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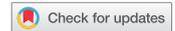
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Geography as strategy: the changing geography of corporate headquarters in post-industrial capitalism

Patrick Adler^a  and Richard Florida^b

ABSTRACT

This paper develops a theory of large corporate headquarters' location in post-industrial capitalism. It posits that human capital has become the primary factor in the location decisions of large corporate headquarters. It argues that such operations will locate in skilled cities that are also larger and globally connected. These hypotheses are tested using data from the Fortune 500 between 1955 and 2017. Count models are estimated to test the relative importance of human capital, population size and airport connectivity, alongside taxation and other factors identified in the relevant literature. The findings are consistent with the hypotheses.

KEYWORDS

corporate headquarters; talent; human capital; knowledge capitalism; post-industrialism; corporate strategy; localization; agglomeration

JEL E24, F63, J48, M21

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INTRODUCTION

Recent decades have seen a revolution in theory and research about location and economic geography. The field has focused on the new economic geography of 'post-industrial capitalism' (Bell, 1976; Drucker, 1993; Machlup, 1962; Piore & Sabel, 1984; Powell & Snellman, 2004),¹ identifying the role of clusters and industrial districts, innovation ecosystems, talent, amenities and related factors in the location and spatial organization of firms and industries (Glaeser & Mare, 2001; Krugman, 1993; Porter, 2000). However, this research has focused mainly on identifying the key characteristics of these evolving spatial forms and their effects on the innovative and economic performance of cities and metro areas. While there is a significant literature on the location decisions of corporate headquarters in the older Fordist industrial era, little theory and research explores the way that such factors may affect the location of corporate headquarters in post-industrial capitalism.

Yet, corporate headquarters' location is a key facet of this new economic geography. Headquarters are the strategic sites of advanced capitalism and its largest and most advanced firms. During the 1960s and 1970s, cities once often ranked by their concentrations of corporate headquarters. Moreover, classic industrial location theory sought to account for the factors that influence firm

location; and literature dating to the 1970s and 1980s sought to identify the factors associated with corporate headquarters' location.

There is substantial anecdotal evidence that corporate headquarters have become more mobile. Several years ago, the leading trade journal devoted to business site selection proclaimed that such corporate headquarters relocations had reached an historic high, noting that 'no headquarters is immune to relocation' (*Site Selection*, 2014, p. 206).

No other location decision in modern memory has generated the attention and the press of Amazon's controversial decision to find a new site for its second headquarters, its so-called HQ2, outside Seattle. Ultimately, more than 230 cities responded to its request for proposals (RFP), a group that was winnowed to a group of 20 finalist cities, of which New York and Washington, DC, were ultimately selected. Amazon then backed out of New York City in reaction to political activism and opposition to the large public incentives granted to the company.

Amazon is far from the only large company to relocate its headquarters recently. In the early 2000s, Boeing's 2001 decision to move from suburban Seattle to downtown Chicago with starting. Other high-profile head office movers include Conagra (which moved from Omaha to Chicago), Phillip Morris (from New York to Richmond), Aon (from Chicago to London), Hertz (from Greater New York to

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Cape Coral), and General Electric (from Hartford to downtown Boston) and more.

The increased mobility of corporate headquarters stands in contrast to the older pattern of the previous industrial or Fordist era, where headquarters seemed to be more rooted or sticky in their original locations and where relocation decisions were more driven by factors such as land and labour costs. Furthermore, such mobility may be at odds with prevailing theories of industrial clustering that imply that such high-skill corporate units gain significant advantage from being embedded in established networks of related firms, suppliers, customers and skill.

This change in the geography of corporate headquarters is of interest to corporate strategists and economic geographers for two key reasons. On one hand, it implies that the upper reaches of executive and management functions of the modern knowledge-based corporation are increasingly footloose and driven by access to talent. On the other hand, it suggests that the resources that large corporate headquarters demand from their environment are changing, demanding new theoretical understanding of the factors that bear on firm location.

Drawing on the literatures on post-industrialism and its geographical implications, we advance a basic theory of corporate headquarters' location in knowledge-based capitalism. We argue that as talent has become a key factor of production in post-industrial economies, corporate headquarters' location and relocation will be oriented toward cities and metro areas with large concentrations of human capital. We further contend that corporate headquarters' location will be shaped by population size and global connectivity, principally access to proximity to global airports. We use data on the location of corporate headquarters from Fortune 500 spanning the period 1955–2017 to test these hypotheses. We estimate count models that test the relative importance of human capital variables alongside measures that have been proposed by other studies on the location of modern firms and workers.

CONCEPTS AND THEORY

To motivate our own contribution, we begin by reviewing the older literatures on industrial location, corporate headquarters' location and more recent theories of economic geography.

