Metropolitan Statistical Area Location Choice by Foreign Direct Investors in the United States

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Abstract The importance of new foreign direct investment as a vehicle for the formation of productive capital has stimulated interest in understanding why multinational enterprises choose particular locations for their investments. Using data from greenfield investments reported on the Bureau of Economic Analysis Survey of New Foreign Direct Investment in the United States, I analyze how locational characteristics influence the choice of where foreign multinational enterprises establish their new investments in the United States. Identifying location choice at the metropolitan statistical area level allows me to analyze both traditional determinants of location choice, such as industrial agglomeration as well as measures of international connectivity that have been studied in research on global cities. My results support the finding that global cities are attractive to foreign direct investors in the United States not just by virtue of their population or industrial agglomeration, which serve to attract investment, but by virtue of a much wider set of attributes, related to their demography and connections to the wider world.

Keywords Location choice, foreign direct investment, MSA, Global cities

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1. Introduction

Foreign direct investment (FDI) carried out by multinational enterprises (MNEs) continues to be one of the principal drivers of the formation of productive capital. In 2017, for example, capital expenditures by majority-owned U.S. affiliates of foreign companies accounted for 10 percent of total private nonresidential fixed investment in the United States. As a consequence, the location choice decisions of MNEs have received considerable scholarly attention.

Early modern economic literature on location choice observed that certain industries, such as pottery or furniture production, tended to concentrate in certain regions, in part due to natural advantages or accidents of history. For example, Marshall (1920) notes that this agglomeration effect tends to be self-reinforcing, as employers choose sites where they can find specialized labor needed for their industries, and skilled labor gravitates to areas where employers are plentiful.

Research on location choice has shifted over time to focus on identifying other attributes of an area that tend to attract investment. In addition to the agglomeration effect mentioned above, researchers have examined how characteristics such as labor costs, taxes, transportation infrastructure, demographics, and amenities have tended to attract investment (Jain and others 2016).

Most of these characteristics are similar within individual cities or metropolitan areas. A metropolitan area typically forms an integrated labor market, in the sense that workers can be hired without relocating. Also, establishment-level externalities are typically strongest within a metropolitan area because the transmission of ideas across firms often occurs in person, notably, for example, in the Silicon Valley (Saxenian 1996). Transportation infrastructure such as airports typically have an impact at the city level because businesses are particularly attuned to the costs of travel time. In contrast, U.S. states (or other subnational regions) are frequently so large that the social and economic conditions in one part of the state can be unrelated to conditions in other parts of the state. The boundaries of states often divide metropolitan areas that have similar characteristics. For example, the New York City metropolitan statistical area (MSA) includes localities in New York, New Jersey, and Connecticut. For these reasons, this paper uses the MSA as the geographic unit of observation.

Previous work such as Goerzen, Asmussen, and Nielsen (2013) has noted that international transportation links, a cosmopolitan population, and the presence of advanced producer services, such as legal and financial firms, are attributes of an urban area that are particularly attractive to multinational enterprises and are among the hallmarks of a “global city.” Global cities are those cities that serve as primary nodes in the world economy and “are centers for servicing and financing international trade, investment, and headquarters operations” (Sassen 2016).

This paper analyzes the appeal of the approximately 30 U.S. metro areas that have been identified as global cities by considering whether these cities attract more investment than cities with similar endowments in terms of population, gross domestic product (GDP) per capita, and other traditional measures of attractiveness. I find that, even considering these factors, global cities are more likely to be chosen by foreign direct investors than other metro areas in the United States.

This paper further analyzes the appeal of the global city by developing measures for the characteristics of global cities that have been found to attract foreign investment in other research and by tests to determine to what extent the attractiveness of global cities is due to these factors. I find that some, but not all, of the attractiveness of global cities can be accounted for by these characteristics, suggesting that the attractiveness of global cities is difficult to fully quantify.

2. Literature Review

Early studies of location choice for FDI studied the extent to which national or subnational regions (states, in the U.S. context) attract foreign investment. There are valid reasons to explore more than one geographic scale, as many important policy choices such as taxes and labor laws are set at that level of jurisdiction, and key data are widely available at both the national and subnational level. Much of this research has examined aggregate economic factors such as GDP per capita. For example, Cleeve (2008) finds that GDP per capita has a positive effect on foreign direct investment in a sample of African counties. The impact of the labor market on location choice is frequently analyzed in these studies, as in Chung and Alcacer (2002) who find that higher average wages in U.S. states tend to attract foreign manufacturing investment, suggesting that the higher skill that often comes along with higher wages is more important to investors than minimizing labor costs.

Previous research has found that industrial agglomeration attracts new investments. Some examples in this literature include Head, Ries, and Swenson (1999) who find that agglomeration effects and state promotion efforts have a significant impact on the U.S. state chosen for new manufacturing investment by Japanese investors. Shaver and Flyer (2000) explore this effect further using a sample of all inbound U.S. FDI transactions in 1987. They find that investing firms with lower productivity are more attracted to U.S. states with concentrations of firms in their industry, while relatively more productive firms tended to avoid such concentration. This "adverse selection" view of the attractions of agglomeration is based on the premise that relatively less productive firms benefit more than relatively more productive firms from local information spillovers. Mataloni (2011) employs a nested choice model of country and subnational regions chosen for U.S. direct investment in the Asia Pacific region and found that productivity-enhancing attributes such as worker skills, agglomeration, and transportation infrastructure are important attributes in the location decision. Similar agglomeration analyses have been performed for location choice amongst the states of Germany (Spies 2010), regions of Italy (Mariotti and Piscitello 1995), provinces of Vietnam (Trinh 2013), and counties of Ireland (Barry, Gorg, and Strobl 2003).

