The decentralization of freight transportation: Chicago in context

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As with many other economic sectors, warehousing and trucking have shifted from historical central locations to the suburban fringe over the last few decades due to major changes in the global logistics industry. The need for more space and easier transportation access to road, rail, and air has led to a shift towards intermodal logistics centers requiring large amounts of land on the metropolitan fringe. At the national and regional levels, this has meant a change in the spatial organization of the freight distribution sector, from the concentration of maritime traffic in fewer ports to a shift towards inland "ports" to combat congestion at terminals, as well as the increased use of rail.

At the same time, many metropolitan areas are also experiencing growth within their central cities *and* suburbanizing edges in terms of freight distribution and intermodal activity. While historical work has been done on the relocation of transportation and warehousing activity to suburban locations, there has been little to document the most recent shifts. This research does so via spatial analysis of Economic Census data, comparing recent trends in Chicago with other metropolitan areas and with the U.S. as a whole.

This paper presents the results of exploratory data analysis, placing Chicago in the context of national trends in the location of warehousing and logistics activity. The results have important implications for transportation planners, showing how the forces driving transportation demand are no longer contained within metropolitan areas as they once were, driven now by national and even global components. But it also points out the importance of considering the factors of individual places, as Chicago is an important exception to many of these trends. The paper starts with a review of the literature on the geography of freight distribution, followed by an explanation of methods. The results of the data analysis are then presented, first for the number of freight firms and then for their spatial concentration, with an eye towards the Chicago metropolitan area. The conclusion summarizes the implications for policy.

Literature review

Since the advent of containerized shipping in the mid-twentieth century, there have been several dramatic changes in where and how flows of goods occur through our urban and national transportation networks. This section outlines five of the most significant changes in the freight distribution sector over the last half-century and then explains how those changes have affected the geography of that sector.

Recent changes in logistics and warehousing

There are five major technological and economic changes that have transformed the distribution industry over the last few decades. While none of these changes can really be separated from the others, they are discussed here separately for purposes of clarity. First is the shift to containers for carrying goods for long distances. Malcolm McLean's 1956 innovation revolutionized not only shipping but the entire production system for most manufacturing sectors (Slack 1990). By shipping goods in a standardized metal container, the physical unloading of ships was reduced from hundreds of men taking many days to a handful of men taking a few hours (Levinson 2006). The reduction in labor costs and theft dramatically lowered transport costs. The twenty-foot equivalent unit, or TEU, has become the standard unit of measurement for freight transport[1].

Second, the globalization of production over the last several decades is an outcome of many different factors, but the reduced cost of transportation due to containers is one of the most important. As a result, many industries have shifted to global production networks, dividing up the production process to minimize costs at each stage, since the cost of transporting a half-finished product between factories is minimal (Hesse 2006). As recent rising prices in food and other sectors indicate, the low cost of transportation has been key to establishing our current manufacturing system. At the same time, increases in manufacturing abroad have come in part at the expense of domestic manufacturing, meaning that distribution functions are now largely organized towards getting goods to the consumer rather than getting manufactured products to market.

Third, related to the globalization of manufacturing has been just-in-time production: making what is needed for a later stage in the production process just in time to implement it, not storing it in a warehouse until it is needed (ULI 2004). To save money on storage space, companies have forged closer relationships with their suppliers and customers as well as their shipping and distribution suppliers in order to keep inventory moving rather than on a shelf. The JIT model has more recently been extended to retailing, with Wal-Mart leading the way (ULI 2004).

One of the advantages of standardized containers is that they can travel as-is on ships, railcars, trucks, and even airplanes, leading to the fourth trend of note: intermodalism. Particularly since the 1980 deregulation of trucking and rail (Slack 1990), the easy movement of containers from one transport mode to another has become a key part of the system. Transfer points such as ports are no longer break-of-bulk points where goods are unloaded by hand and transferred to another type of vehicle, but intermodal yards where cranes lift containers from one vehicle to another. Integrated service providers such as UPS and FedEx are using intermodalism within their own business operations as well.

Finally, the rapid growth of the Internet in the late 1990s included a dramatic increase in e-commerce. While most e-commerce is actually carried out between businesses (Lasserre 2004), there has also been significant growth in parcel delivery as more consumers order products to be delivered to their front doors. Some would hesitate to consider e-commerce as a new trend because vehicles still have to deliver those goods whether they've been ordered on the Internet or not (Hesse 2002b), but because of the

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[1] Most containers in the North American market are actually forty feet long, but are still measured in TEUs (thus twenty-foot *equivalent* units). TEUs themselves are more common in Europe.

speed with which customers demand delivery, e-commerce can be considered in a category of its own (Lasserre 2004).