The classic theory of industrial location (Christaller, 1933; Losche, 1894; see also Isard, 1956; and Alonso, 1960) treat location as a vector of factors such as production costs, transportations costs and local demand, which are optimized in location decisions. A stream of empirical studies has examined the location of corporate headquarters in light of these classic location factors (Holloway & Wheeler, 1991; Horst & Koropeczyi, 2000; Semple, 1973; Semple & Phipps, 1982). Taken as a whole, this literature identified a shift in corporate headquarters' locations from large urban centres such as New York or Chicago or older Rustbelt cities such as Detroit or Pittsburgh to new locations either in their suburbs or in the Sunbelt.

We argue that the nature of corporate headquarters' location has changed concomitant to the rise of post-industrialism. Perhaps the key factor to emerge from our theory and understanding of post-industrial geography is the clustering of economic activity and of human capital or talent. There is substantial literature on clustering or agglomeration dating back to Alfred Marshall's classic insights (Duranton & Puga, 2005; Krugman, 1993; Piore & Sabel, 1984; and especially Porter, 1998, 2000, 2003a; see also Beugelsdijk, McCann, & Mudambi, 2010). According to Porter, competitive advantage is not just rooted in the firm's internal assets, but in the resources of its cluster, that is, the nearby firms with which it shares suppliers, workers and institutional support. Firms that are linked together as part of such formations are seen to have advantages over more isolated, less connected, organizations.

A related body of empirical studies finds clustering to be a factor in the location in corporate headquarters' location. Klier (2006) finds that firms that organically relocate tend to move from smaller to larger cities, and that these moves are also conditioned by access to international flights and warm climates. In a study that considers relocation by more than 30,000 firms. Lovely, Rosenthal, and Sharma (2017) find that exporters are significantly more likely to co-locate in space. Davis and Henderson (2008) find that the presence of intermediate business services is, alongside same-industry specialization, a predictor headquarters' births. Mariotti, Piscitello, and Elia (2010) show that head offices for Italian multinational corporations are more likely to cluster near each other than domestic-serving firms. Strauss-Kahn and Vives (2009) also identify airports as a predictor, alongside relevant local services, low taxes and same-industry specialization.

While important, cluster theory may not be the best guide for how large firms do or should make their location decisions. Cluster theory tends to focus on small and medium-sized firms and emphasizes horizontal linkages among firms within the cluster. In doing so, it tends to neglect the economic power and prerogatives of very large corporations. Mariotti et al. (2010) demonstrate that multinational firms might be disadvantaged by the leakage of knowledge from their firm to other firms in the cluster. Rigby and Brown (2015) show negative productivity effects of urban size on smaller and younger Canadian plants and no such effects for larger and older firms. Riddle (2016) argues that Porter's (1980, 2000, 2003b) work on regional and national clusters is an uneasy and seemingly contradictory continuation of early strategy work (Porter, 1980) that encouraged firms to seek advantage through the elimination of competition.

In contrast, we seek identify the most essential resources large firms look for in locations. We focus on the role of firm behaviour and strategy in identifying and accessing those resources. Our theory is a resource-based approach to large-firm location strategy. This kind of approach paradigm is fairly established in management theory (Penrose, 1959; Wernerfelt, 1984). We see location as a fundamental dimension of firm strategy aimed at

securing the necessary resources available in different locations.

In knowledge-based capitalism, the key resource that firms seek to secure is talent or human capital. An extensive literature documents the importance of human capital to knowledge-based capitalism (Bell, 1976; Drucker, 1993; Machlup, 1962; Piore & Sabel, 1984; Powell & Snellman, 2004). Indeed, a common finding in the new economic geography is that human capital growth has been spatially concentrated in a relatively small number of skilled cities and metropolitan areas (Berry & Glaeser, 2005; Florida, 2002) which have advantages in consumption (Clark, Lloyd, Wong, & Jain, 2002), in production (Kemeny & Storper, 2012), or both (Shapiro, 2006).

This implies the need for a new paradigm for corporate headquarters' location and relocation. Under Fordist industrial capitalism, location decisions, including headquarters' decisions, sought to minimize costs and were more strongly rooted in their origin locations. Under knowledge-based capitalism, firms orient their location – particularly the location of corporate headquarters – to gain access to human capital. Moreover, the kind of talent or human capital that is important to the corporate headquarters of large, global multinational firms – spanning the fields of finance, high-level management, corporate strategy, marketing and technology – are even more concentrated geographically (Duranton & Puga, 2005). This new competitive environment selects for firms with knowledge, skill and knowhow advantages – factors that are unevenly distributed and concentrated in a small number of places. As a result, the location of corporate headquarters has

become heavily inflected toward areas with high concentrations of these required skills and human capital.

Table 1 outlines our basic framework for understanding the corporate headquarters' location of large knowledge-based firms. Under the older Fordist industrial paradigm, firms sought to minimize costs. In the new paradigm, costs are less important, and firms seek to optimize talent. In the old paradigm, firms shifted location from older, large cities in the Northeast and Midwest to smaller younger cities in the suburbs and Sunbelt. In the older paradigm roads and highways were key infrastructure. In the new paradigm, airports and global connectivity matter more.