Where the source data allow, much recent research on FDI location choice has shifted to a more granular level of geographical analysis, that is, the MSA level.[1] An early analysis at this level by Guimaraes, Figueiredo and Woodward (2000), shows that some factors are clearly more relevant at the narrower geographic scope than the national or state level. For example, cities are more realistic representations of the labor force available to firms, where workers can change employers without moving their place of residence. In contrast, many U.S. states (or other larger subnational regions) are so large that it is unreasonable to assume that state-level measures of agglomeration, which may be driven by activity that is concentrated in one or two cities, to be relevant

1. In this paper, the terms "metropolitan area," "MSA," and "city" are used interchangeably. The boundaries of MSAs are set by the Office of Management and Budget and are defined in terms of counties. The set of MSAs in the latter period is slightly larger than the set in the initial period. Restricting the choice only to MSAs that were available throughout the entire sample period does not materially affect the results of the analysis.

for business locations throughout the state.[2] Notable examples of studies that analyze location of foreign investment at the MSA level are Guimaraes, Figueiredo and Woodward (2000), who examine location choice by foreign direct investors in Portuguese urban areas (*concelhos*), Head and Ries (1996) who examined foreign investment in Chinese cities, and Lamin and Livanis (2013) who studied foreign investors choice among urban areas in India for the establishment of research and development (R&D) centers.

Analyzing location choice of foreign investment in the United States using the MSA as the geographic unit of analysis shows that most foreign investment is concentrated in the largest urban areas. This pattern is consistent with the finding in much of the literature that FDI tends to be attracted to "global cities," a concept which developed in the 1980s (Freidman 1986), but which remains "relatively underexplored" in the literature on FDI location choice (Nielsen, Asmussen, and Weatherall 2017). Castellani and Lavoratori (2019) examine location choice for R&D centers by MNEs from many countries across a worldwide collection of "global cities" and found that both internal linkages and external agglomeration economies are important drivers of FDI location choice. Belderbos, Du, and Goerzen (2017) find that among global cities, the mostly highly connected areas are attractive as sites for regional headquarters, especially for those with an entrepreneurial (that is, opportunity seeking, as opposed to strictly administrative role) mandate. Many of the attributes of global cities that are potentially attractive to multinational enterprises are difficult to quantify. These attributes include transportation connectedness, a cosmopolitan (ethnically diverse) environment, and the presence of advanced producer services.

Interconnectedness can attract FDI both through physical transportation infrastructure such as airports and rail, as well as through organizational connections, such as the presence of headquarters of major organizations and enterprises. The role of transportation infrastructure is commonly examined in the academic literature. The importance of air connections was studied by Giroud (2013) who finds that the introduction of new air transportation links between the locations of U.S. manufacturing plants and their headquarters improves plant-level productivity, which may be attributable to greater ease of monitoring of plants by headquarters. Bernstein, Giroud, and Townsend (2016) find a similar result with the introduction of new air routes between venture capital firms and the businesses that they invest in. Likewise, Bernard, Moxnes, and Saito (2015) find that the expansion of highspeed rail in Japan improves firm performance, which they attribute to facilitating face-to-face interactions between purchasing firms and their suppliers. It has been reported that one of the criteria for the selection of Amazon's second headquarters was that the site be within 45 minutes of an international airport,[3] which is substantiated by the fact that all sites short-listed by the firm are well served by airports. Castellani and others (2019) unpack the broad concept of "international connectivity" and analyze how its dimensions, such as internationally connected patents (patents with one U.S. resident inventor and one or more inventors who are not U.S. residents), international airport passengers (a measure of the extent of physical infrastructure facilitating the international connectivity of

2. An even more granular level of disaggregation is the county. This level of granularity has not been explored much in the business location choice literature, perhaps because many of the important attributes considered in location choice such as the workforce available to the firm and transportation infrastructure are many times shared by other counties in the same metropolitan area.

3. https://www.inc.com/christina-desmarais/everything-you-want-to-know-about-amazon-hq2.html

the MSA through the international mobility of people), and cross-border movement of goods, attract multinational enterprises.

A cosmopolitan population facilitates the use of expatriates by the investing firm. These expatriates are supported by cultural amenities such as stores with ethnic food products and houses of worship serving a variety of faiths and languages. Furthermore, a cosmopolitan population, which is open towards people and businesses from other countries and cultures, fosters a welcoming environment that recognizes the foreign firm as a valid potential customer or supplier (Riefler, Diamantopoulos, and Siguaw 2012). Access to ethnically diverse populations can also convey a competitive advantage to local firms because of the creativity and innovation that is often associated with ethnic diversity and the access to global ethnic social networks that diverse communities can give businesses (for example, Smallbone and others 2010). Lorenzen and Mudambi (2012) also outline the importance of personal relationships for an enterprise and noted that such relationships are easier for foreign direct investors in areas with diaspora communities from the foreign investors' country and a diverse populace. Zaheer and others (2009) find that Indian firms are likely to choose new locations based on ethnic connections with the company leadership, while Saha, Fikri, and Marchio (2015) note that the draw of Miami to foreign direct investors from Latin America is based in part on the widespread use of the Spanish and Portuguese languages and cultural similarities.

