measured by the area's wage premium, have an elasticity of 1.31. Among taxes and incentives, the investment tax credit (as a share of value added) is statistically significant, with an elasticity of 1.56. Further analysis reveals that this incentive is only significant in counties that rank in the highest quartile of existing manufacturing agglomeration. In areas falling in the lowest quartile of agglomeration, our estimates indicate that job training subsidies may attract FDI location. The property tax, the job creation tax credit, and research and development tax credit have no measurable effect on the location decisions of foreign manufacturers. In addition, the distance from the foreign-owned plant to a major airport, often overlooked as a determinant in location studies, appears to be attractive.

JEL Codes: R3, H25, H32

Keywords: foreign direct investment, greenfield plant location, economic development incentives, business subsidies and taxes, manufacturing agglomeration, Poisson model

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1 Introduction

Revitalizing U.S. manufacturing remains a paramount policy goal for national and regional economic development. The outsourcing of manufacturing investment and import dependence for many products are ongoing concerns, with scholarly research uncovering adverse impacts across U.S. regions (Autor, Dorn, and Hanson 2016). In contrast, inward foreign direct investment (FDI) augments U.S. factory employment and the manufacturing capital stock. The United States consistently attracts large FDI inflows. Among all industry sectors, manufacturing attracts the highest share of inward FDI, accounting for more than 40 percent of total U.S. FDI stock (Organization for International Investment 2018).

Attempting to steer new manufacturing investment into particular regions, many state and local governments offer favorable tax breaks and incentives. This paper examines the potential effect of these policies on FDI greenfield (new plant) manufacturing location decisions. Greenfield investment requires an explicit location choice, while other types of FDI such as mergers and acquisitions do not. Regional policy makers target greenfield FDI because of perceived benefits for host economies, notably the prospect of boosting high-wage employment in new, traded (exported) manufactured products. Controlling for industry and location, previous research estimates that wages for foreign enterprises are 25 percent higher than average wages for domestic firms (Setzler and Tintelnot 2021). This high-wage employment may justify incentives. Given perceived high wages and large employment multiplier effects, state and local incentives are often tailored to attract manufacturing (Bartik 2017).

Even so, incentives and taxes programs remain highly controversial. States and localities compete aggressively in efforts to draw in new capital investment and expand the employment base (Zhuang 2016). In the regional development literature, incentives are generally seen as distorting market decisions and are largely considered to be wasteful (Bartik 2017). Yet, across the United States regional development incentives policies show no sign of abating.

In the regional development literature, a major issue is answering the "but for" or "without" question: That is, without incentives would firms make the same location choice? In a study of U.S. states, Bartik (2019) concludes that incentives do not make any difference in approximately 75 percent of site selection or plant expansion decisions. Yet he finds that in up to 25 percent of the cases they could possibly tilt investment outcomes toward states with strong incentive programs.

Our paper's objective is to provide new evidence pertinent to answering the "but for/without" question. Having obtained establishment-level FDI data, we delve deeper into understanding the kinds of incentives, if any, that may be influential in location decisions and under what regional economic conditions. We investigate whether incentives and taxes have any influence beyond agglomeration, which is well-established

as the fundamental determinant of manufacturing location. We focus on the U.S. regions where there is the greatest intensity of manufacturing agglomeration and fierce incentive competition among states: the Midwest/Great Lakes and Southeast. According to the Institute for Competitiveness (2020), Indiana has the highest share of manufacturing employment, followed by Wisconsin and Michigan. In the Southeast, Alabama leads as the state with the highest share of manufacturing employment, followed by Kentucky and South Carolina.

Our research utilizes two unique databases to identify manufacturing FDI location and test the efficacy of regional incentives: *fDi Markets* and the Bartik Panel Database. The *fDi Markets* database, maintained by the *Financial Times*, tracks cross-border greenfield investment. It identifies the establishment location of foreign investment by industry. The Bartik Panel Database has state-level incentive and tax data (as a proportion of value-added) available for both the traditional Midwestern "industrial heartland" and the ascending Southern states that have attracted a large share of recent FDI. The data provide measures for a variety of regional incentives and tax breaks offered to manufacturing firms (Bartik 2017). These data enable us to isolate the importance of incentives relative to agglomeration and other fundamental location factors.

We estimate a panel Poisson model with random effects to evaluate the state and county-level determinants of foreign manufacturing investment. Confirming previous research, our results reveal that agglomeration is the most robust, statistically significant factor (at the one percent level) in the manufacturing location decision. Urban agglomeration, as captured by the wage premium, has an elasticity of 1.32 percent. Local industry agglomeration (localization), as modeled by the number of domestic manufacturing establishments, has an elasticity of 0.92 percent.

In addition, we find that some incentives may matter. We only accept incentive estimates as reliable if they exhibit the degree of statistical significance as we find for agglomeration (the one percent level). Among the incentives and taxes considered, our analysis reveals that state investment tax credits may potentially influence the location decision. A one percent increase in the investment tax credit as a percentage of the value added increases the expected number of FDI projects by 1.56 percent. The investment tax credit, however, only seems to exert an influence in counties that already rank in the highest quartile of manufacturing agglomeration. Other taxes and incentives have no measurable effect on the location decision of firms: the sales and property tax, the job creation tax credit, and the research and development tax credit. Customized job training subsidies, however, are statistically significant in areas falling in the lowest quartile of manufacturing agglomeration. In low-agglomeration regions, the distance of the establishment from an airport is also found to be a factor that influences the location decision.

These findings have implications for state and local development policy. If the development objective is

to offer an additional financial advantage not available in competitor states that have similar agglomeration, then investment tax credits may work at the margin. In others words, our results are consistent with the view that without this incentive, FDI site selection decisions may not have been favorable to the government's objective to boost local manufacturing investment and employment. In the quartile of areas that have strong agglomeration, the investment tax credit offers a inducement that lowers startup costs compared with competing out-of-state concentrations of manufacturing activity. Investment tax credits represent approximately seven percent of state incentives according to Bartik (2019). Yet if the policy objective is to stimulate investment in areas that have weak existing agglomeration, then incentives may not matter. The exception is that in regions with a legacy of low manufacturing agglomeration, then subsidized labor training may be effective. This finding falls in line with previous work pointing to the positive effects on economic development as a result of customized job training and other government-sponsored business services (Bartik 2017). Moreover, it appears that investors favor low-agglomeration regions if they offer accessibility to major airports, which are found in urban areas. Thus, incentives may not attract foreign investors to more isolated rural areas, which lack both agglomeration and crucial transport linkages.

The rest of the paper is organized in the following manner. Section 2 reviews the agglomeration and recent economic development incentive literature. In Section 3, we explain the Poisson regression model, while section 4 describes the data that underlie the model's estimates. Sections 5 and 6 put forth the state and county hypotheses that are tested in the model and Section 7 presents the main results. Section 8 introduces some possible extensions of the model. Finally, Section 9 concludes.

2 Literature Review

Countering the widely held belief that manufacturing is moribund, foreign manufacturing firms continually invest in the United States. Unlike many areas of the world, the United States offers a large, relatively stable, and growing market. In making a final location decision within the country, foreign firms must choose among regions with varying competitive advantages for profitable production. Firms and their site selection consultants screen for profit-maximizing local characteristics such as agglomeration and development incentives (Woodward 2012). Agglomeration is central to the location decision of firms, as has been extensively studied and confirmed in the regional science literature.

2.1 Agglomeration

Agglomeration refers to the spatial concentration of firms and workers beyond what would be expected in a given area based on its size and overall level of economic activity. Regions with high agglomeration

benefit from positive externalities stemming from the close proximity to other firms. The spatial clustering of manufacturing allows for productivity gains through knowledge transfer and supplier specialization. Additionally, it has been recognized that industrial clusters may also create large centralized labor pools that allow for better matching of workers to employers (Newman and Tarp 2012). Most studies have found positive effects of manufacturing agglomeration on firm location decisions. Research across many different fields, including labor economics, industrial organization, international business, and economic history have shown that industrial clusters raise worker productivity. Additional positive externalities include increasing returns to scale which allow firms and workers to generate more output with the same amount of inputs. These benefits of agglomeration typically offset the cost of congestion, pollution, and other negative externalities that may occur through regional agglomeration (Henderson 1974). The regional science and urban economics literature defines agglomeration in two ways, industry localization and urbanization economies.