The headquarters forms the focal management and strategic centre of the firm. This has several implications for human capital attraction and retention. It is where the most relevant knowledge and expertise related to firm strategy must end up in order for strategic decisions to be made. It is also where skilled firm employees will likely end up, if not on a permanent basis than on a regular basis. Furthermore, it tends to be where the firm is governed, not just by managers but by boards of directors and employee directors.

Firms for whom talent is a source of competitive advantage cannot by definition afford to compromise on this factor. Talent is attracted to and is concentrated in certain locations. While some firms may be able to attract talent to smaller locations, such as Wal-Mart in Bentonville, Arkansas or Warren Buffett's Berkshire-Hathaway in Omaha, Nebraska, most firms including large firms are not, and require access to large talent pools and specialize veins of talent that are coated in a relatively small number of larger cities.

Furthermore, the corporate headquarters site serves a number of critical functions from the standpoint of human capital. It is a key, if not the major, site of knowledge exchange for the firm's workers and partners. It is furthermore the location where senior managers are based and where high-level corporate operations are conducted. As such the headquarters acts as the symbolic focal point for the firm. In a meaningful sense, Apple, Google and other leading tech firms are of Silicon Valley; Goldman Sachs and other leading financial firms are of New York; leading media and film companies are of Los Angeles, even though these firms have sprawling global operations. Such symbolism matters for those skilled workers who seek to carve out careers with firms and in places that align with their individual identity.

Corporate headquarters require specialized pools of talent related to global finance and management, marketing, branding and technology. This kind of talent is unevenly concentrated in certain cities and metro areas. When there are specific competencies required by a firm, the labour force's specialization will play an important role. This is true of not just of technology-based firms but in sectors such as energy and finance where there are special competencies: if technology talent is concentrated in the Bay Area, skills related to energy and resource are concentrated in Houston, financial skills in New York,

Table 1. Old and new paradigms for corporate headquarters' location.

	Cost minimization	Talent
First-order factor	Cost of labour	Quality and concentration of talent
Size/type of city	Sunbelt/suburban orientation	Large urban centre
Labour pool	Local	Global
Guiding labour principle	Lowest cost	Quality
Key infrastructure	Highways, railroads, seaports	Global airports
Guiding transportation principle	Minimize cost	Connectivity trumps cost
Taxes	Low-tax, low services and amenities	High tax, high services and amenities
Incentives	Can alter location decisions	Play little or no role (are extractive rents)

talent related to film and media in Los Angeles (Helsley & Strange, 1990).

Population size increases the pool of talent. Bigger cities and metro areas have more talent and greater diversity of talent. The introduction of a large firm into a local ecosystem may dramatically increase wage levels and prices for local goods. In general, larger cities will be better able to absorb large corporate relocations such as Amazon HQ2, and perhaps to sustain growth of firms to higher levels. Furthermore, labour markets with larger and more relatively inelastic housing supply will be more amenable to large firms. It is along dimension that the headquarters decisions of large and small firms should be the most different.

The ideal large firm headquarters would be located in a skilled city, with similar headquarters nearby, and both land and labour markets that are relatively insensitive to its own presence. This implies that, over the long run, corporate headquarters should not converge into a single labour market, but perhaps a small roster of corporate specialists. It also implies that as new industries developed, they may come to be headquartered in newer geographical frontiers. At the beginning of the industry life cycle, firms might not be able to pay the rents that more mature headquarters are paying and locate on the periphery.

Human capital-intensive firms will afford a premium on global connectivity. Global airports are crucial conduits for human capital that resides outside the region, and firms with access to international flights might find it strategically beneficial to source human capital from abroad on a more temporary basis (Florida, Mellander, & Holgersson, 2015; Kasarda & Lindsay, 2011). Florida et al. (2015) find that global airport access and connectivity is one of three key factors alongside access to universities and talent clusters that act on regional economic development. There is also evidence that airports themselves act to enable business activity (Neal, 2011).

The literature identifies other factors that bear on the location decisions of firms and corporate headquarters. One is business services. Davis and Henderson (2008) find that both headquarters localization and the presence of business services predict manufacturing firm headquarters; however, they do not consider the unique dynamics that might face large firms. Another is weather and climate as numerous studies identify a shift in business activity and corporate headquarters to warmer areas of the Sunbelt. Then there are taxes and incentives. Firms will go to large lengths to avoid tax exposure, as the literature on fiscal geographical of tax avoidance notes (Wainwright, 2011). Cities and states often use incentives to try to lure corporate activities and in particular corporate headquarters. Such mega-deals have risen into the billions of dollars (Bartik, 2018). While incentives may have been able to alter the locational calculus of firms in the older Fordist era, the consensus is that they essentially amount to wasteful giveaways that do little to alter the basic locational calculus of large firms which basically choose where they want to be based on fundamental factors such as the availability of human capital and talent and then set in motion a fictitious

competition to capture incentives and tax breaks. Our research is designed to examine the effect of these factors on the location of corporate headquarters.