There are two main consequences of these recent trends. First, reliability matters more than distance or even travel time (Lasserre 2004; Capineri and Leinbach 2006). If a supply chain extends across several continents, particularly if it employs just-in-time methods, it is vital to know precisely when items will arrive, whether that is a span of hours or weeks. Firms have therefore outsourced their shipping functions to third-party logistics providers (3PLs), who specialize in moving goods in a timely fashion. Second, movement and not storage is the main goal. Warehouses are no longer so useful; distribution centers now determine the spatial nature of the distribution sector. Parts and products are not meant to sit on a shelf, but to be in constant motion along the supply chain until the final product reaches store shelves.

The changing geography of logistics and warehousing

Many authors have argued that because of these changes in freight distribution, the location of distribution activity now occurs according to its own logics, not those of its neighbors in the supply chain (Lasserre 2004, Rodrigue 2006, Hesse 2007). In other words, rather than warehouses locating in certain places because of proximity to customers or suppliers, distribution centers are locating based on their own spatial logics of access to transportation and lots of room. Traditional hinterlands are changing as fewer major ports serve larger regions and even whole continents. This "new spatial logic" (Hesse 2007) and rise of "virtual" or "informational" space (Aoyama et al. 2006) suggest that the system is now being driven at the global scale, not that of the region or the city.

On the other hand, it is hard to see how this new spatial logic is different from what existed before: “The major determinants of wholesale/warehousing location are proximity to customers/clients, reasonable real estate costs, access to interstate highways, availability of appropriately skilled workers, and reasonable costs of doing business” (Glasmeier and Kibler 1996, p. 740). Proximity to customers and clients here might not mean spatial proximity, but access within a day's travel as part of a road or rail network. Real estate costs certainly drive the suburbanization of freight (Hesse 2006), as does highway access (Rodrigue 2006). Proximity to a low-skill, low-wage workforce remains an important consideration for distributors. Finally, lower taxes, weaker unions, and other traditional costs of doing business are all motivations for distributors to relocate to the suburbs. The spatial logic is the same; it's just the geographic results that are different.

In particular, the original change in the geographies of warehousing and logistics as a result of the aforementioned trends was centralization on land and at sea (Slack 1990). Maritime traffic has become concentrated in larger ships and thus fewer ports, leading to congested infrastructure while competing ports watch their market share drop. Within the U.S., rail terminals have become more concentrated as well because of the capital required to provide the necessary equipment for handling containers and because of consolidation within the industry itself (Slack 1990). Distribution centers are becoming fewer in number and larger in size, with a hinterland or market area of an entire continent (Lasserre 2004).

As a result of this growth, terminal areas have become congested, especially as port-owned land changes from ancillary uses such as warehousing into more direct uses such as cranes or larger berths. This in turn pushes ancillary uses farther inland and leads to satellite facilities to relieve dockside congestion, thus leading to *de*centralization at the metropolitan scale (Slack 1999, Hesse 2006). Furthermore, existing urban railyards are often not suited for the demands of intermodalism, since they were built for switching rail cars between tracks, not containers between train cars and truck chassis (Grueling 2007). With little room to expand within the central city, new intermodal facilities are being built on the edges of metropolitan areas to attain a balance between infrastructure and labor on the one hand, and large parcels of vacant land and lack of congestion on the other (Rodrigue 2006).

This later trend towards decentralization clearly argues for a spread of freight transportation to the suburbs. However, as Hesse (2007) has noted, “Empirical studies on the extent of this trend are rare” (p. 6). Those that do exist are almost entirely in the context of the consolidation of activity within the European Union (Cabus and Vanhaverbeke 2003, Hesse 2004, 2006, Riemers 1998). The contribution of this paper is therefore to provide an empirical study of the decentralization of warehousing and distribution centers within the U.S., as measured at the metropolitan level.

In addition, the example of Chicago demonstrates the interconnection between global and local scales. While global-scale forces are shaping the freight distribution system into fewer, larger nodes, thus concentrating traffic in fewer places, at the metropolitan level, freight activity is decentralizing to the outer suburbs *and* growing within the center county. As will be shown below, the processes that are taking place in Chicago, and their impact on the landscape, are typical of those in the rest of the country. What is unusual is the scope of activity, particularly for a metropolitan area without significant maritime container traffic.

Methods

This paper relies on quantitative data to determine the distribution of freight transportation-related activity. Because my interest is in warehousing and logistics-related activity, the main variables used are the number of freight establishments within a county, aggregated to the metropolitan level. Due to the classification system of the U.S. Census, trucking firms are included under warehousing, thus capturing a significant percentage of all freight-related transportation.[2] Furthermore, a warehouse or distribution center can not exist without truck, rail, or maritime traffic, and thus the location of warehousing firms is a good proxy for the location of freight transportation.