2.1.1 Establishments and Localization Economies

Localization economies are positive externalities for firms locating within a cluster of local business establishments in a particular industry. Overwhelmingly, previous studies find positive and significant effects of industry-specific agglomeration economies on location. Industry agglomeration is solidly grounded in theory and ranks most enduring facts in regional science.

Localization is consistently found to be a location determinant of location of foreign investment. In an early study examining the determinants of manufacturing foreign direct investment in the U.S. (FDIUS), Coughlin, Terza, and Arromdee (1991) find that the primary force driving the location decisions of FDIUS in state-level manufacturing is agglomeration. Later studies examining Japanese FDIUS confirm these findings. Woodward (1992) implements a conditional logit model to estimate the probability of site selection at both the state and county level. Once a particular state is chosen, Japanese investors are drawn by existing manufacturing agglomerations as well as more educated and productive local labor force. Head, Ries, and Swenson (1995) also examine the location decisions of Japanese manufacturing firms in the United States, highlighting the effect of agglomeration economies on the location decision. They test several agglomeration variables including local manufacturing clusters of domestic and Japanese establishments as well as clusters of manufacturing establishments in bordering states. They find that a 10 percent increase in any of the agglomeration variables tested increases the probability of Japanese investment by 5 to 7 percent, even after controlling for state specific effects, state time trends, and industry-level stocks and flows of domestic investment. Their results, however, also show that for Japanese investors, an agglomeration of Japanese manufacturing activity outweighs the importance of domestic manufacturing agglomeration. In another study of Japanese manufacturing location decisions, Smith and Florida (1994) test the impact of several

measures of agglomeration along with other location characteristics. They explore the idea that many Japanese investors cluster in certain areas to take advantage of "just-in-time" production, a business practice aimed at promoting efficiencies related to transportation costs. The authors test the effect of distance to the nearest Japanese automotive assembly plant, as well as the number of "Big Three" domestic automotive assemblers within 250 miles of a given county. As in previous research, they also test the manufacturing density as measured by the percentage of a county's labor force employed in manufacturing. They find strong evidence of the importance of agglomeration economies across all models tested. Beyond Japanese investment, studies that examine FDIUS find similar effects. Zhuang (2014) and Zhuang (2016) examine the location decisions of greenfield FDIUS. Zhuang (2014) analyzes the location decisions of foreign manufacturers at the state level. Again, the paper finds that manufacturing FDIUS is attracted to areas with a higher density of manufacturing establishments. Zhuang (2016) analyzes the location decisions of all greenfield FDI at the metropolitan statistical area (MSA) level. The results also suggest that new investment is attracted to areas with a high share of manufacturing activity.

Apart from FDI, the importance of agglomeration is well-documented in location studies. In a study examining why headquarters move, Strauss-Kahn and Vives (2009) find that an agglomeration of headquarters in the same industry has a significant effect on the probability of relocating a firm's headquarters in every specification tested. A ten percent increase of headquarters in the same industry increases the probability of choosing a location by 6.7 percent. More supportive evidence of agglomeration can be found in studies including (Luger and Shetty 1985; Friedman, Gerlowski, and Silberman 1992; Guimaraes, Figueiredo, and Woodward 2000; List 2001; Gabe and Bell 2004). While localization consistently stands out as a contributing factor in drawing new investment, urbanization economies are also crucial in the location decisions of firms(Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010).

2.1.2 Urbanization Economies

Urbanization economies refer to positive spillovers generated through the interaction of all economic activities within a given region. Previous studies have noted that firms can achieve higher productivity from the activities of a diverse set of firms and services that occur in an area that may not necessarily be related to a specific industry (Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010). One of the ways in which this productivity phenomenon is demonstrated is through the urban wage premium.

2.1.3 Urban Wage Premium

Areas with higher wages may reflect the positive spillover effects of urban agglomeration. Notably, researchers consistently find that urban wages reflect higher productivity (Yankow 2006). The urban wage premium

could also stem from the selection of workers into areas based on their abilities and career choices (Gould 2007). The higher skills and productivity of workers are embodied in higher regional average wages. Studies show that at the firm level, foreign firms typically pay higher wages than domestic firms (Doms and Jensen 1998; Feliciano and Lipsey 2006; Setzler and Tintelnot 2021). Setzler and Tintelnot (2021) show that most of this premium can be attributed to higher worker skill. However, they also find that there is no discernible difference in wage premiums between foreign firms and domestic multinational firms suggesting that the wage premium can also be explained by the higher productivity of such firms as well as the "tangible and intangible foreign inputs" these firms may have access to.

In empirical studies, the effect of local average wages on the location decisions of firms is mixed. Some studies find that area average wages have a negative effect on the location decisions of firms (Luger and Shetty 1985; Coughlin, Terza, and Arromdee 1991; Friedman, Gerlowski, and Silberman 1992; Luker 1998; Coughlin and Segev 2000; List and McHone 2000; List 2001; Strauss-Kahn and Vives 2009). However, many studies find a positive and significant effect of wages on the manufacturing location. Smith and Florida (1994) perform a county-level analysis of the determinants of Japanese manufacturing investment in the United States. Using a measure of the average annual wage for production workers in the manufacturing industry, they find a positive and significant effect of wages across all models considered. They note that Japanese firms typically offer high wages to ensure labor force stability and to develop higher levels of human capital. Head, Ries, and Swenson (1999) examine Japanese manufacturing investment in the United States from 1980-1992. They use a measure of the average state manufacturing wage. In their base specification, the effect of wages is negative and insignificant. Once they control for industry agglomeration, wages become positive and statistically significant. The authors state that these results could reflect the variation in the skill composition of the work force. Zhuang (2014) and Zhuang (2016) find that higher wages across U.S. states appear to have a positive effect on attracting FDI. He finds that higher wages increase FDI, while standard measures of agglomeration also matter for manufacturing. Guimaraes, Figueiredo, and Woodward (2000) examine the location decisions of foreign firms in Portugal. Using an index of manufacturing wage rates in Portugal, the authors find a positive effect of wages on location decisions of firms. In some specifications of the model, the results are significant. Thus, the FDI literature on location outside the United States once again reveals that higher average location wages do not deter investors at the local level. Instead high-wage areas, which reflects higher productivity, attract investors. Accordingly, the average wage may pick up the positive productivity effects of urbanization economies.

2.2 Development Incentives and Taxation

With the expectation that industry and urban agglomeration should matter in the location of FDI, our primary research question is: Are firms also influenced by incentives and taxes? Incentives are frequently offered because they are believed to alter economic development outcomes. If incentives are successful in attracting firms they may expand local jobs and raise wages, as well as increase tax revenue. Conversely, incentives may diminish funding for state and local government services while simultaneously increasing the demand for such services as a result of new firm location (Bartik 2018).

Unlike agglomeration, the effect of incentives and taxation on the location decision of firms is not well established in the literature. As summarized by Peters and Fisher (2004), early studies conducted before 1980 found that incentives had at best a marginal impact on the firm location decision and did not significantly alter the spatial distribution of firms. Over time, with improvements in econometric modeling, researchers are now better able to model the influence of taxes and incentives on location. More recent studies conclude that taxes and incentives, may affect regional and local economic growth. The taxes considered in past studies are per capita property taxes (Guimaraes, Figueiredo, and Woodward 2004), as well as other measures including state and local income tax, unemployment tax, severance taxes, and business fees and licenses (McConnell and Schwab 1990). Generally, these studies find that higher levels of taxation have a negative effect on the locational probability of investment. Some studies assess incentives through other measures such as subsidies offered (Head, Ries, and Swenson 1999) or state promotion expenditures (Coughlin, Terza, and Arromdee 1991). Some researchers construct indices that attempt to measure state "effort" by combining measures of job training subsidies, business climate indicators, and expenditures on investment attraction and retention (Luger and Shetty 1985).