VARIABLES, DATA AND METHODOLOGY

To understand the changing geography of large firm headquarters in post-industrial capitalism, we develop a database of the corporate headquarters' location based on the well-known Fortune 500 list of the largest corporations (F-500 hereafter). The F-500 is a list of the firms in the US economy based on revenue. Our data span the more than half-century period from 1955 to 2017, the period of the transition of the US economy from an industrial to post-industrial economy.

We are interested in the location decisions of the largest, most economically powerful firms. In total, F-500 firms form the power centre of the US economy. They employ more than 28 million employees globally and account for more than US\$12.5 trillion in revenue. F-500 firm revenues in 2017 were equivalent to 75% of the gross domestic product (GDP) produced by the entire metropolitan economy. The revenues for the average F-500 company are equivalent to Midland Texas' entire metropolitan GDP. Our analysis follows in a tradition of similar studies (Klier, 2006; Semple, 1973; Semple & Phipps, 1985) and allows one to consider the geography of large firms, while also considering a cross-section of industries.

There was considerable turnover on the F-500 list over this period. Accounting for mergers and acquisitions, only 60 firms from the 1955 list, 12% of the total, remained on the list in 2017 (Perry, 2017). Thus, our exercise is mostly not an analysis of where the same set of firms relocated. We are chronicling where new firm headquarters emerged, and potentially where those relocated.

The F-500 has been published annually since 1955. From 1955 to 1995, it did not include service firms; however, since then it has reflected the full spectrum of sectors in the economy (Stangler & Arbesman, 2012). Because of the 1996 methodological change, lists before and after this year are not strictly comparable. To produce comparable estimates, we use Fortune 1000 lists from 2017 and 1996 to create hypothetical, counterfactual lists that do not contain service firms. This allows us to comment on how the geography of major firms has changed from the days when cost minimization is assumed to have been a dominant paradigm.

Our study uses data from the 1955, 1975, 1996, 2000 and 2017 F-500 lists to conduct three types of analyses: geography over time, geography by industry and analysis of the firm environment (Fortune Datastore, 2017). Geographical data for 1955 and 1975 are not available from Fortune and are hand coded using information from company directories, which were found using annual report information available at Mergent Archives. Our analysis is based on combined statistical areas and metropolitan statistical areas.

In order to isolate the effects of our key hypothesized factors while controlling for other variables identified in the literature, we estimate several maximum likelihood models, where the dependent variables of interest are F-500 headquarters counts at the metro level. Here, we use core-based statistical areas (CBSA) as our unit of analysis. Such models are appropriate for variables such as ours, where there is a mostly discrete set of outcomes, where negative outcomes are not possible and where many units take zero values. After tests to detect the over-dispersion of counts, we determined that negative binomial estimates were appropriate. These estimates are not zero-inflated because the assumed mechanisms explaining zero values are the same as those for positive values.

Our estimating equation is as follows:

$$\begin{aligned} \Pr(Y_{\text{FortuneCount}} = y | \lambda, \alpha) \\ = \frac{(y + \alpha^{-1})}{y! (\alpha^{-1})} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \lambda} \right)^{\alpha^{-1}} \left(\frac{\lambda}{\alpha^{-1} + \lambda} \right)^y \end{aligned} \quad (1)$$

where Y is some count of Fortune firms; and λ is the expected value. In turn, λ is dependent on a vector of local characteristics in region i that have been identified by us and the literature, expressed in natural log terms:

$$\lambda_1 = \beta X_i \quad (2)$$

Based on our theory, our models include seven key variables:

- *Human capital/talent*: a measure of talent or human capita is the conventional one – the share of adults with a bachelor's degree or more.
- *Population size*: a variable for size is metro population.
- *Airports*: a variable for global airport connectivity based on the presence of an international airport as identified by the Department of Transportation's passenger estimates.
- *Historic human capital*: educational attainment measured as the highest grade achieved by adults in 1950 (from IPUMS 2016). We include this to capture the lasting effects of human capital that have been identified elsewhere (Moretti, 2012; Shapiro, 2006).
- *Weather/climate*: numerous studies note the shift in corporate headquarters to warmer cities in the Sunbelt. To account for this, we include a variable for average January high temperature for the metro's largest city.
- *Business services*: studies such as Davis and Henderson (2008) find business services to be related to manufacturing headquarters. To test for this, we include a measure of lawyers per capita.
- *Corporate tax environment*: numerous studies suggest corporate headquarters' location is oriented to minimize tax burdens. To account for this, we include a variable of the state corporate tax favourability score for the largest city.
- *Industry localization*: we include a variable for industry localization based on workers per capita in extraction, information services, wholesale sales, manufacturing and lawyers.