The availability of advanced producer services, such as law, finance, and translation, allows the foreign investor to access these services more easily and at a lower cost. A survey of European offices of mainly U.S.-based MNEs reported in Dunning and Norman (1983) revealed that the presence of business services is an important factor in location choice, ranked higher than, for example, labor costs. Sassen (2018) spotlights the presence of advanced producer services—such as experts in law, accounting, and business culture who provide vital services to management of large enterprises—as a key hallmark of the global city.

Using data that identifies FDI location choice in the United States at the MSA level, this paper analyzes traditional determinants of location choice, such as industrial agglomeration, as well as measures of international connectivity that have been highlighted in research on global cities. The paper first tests whether those U.S. global cities are more attractive to foreign investors, considering population, economics, and other widely recognized determinants. It then examines which of the characteristics of global cities are most attractive to investors.

3. Empirical Technique

I choose to analyze the location choices of foreign direct investors in the United States by MSA using the conditional logit model of McFadden (1974). This approach is commonly used in the location choice literature because its functional form guarantees that the predicted probabilities sum to one, and because it allows for the choice of multiple alternatives. In addition to being widely used for studies of location choice by business,[4] the conditional logit model has been used in other choice-modeling contexts, such as the decision of which college to attend (Fuller, Manski, and Wise 1982) or the decision of which automobile to purchase (Train and Winston 2007).

In McFadden's framework, the agent chooses the alternative that yields the highest expected utility or profit. In the context of location choice, we consider the case where the firm must choose over N possible locations, such as a state or an MSA, which are denoted $i = 1,...,N$. The expected profitability of location i (Π_i) is a function of the identified quantifiable attributes of that location (V_i), referred to as systematic value or utility, and a stochastic error term (ε_i), which captures the influence of unobserved (or latent) attributes, which are those that were excluded by the researcher, perhaps because they could not be quantified. So, we can write:

$$\Pi_i = V_i + \varepsilon_i \tag{1}$$

This equation can be rewritten to recognize that V_i generally consists of a vector of location attributes (X_i) and parameters to be estimated (ß):

$$\Pi_i = ßX_i + \varepsilon_i \tag{2}$$

The dependent variable in a simple conditional logit model is a binary variable, which customarily takes a value of one if investment is observed to occur in a particular location and a value of zero if it does not. McFadden has shown that the expected probability (P) of investing in location i, which is an element of the set {1, 2, ...N}, can be expressed in the form of the conditional logit model:

$$P_i = \frac{e^{ßX_i}}{\sum_{i=1}^{N} e^{ßX_i}} \tag{3}$$

where ß is a vector of coefficients to be estimated.

4. In fact, only a few papers in the literature on location choice by business do not use the logit model, notably Blanc-Brude and others (2014) who used Ordinary Least Squares with fixed effects in their study of location choice by investors in China.

The model further assumes the independence of irrelevant alternatives (IIA)—the relative probabilities of any two alternatives are unaffected by changes in the set of all available alternatives. McFadden, Tye, and Train (1977, 39) describe IIA as "the property that the ratio of the probabilities of choosing any two alternatives is independent of the attributes or the availability of a third alternative." Considering that this analysis involves multinational enterprises making choices over locations which are distinct MSAs, rather than larger geographic areas such as states, for large investments, the assumption seems reasonable.

The estimated ß vector cannot be interpreted as marginal effects, as in Ordinary Least Squares (OLS) regressions. Based on equation 3, the marginal effect of a 1-unit change in an independent variable for a given set of data are $P_i^* (1 - P_i)^*$ß, and so is dependent on the values, not only of ß, but the values of all other variables. The marginal effect presented for each independent variable in this paper is the average marginal effect evaluated at the mean. Because of the large size of the set of viable alternatives, the predicted probabilities for any given MSA are small, and the average marginal effects are thus necessarily small as well.

4. Data and Hypotheses

I construct the dependent variable for the conditional logit from data on new foreign investments collected by the Bureau of Economic Analysis (BEA). The dependent variable has a value of 1 if the MSA was chosen for the investment and 0 otherwise. The United States is one of the few countries to produce statistics on the number and value of new realized foreign direct investments. BEA initiated this survey in 1979 and it was subsequently discontinued in 2009 due to budget constraints but was then reinstated beginning in 2014.

The survey covers U.S. businesses that are newly acquired, established, or (for the years 2014 onwards) expanded by foreign direct investors. This study employs only the newly established or expanded facilities, or greenfield investments, which occurred in MSAs for the periods 2005–2008 and 2014–2016.[5] The data include the precise physical location of the new U.S. company or the location of the expanded facility, enabling postal codes (ZIP codes) to be matched to MSAs.[6] In the case of newly established businesses, the address pertains to the headquarters location, which may or may not be the location in which most of the production by the business in the United States occurs. For newly established businesses, it seems reasonable to assume that most, if not all, of the production will occur in this location in the firm's initial year. In the case of expanded businesses, the address pertains to the actual business location that is being expanded. Establishments account for 62 percent and expansions account for 38 percent of the observations in the empirical analysis.