Recent research examines the impact of particular policies such as the Empowerment Zone Program (Hanson and Rohlin 2011) and the New Markets Tax Credit Program (Harger and Ross 2016) on employment and job creation. These studies find positive effects for incentives in particular industries such as the service and retail industries. Similarly, recent studies also examine the impact of the Tax Increment Financing Program (TIF) on the number of jobs created (Byrne 2018) and the the impact of "deal-closing" funds, such as Arkansas' Quick Action Closing Fund (QACF) on job establishment and growth (Bundrick and Snyder 2018). These researchers find that targeted incentives do not have a statistically significant impact on employment or offer the widespread benefits promised by the programs. Within these modern studies that have only examined particular incentive programs, there is at best minimal evidence that incentives affect the business location decision. In a recent review of the incentive literature, Bartik (2018) finds that most studies overestimate the importance of incentives. Based on the most recent studies, he concludes that

incentives only alter the investment decision of firms 2 to 25 percent of the time.

Clearly, the importance of incentives in the location process is still under debate. The precise effect of incentives is difficult to determine because often the incentive variables tested in location models are rough proxies, cover short time periods, or are only available for small sample sizes. Yet using the Bartik state-level data, recent research has uncovered evidence that some incentives (investment tax credits, job creation tax credits, and job training grants) may advance manufacturing agglomeration (Meurers and Moenius 2020). With this database, our study tests three types of taxes and five types of incentives in FDI location decisions.

3 Model

Figure 1: Manufacturing Intensity in the United States, 2003-2017

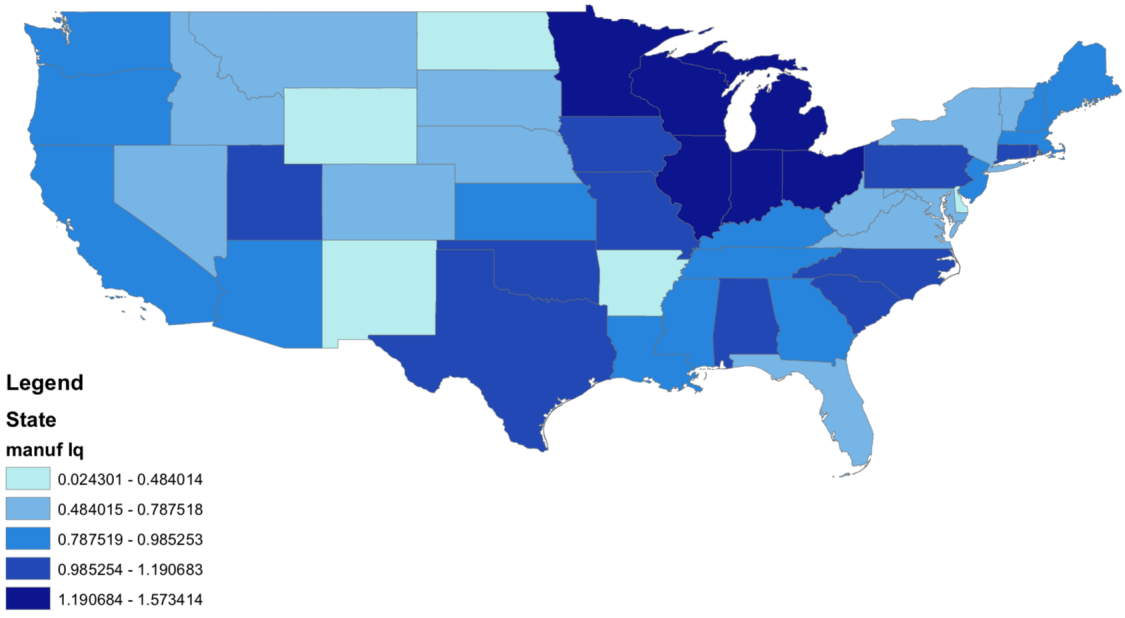
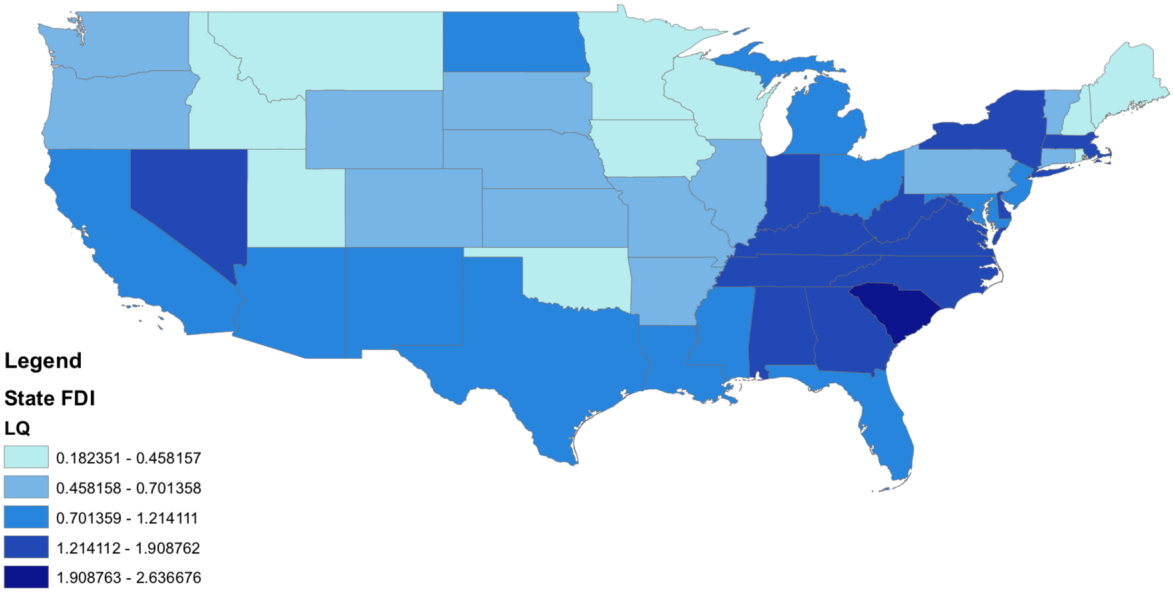


Figure 2: Foreign Manufacturing Intensity in the United States, 2003-2017



The aim of our empirical analysis is to assess which incentives or taxes, in any, influence FDI location beyond agglomeration in a given U.S. county of the Midwestern and Southern regions of the United States. These regions are the most popular location choices for greenfield manufacturing firms. Figure 1 shows domestic manufacturing intensity throughout the country as measured by the location quotient. A higher location quotient represents a higher density of manufacturing firms relative to other types of firms in the United States. As shown in the map, the Midwest (Minnesota, Wisconsin, Michigan, Illinois, Indiana, and Ohio) is the hub of domestic manufacturing. Figure 2 shows the intensity of foreign manufacturing investment at the state level as measured by the location quotient. From this map, it is obvious that the Southeast stands out when it comes to foreign manufacturing investment. Historically, this area has often offered large incentive packages in order to lure potential investors. As such, our model will examine location characteristics in the Southeast and Midwest. The states included in the Southeast are Alabama, Florida, Louisiana, South Carolina, North Carolina, Georgia, Virginia, Tennessee, and Kentucky. In the Midwest, the relevant states are Michigan, Indiana, Ohio, Minnesota, Illinois, Missouri, and Wisconsin. As a result, the model will encompass a choice set of 1,491 possible counties across sixteen states. With manufacturing FDIUS projected to expand, notably in the Southeast and Midwest/Great Lakes regions, it will continue to represent a major force in economic development.