FINDINGS

We now turn to the main findings from our analysis. We begin by describing the changing geography of F-500 corporate headquarters from 1955 to 2017, outlining these trends in the aggregate and by major industrial sector. We then turn to the findings of our regression analysis which examines the role of talent or human capital in the geography of F-500 corporate headquarters compared with commonly cited factors.

Table 2 charts the changing geography of F-500 corporate headquarters from 1955 to 2017. It shows both the leading areas for F-500 firms and the magnitude of change over the study period. While New York has the largest number of corporate headquarters, that has fallen slightly over the study period. Los Angeles, America's second largest metro, saw a 17% decline. Chicago, the nation's third largest metro, saw an even bigger decline of 28%, losing 19 headquarters since 1975. Despite picking up General Electric, Boston saw a 21% decline in its F-500 headquarters between 1975 and 2017. The Rustbelt metros of Detroit, Pittsburgh, Milwaukee and Cleveland also lost corporate headquarters, with Minneapolis being an exceptional Midwest city that grew its share of the F-500.

The rise of high-tech industry has made the San Francisco Bay Area, which spans the San Francisco and San Jose metro areas, the nation's second largest centre of corporate headquarters with 35 compared with Chicago's 33. Still, other places across the country have posted even faster rates of growth. Denver and Seattle each added eight headquarters for a 400% rate of growth, and San Antonio also saw a 400% increase. Washington, DC, added 13 new headquarters, for a growth rate of more than 300%. The Sunbelt has also seen substantial growth as headquarters locale. Dallas and Houston rank third and fourth, with 22 and 20 respectively, each posting a 60% plus growth rate. Miami, which has solidified its position as the economic and financial centre of Latin America, has seen 200% growth in its headquarters, while Atlanta and Nashville have posted 50% growth since 1975.

There were two notable cases of intra-regional suburbanization. The New York metropolitan portion of the area declined by 1.8 points during the period and the Bridgeport metro area increased by 1.4 points. Meanwhile, the relatively more suburban part of the Bay Area, grew its share of the F-500 from zero to 5 points, as San Francisco's share grew by a more modest 0.5 points. Figure 1 maps changes at the CBSA level, that is, the more granular level, at which there are two metro regions in the San Francisco Bay Area and two in the Washington–Baltimore area.

With all that change, the F-500 corporate headquarters remain oriented to very large metropolitan areas. There is no region with at least 5 F-500 headquarters and fewer than 1 million residents at either the CBSA or CSA level. The smallest such area is Greater Hartford, a metro of 1.2 million people but which is otherwise

Table 2. Proportion of Fortune 500 headquarters by metro region, 1955 and 2017.

Area	2017	2017 share (%)	1955	1955 share (%)	Percentage change
New York	80	16%	81	16.2%	-1%
San Francisco	35	7%	8	1.6%	438%
Chicago	33	6.6%	46	9.2%	-28%
Dallas	22	4.4%	13	2.6%	69%
Houston	20	4.0%	12	2.4%	67%
San Francisco	35	3.6%	7	1.4%	157%
Washington, DC	17	3.4%	4	0.8%	325%
San Jose	17	3.4%	5	1.0%	240%
Minneapolis	17	3.4%	11	2.2%	55%
Atlanta	15	3.0%	10	2.0%	50%
Los Angeles	15	3.0%	18	3.6%	-17%
Philadelphia	14	2.8%	12	2.4%	17%
Boston	11	2.2%	14	2.8%	-21%
Denver	10	2.0%	2	0.4%	400%
Seattle	10	2.0%	2	0.4%	400%
Detroit	10	2.0%	16	3.2%	-38%
St. Louis	9	1.8%	6	1.2%	50%
Richmond, VA	8	1.6%	6	1.2%	33%
Cincinnati	8	1.6%	7	1.4%	14%
Milwaukee	7	1.4%	11	2.2%	-36%
Miami	6	1.2%	2	0.4%	200%
Nashville	6	1.2%	4	0.8%	50%
Charlotte	6	1.2%	11	2.2%	-45%
Pittsburgh	6	1.2%	13	2.6%	-54%
San Antonio	5	1.0%	1	0.2%	400%
Hartford	5	1.0%	5	1.0%	0%
Columbus, OH	5	1.0%	5	1.0%	0%
Cleveland	5	1.0%	18	3.6%	-72%