[2] Therefore, the term "freight establishments" in this paper refers not only to warehousing but to trucking, distribution centers, waste disposal, and other kinds of firms as explained below.

Data collection

This paper is part of a larger project investigating how the suburbanization of warehousing and distribution activity has occurred over time in the major metropolitan areas of the U.S. The most consistently available data source for this information is the U.S. Economic Census. The Economic Census is taken every five years (in years ending in 2 and 7) and is supplemented with County Business Patterns and ZIP Code Business Patterns taken every year. Unfortunately, the ZIP Code Business Patterns do not break down the data by detailed enough economic sectors to separate out information on warehousing. Therefore, the County Business Patterns were used to collect the number of establishments by country for 2005 (the most recent available) and 1986 (the earliest available in digital form). Data were collected for all 3140 designated counties and county equivalents in the U.S., and later aggregated into metropolitan areas according to the 2003 U.S. Census designation of core-based statistical areas (CBSAs) as explained below.

The U.S. Census gathers economic data by individual establishments. A freight company that has multiple locations will therefore be counted multiple times, while a firm with all of its operations in the same place will only be counted once. From a transportation point of view, since the former generates more trips than the latter, it is the more relevant means of measurement. Additionally, alternate forms of data such as employment or payroll are not available at the county level for as specific an economic sector as warehousing.

Tracking changes in economic activity over time can be difficult because of changes in the methods of data collection and classification. In 1997, the Census Bureau switched from the Standard Industrial Classification system (SIC) to the North American Industrial Classification System (NAICS) in order to make cross-border comparisons with Canada and Mexico easier after the implementation of NAFTA. Many different kinds of industrial activity were re-classified under NAICS to be more precise and to reflect the increasing service orientation of the economy. Based on the bridges established between the two systems by the Census Bureau, adjustments were made to the NAICS data (post-1997) in order to keep them comparable with the SIC data.

In addition to the number of freight establishments, a number of other variables were collected in order to attempt to explain the location of those establishments. A complete list of variables is in Table 1. In addition to the Economic Census, data on transportation were gathered from the Bureau of Transportation Statistics, with some calculations made using ArcMap 9.3. Data on the year of a central city's incorporation were taken from various sources.

Gini coefficients

The Gini coefficient (sometimes called an index) is one of the most common methods for analyzing the concentration of a phenomenon. Originally used for determining how evenly distributed incomes are across a country (Gini 1912), it has since been used by transportation geographers to compare concentrations of maritime and air traffic over time and across space (e.g., Reynolds-Feighan 1998, McCalla 1999, Notteboom 2006). The Gini coefficient is a number from 0 to 1, with a higher number indicating greater concentration. In order to calculate the index, observations (in this case, counties) are ranked in order from highest to lowest (in this case, by number of freight establishments), then cumulatively added and compared to the curve that would result if all observations contributed equally to the total (which would be the line y=x).

This coefficient was calculated for 1986 and 2005 for fifty of the largest metropolitan areas in the U.S. In calculating Gini coefficients, Core-Based Statistical Area (CBSA) definitions were used. A CBSA consists of one or more metropolitan and micropolitan areas as designated by the U.S. Census. CBSAs are collections of counties, ranging in size from one to thirty-three. For purposes of this analysis, CBSAs with fewer than four counties were eliminated (e.g., Miami, Phoenix, and San Diego) because the value of the Gini coefficient is suspect for so few observations. Linear regression confirmed that of the metropolitan areas chosen, neither the number of counties nor the number of smaller metropolitan areas within the CBSA significantly affected the resulting Gini coefficients.

Regression analysis

Multiple regression analyses were carried to explain the number of establishments, change over time in absolute and percentage terms, and the Gini coefficients as well as their change over time. Table 1 lists the data used as independent variables for each of these regressions. They were collected or calculated at the CBSA level, based on 2003 CBSA definitions. In order to reduce multicollinearity, many of the variables were normalized by population as indicated. Additionally, stepwise, forward, or backward regressions were carried out as appropriate. Tables in the following section include the significant regression results. All statistical analysis was carried out in SPSS 15.0.

The decentralization of freight transportation

There are two different approaches presented in this paper. First, I examine the number of freight establishments in fifty of the largest metropolitan areas across the U.S. and how those numbers have changed over the last twenty years. In which metropolitan areas has the greatest growth occurred, and has the spatial distribution across the country changed? Second, I move to the regional scale and look at the Gini indices for those same fifty metropolitan areas. To what extent is freight activity spatially concentrated in central counties? Has deconcentration occurred over the past twenty years, and if so, what might explain it? In both cases, Chicago is singled out to demonstrate how it exemplifies or defies these trends.