Our empirical model is a variant of the Count Data Model (CDM), which is commonly employed in location research (Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010). The CDM approach is appropriate because the dependent variable is the count of new foreign investments in a given county.

Specifically, we estimate a panel Poisson regression with random effects. Under this analysis, the determinants of the firm location decision can be empirically estimated by calculating how changes in location characteristics affect the conditional expectation of the number of firms created in a particular county i in state k at time t. To derive marginal effects, it is assumed that the probability mass function of y_{ikt} is Poisson distributed. Along with these assumptions, the model also implies that the first two moments are $E(Y_{ikt}) = \lambda_{ikt}$ and $V(Y_{ikt}) = \lambda_{ikt}$ respectively. In count data it is not uncommon to find that the data are overdispersed; or in other words, that the variance is larger than the mean. Overdispersion introduces similar problems as heteroskedasticity in ordinary least squares regressions. Tests reveal that our data are overdispersed. Estimating the model using robust standard errors can correct for this issue. When dealing with overdispersion, the model can be estimated using a negative binomial specification or estimated using a Poisson specification with robust standard errors. If the aim of the analysis is prediction, a negative binomial is preferred over the Poisson. Instead, if the aim of the analysis is to model the conditional mean, the Poisson specification is preferred. The Poisson model will retain its consistency even if the count is not Poisson distributed provided that the conditional mean function is correctly specified (Cameron and Trivedi 2013). For these reasons, we estimate a Poisson model using robust standard errors that are clustered at the county level.

The Poisson model also has several advantages that make it a preferred method in this analysis. First, it is capable of handling a large choice set. Other studies that use discrete choice methods, such as a conditional logit model, model the location choice at highly aggregated levels such as U.S. states which typically contain a lot of heterogeneity within them (Coughlin, Terza, and Arromdee 1991; Friedman, Gerlowski, and Silberman 1992; Head, Ries, and Swenson 1999). This approach is problematic for two reasons. First, many relevant location factors, such as agglomeration and labor market characteristics, occur at the local level (Guimaraes, Figueiredo, and Woodward 2004). Second, in discrete choice models, only the locations that are chosen contribute to the likelihood function whereas under a CDM approach, the unchosen locations not only contribute to the likelihood function but they can importantly provide interesting insights (Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010). Finally, in some cases the Poisson model can also circumvent the Independence of Irrelevant Alternatives (IIA) assumption, which rarely holds under a conditional logit specification (Gabe and Bell 2004). Because of these advantages, newer location studies have frequently used a CDM approach to model the firm location decision.

3.1 Location Model

Under this model, the probability of attracting a new foreign firm is assumed to be a function of both state and county location characteristics such that,

$$Prob(Invest_{ikt}) = f(X_{ikt}, Z_{kt}), \tag{1}$$

where $Invest_{ikt}$ represents the number of new investments made in county i in state k in year t, while X_{ikt} and Z_{kt} represent county and state characteristics that affect a given firm's spatial profit function respectively (List 2001). Following Hausman, Hall, and Griliches (1984), the Poisson parameter will be denoted as λ_{ikt}, where $ln(\lambda_{ikt}) = X_{ikt}\beta + Z_{kt}\phi$. Given these assumptions, the basic panel Poisson probability specification can be modeled as follows:

$$Prob(Y_{ikt} = Invest_{ikt}) = \frac{e^{-\lambda_{ikt}}\lambda_{ikt}^{Invest_{ikt}}}{Invest_{ikt}!} \tag{2}$$

Given the panel structure of the data, there may be serial correlation. To correct for this and estimate a more precise model, fixed or random effects are often used in regression analysis. In a fixed effects model, it is assumed that any unobservable factors that may impact the estimation are time-invariant. A fixed effects model would not be appropriate in this case due to a lack of variation within the counties included in the dataset. Moreover, we are interested in understanding the effect of particular time invariant location characteristics. For these reasons, we estimate a panel Poisson model with random effects. Under a random effects specification, the Poisson parameter is specified as $\widetilde{\lambda_{ikt}} = \lambda_{ikt}\widetilde{a_{ik}}$ where $\widetilde{a_{ik}}$ is a random county specific effect. Following Hausman, Hall, and Griliches (1984), $\widetilde{\lambda_{ikt}}$ will take the following form:

$$\widetilde{\lambda_{ikt}} = \lambda_{ikt}a_{ik} = e^{X_{ikt}\beta + Z_{kt}\phi + \mu_0 + \mu_{ik}}, \tag{3}$$

where μ_{ik} is the county specific effect and μ_0 is the overall intercept. The Poisson probability specification then becomes:

$$Prob(Y = Invest_{ikt}) = \frac{e^{-\lambda_{ikt}e^{\mu_{ik}}}(\lambda_{ikt}e^{\mu_{ik}})^{Invest_{ikt}}}{Invest_{ikt}!} \tag{4}$$

The basic panel Poisson model that is estimated takes the following form:

$$Invest_{ikt} = a_{ik} + X_{ikt-1}\beta + Z_{kt-1}\phi + \rho_{ik} + \gamma_k + \delta_t + \epsilon_{ikt}, \tag{5}$$

where *Invest* represents the count of foreign manufacturing investments in county i in state k at time t. As previously stated, investment is assumed to be a function of both county and state characteristics denoted

by X_{ikt-1} and Z_{kt-1} respectively. All state and county characteristics are entered as logs in the equation. To avoid taking the log of 1, we add 1 to all tax and incentive variables. We assume a prospective firm at time t takes into account all relevant location specific characteristics as of time $(t-1)$. Variables that do not vary over time, such as county land area, are not lagged. Additionally, state taxes and incentives are not lagged as these "packages" are determined in the year in which the investment is made. Including a lag in the model for many of the area specific characteristics should also control for any possible endogeneity between these factors and investments in a given year. The main specification also controls for several time invariant county specific factors, ρ_{ik}, a set of state dummies, γ_k, to account for any unobservable or unmeasureable characteristics that may make a state more attractive to investors, as well as a set of year dummies, δ_t, to account for any factors that may differentially impact FDIUS in a given year.

4 Data

Estimation of the model requires information regarding foreign location decisions as well as state and county characteristics. Firm investment data come from fDi markets, a database maintained by the *Financial Times*, that includes cross-border greenfield investment information from 2003-2015. This database is unique in the level of detail that it offers. This data set includes the specific location of investment projects down to the city level. The database also identifies investor specific characteristics such as the name and origin of the investing company, the industry of the investment project by NAICS code, as well as the size of the investment as measured by the number of jobs created and the amount of capital invested.

The Bartik database contains the state and local business taxes used in the analysis. The included taxes represent over two-thirds of the total state and local tax burden a typical medium to large sized-export oriented manufacturing firm would face (Bartik 2017). The incentives that we consider include the job creation tax credit, investment tax credit, research and development credit, property tax abatement, and the customized job training subsidy. Similarly, the incentives that are included are not all encompassing, rather they represent the incentives a manufacturing firm is most likely to face. The focus of this database is on medium to large export-oriented firms as these are the ones that typically receive the most economic development dollars. The data are available by industry and are based on a simulation of taxes and incentives a given firm would face if they decided to open a new facility in a particular state in a particular year. In the simulation, the present value of taxes and incentives is calculated using a 12 percent discount rate. This rate is selected based on previous literature, which suggests that firms place a higher value on short term factors rather than long term factors. The database has the capability to simulate the tax and incentive rates a firm would experience in it's first 20 years of operation. As we are only interested in the initial tax climate

faced by an incoming firm, the simulation only runs for one year in the model. In order to calculate each of the tax and incentive rates, the database employs a hypothetical firm balance sheet. This balance sheet includes industry averages for the value-added, pre-tax profits, property asset mix, employment, wages, and R&D spending. Using this information, along with information on state and local tax rates and rules on how incentives are applied based on firm characteristics, the database is able to separately calculate state tax and incentive rates for each year of operation. The present value of the stream of taxes and incentives is then calculated using a discount rate. The data are then reported as a percentage of the value added for the new firm. It is also important to note that we are using the average state incentive and tax as a percentage of the value added at each time period. It would be ideal to exploit variation in taxes and incentives given to firms within various manufacturing sectors in the same state; however, given the nature of the model and available data, we are unable to take advantage of such variation.