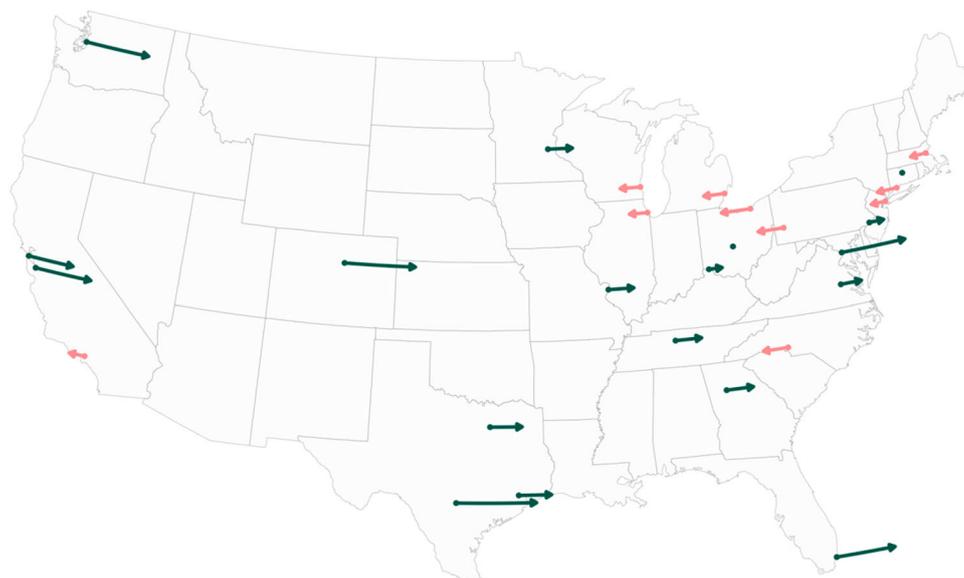
**Figure 1.** Changing distribution of the Fortune 500 among metros. Drawing: David Montgomery, CityLab (<http://dhmontgomery.com/>).

Table 3. Industrial sector with the highest Fortune 500 growth, 1996–2017 by metro.

Region	Top gaining sector	Sector gains	Total gains	Region	Top gaining sector	Sector gains	Total gains
San Jose	Tech	12	10	Richmond	Business services, sales	2	1
Houston	Energy	8	4	Charlotte	Sales	2	2
Chicago	Sales	4	-2	Miami	Sales	2	2
Atlanta	Sales	4	4	Nashville	Sales	2	4
Minneapolis	Goods and materials	3	4	Pittsburgh	Sales	2	-3
Washington, DC	Tech	3	2	Columbus, OH	Sales	2	-2
Detroit	Goods and materials	3	1	Philadelphia	Business services	1	-5
Cincinnati	Business services	3	2	Boston	Tech	2	-1
New York	Business services	2	-21	Milwaukee	Business services	1	2
Dallas	Business services, sales, tech	2	7	Cleveland, OH	Goods and materials	1	-6
Denver	Consumer services, business services, sales	2	6	Hartford	Consumer services, goods and materials	1	1
Seattle	Tech	2	3	San Antonio	Consumer services, sales	1	1
St. Louis	Consumer services	2	0	Los Angeles	Business services	0	-14

connected (i.e., transit links) to the much larger New York metro. The centre of gravity of F-500 headquarters may have shifted west and south, but it maintained its connection to the biggest cities and metro areas throughout this period.

America's headquarters' geography reflects the substantial variation and specialization of the US economy. Table 3 arrays F-500 headquarters by industry sector. New York leads in finance and business services, consumer services, and goods and materials. However, Houston leads in

Table 4. Model results for actual (2017) Fortune 500 (F-500) headquarters and counterfactual Fortune 500 headquarters, negative binomial estimates.

	Dependent variable = Count of F-500 firms per region			Dependent variable = Count of counterfactual F-500 firms per region		
	1	2	3	1	2	3
Region population (100,000s)	.02** (.00)	.02** (.00)	.02** (.00)	.02** (.00)	.02** (.00)	.02** (.00)
Regional human capital share (points)	.07** (.014)	.07** (.017)	.07** (.021)	.07** (.017)	.09** (.019)	.08** (.020)
Highest grade completed, 1950		-.36 (.40)			-.82 (.43)	
International airport? (1/0)	.49** (.25)	.61** (.35)	.25 (.26)	.83** (.29)	.84** (.36)	.46 (.35)
Corporate tax favourability			.11 (.93)			.07 (.15)
January temperature			-.02** (.01)			-.01 (.01)
Lawyers per capita			.00 (00)			.00 (00)
Constant	-1.42** (.42)	-.75 (.98)	-1.65 (1.28)	-1.03** (.33)	-1.29** (.36)	1.00** (.43)
Observations	357	119	122	357	119	122
LR Chi ²	97.60	72.51	88.9	106.49	74.74	80.6
Log-likelihood	-166.52	-132.14	-150.01	-242.96	-168.47	-179.05

Table 5. Model results actual (2017) Fortune 500 (F-500) firms by industry, negative binomial estimates.