Table 1. Number of Investments by Industry and Type, 2005–2008, 2014–2016

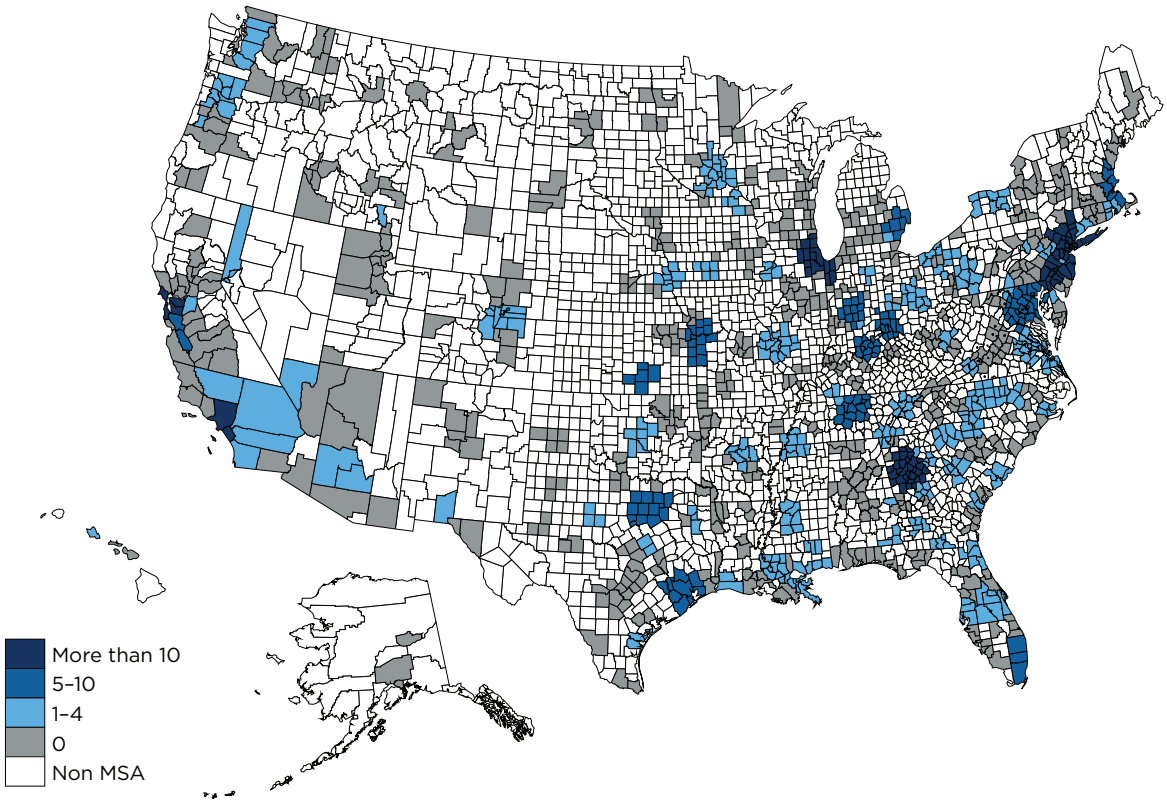
	Establishment	Expansion	Total
Manufacturing	71	97	168
Nonmanufacturing	152	46	198
Total	223	143	366

The survey covers investments in all industries but, for purposes of this study, investments in mining, North American Industry Classification System (NAICS) 22, real estate (NAICS 53), and holding companies (NAICS 55) were excluded from the analysis, as the factors that influence location choice in these industries are largely specific to the industry. The transactions in the dataset are roughly evenly distributed by type of investment (establishment versus expansion) and broad industry classification (manufacturing versus nonmanufacturing) as shown in table 1.

5. The overall results of the paper are unchanged if the periods are analyzed separately.

6. Some ZIP codes are in multiple counties, so these had to be checked individually with maps. Unfortunately, there is only limited information on the investing company—its name, broad industry, and country.

Map 1. Number of Investments by Metropolitan Area



Of the 381 MSAs in the United States, 109 are represented in these data.[7] Map 1 presents the distribution of investments by MSA, revealing that investments are concentrated in larger cities, especially New York, Chicago, Los Angeles and Atlanta, and are rarer in smaller cities, especially in the west (table 2). Each of these investments represents a location choice made by the investing firm, which potentially considered a variety of location attributes including general demographic and economic factors as well as the extent of the global connectedness of a potential location. The general factors included in the location attributes include population, GDP per capita, labor market variables, and a measure of industrial agglomeration. The factors related specifically to the global connectedness are the global city dummy variable, the airport dummy, the flight match dummy, the share of the population with a graduate degree, the advanced producer services index, and the distance to the nearest port. Because of the potential endogeneity that could be created if the independent variable were measured at the same time the investment took place, independents variables are lagged one year.

General Demographic and Economic Factors. Data on the population of MSAs are from the Census Bureau. As would be expected and as presented in table 2 below, the largest metropolitan areas attract the bulk of investments.

7. Puerto Rico and other U.S. territories are not included in the analysis.

Table 2. Number of Investments and Population for MSAs with Largest Number of Investments

Name	Number of investments	Population 2014
New York-Newark-Jersey City NY-NJ-PA Metro Area	50	20,092,883
Chicago-Naperville-Elgin IL-IN-WI Metro Area	21	9,554,598
Atlanta-Sandy Springs-Roswell GA Metro Area	16	5,614,323
Philadelphia-Camden-Wilmington PA-NJ-DE-MD Metro Area	16	6,051,170
San Francisco-Oakland-Hayward CA Metro Area	16	4,594,060
Los Angeles-Long Beach-Anaheim CA Metro Area	14	13,262,220
Indianapolis-Carmel-Anderson IN Metro Area	11	1,971,274
Houston-The Woodlands-Sugar Land TX Metro Area	10	6,490,180
Dallas-Fort Worth-Arlington TX Metro Area	7	6,954,330
Detroit-Warren-Dearborn MI Metro Area	6	4,296,611

Following the literature, for example, Deichmann and others (2003) and Cleeve (2008), I hypothesize that cities with a higher level of GDP per resident will be more attractive to investors, due to the larger potential market and because a higher GDP per capita implies higher levels of public services. Data on GDP per capita are from BEA.