Geography of freight transportation in the U.S.

Figure 1 shows the spatial distribution of freight activity per capita in the fifty largest metropolitan areas in the U.S. in 1986 and in 2005. A simple linear regression indicates that 98% of the variation in number of establishments can be explained by variation in population, so per capita data were used instead. In the mid-1980s, warehousing and distribution activity was fairly randomly distributed, concentrated more heavily in the West Coast and Lower Midwest. By 2005, there is a strong pattern of Midwestern distribution centers emerging, with the Pacific Northwest as an exception. The trend towards inland ports is clearly visible here.

Table 2 shows the results of multiple regressions carried out to explain the spatial distribution of establishments in 2005. Because many of the explanatory variables correlate highly with population, they were transformed into per capita variables as listed in Table 1. For the number of freight establishments per capita, the only significant variables were miles of railway in the metropolitan area and the Gini index. What these results indicate is that cities with disproportionately many warehousing and logistics firms have good rail service and have their facilities concentrated in the central county. However, only 35 percent of the variation in location is explained by these variables. For percentage growth in freight establishments, two variables produced significant results: population growth and the year of incorporation. The first result is expected from the strong correlation between population and freight activity, and the latter confirms the pattern seen in Figure 1: newer metropolitan areas are experiencing the fastest growth in warehousing activity. For growth in the absolute number of establishments, only population growth was significant.

In terms of freight establishments per capita, Chicago has more than one would expect, even given its extensive rail network. In terms of percentage growth, it is not at all exception, with change in establishments almost directly proportional to change in population. However, when it comes to the number of freight establishments added in the past twenty years, Chicago is literally off the charts (Figure 2). While most cities have a tight connection between increasing numbers of people and increasing numbers of warehouses, Chicago added nearly three times the number as one would expect. Given that the *percentage* increase *was* proportional, this reaffirms Chicago's traditional strength in freight transportation. It also suggests more dramatic changes in the landscape, if proportionately more firms are being added—where are they going within the metropolitan area? The following section explores this in more detail.

Spatial concentration of warehousing within regions

One way to look at the changing landscape of freight activity is to see where the greatest change is occurring within metropolitan areas (With very few exceptions, "change" means "growth".) In many cities, the greatest numerical and percentage growth is occurring in a suburban county (Table 3). These tend to be larger, older cities, traditional gateways such as Boston, New Orleans, or Seattle. However, there are equally many cities where the largest number of establishments was added in the central county, although it was a suburban county that experienced the highest percentage growth. These tend to be inland cities known as regional gateways, such has Chicago and Minneapolis-St. Paul (Los Angeles is a notable exception, speaking to its increasing role as a gateway for the interior of the U.S.). Finally, seemingly contrary to the decentralization thesis, the greatest number of cities (nineteen out of fifty) added the most freight establishments in numerical *and* percentage terms in their central counties. However, these are generally smaller metros where the central county dominates, such as Albuquerque or Indianapolis (though Dallas-Ft. Worth and Huston are exceptions).

Notwithstanding the growth in central counties, most are losing ground to their suburbs as a whole. The methodology section above explained the calculation and meaning of the Gini index or coefficient; recall that the higher the index, the more concentrated the activity. Figure 3 maps the values of the index in 1986 and 2005, as well as the changes over time. In the earlier year, we can see that metro areas with warehousing activity most heavily concentrated in the central county are located in the middle third of the country, with the most decentralized cities in the Northeast. By 2005, with the same categories in place, nearly all cities have decentralized to some extent, with Texas cities still the most spatially concentrated. The third map shows that Denver experienced the greatest decentralization, with only two cities centralizing (San Francisco-Oakland, where the centralization is actually occurring outside the central county, and Hartford, CT). Table 4 shows the Gini coefficients for all fifty metropolitan areas, sorted by the amount of decentralization over time.

Table 5 attempts to explain the decentralization of warehousing activity within metropolitan areas. With the Gini coefficient in 2005 as the dependent variable, the best model produced an R^2 of only 0.212 with two significant variables: year of incorporation and firms per capita. The newer the city, the more spatially concentrated warehousing activity is within the central county, probably because multiple nuclei of economic activity haven't yet had time to develop. At the same time, the more firms there are per capita, the more decentralized warehousing activity is, which supports the multiple nuclei thesis.

In explaining the change over the two decades in the Gini coefficient, again, only two variables were significant: the Gini coefficient at the beginning of the time period, and firms per capita at the end of the time period, both with a negative coefficient. The first result means that the more concentrated a city's warehousing activity was in 1986, the more likely it was to deconcentrate. The second result follows from the previous paragraph: if warehousing activity is more decentralized in metropolitan areas with relatively more firms per capita, it's also decentralizing more extensively in those areas.