There are several limitations of the Bartik dataset. The first is that incentives do not just occur at the state level. Previous literature has shown that localities also offer incentives and may even work with state officials to create a compensation package for a particular industry or firm (Calcagno and Hefner 2018). While this may be the case, the Bartik dataset creates the state incentive numbers based on incentives offered in major metropolitan areas within the state. Most incentives typically go to companies that locate in the major metropolitan areas, which also represent the main "economic centers" of each state. Taxes may also differ across counties; however, any differences in taxes would pressure counties to offer similar net taxes after abatements (Bartik 2017). Second, there are several important types of incentives that are excluded from the database. These include "deal-closing" funds and other discretionary incentives that are used by government officials and economic development agencies to tip the firm location decision in their favor. While this would be interesting to include in the model, these types of offers are generally reserved for few large investments and the amounts offered can differ substantially among firms. Additionally, if such incentives were included, selection bias would affect the model estimates as any type of data coming from these types of incentives would only reflect accepted offers. Finally, any tax simulation should account for apportionment of corporate income. Generally, states do not only tax firms on profits made in the state; rather they also tax firms on profits a firm has made within the country. Any national profits made are typically apportioned to the state based on the share of property, payroll, and sales that occurred in that state (Bartik 2017). Traditionally, each of these characteristics received equal weight in the calculation. More recently, states have adjusted the formula in order to lower taxes for firms that have a large share of out of state sales, as these firms make up a significant portion of the state's export base. The Bartik database handles this by separating export based firms from non-export base firms. For export oriented firms, the effective corporate income tax is the nominal corporate income tax rate which is then adjusted

by the sales factor ranging from 1/3 to 1, depending on state rules. While this does not account for the full complexity of the U.S corporate tax code, it does reflect some of the more important rules that are imposed on corporations. As a result, the database should provide a good representation of the "standard deal", or the overall incentives and taxes offered to a new firm, in the manufacturing industry in a particular state and year.

Additional data on state characteristics are pooled from the U.S. Bureau of Economic Analysis and the U.S. Bureau of Labor Statistics. County characteristics are drawn from the U.S Bureau of Census reports, the Bureau of Transportation Statistics, the U.S. Bureau of Labor Statistics, and the U.S Department of Agriculture. The state and county-level location determinants have been selected based on a review of the previous empirical literature and regional economic theory. Tables 1 and 2 summarize each variable used, their definitions, and their anticipated signs.

5 State Hypotheses

Table 1 displays all state characteristics that we use in our analysis. Consistent with earlier FDI location research, we test two different types of agglomeration: domestic agglomeration and foreign agglomeration. Previous studies capture foreign agglomeration through the presence of existing manufacturing employment by foreign-owned firms in a given area (Head, Ries, and Swenson 1999), previous FDI establishments (List 2001), or share of foreign-owned firms (Guimaraes, Figueiredo, and Woodward 2004). Most of these studies find a positive effect of foreign agglomeration on the location decision of firms. As in Head, Ries, and Swenson (1999), we measure foreign agglomeration by the prior year's stock of manufacturing employment by foreign owned firms. A location that has been frequently selected by many other foreign firms should be attractive for a new foreign firm as well. This is the result of certain local characteristics that foreign firms would find attractive. A new firm could take advantage of information and networks that other foreign firms have already established. Cultural aspects could also dictate this relationship. For example, Head, Ries, and Swenson (1999) finds that Japanese firms prefer locations that already have clusters of Japanese firms. We expect that a higher presence of foreign manufacturing employment concentration will increase the probability of investment by a new foreign firm.

5.1 Unionization and the Business Climate

One characteristic of a state's business climate that may affect foreign investors' location is the strength of unions. Previous literature has found mixed results for the effect of unionization rates on manufacturing plant location. In an early study of U.S. manufacturing, unionization increased the probability of location

Table 1: State Variables

State Variables	**Definition**	**Mean (S.D.)**	**Anticipated Sign**	**Source and Year**
Prior FDI Stock	Prior year stock of manufacturing employment of majority owned US affiliates (thousands of employees)	68.824 (30.017)	+	BEA 2005-2015
Job Creation Tax Credit	Incentive received as a percentage of the value-added	0.564 (0.495)	+	Bartik Database 2005-2015
Investment Tax Credit	Incentive received as a percentage of the value-added	0.416 (0.654)	+	Bartik Database 2005-2015
R&D Credit	Incentive received as a percentage of the value-added	0.064 (0.0963)	+	Bartik Database 2005-2015
Property Tax Abatement	Incentive received as a percentage of the value-added	0.617 (0.902)	+	Bartik Database 2005-2015
Customized Job Training Subsidy	Incentive received as a percentage of the value-added	0.106 (0.155)	+	Bartik Database 2005-2015
Property Tax	Tax paid as a percentage of the value-added	0.925 (0.607)	-	Bartik Database 2005-2015
Corporate Income Tax	Tax paid as a percentage of the value-added	1.1897 (0.313)	-	Bartik Database 2005-2015
Union	Percent employed that are members of a union	9.234 (4.815)	-	Bureau of Labor Statistics CPS 2005-2015

(Bartik 1985). For studies of FDIUS, however, Friedman, Gerlowski, and Silberman (1992) detects no effect for labor market characteristics. Zhuang (2016) finds insignificant effects of unionization. Nevertheless, most studies (Coughlin, Terza, and Arromdee (1991); Woodward (1992); Head, Ries, and Swenson (1999); O Huallachain and Reid (1997)) uncover that foreign-based manufacturing firms appear to prefer areas that are less unionized.

As in previous studies, we measure unions as the percentage of the state employed population that is represented by unions. Unions represent an increased cost to incoming firms and may impede managerial control and operational flexibility. In the United States, companies increasingly avoid highly unionized areas, with manufacturing firms like Boeing even relocating to take advantage of lower costs in non-unionized areas like South Carolina (Olgin 2017). Union participation should negatively affect the probability of investment.

At the state level, taxes and incentives in the Bartik database are reported as percentages of the value-added for the manufacturing industry. Value-added refers to the value of manufactured products above and beyond the value of the materials that went into the production process. This measure is used for various reasons. First, value added is an easier measure to compare across industries than something like profit which usually reflects some kind of tax planning. Second, the literature on business location commonly measures the impact of various costs in terms of the value added. For these reasons, it is only natural to express taxes and incentives, which represent increased/decreased costs to an incoming firm, as a percentage of the value-added (Bartik 2017). The incentives listed in Table 1 range from .06 percent of the value-added to 0.62 percent of the value-added. The property tax abatement is the largest incentive offered in our sample while the research and development credit is the smallest incentive offered. The taxes range from 0.9 percent to 2.66 percent of the value-added. The sales tax represents the smallest tax burden while the property tax represents the highest tax burden for firms in our model. All else equal, higher incentives should increase the probability of investment while higher taxes paid should decrease the probability of investment.

6 County Hypotheses

Table 2 shows the county characteristics that we consider in the analysis. At the U.S. county level, the traditional locational determinants are agglomeration, workforce characteristics, infrastructure, and other local area specific characteristics.