Labor market considerations are potentially part of the decision-making process for firms choosing an investment location and are commonly examined in the location choice literature (Botric and Sklufic 2006). It is sometimes thought that a higher unemployment rate will make a city more attractive to investors, as it indicates that there is a large pool of potential employees. Similarly, all else equal, a low average wage is considered to be attractive, as it indicates a lower cost of operating a facility. Both the unemployment and wage data are from the U.S. Department of Labor.

As has been widely observed in the literature, I consider whether firms will be attracted to cities with a high degree of specialization in their industry. Much of the research that evaluates the effects of industry concentration, such as Glaeser and others (1992) and Holmes and Stevens (2002), measures the degree of concentration of an industry in an area by the industrial location quotient described in Barber (1988). The data used to compute this measure are from the Bureau of Labor Statistics Quarterly Census of Employment and Wages.[8]

Mathematically, the Location Quotient for industry i in metro area m, ($LQ_{i,m}$) is expressed as:

$$LQ_{i,m} = \left(\frac{Estab_{i,m}}{Estab_m}\right) / \left(\frac{Estab_i}{Estab}\right) \quad (4)$$

where ESTAB is the number of establishments in industry and metro area. A location quotient greater than unity indicates that the concentration of an industry in a metropolitan area is greater than that industry's concentration in the United States as a whole. The same calculation could be done with other metrics such as

8. https://www.bls.gov/cew/datatoc.htm

employment or total payroll; however, data on these measures are not available for all industry and metropolitan area combinations, due to suppression to protect confidentiality of individual firms.[9] I measure industry concentration at the 4–digit NAICS level, matching the level of industry aggregation reported in BEA's survey of new foreign direct investment in the United States.

Global Connectedness. There are several designations of which cities are considered global. One source that is widely used in the literature (see Castellani and others 2019, for example) was developed by The Globalization and World Cities Research Network and designates world cities as "Alpha," "Beta," and "Gamma" based on their international connectedness.[10] Alpha cities are the most globally connected and are considered to be primary nodes in the global economic network, such as New York City (MSA population 19.2 million in 2019). Beta cities are those that link medium-sized economic regions to the global economy, such as Boston (MSA population of 4.9 million in 2019). Gamma cities are those that link smaller economic regions to the global economy, such as Cleveland, Ohio (MSA population of 2.0 million in 2019). These indices are derived from examining the locations of head and branch offices of global multinational firms. These three categories are combined in the dummy variable "global city."[11]

As presented in table 3 below, global cities, especially the Alpha level cities, draw a disproportionate share of investment.

Table 3. Number, Share of Population and Share of Foreign Direct Investments in the United States for World Cities and Non-world Cities

	Number of cities[1]	Share of population 2014	Share of investments received
Alpha	8	25.6	37.3
Beta	9	14.3	13.4
Gamma	13	11.4	11.9
Other	351	48.7	37.3

1. Based on the 2012 classification of Globalization and World Cities Network

Investigating the Attributes of Global Cities. MSAs designated as global cities are different from other cities in several notable ways—for example, they tend to be more populous, have higher GDP, and have more ethnically diverse populations. Table 4 presents unweighted means of key variables for global and other cities in the United States. Global cities, in addition to being much more populous that other cities, have higher GDP per capita, wages, education, diversity and a greater presence of advanced producer services.

9. In cases where the number of establishments and employment or payroll data are available by industry and metro area, the number of establishments tends to be highly correlated with employment and payroll data across metropolitan areas and industries.

10. https://www.lboro.ac.uk/gawc/gawcworlds.html

11. Regression analysis with separate dummy variables for alpha, beta, and gamma cities yielded results similar to using a single dummy variable for any world city.

Table 4. Means of Key Demographic and Other Variables for U.S. Cities by City Classification, 2014

Statistic	All cities	Global cities	Other cities
Population	718,537	4,656,650	378,081
GDP per capita ($ Thousands)	45.6	65.2	43.9
Unemployment rate (Percentage)	6.3	5.9	6.3
Median wage (Dollars per hour)	16.05	18.94	15.81
Airport dummy (Share)	47.5	100.0	43.1
Distance to port (kilometers)	282	186	290
Share of adult population with graduate degree (Share)	9.1	12.4	8.9
Ethnic diversity index	0.34	0.48	0.33
Advanced producer services index	14.99	19.34	14.68

Transportation Links. One attribute of global cities sought by multinational enterprises that has been highlighted in the literature is the presence of nearby transportation connections. All the global cities are close to an international airport, whereas more than half of non-global cities are not. Transportation infrastructure has been shown to be an important requirement for the operation of a large enterprise (for example, see Giroud 2014), particularly infrastructure that facilitates face-to-face communication. I expect the presence of an international airport to enhance the attractiveness of an MSA to foreign direct investors (Belderbos, Du, and Goerzen 2017).