Freight activity is more centrally concentrated in Chicago than one would expect, given its age and number of firms per capita. Its ranking in terms of Gini coefficient is seventh, comparable to Dallas, Memphis, and Denver. While its Gini coefficient fell considerably over the last twenty years, so did its fellow centrally-concentrated cities. So, Chicago might be gaining freight establishments at an exceptional rate, but where those firms are going is a combination of city and suburb that is not unusual in the national context. Therefore, we can learn from and contribute to other cities' and regions' lessons with regards to the positive and negative impacts of increasing freight traffic.

Conclusion

The purpose of this paper was to see if the empirical justification existed for several trends noted in the academic literature on transportation: the move towards inland distribution centers and the suburbanization of freight activity. Both trends were confirmed through a combination of mapping, calculating Gini coefficients, and multiple regression. Chicago exemplifies both of these trends, making it an excellent laboratory for further investigation into the changing spatial distribution of freight activity.

As freight traffic has both increased in volume and become more international in scope, it has concentrated in fewer ports and gateways. As those gateways have become congested, shippers have begun to move towards inland ports and distribution centers to free up dockside space for maritime activities. Mapping the location of freight establishments per capita for fifty of the largest U.S. cities confirms that there is a shift in the last twenty years towards concentrating freight activity in the Mississippi, Ohio, and Missouri River valleys. Highways, rail, and inland waterways, though themselves not significant predictors of freight establishments, are therefore of considerable importance both in these Midwestern cities and in the coastal gateways they are connected to.

Secondly, as containerization has led to the need for single-story distribution centers spread over hundreds of thousands of square feet, freight distribution activity has moved out from its traditional central-city location to suburban sites. Of the fifty cities analyzed here, only three did not experience a decentralization of freight activity over the last twenty years as measured via Gini coefficients, confirming this suburbanization. On the other hand, in most metropolitan areas, the largest number of freight establishments was actually added in the central county. It is therefore important to consider the impacts of increased freight activity not only on the suburbanizing fringe, but on existing central city locations.

Within this context of national centralization and metropolitan decentralization, Chicago exemplifies both trends. Its already high number of freight establishments per capita is growing at a proportionate rate to population, but the number of locations being added is disproportionately huge. While this growth is occurring in both city and suburban locations, there is a general decentralization commensurate with that happening across the country. Chicago's experience is therefore relevant to a wide range of other metropolitan areas. However, because the increase here is so much larger than most other places, it also provides more opportunities for investigating the impacts on job creation, city planning, traffic congestion, and economic development.

Table 1. Variables collected for analysis. Source: U.S. Census, U.S. Bureau of Transportation Statistics, calculations by author.

Number of warehousing firms in 1986 and 2005*
Gini coefficient in 1986 and 2005**
Population in 1986 and 2005**
Total number of firms in 1986 and 2005*, **
Median household income in 2005
Number of interstate highways*
Miles of railroad track*
Container port proximity (calculated according to a gravity model: number of containers handled in 2005 at the nearest container port divided by distance squared)*
Distance from the population center of the U.S.
Year central city was incorporated

* Data normalized by population.