6.1 Agglomeration

As previously discussed, an area's agglomeration is an crucial and reliable factor in empirical location studies. It is widely accepted that regions with high industry agglomeration will benefit from positive externalities of

Table 2: County Characteristics

County Variables	**Definition**	**Mean (S.D.)**	**Anticipated Sign**	**Source and Year**
Distance to Airport	Distance from center of county to nearest airport in miles	18.784 (11.265)	-	Bureau of Transportation Stats. 2005-2015
Distance to Port	Distance from center of county to nearest port in miles	371.935 (268.768)	-	U.S. Department of Transportation 2005-2015
Establish-ments	Number of manufacturing establishments by NAICS code	101.5 (278.8)	+	County Business Patterns 2005-2015
Wage	Average weekly wage to manufacturing workers in dollars	815.4 (252.9)	+ / -	Bureau of Labor Statistics 2005-2015
Land Area	Total land area measured in miles	534.0 (332.2)	+	U.S. Census Pop., Housing Units, Area & Density, 2000 /2010
Metro	= 1 if county is urban = 0 otherwise	0.4334 (0.496)	+	U.S. Dept. of Ag. County Typology 2015
Persistent Poverty	= 1 if at least 20% of the pop. considered to be poor = 0 otherwise	0.126 (0.332)	-	U.S. Dept. of Ag. County Typology 2015

being in close proximity to other firms and workers. In our model, localization and urbanization economies are measured at the county level.

6.1.1 Establishments and Localization Economies

As discussed earlier in the paper, localization economies are the positive spillovers that a local manufacturing firm can benefit from by locating within a cluster of local establishments in the same industry. Previous studies capture this effect of total domestic agglomeration through the number of existing manufacturing plants in a county (Woodward 1992); (Head, Ries, and Swenson 1999), manufacturing employment (Strauss-Kahn and Vives 2009), or production worker hours by industry (McConnell and Schwab 1990). Most of these studies have found positive and significant effects of domestic agglomeration on the location decision. In my analysis, local agglomeration will be captured by the total number of manufacturing establishments in a given county each year. As previously mentioned, there are many reasons why agglomeration should matter. Clusters of manufacturing firms may have already developed important infrastructure networks, supplier relationships, and a strong pool of highly skilled labor. For these reasons, it is expected that the county-level concentration of manufacturing establishments will be a positive and significant factor in the location decision.

6.1.2 Urbanization Economies

Urbanization economies are the more general benefits that a manufacturing firm can benefit from that are generated through the interaction of various industries and clusters within a given region. It has been noted by previous studies that firms also receive benefits from urban agglomeration, or the activities of a diverse set of firms and services that occur in an area that may not necessarily be related to an industry (Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010).

This effect will be captured through an indicator for the urbanization of a given county. This measure comes from the U.S Department of Agriculture Typology Codes for Counties. A county is considered urban if it has a population of at least 50,000 or if it is economically tied to a neighboring urban county. This is expected to be a positive factor in the location decision. Urbanized areas are expected to have better infrastructure and more specialized business services that a new firm could take advantage of.

6.1.3 Urban Wage Premium

Another way that agglomeration economies can be captured is through the urban wage premium. In the model, we enter the average weekly manufacturing wage in each county for each year. The county-level average wage is a measure reflecting the higher productivity or skill of the workforce in a given area. Note

that his variable is a labor force characteristic of the region and not the wage that is paid by the firm. The wage that is actually paid is negotiated and varies by investor. Actually, when foreign investors enter a new market, they start at a disadvantage relative to actual domestic competitors. In particular, they are unfamiliar with local laws and the business culture. In order to compete and succeed, it is logical that they must have a competitive advantage over domestic firms (Hymer 1960). This could come from superior technology, branding, or better management. Without these advantages, FDI would not succeed in developed economies. For these reasons, it makes sense that foreign firm would not simply search for areas with low wages; rather they would look for areas that offer high productivity and worker quality. As it has been well documented that firms locate in areas with high concentrations of like firms, we expect higher local wages to increase the probability of investment.

6.2 Other Area Specific Characteristics

Beyond incentives and agglomeration, firms may be influenced by county-level characteristics. Due to inconsistent and varying models, data, time periods, locations, and industries, there is no consensus on the most important county determinants of firm location decisions. To assess incentives and taxes, other factors should be tested besides agglomeration. At the local (or county level), firms may to prefer areas that enjoy better transport accessibility. This is confirmed by Coughlin, Terza, and Arromdee (1991) and Zhuang (2014). Zhuang (2014) finds that highway access seems to be the most important element of infrastructure, yet airport and railroad connectivity did not have significant impacts for greenfield investment. Woodward (1992) finds that at the county level, highway access is an important for plants that are located in more rural areas. Infrastructure and access to markets have often been found to be positive factors for the firm, yet this may depend on the nature of the investment. The importance of these factors may depend on the end goal of the investing firm. If the firm has national or international markets, or extensive national or international supply chains, then a longer distance to airports and ports may negatively impact the investment decision. Moreover, airport connections may be especially attractive to foreign investors, given the need for managers' need for extensive air travel. To account for infrastructure characteristics, we calculate the centroid of each county in my data set. We then calculate the geodesic distance, in miles, from each county centroid to the nearest airport and port. Ideally, this measure would account for the distance from the actual investment to the nearest airport/port, however, my FDI data is not geocoded. While this is a limitation of the data, it should serve as a rough approximation for local area infrastructure characteristics. We expect a greater distance between a given county centroid and the nearest airport/port to decrease the probability of a foreign firm locating in that county. If the aim of the firm is to access local consumers or does not depend on

distance to suppliers, then transport infrastructure may not matter.

In previous research, land area is considered a proxy for the number of available locations within a state. Similarly, the county land area will be used as a proxy for the number of available locations within a county. Increased availability of investment options should increase the probability of investment, and as previous results have found, it is assumed to be positive in this study as well.

Finally, we will consider persistent poverty as a measure of economic distress that may deter investment. The data also come from the U.S Department of Agriculture Typology Codes for Counties. Counties are classified as being in persistent poverty if at least 20 percent of their population was considered poor in the 1980, 1990, and 2000 census, as well as in the ACS 5 year estimates from 2007-2011. We choose to control for counties that are in persistent poverty because such areas may lack public services and infrastructure as well as have poor labor market conditions. We expect this variable to negatively impact the location decision.

7 Estimates of the Determinants of FDI

The main results for five specifications of the model are presented in Table 3. The first column shows the estimates for the determinants of foreign investment without considering incentives and taxes. The second column includes the aggregate tax and incentive variables, while the third column breaks out specific tax and incentives.

Ideally, we would like to measure the effect of both property tax abatements and property taxes on the probability of investment. However, property tax abatements are used to offset the local property tax and traditionally abatements are higher in states with higher property taxes. For this reason, these measures are highly correlated with each other. As such, we instead choose to measure the effect of the net property tax on the probability of investment.

Generally the traditional determinants all have the expected sign but are not statistically significant at the one percent level. Besides incentives, only the agglomeration and distance to airport estimates meet this stringent level of significance. These estimated results are robust to the inclusion of the tax and incentive variables. It can be shown for the Poisson model that $E(Y|X) = exp(\beta lnX) = \hat{\beta}$. As all variables enter the estimation equation logarithmically, the reported coefficients can be interpreted as elasticities, representing the percentage change in the expected number of FDI projects given a one percent increase in the given variables (Cameron and Trivedi 2013). When considering the overall effect of taxes and incentives in column 2, only the latter has the correct sign and is statistically significant at the one percent significance level. Importantly, these results reveal that a one percent increase in total incentives as a percentage of total business costs increases expected investment by 0.34 percent.