This paper takes two approaches to accounting for air transportation infrastructure. In the first specification, the airport dummy variable identifies MSAs with an international airport within 100 kilometers of a central county of the MSA.[12] The empirical results are robust to thresholds of 50 km and 150 km used to create the dummy variable. In the second specification, the airport dummy variable identifies MSAs with international airports having direct flights between the metropolitan area and any airport in the investing country. Locations that are proximate to a seaport are also expected to be more attractive, especially for manufacturing industries, due to reduced transportation costs. Therefore, I also include a variable for the distance from the centroid of the central counties[13] of an MSA to the nearest seaport using data on port location are from U.S. Department of Transportation, Maritime Administration.[14]

Demographic Characteristics of Global Cities. A second attribute of global cities is a cosmopolitan environment. To measure this, I use an ethnic diversity index outlined in Blau (1977). The index is calculated as $1-\sum_{j=1}^{N} p_j^2$, where p_j is the proportion of the ethnic group in the overall population for seven exclusive ethnic

12. There are some small airports that have occasional international flights. I define an international airport as a facility with at least 5,000 total international passengers annually.

13. As designated by the Office of Management and Budget.

14. I use a simple distance rather than a dummy variable with a cutoff as I did in the airport variable, on the assumption that the cost of transportation of materials is a continuous function of the distance; whereas, there is a discontinuity in the relationship of distance to an airport and cost. Beyond a certain distance from a city to an international airport, it will be necessary to use a connecting flight.

categories and higher values of the index indicate greater diversity. Blau's index is widely used to measure ethnic or other forms of diversity in social science research. (See Richard and others (2004) for an illustrative example.) To avoid endogeneity issues, these measures are based on the U.S. population census year preceding the investment, that is, 2000 Census population shares for the 2005–2008 investments and 2010 Census population shares for the 2014–2016 investments.

Global cities are also associated with skilled workers. As in Schneider and Frey (1985), I measure the level of education by the share of the adult population that has a graduate level degree.

Advanced Producer Services. A third attribute of global cities is the presence of "advanced producer services" referring to the professional and financial services that large complex business enterprises often seek. Following Sassen (2018) who examined the importance of business services in a global city, the level of advanced producer services is expected to attract FDI. In this paper, the level of advanced producer services is measured as the average of the MSA location quotients for all the 4–digit NAICS industries in finance and insurance (NAICS 52) and professional, technical, and scientific services (NAICS 54).

Table 5 summarizes the variables used in this analysis.

Table 5. Description of Variables

Variable	Description	Unit of measure	Source
	Dependent Variable		
New greenfield investment	Greenfield investment by FDI	Binary (0/1)	BEA (BE–13 survey)
	Demographic and Economic Variables		
Population	Population resident in an MSA	Millions of persons	Census Bureau
GDP per capita	GDP per capita	Millions of dollars	BEA
Unemployment rate	Share of working age population that is unemployed	Percent	Bureau of Labor Statistics
Industry location quotient	Industry concentration of investment	Location quotient	Bureau of Labor Statistics
	Global City Variables		
Global city dummy	The MSA's connectedness to the global economy	Binary (0/1)	Globalization and World Cities Research Network
Airport dummy	Presence of an international airport	Binary (0/1)	Dept. of Transportation
Flight match dummy	Presence of a direct flight between MSA and investing country	Binary (0/1)	Dept. of Transportation
Diversity index	A measure of the ethnic diversity of the MSA	Index of increasing diversity from 0 to 0.857	Census Bureau
Share of adults with graduate degree	Share of adults with a graduate degree	Fractional decimal (0–1)	Census Bureau
Advanced producer services index	Index of MSA advanced producer services	Average of relevant location quotients	Bureau of Labor Statistics
Distance to port	Distance: MSA to the nearest seaport	Miles (thousands)	U.S. Maritime Administration

Note: All explanatory variables are lagged.

5. Logistic Regression Results

Table 6 below presents the results of a parsimonious logistic regression, which estimates the impact of basic economic variables, industry concentration, and a global city dummy on location choice, but does not account for the influence of specific attributes that characterize a global city. Results are presented for all investments and broken down for manufacturing investments and nonmanufacturing investments.[15] Standard errors are in parentheses and average marginal effects at the mean are shown below the standard errors. Results reported in **bold** indicates significance at the 5–percent level.

Table 6. Logistic Regression Results, Basic Model

	All investments	Manufacturing only	Nonmanufacturing only
Population	**0.1345**	**0.1127**	**0.1435**
	(0.0099)	**(0.0184)**	**(0.0117)**
	0.0003	0.0003	0.0004
GDP per capita	**18.0815**	**13.5797**	**25.2235**
	(4.3439)	**(6.4639)**	**(5.7629)**
	0.0469	0.0356	0.0642
Unemployment rate	0.0455	0.0238	0.0793
	(0.0354)	(0.0465)	(0.0533)
	0.0001	0.00006	0.00002
Median wage	0.0087	–0.0334	0.0274
	(0.0253)	(0.0402)	(0.0329)
	0.00002	–0.00009	0.00007
Industry concentration	**0.0318**	**0.0272**	**0.0682**
	(0.0065)	**(0.0069)**	**(0.0169)**
	0.00008	0.00007	0.0002
Global city dummy	**1.8174**	**1.5425**	**2.2007**
	(0.1476)	**(0.2228)**	**(0.2096)**
	0.0047	0.0040	0.0056

The results for population, GDP per capita, industry concentration, and the global city dummy are consistent with expectations and statistically significant. The coefficients on population and GDP per capita are positive, implying that more populous MSAs and those with a higher level of income are more likely to be chosen. The estimated impact of GDP per capita is higher for nonmanufacturing investments, as measured both by the magnitude of the coefficient and the average marginal effect. This result could imply that the higher level of provision of public services generally associated with higher GDP per capita is more important for these investments than it is for manufacturing investments, potentially offsetting any increased cost effect that might by associated with higher GDP per capita. The estimated coefficient on the industry concentration measure is positive and larger for nonmanufacturing investments, suggesting that the positive externalities associated with the presence of other establishments in the investing industry are greater for nonmanufacturing investments.