**Change over time also used as a variable.

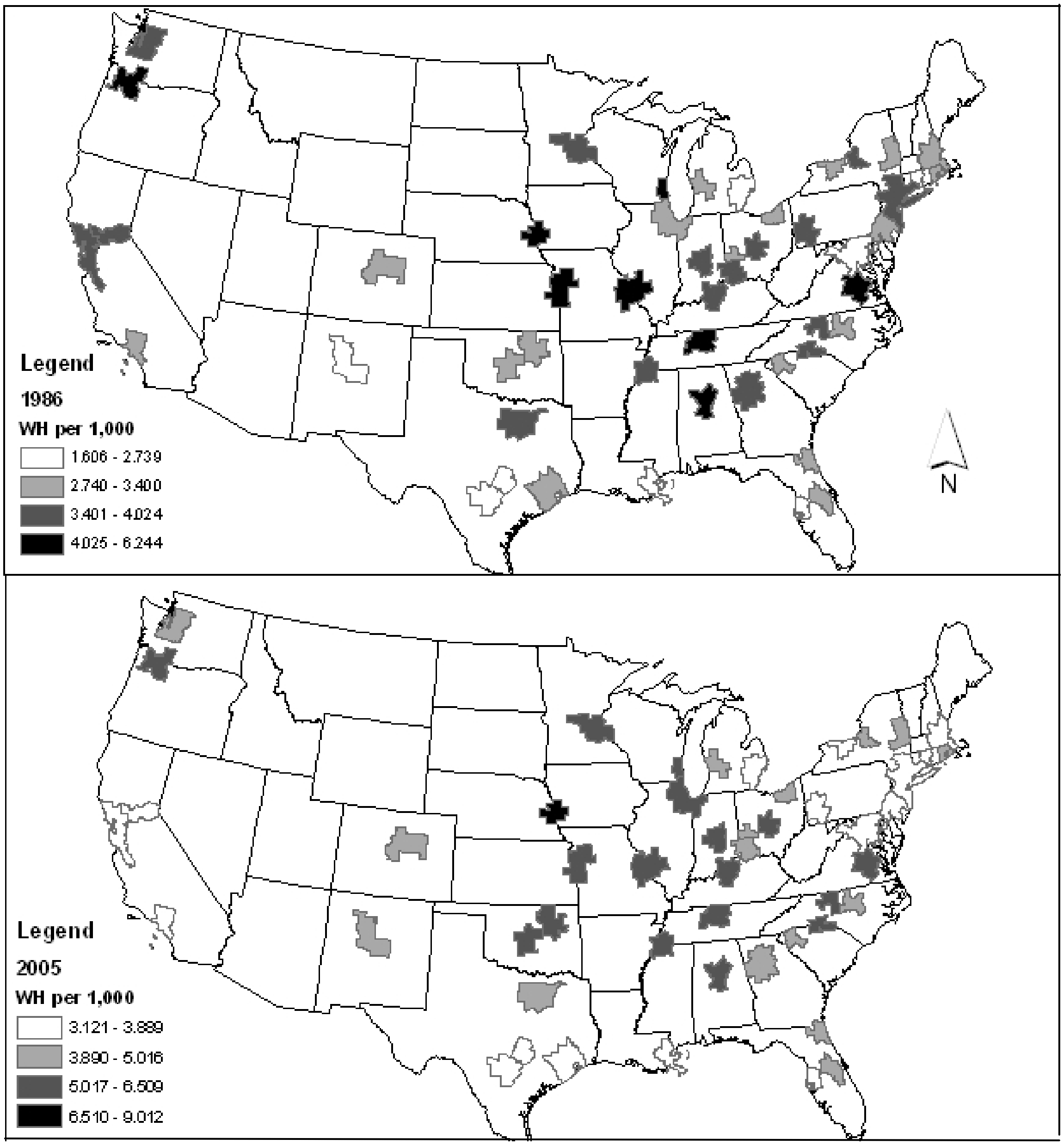

Figure 1. Per capita warehousing establishments in the U.S. in 1986 and 2005. Source: U.S. Economic Census, calculations by author.

Table 2. Regression results for warehousing firms and change in firms. Calculations by author.

	R^2	Standardized coefficients	t	Significance
Warehousing firms per capita, 2005	0.354			
RRCAP		0.543	4.632	0.000
GINI05		0.218	1.861	0.069
Warehousing firms, percent change	0.551			
POPCHANGE		0.656	6.394	0.000
INCORP		0.202	1.971	0.055
Warehousing firms, number change	0.717			
POPCHANGE		0.847	11.023	0.000