	Dependent variable = Count of F-500 tech headquarters per region		Dependent variable = Count of F-500 finance headquarters per region		Dependent variable = Count of F-500 energy headquarters per region		Dependent variable = Count of F-500 sales headquarters per region	
	1	2	1	2	1	2	1	2
	Region population (100,000s)	.01** (.00)	.01** (.00)	.02 (.00)	.01** (.02)	.01** (.01)	.02 (.01)	.01** (.00)
Regional human capital share (points)	2.35** (4.19)	1.75** (5.16)	.07** (2.81)	.034 (4.88)	.067** (5.17)	-.07 (4.90)	.06** (3.17)	.02** (3.24)
Highest grade completed, 1950	1.21** (.43)		1.82 (1.18)		-.80 (.67)		-.80 (.67)	-1.29** (.65)
International airport? (1/0)	-1.38 (.97)	0.00 (0.00)	1.82* (1.18)	2.33** (1.17)	1.65 (1.17)	2.33 (1.11)	.67 (.82)	.16 (.51)
Corporate tax environment		.43 (.37)		-.55** (.26)				.46** (.19)
January temperature		.04** (.02)		-.01 (.02)		0.00 (0.00)		-.02* (.01)
Localization share		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)
Constant	-10.74** (2.82)	-13.67** (4.14)		-4.44** (1.62)	.25 (2.36)		-1.16 (2.60)	-5.52** (1.65)
Observations	119	319	119	111	119	319	119	319
LR Chi ²	29.89	35.51	38.51	27.66	19.12	17.11	19.12	32.27
Log-likelihood	-40.14	-40.30	-60.79	-83.30	-60.63	-64.53	-67.992	-75.76

energy, San Jose and San Francisco in tech, and Chicago in retail and wholesale. Chicago also ranks second in consumer services and goods and materials, and Dallas takes third in energy. Other cities such as Nashville and Minneapolis take third in consumer services and goods and materials, respectively.

Almost all metros saw gains in at least one sector, even those that saw net declines in headquarters. New York, Chicago, Boston, Cleveland and Pittsburgh lost a combined 41 headquarters between 1996 and 2017 but gained a combined 13 firms in their largest-gaining sectors. Only Los Angeles did not gain in at least one sector, although it did maintain its number of business services firms. Houston, Washington, DC, Cincinnati and Richmond saw net growth but declines across some sectors; Dallas, Denver, Seattle and Nashville stand out as regions that saw growth across multiple sectors.

Taken as a whole, these trends suggest the increased specialization of F-500 headquarters. Rather than shedding headquarters altogether, older and colder places appear to be developing narrower headquarters niches. Greater New York is a business services centre specializing in finance headquarters in particular; Boston added tech headquarters; and Chicago, Atlanta, Columbus and Pittsburgh added sales headquarters. Minneapolis added goods and materials headquarters. Houston is the nation's

energy hub, adding new energy headquarters. This finding is consistent with an earlier Australian study that found that Sydney and Melbourne saw increased specialization in headquarters (Tonts & Taylor, 2013).

THE GEOGRAPHICAL DETERMINANTS OF CORPORATE HEADQUARTERS

We now turn to the results of our statistical analysis of the geographical determinants of F-500 headquarters' location. Recall our central hypothesis is that the geography of F-500 corporate headquarters is shaped by concentration of human capital or talent. We also posit that population size and airport connectivity will play a significant role in the location of large corporate headquarters.

Figure 1 shows the number of F-500 firms by quartile for our key variables. It suggests that human capital, size and airport connectivity are all strongly associated with the presence of F-500 headquarters. A total of 70% of headquarters' metros are in areas in the top quartile of human capital, and most of the rest are in the third quartile. Headquarters are even more anchored to large urban areas. More than 90% of headquarters are found in metro regions at or above 1.3 million people – roughly the size of Providence, Rhode Island. Almost 90% (87%) of F-500 of headquarters are located in metros with global airports.

Table 4 shows the results for the locations of actual F-500 headquarters and counterfactual firms under the original methodology. Human capital and population size broadly, significantly and strongly predict F-500 location across all models. For every additional 100,000 population in a metro, the log of the probability of an additional F-500 firm is increased by 0.02. For every whole percentage point on local human capital share, the log probability increases by 0.07. These magnitudes are so large that they cannot just be explained by the direct presence of F-500 firms. As a reference, an unusually large corporate headquarters is Walmart's Bentonville's campus (14,000), which comprises only 5% of the relatively small Fayetteville metro area. Airports are significantly associated with F-500 firms in models that consider our hypothesized variables but not in less restrictive models that consider measures identified elsewhere.

The results for other variables are mixed. The variable for climate/weather does not have the sign as predicted by the extant literature. January temperature is negatively associated with headquarters location, controlling for other variables. The variables for businesses services and state taxes are not significant, once the main variables are accounted for.

We proposed that as the fundamental structure of the economy has shifted from industrial to post-industrial and knowledge-based, access to human capital and talent has become more important for major corporations. If this is true than our model of the F-500 headquarters' environment would better apply to the modern F-500 list than the hypothetical non-service list. Indeed, the likelihood ratio statistics (LR) show that the model is a better fit for the published F-500 than the hypothetical F-500 list, based on original methodology.