15. The small number of investments in the data set makes it difficult to breakdown industry in greater detail.

As expected, the estimated coefficient on the global city dummy is positive, indicating that investors are more likely to choose MSAs that are global cities. The magnitude of the coefficient and the average marginal effect are larger for nonmanufacturing investments.

The estimated coefficients for both labor market variables (unemployment and wages) were statistically insignificant suggesting that labor market conditions do not have a clear impact on location choice decisions.[16] As noted in studies such as Taylor (1993) and Mataloni (2010), some firms may be primarily focused on realizing labor cost economies, seeking lower cost locations with lower labor costs and higher unemployment, while other firms may be primarily focused on worker productivity, seeking locations with higher worker skill, higher wages and less unemployment.

To better understand the most salient aspects of global cities on location choice, I also estimate the impact of specific attributes of global cities. Table 7 reports the results of logistic regression analysis with additional variables that explore the attributes of a global city. The estimated coefficients on population, labor market variables, and industry concentration are not substantially impacted by the inclusion of the additional variables. The magnitude of the GDP per capita coefficient is reduced by the inclusion of additional variables to some extent, which is not surprising as GDP is positively correlated with some of the attributes of global cities such as education and the presence of advanced produced services. The average marginal effect of being a global city is similarly reduced for all investments from 0.0047 in table 6 to 0.0030 in table 7.

16. Estimating the same equation with only the unemployment rate or only the median wage yields similarly inconclusive results.

Table 7. Logistic Regression Results, Expanded Set of Explanatory Variable

	All investments		Manufacturing only		Nonmanufacturing only	
Population	**0.1214**	**0.1161**	**0.0954**	**0.0859**	**0.1316**	**0.1281**
	(0.0111)	**(0.0113)**	**(0.0208)**	**(0.0214)**	**(0.0132)**	**(0.0135)**
	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003
GDP per capita	**12.7196**	**11.6010**	**8.2011**	**6.3026**	**20.1847**	**19.8220**
	(5.0068)	**(4.9633)**	**(7.5850)**	**(7.5342)**	**(6.5445)**	**(6.5395)**
	0.0301	0.0301	0.0215	0.0165	0.0513	0.0504
Unemployment rate	0.0414	0.0398	−0.0003	−0.0002	0.0983	0.0927
	(0.0428)	(0.0420)	(0.0610)	(0.0590)	(0.0589)	(0.0597)
	0.0001	0.0001	−0.000007	−0.000004	0.0002	0.0002
Median wage	−0.0045	−0.0007	−0.0579	−0.0497	0.0216	0.0182
	(0.0036)	(0.0365)	(0.0543)	(0.0540)	(0.0517)	(0.0515)
	−0.00001	−0.000017	−0.0002	−0.0001	0.00005	0.00004
Industry concentration	**0.0340**	**0.0335**	**0.0303**	**0.0296**	**0.0825**	**0.0826**
	(0.0065)	**(0.0065)**	**(0.0069)**	**(0.0069)**	**(0.0183)**	**(0.0182)**
	0.0009	0.00009	0.00008	0.00007	0.0002	0.0002
Global city Dummy	**1.1972**	**1.2918**	**0.8918**	**1.0292**	**1.6790**	**1.6643**
	(0.1691)	**(0.1611)**	**(0.2405)**	**(0.2369)**	**(0.2628)**	**(0.2339)**
	0.0031	0.0033	0.0023	0.0027	0.0043	0.0042
Distance to port	−0.0108	−0.0479	−0.2185	−0.3012	0.1975	0.2251
	(0.2331)	(0.2314)	(0.3409)	(0.3382)	(0.3198)	(0.3165)
	−0.00003	−0.0001	−0.0006	−0.0008	0.0005	0.0006
Airport dummy	**0.3657**		**0.5436**		0.0777	
	(0.1806)		**(0.2258)**		(0.3057)	
	0.0009		0.0014		0.0002	
Flight match dummy		0.2529		0.3641		0.2468
		(0.1515)		(0.2164)		(0.2127)
		0.0006		0.0010		0.0006
Share of adults with graduate degree	−1.2824	−1.5487	−1.1277	−1.4558	−1.1111	−1.2812
	(2.4614)	(2.4665)	(3.3147)	(3.3148)	(3.7429)	(3.7433)
	−0.0033	−0.0040	−0.0030	−0.0004	−0.0029	−0.0003
Diversity index	**2.6790**	**2.6926**	**2.5221**	**2.5561**	**2.9505**	**2.9172**
	(0.5443)	**(0.5412)**	**(0.7308)**	**(0.7227)**	**(0.8337)**	**(0.8325)**
	0.0070	0.0069	0.0066	0.0067	0.0075	0.0074
Advanced producer services index	**1.3726**	**1.4061**	**1.3591**	**1.4190**	**1.4484**	**1.4201**
	(0.2643)	**(0.2597)**	**(0.3825)**	**(0.3709)**	**(0.3755)**	**(0.3719)**
	0.0035	0.0035	0.0036	0.0035	0.0037	0.0036

The estimated coefficient on the "global city" dummy is substantially decreased by the inclusion of new variables, for example, from 1.8174 in the all-investments specification of the basic model to 1.1972 in the all-investments specification of the expanded model. The average marginal effect of the global city dummy is similarly reduced, from a range of 0.0040–0.0056 to 0.0023–0.0043. These results suggest that some, but not all, of the attractiveness of global cities to international direct investors can be explained by their transportation connections, cosmopolitanism, and the presence of advanced producer services.