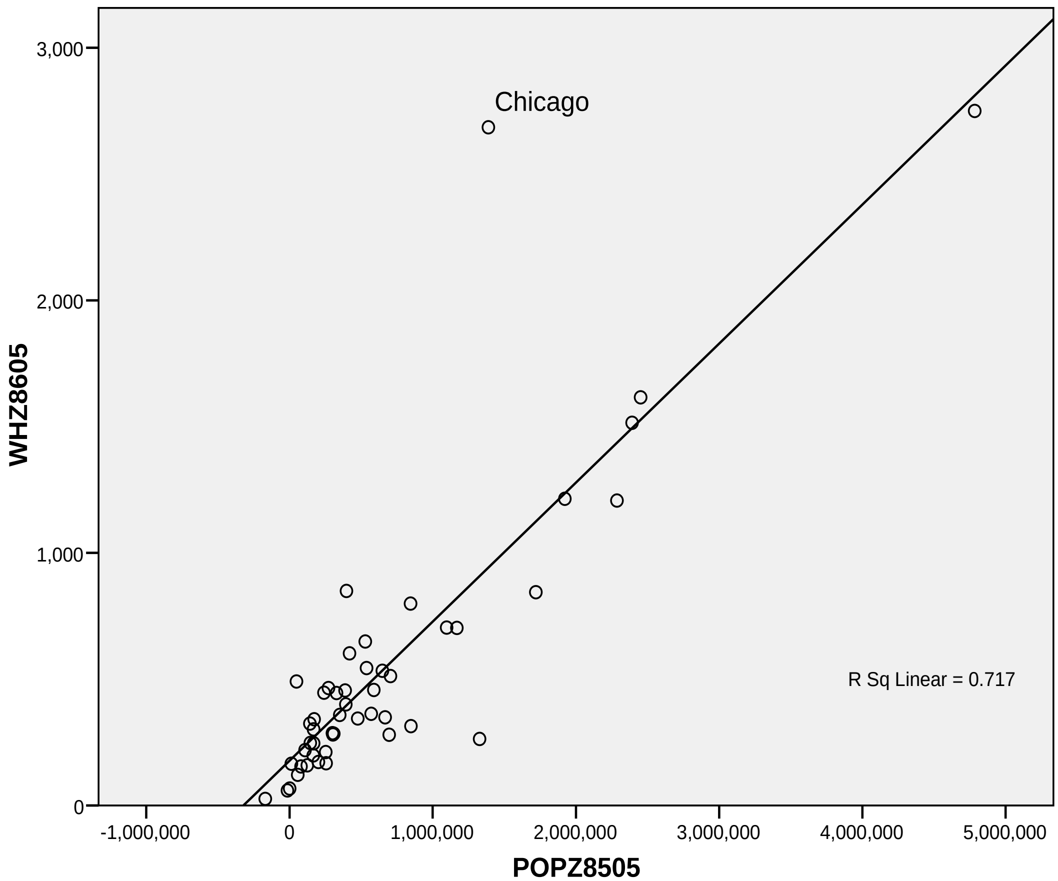

Figure 2. Scatterplot for change in warehousing firms versus change in population, 1985-2005. Calculations by author.

Table 3. Location of warehousing and distribution growth by county, 1986-2005. Calculations by author.

Central co. leads in both	***Central co. leads in numbers Suburban co. leads in %***	***Suburban co. leads in both***
Albany	Austin	Atlanta
Albuquerque	Birmingham	Boston
Charlotte	Chicago	Cincinnati
Columbus	Cleveland	Dayton
Dallas-Ft. Worth	Detroit	Denver
Greenville, SC	Grand Rapids	Kansas City
Hartford	Greensboro, NC	Milwaukee
Houston	Los Angeles	New Orleans
Indianapolis	Louisville	New York
Jacksonville	Minneapolis-St. Paul	Philadelphia
Memphis	Omaha	Pittsburgh
Nashville	Orlando	Portland, OR
Oklahoma City	Raleigh-Durham	Richmond
Providence	Rochester	Seattle
Sacramento	Syracuse	Washington, DC
San Antonio	Tampa	
San Francisco-Oakland		
St. Louis		
Tulsa		