Table 5 shows our model results for headquarters by specialized industries. The variables for human capital and population size are again positive and significant across most models. The human capital effect is most pronounced with technology and least for finance and energy. January temperature is also modestly and significantly associated with technology firms. A favourable corporate tax environment is associated with sales firms and negatively associated with finance firms.

The results of these models show little effects from localization. We include localization measures (based on employment per capita) for sectors of finance and insurance, data processing, wholesaling, and extraction and mining. None is significant. Provided that these adequately capture related industry employment, one interpretation of this result is that corporate headquarters do not seem to draw on resources from the wider industry as is the case for other firms.

DISCUSSION AND CONCLUSIONS

We advanced a new theory for understanding the location and geography of corporate headquarters of very large firms. We argued that the location of these headquarters is largely determined by access to talent or human capital,

with population size and airport connectivity playing additional roles. We tested this by examining data on the location of F-500 corporate headquarters for more than a half century.

The results of our analysis confirm our initial thinking America's F-500 corporate headquarters are located in areas that are relatively rich in human capital. The tendency to locate near talent is more pronounced in high-tech industries, which are more knowledge and skill based. Similarly, our human capital models are better fits when service-oriented firms are considered than in goods-producing firms only.

Regional size also matters, being consistently positive and significant in our statistical models. Furthermore, we do not observe significant clusters of F-500 corporate headquarters in regions of fewer than 1 million people. Corporate headquarters locate in large metros to be close to larger and more diverse pools of talent and the service and amenities that attract that talent. Large cities and metro areas account for a disproportionate share of F-500 corporate headquarters. We find F-500 headquarters to be most closely associated with population size. Roughly 90% of F-500 headquarters are located in metros the top quartile of population and with international air access, suggesting urbanization threshold effects. The number of F-500 headquarters in metros under 1 million or 500,000 people is small. Even Walmart, which has historically been located in the small town of Bentonville, Arkansas, and is building its new headquarters there, is part of the Fayetteville, Arkansas metro with a population of 500,000 residents.

Airport connectivity is the third factor that is positively and consistently associated with the location of F-500 corporate headquarters. A total of 90% of F-500 headquarters are located in metros with international airports. Thus, we find airports to be vital pieces of infrastructure for connecting F-500 firms to the global corporate environment and for circulating global talent.

Although there has been a broad shift in the centre of gravity of F-500 headquarters' location from the Northeast and Midwest to the South and West (Holloway & Wheeler, 1991; Horst & Koropecyki, 2000; Semple, 1973; Semple & Phipps, 1982), New York remains the largest centre for corporate headquarters followed by the San Francisco Bay Area, the centre of gravity for knowledge based high-technology industry.

We also find overlapping geographical and industrial specialization of F-500 headquarters. Finance and business services remain disproportionately concentrated in greater New York; High-technology headquarters are disproportionately concentrated in the San Francisco Bay area; energy and resources firms are disproportionately concentrated in greater Houston. Such specialization is consistent with prior studies (Klier, 2006; Strauss-Kahn & Vives, 2009) and points to local external benefits for large firms in a sector. However, we find no evidence the role of localization in corporate headquarters' location. This is broadly consistent with core argument and logic of our theory. Very large firms are forces unto themselves that do not need to tap into wider ecosystems as much as smaller firms. This

result is somewhat encouraging for local jurisdictions who aspire to host F-500 firms in industries where they do not have strong local clusters.

While we have not examined them directly, our findings lead us to conclude that taxpayer-financed business incentives can do little to alter the locational calculus of corporate headquarters, for two reasons. On the one hand, the results for tax climate indicate that it plays no role: headquarters are not being attracted to lower tax environments. On the other hand, our results indicate that the geography of F-500 corporate headquarters is largely determined by concentrations of human capital and factors such as population size and global airport connectivity. Firms will go to large lengths to avoid tax exposure as per the literature on fiscal geographies (Wainwright, 2011). However, large firms need not base their location decisions on tax levels because they have the power to effect and shape tax rates where they are. Large firms play a well-documented game of extracting tax and financial incentives out of jurisdictions after they have selected their locations based on other factors, of which Amazon's HQ2 is just the most recent case in point. In this way, they reduce their effective rate of taxation wherever they choose to locate, with many large firms paying minimal or even no effective tax. When it comes to large firms, the geography of talent and of productivity almost always trumps the fiscal geography of taxation. In this respect, our analysis supports a large body of research that finds that tax incentives are largely a wasteful and extractive rents that jurisdictions are duped into paying for corporations who have already made their location decision based on more fundamental factors.

Ultimately our research identifies three key factors – human capital, population size and global airport access – that matter significantly to the geography of corporate headquarters post-industrial capitalism. Future research can help untangle the extent to which these factors are a cause of regional characteristics per se or the degree to which they are related to having such large concentrations of F-500 corporate headquarters in the first place.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

NOTE

1. Like Bell (1976), we use the term 'post-industrial capitalism' to describe a set of knowledge-based sectors

that have been the centre of economic growth in advanced economies.

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