The results for a nearby airport, diversity index, and advanced producer services index are consistent with the hypothesis that these characteristics of a global city are attractive for investments. The estimated coefficient on the airport dummy is positive, suggesting that cities close to international airports are more likely to be chosen. The magnitude of the coefficient is larger for manufacturing investments. This result stands in contrast to other research such as Blonigen and Cristea (2015), who found that employment in wholesale and retail trade industries is more responsive to changes in airport service than employment in manufacturing industries.

The estimated coefficient on the diversity index is positive, indicating that cities with higher levels of ethnic diversity are more likely to be chosen, and the result is statistically significant and consistent across specifications. The estimated coefficient on the index of advanced producer services is positive, indicating that cities with higher levels of these services are more likely to be chosen, and the result is statistically significant and consistent across specifications.

The estimated coefficients on the flight match dummy and educational attainment and on the distance to the nearest seaport are all insignificant, so their impact on the location choice is not confirmed by the analysis, which may reflect small sample sizes for some MSAs.

6. Simulations

Simulations based on the regression results suggest that greater international connectedness makes it much more likely for a city to be chosen as an investment site. Due to the nonlinear nature of the estimation equation, the coefficients presented in tables 6 and 7 cannot be interpreted as marginal effects as they would if the estimation technique were ordinary least squares or other linear estimation techniques. In addition to the estimated marginal effects, another way to illustrate the *economic* significance of these results is to perform a simulation where some of the independent variables are altered while the others are held constant, and the effect of the change on the probability that an area is chosen can be evaluated.

A Tale of Two Cities. The econometric analysis demonstrated that global cities are more likely to be chosen as locations by direct investors, even considering their larger population and other economic attributes. To further illustrate this result, I compare the probability a global city and a nonglobal city with similar attributes being selected for an investment.

Consider two large MSAs that both have a population of 2.2 million[17] and have median values for GDP per capita, unemployment rate, and median wage. The industry concentration is set to 1, which means that the number of establishments in the investing industry is average for both cities. Using the logistic equation outlined in the previous section and the values of the independent variables for these two cities, the probability of either of these cities being chosen can be calculated. Given the large number of cities in the full set of alternatives, the simulated probability of either city A or city B being chosen is small. Based on the coefficients in table 5 (basic model) for all investments (column 1), city A, the global city, is more than five times more likely to be chosen than city B. In other words, if an investor had a choice of only these two cities, we would expect city A to be chosen 85 percent of the time and city B to be chosen 15 percent of the time. Even holding other traditional attributes of a city constant, the fact of being considered a global city greatly increases the probability of being selected for an investment.

The Importance of an Airport. The attributes of global connectedness can also impact the probability of nonglobal cities being chosen for new foreign investment. To illustrate the economic significance of an international airport for an MSA, an exercise similar to the analysis of the global city can be performed using the airport dummy variable. Because all of the global cities have international airports, we can consider two non-global cities, city C and city D. City C has an international airport nearby, while city D does not. Both cities have median values for non-global cities for all other explanatory variables and an industry location quotient of one. Although the estimated probability of either city being chosen is small, the city with an international airport is 44 percent more likely to be chosen than the city without a nearby international airport. In other words, given a choice between two non-global cities, it is predicted that city C with the international airport will be chosen 59 percent of the time, and city D, the city without an airport, would be chosen 41 percent of the time. This share is higher than the share observed in the data on new investments used for this study. Among non-global cities, those with international airports received 56 percent of the investments, those without airports received 44 percent, further supporting the significance of transport connections to the appeal of cities as a destination for international investment.

17. The approximate population of the Sacramento CA and Cincinnati OH metropolitan areas is 2.2 million. Cincinnati is considered a global city, Sacramento is not, in the 2012 GAWC classification.

7. Summary

Using data that identifies location choice for foreign direct investment in the United States at the MSA level, this paper analyzes both traditional determinants of location choice, such as industrial agglomeration, as well as measures of international connectivity that have been highlighted in research on global cities. This study supports the finding that global cities are attractive to foreign direct investors not just by virtue of their population or industrial agglomeration, which do serve to attract investment, but by virtue of a much wider set of attributes, related to their demography and connections to the wider world. It has focused on the appeal of global cities and found that those metropolitan areas identified as global cities tend to attract a disproportionate share of investment, even considering standard demographic and economic variables that previous academic work in this area has considered. A simulation based on the regression results suggests that, all other factors being equal, a global city is much more likely to be chosen as an investment site than a non-global city, further demonstrating the importance of the global city to international investors.

Constructing measures of three of the main characteristics of global cities—connectedness, a cosmopolitan population, and the presence of advanced producer services—allowed further investigation of the phenomenon of global cities. The results suggest that all these characteristics are part of the appeal of global cities to investors. A simulation of the significance of having close access to an international airport further demonstrates the importance of transport connections in that, all other factors being equal, the presence of an international airport increases the probability of being chosen for an investment. Future work in this area should focus on further examining the characteristics of global cities and why they have such an appeal as a destination for investment.

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