Table 3: Estimates of the Determinants of FDI

Investments	(1)	(2)	(3)
Prior FDI Stock	0.519	0.571	0.166
	(0.289)	(0.285)	(0.275)
Establishments	0.947**	0.923**	0.922**
	(0.043)	(0.042)	(0.042)
Wage Premium	1.180**	1.310**	1.305**
	(0.263)	(0.237)	(0.239)
Metro	0.045	0.053	0.054
	(0.100)	(0.101)	(0.102)
Union	-0.042	0.088	-0.016
	(0.125)	(0.143)	(0.153)
Distance to Airport	-0.150*	-0.148*	-0.147*
	(0.049)	(0.047)	(0.047)
Distance to Port	0.036	0.027	0.027
	(0.064)	(0.064)	(0.064)
Land Area	0.186	0.188	0.188
	(0.092)	(0.091)	(0.091)
Persistent Poverty	-0.396	-0.376	-0.376
	(0.162)	(0.162)	(0.162)
Taxes		-0.117	
		(0.051)	
Incentives		0.135	
		(0.056)	
Net Property Tax			0.031
			(0.078)
Corporate Income Tax			-0.345
			(0.158)
Sales Tax			-0.092
			(0.090)
Job Creation Tax Credit			-0.095
			(0.171)
Investment Tax Credit			1.177**
			(0.331)
R & D Credit			-0.574
			(0.698)
Customized Job Training Subsidy			-0.329
			(0.216)
Constant	-16.775**	-17.985**	-16.996**
	(2.450)	(2.310)	(2.384)
N	18259	16862	16862
LL	-6285.172	-5737.353	-5727.575
BIC	12943.216	11854.285	11883.394

Note: All models include both state and year controls.
Standard errors in parentheses, clustered at the county level
* $p < 0.01$, ** $p < 0.001$

In order to understand which incentives are driving these results, consider the model in column 3. The following analysis comes from the results in column 3. As expected, most of the variables that represent increased costs are negative but only two are statistically significant at the one percent significance level. Higher union participation decreases investment but this is not statistically significant. This insignificant result could be due to the inclusion of state controls in the analysis. The negative result, however, is as expected; when firms locate in such areas, they may have to deal with higher wages and regulations when hiring employees which increases the overall cost of doing business. These results also confirm that foreign investors desire proximity to airports in the location decision. Increased distance to airports negatively affects the location decision. For a one percent increase in distance to an airport, expected investment decreases by 0.14 percent. This indicates that firms are more likely to choose areas that are well connected. Note that distance to ports is not statistically significant. This could indicate that these firms are not necessarily exporting their goods overseas. It is more likely that the markets they aim to reach when they locate in the United States are located within the country.

As expected, county land area was positive but it is not statistically significant. A one percent increase in county land area increases the probability of investment by 0.19 percent. Larger land area signals more investment opportunity. Firms are drawn to counties that have more space available on which to build their facilities. Larger counties could also benefit firms that have long investment horizons and may wish to expand operations in the future.

Consistently, the variables that represent domestic agglomeration were positive and statistically significant factors in the FDI location decision. Localization economies, as measured by the total manufacturing agglomeration at the county level, has a larger impact on investment than foreign agglomeration at the state level. Investment increases by an approximate 0.92 percent for a one percent increase in the number of domestic establishments in a given county. Areas with higher FDI employment do not appear to attract more investment. This indicates that foreign firms value areas that have high industry concentration. Areas with a higher number of existing manufacturing firms are more favorable because they have existing supplier networks and specialized pools of labor. Additionally, high industry agglomeration allows for learning and other beneficial spillover effects.

Moreover, the results suggest that companies value the productivity of the local labor force. From these results, it appears that firms do not look for low-skilled, low-wage labor. Urban wages, which represent productivity, are a positive and significant factor in the location decision. A one percent increase in the average weekly manufacturing wage increases expected investment by approximately 1.31 percent. T

From a policy perspective, the most interesting and compelling results come from the variables representing taxes and incentives. The three tax variables were not statistically significant at the one percent

level. The corporate income tax was the only tax that statistically significant at the five percent level. A one percent increase in the corporate income tax as a percentage of local firm costs decreases the expected number of FDI projects by 0.46 percent.

These results suggest that taxes do not matter for the location decision of foreign-owned firms. This contrasts some previous findings in the urban and regional economics literature (Bartik 1991); (Peters and Fisher 2004); (Arauzo-Carod, Liviano-Solis, and Manjón-Antolín 2010); (Bartik 2018); (Walckzak, Drenkard, and Bishop-Henchman 2018). This is a relevant finding that could help inform today's debate over taxes and their effect on investment in the United States.

In terms of incentives, the investment tax credit is the only incentive that is positive and statistically significant at the one percent level. The results indicate that a one percent increase in the investment tax credit as a percentage of value added, increases the expected number of FDI projects by 1.56 percent.

The property tax abatement had no measurable impact on the investment decision. This is surprising as the property tax abatement has long been one of the most significant subsidies for capital intensive firms like manufacturers. These results could have occurred for two reasons. First, the Bartik database does not account for the full complexity of the property tax abatement. The database does not model Tax Increment Financing (TIF) programs which typically allow special property tax exemptions for firms. Second, the simulation only runs for one year as we are only interested in the full value of the incentive package at the time the investment is made. This could plausibly result in some downward bias in the results. Generally property tax abatements are granted on a case by case basis to particular firms. This incentive can also be structured in many ways which is not fully captured by the database. It is not unusual for such a subsidy to last up to 30 years. Firms may receive a specific tax reduction for a specified amount of time. Localities could also allow for the property tax itself to be phased in over a certain number of years, until the full property tax rate is reached. Alternatively, the property tax may be frozen at the time the deal is signed, which could benefit firms that may wish to expand in the future. Sometimes, firms may even make payments in lieu of taxes, which usually consist of a yearly payment to the school system at a lower rate than the tax itself (Good Jobs First 2018).

The property tax abatement is controversial so its effect is important to understand. Local governments often support the subsidy because they argue that otherwise, they may not have had any investment in the community. There is also some debate as to whether the companies that receive the abatement actually value them. These subsidies can be detrimental to school districts as well as fire and police departments which generally receive a majority of their funding through state property taxes (Good Jobs First 2018). Property tax abatements tend to be highest in states with higher property tax rates. South Carolina, Michigan, and Tennessee have high property taxes relative to the national average and consequently also have higher

property tax abatements. While this incentive does not appear to lure manufacturing investments to a given area, further research should examine the extent to which the community may be affected by the property tax abatement.

While the property tax abatement was the most important incentive in the 1990's, the investment tax credit has recently experienced the largest increase in use over time (Bartik 2017). Investment tax credits are typically offered to firms that invest in new property, plants, equipment, or machinery in the state. This investment must be deemed a "qualified" investment by the state to be awarded. Typically, this credit is offered to firms that invest in new property only as opposed to those that renovate existing properties (Walckzak, Drenkard, and Bishop-Henchman 2018). Investment tax credits are particularly large in south-eastern states like Alabama, Kentucky, and South Carolina. This incentives had the highest impact on the probability of investment relative to all other incentives considered in this study. A one percent increase in the investment tax credit as a percentage of local firm costs increased the number of expected FDI projects by 1.56. This could be because this incentive is only given once at the start of the project whereas other incentives like the property tax abatement may be phased in over a longer period. It could also be the case that capital intensive firms like manufacturers, make need this type of incentive to offset their high start up costs. Previous research using the Bartik incentive data also found that the investment tax credit was significant (Meurers and Moenius 2020).

8 Incentive Effects by Agglomeration Intensity

Agglomeration is a consistently robust determinant in all specifications of our model. That is not the case for taxes and incentives. To get a better sense of whether specific incentives and taxes affect FDI location choices, we ran separate regressions for levels of county-level manufacturing concentration. Counties are placed into four groups according to the percentile rank for agglomeration, measured by the number of manufacturing establishments: 0-25th percentile, 25th-50th percentile, 50th-75th percentile, and 75th-100th percentile.

Table 4 displays the results for all counties (pooled) and the four groups of counties organized into different quartiles of manufacturing agglomeration, as measured by the number of existing establishments in the county. Agglomeration, as measured by establishments or wage premiums, is statistically significant (at the one percent level or less) across all regressions. For counties with low agglomeration (0-25 percentile), only the customized training subsidy is statistically significant (see column 2). For counties with agglomeration in the mid-range from 25th-75th percentiles (columns 3 and 4) no taxes or incentives are found to be statistically significant). For high agglomeration counties (column 5) the investment tax credit is statistically significant,

as we find in the pooled regression for all counties.[1]

These findings suggest that only areas with already high levels of manufacturing benefit from the investment tax credit. This result implies that similar high-agglomeration counties, which are already likely to attract new investment, may tilt the location decision with the tax credit. Given that many manufacturing firms have high start-up costs, the investment tax credit offers a particularly attractive inducement, especially for large capital investments. The impact is substantively large. If we estimate the marginal effect of the value of the investment tax credit at the 25th (0), 50th (0.112), and 75th (0.735) percentiles of the sample with high-agglomeration, the predicted number of investments are 0.415, 0.475, and 1.01, respectively. Hence, moving from the median level of incentives for the investment tax credit to the 75th percentile has a noticeable effect on the attractiveness of the county as an investment site if there is a high pre-existing level of agglomeration. However, small incentives do not have as noticeable an effect.