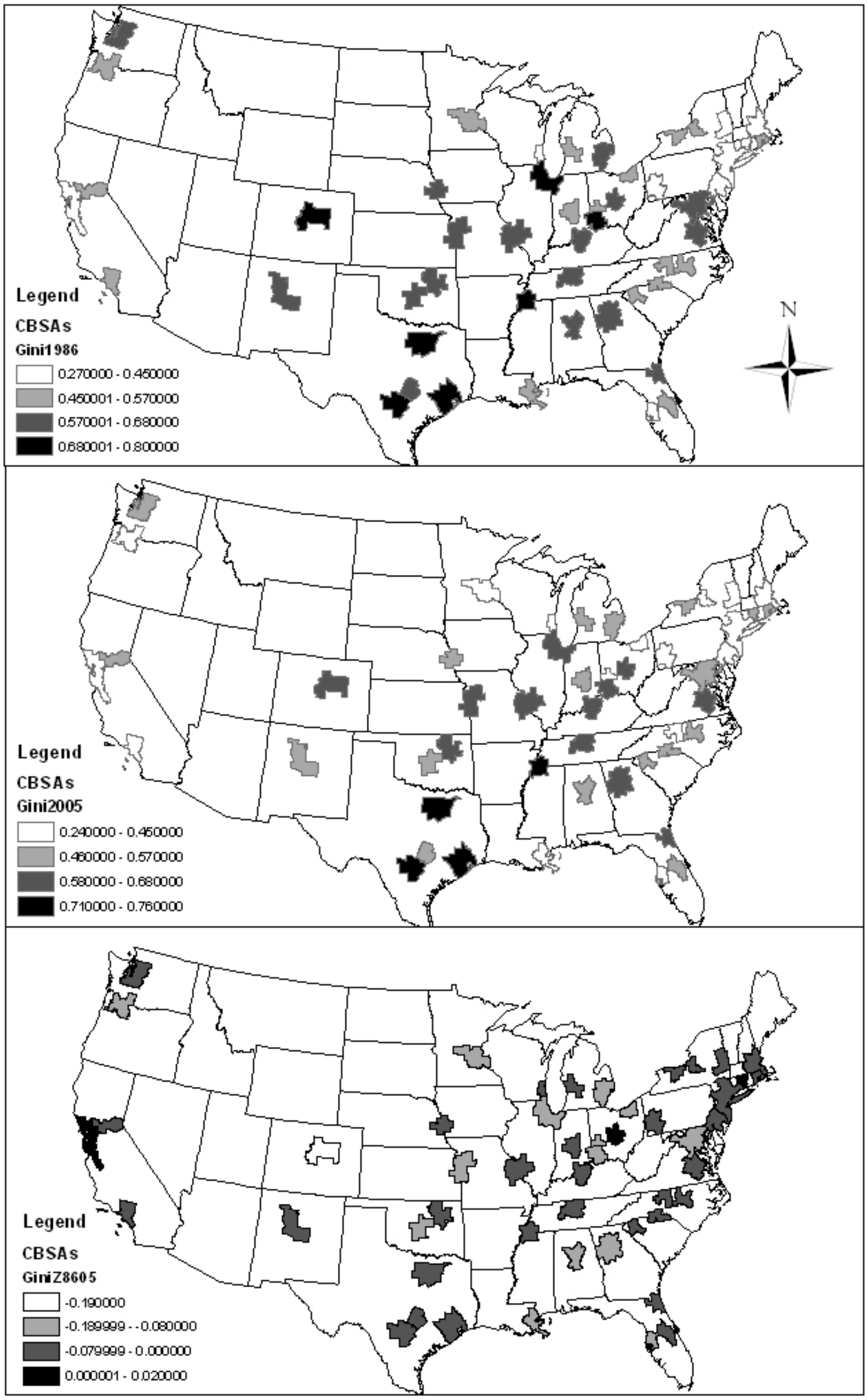

Figure 3. Gini coefficients for warehousing firms in 1986, 2005, and change over time.

Table 4. Gini coefficients for warehousing and distribution firms, 1986-2005. Calculations by author.

City	***1986***	***2005***	***Change***		***City***	***1986***	***2005***	***Change***
Denver	0.79	0.60	-0.19		Seattle	0.61	0.55	-0.06
Portland, OR	0.55	0.42	-0.13		Syracuse	0.48	0.42	-0.06
Birmingham	0.61	0.50	-0.11		Dallas-Ft. W.	0.76	0.71	-0.05
Cincinnati	0.74	0.63	-0.11		Los Angeles	0.47	0.42	-0.05
Cleveland	0.50	0.39	-0.11		Orlando	0.54	0.49	-0.05
Detroit	0.59	0.48	-0.11		Rochester, NY	0.51	0.46	-0.05
Wash., DC	0.58	0.47	-0.11		Houston	0.80	0.76	-0.04
Mpls-St. Paul	0.52	0.42	-0.10		Louisville	0.66	0.62	-0.04
New Orleans	0.53	0.43	-0.10		Raleigh-Durham	0.54	0.50	-0.04
Atlanta	0.68	0.59	-0.09		Sacramento	0.56	0.52	-0.04
Dayton	0.47	0.38	-0.09		Albany	0.39	0.36	-0.03
Oklahoma City	0.64	0.55	-0.09		Memphis	0.76	0.73	-0.03
Tampa	0.44	0.35	-0.09		Milwaukee	0.41	0.38	-0.03
Chicago	0.72	0.64	-0.08		Philadelphia	0.27	0.24	-0.03
Kansas City	0.66	0.58	-0.08		Providence	0.51	0.48	-0.03
Boston	0.44	0.37	-0.07		St. Louis	0.64	0.61	-0.03
Greensboro, NC	0.51	0.44	-0.07		Charlotte	0.49	0.47	-0.02
Omaha	0.59	0.52	-0.07		Greenville, SC	0.53	0.51	-0.02
Albuquerque	0.60	0.54	-0.06		Jacksonville	0.64	0.62	-0.02
Austin	0.61	0.55	-0.06		New York	0.43	0.41	-0.02
Grand Rapids	0.55	0.49	-0.06		Tulsa	0.68	0.66	-0.02
Indianapolis	0.57	0.51	-0.06		Pittsburgh	0.40	0.40	0.00
Nashville	0.67	0.61	-0.06		Columbus	0.60	0.61	0.01
Richmond	0.64	0.58	-0.06		San Francisco	0.41	0.42	0.01
San Antonio	0.78	0.72	-0.06		Hartford	0.45	0.47	0.02

Table 5. Regression results for Gini coefficients and change over time. Calculations by author.

	R^2	Standardized coefficients	t	Significance
Gini coefficient, 2005	0.212			
INCORP		0.350	2.694	0.010
FIRMCAP05		-0.276	-2.123	0.039
Gini coefficient change	0.181			
GINI1986		-0.383	-2.835	0.007
FIRMCAP05		-0.286	-2.117	0.040

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