Counties with low agglomeration are clearly at a competitive disadvantage in attracting greenfield FDI. Customized job training may help overcome the reluctance to invest in areas that have small labor pool to search and find the appropriate labor for manufacturing. While the coefficient on this variable in the Poisson specification is high, the small values of the variables involved mean that the absolute effect is modest. Of the 4802 observations that we have in the quartile with low existing agglomeration, 4739 (98.69%) have no investments, 61 (1.27%) have one investment, and 2 (0.04%) have two investments. So, even going from 0 to 1 investment is a huge jump for these counties. If we transform this coefficient into a marginal effect, at the 25th (0.033) 50th (0.039) and 75th (0.092) percentiles the customized job training subsidy variable leads to an expected increase in investments from 0.017 to 0.025 to 0.712. In other words, a county has to boost its training subsidies to a relatively high level before it gets a noticeable effect on expected investments (and even then, it only increases the expected impact to about a 70% chance of landing one with a high margin of error).

Table 4 also indicates that in low-agglomeration regions, the proximity of an airport may positively influence the location decision. Overall, we find that foreign investors favor highly agglomerated areas. Yet in the few cases where they choose low-agglomeration areas, the distance from an airport is a factor. Sites near an airport may exert a particular influence on FDI location because of the need of plant managers and suppliers to have frequent and quick access to the site.

1. Columns 2-5 of Table 4 do not have equal numbers of observations due to missing data in some of the regressors. The quartiles are evenly split according to the number of establishments.

Table 4: Determinants of FDI by Percentile of Establishments

Percentile	(1) Pooled	(2) 0 - 25th	(3) 25 - 50th	(4) 50 - 75th	(5) 75 - 100th
Prior FDI Stock	0.168	0.370	2.134	-0.158	0.216
	(0.272)	(3.342)	(1.580)	(0.823)	(0.299)
Establishments	0.923**	1.107	1.612**	0.887*	0.953**
	(0.046)	(0.449)	(0.462)	(0.291)	(0.062)
Wage Premium	1.279**	1.885**	1.070*	1.522**	1.076**
	(0.189)	(0.396)	(0.391)	(0.366)	(0.253)
Metro	0.008	-0.382	0.378	-0.106	0.141
	(0.108)	(0.494)	(0.232)	(0.161)	(0.173)
Union	-0.022	-1.571	0.352	-0.165	-0.003
	(0.154)	(1.054)	(0.662)	(0.350)	(0.181)
Distance to Airport	-0.131*	-0.619*	-0.271	-0.136	-0.125
	(0.049)	(0.204)	(0.118)	(0.080)	(0.060)
Distance to Port	0.043	-0.298	0.094	0.193	0.011
	(0.055)	(0.348)	(0.197)	(0.164)	(0.058)
Land Area	0.358**	0.098	0.199	0.107	0.512**
	(0.101)	(0.277)	(0.206)	(0.138)	(0.124)
Persistent Poverty	-0.296	-0.062	-0.352	-0.802	0.024
	(0.188)	(0.339)	(0.249)	(0.459)	(0.417)
Net Property Tax	0.032	0.050	-0.372	0.153	0.029
	(0.079)	(0.675)	(0.489)	(0.211)	(0.088)
Corporate Income Tax	-0.344	-0.466	-0.244	-0.757	-0.291
	(0.159)	(2.347)	(1.092)	(0.545)	(0.171)
Sales Tax	-0.094	-0.569	0.006	0.274	-0.148
	(0.090)	(0.492)	(0.377)	(0.201)	(0.105)
Job Creation Tax Credit	-0.101	1.390	1.112	-0.111	-0.166
	(0.168)	(1.738)	(0.915)	(0.480)	(0.186)
Investment Tax Credit	1.171**	-5.888	2.091	1.153	1.209**
	(0.328)	(5.008)	(1.800)	(1.016)	(0.362)
R & D Credit	-0.542	-18.783	-1.435	-0.464	-0.409
	(0.690)	(39.682)	(7.034)	(2.207)	(0.717)
Customized Job Training Subsidy	-0.379	63.696**	1.645	-0.227	-0.388
	(0.223)	(16.465)	(2.593)	(0.830)	(0.246)
Constant	-18.102**	-10.619	-28.732**	-17.106**	-18.231**
	(1.962)	(13.356)	(8.277)	(4.730)	(2.437)
N	16862	3293	4527	4600	4442
LL	-6088.045	-216.481	-618.410	-1455.587	-3669.338
BIC	12594.602	773.142	1598.787	3273.827	7699.826

Note: All models include both state and year controls.
Standard errors in parentheses, clustered at the county level
* $p < 0.01$, ** $p < 0.001$

9 Conclusion

Academic criticism notwithstanding, taxes and incentives are widely proffered by state and local governments. Potentially, incentives (including tax breaks) could increase demand for high-wage employment and local inputs, thus elevating economic prosperity (Peters and Fisher 2004). This paper provides evidence regarding incentives and the location decisions of foreign investors, based on the fDi Markets and the Bartik databases. To our knowledge this paper is the first to test the "but for/without" question regarding taxes and incentives relative to agglomeration and other possible influences on FDI.

Our analysis reveals that one particular tax incentive, the investment tax credit, impacts the location decisions of manufacturing FDI. Through a panel Poisson regression with random effects, we find that the investment tax credit has the statistically significant pull in the location decision, with an elasticity of 1.56. Many manufacturing activities are more capital-intensive in the 21st century, Thus foriegn firms may value this particular incentive because it offsets large start-up costs and reduces the risk of expanding operations in distant land. Our research shows, however, that only high-agglomeration regions benefit from the investment tax credit. We reach this conclusion by assessing our model according to the quartile of existing manufacturing establishment concentration.

Across all specifications of our model, the results confirm the leading role of agglomeration economies (both localization and urbanization). Manufacturing FDI clusters in areas where U.S. manufacturing agglomeration is the highest. Not surprisingly, new operations take advantage of existing manufacturing spillovers (localization) and urbanization economies. We find that a one percent increase in domestic manufacturing agglomeration in a given county increases FDI establishments by approximately 0.92 percent. Urban agglomeration economies, as captured by the urban wage premium, can be even more important than localization economies. We find that a one percent increase in the average weekly manufacturing wage increases the investment count by approximately 1.31 percent.

Given that the investment tax credit may exert a self-reinforcing effect on agglomeration, state and local policy makers face a dilemma if the goal is to to assist lagging, low-agglomeration regions with this incentive. We uncover some evidence, however, that customized job training may induce foreign-based manufacturers to low-agglomeration regions. This result confirms our intuition that finding a skilled workforce is an important determinant of foreign investment. If a prospective location does not have such a workforce due to pre-existing agglomeration, then the best thing that it can do to attract foreign investment is to train one.

Our paper indicates that in order to attract FDI to these areas, the distance to a major airport is significant. This important influence in contemporary location is not often studied in the regional science and urban economics literature and merits further investigation. Clearly, plant managers and suppliers,

along with foreign decision makers residing far from the U.S. operations, would desire airport accessibility. At least for FDI, a longer travel time to a major airport is a substantial disadvantage facing remote areas with low-agglomeration economies. Beyond manufacturing FDI, future research should corroborate that airport distance affects site selection decisions in other contexts. Above all, our paper concludes that understanding the "but for" effect of specific incentives relative to agglomeration may depend on the industry and state of regional agglomeration.

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