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Demography of T&W Firms in LA County: A Subset of LA Metro and Global Port LA

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by

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Abstract of the Thesis

Demography of T&W Firms in LA County: A Subset of LA Metro and Global Port LA

By Phillip Lee, Master of Social Ecology

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Professor David A. Smith, Chair

Los Angeles (LA) County is a facet of the Los Angeles Metropolitan Area, a global city encompassing a significant portion of Southern California. Within this city lies a vibrant Transportation and Warehousing Sector that has served as a source of employment, as well as anchor to the global commodity chains that feed the city's economic lifeblood. The global city itself is divided into numerous incorporations with varying jurisdictional boundaries and different economic regulations. Utilizing geographical information systems (GIS) to create graduated maps of T&W density, this study will highlight patterns in the distribution of the T&W sector in LA County. These jurisdiction boundaries and economic regulations have an influence on the density distribution of the T&W sector; with an agglomerative tendency among T&W subsector firms within specific incorporations, such as Lennox or Vernon. In addition, ethnicity appears to share a relationship with the density of the T&W sector; particularly, ethnicity of Hispanic or Latino origin, whom individuals make up a fair proportion of the minority labor employed in LA County. This study underlines the importance of firm location within a jurisdictional environment that attracts other-like subsector firms in the T&W sector, especially regarding infrastructure development and employment prospects of minority workers.

Introduction

The Greater Los Angeles Area encompasses Los Angeles (LA) County, Orange County, San Bernardino County, Riverside County and Ventura County. Of the five counties, LA County is the centermost geographically, and it is the home of the Port of LA and Long Beach (LB), Los Angeles International Airport (LAX), and the Alameda Corridor railway, as well as numerous highway and road networks. As part of the Greater Los Angeles Area, LA County is a major population center and one of the largest urban concentrations in the Western Hemisphere. LA County is a resource-rich environment for a burgeoning Transportation and Warehousing (T&W) sector in the Southern California area. Due to the centrality of the Greater Los Angeles Area, hence LA County, in global commodity chains (GCCs), the T&W sector is a prime employer of minority and immigrant labor (Allison et al. 2013, p. 2), within multiple local government incorporations throughout the county that provide a regulatory environment for firms and workers. This study tracks the number and distribution of firms, as well as sectoral movement in the T&W sector from 2006 to 2014. This study hypothesizes that the number of firms will have a positive association with the distribution of legal incorporations that comprise LA County, alongside influencing (and being influenced by) worker demographic identifiers, such as ethnicity.

This study applies a background of world city theory and the global city concept to LA County's status as a global port of the greater LA metropolitan area, a central regional node within global commodity chain (GCCs) theory. GCCs utilize LA County as a node of entry and departure serving the West Coast of the United States. Connected to GCCs, LA County as a global port that leverages the presence of minority and immigrant groups seeking employment. LA County is a global port by virtue of its position amid an expanding maritime trade network of

products and workers. The county is located close to the U.S./Mexican border, and the presence of multiple land/air/sea ports brings in material from the maquiladora manufacturing zones in Mexico, as well as outsourced projects from Asia (Bair and Gereffi 2001).

The existing literature on the T&W industry is focused on intraregional association between the economic influences of T&W firms, such as revenue and containerized capacity (Levinson, 2006). This study utilizes the demography of firms within local incorporations and jurisdiction in LA County. LA County is an exceptional case to understanding the influence that the logistical sector has on public governance and the formation of political jurisdictions through said governance. There has been research on the economic indicators as independent variables in relation to the population of firms (such as Bhat et al. (2014)); however, none that focus explicitly at the county- and local- level of incorporation within a notable 'global port,' such as LA County. LA County is a 'global port', as not only is the county a destination for the ubiquitous maritime trade through the Ports of LA and LB, but also a node of wider rail, trucking and air transport networks in the United States. This study will highlight growth of the T&W sector in LA County, as well as the role that the logistics sector (as well as commercial and industrial interests supported by the T&W sector) has played in the vitality of incorporations in the LA metropolitan region.

Background and Literature Review

This study focuses on firm counts in LA County, through the theoretical lens of GCCs and world cities. The foundation of this study is the T&W sector as identified through the North American Industry Classification System (NAICS). GCCs have allowed the T&W sector to rise in dominance, despite the relatively low-wages of workers, barring exceptions (such as members of the International Longshore and Warehouse Union (ILWU)) (Levinson 2006). While

formally-employed workers maintain a degree of protections; many T&W firms utilize labor-saving automation and the temporary services industry, which is staffed by low-income and minority workers (Allison et al. 2013). LA County is a node composed of smaller sub-nodes that operate throughout the county area. LA County is contained within the Los Angeles-Long Beach-Glendale, CA metropolitan division (MD), which is part of the greater Los Angeles-Long Beach-Anaheim, CA metropolitan statistical area (MSA), alongside the Anaheim-Santa Ana-Irvine, CA MD, which includes Orange County.

The T&W sector is heavily inter-modal (land-sea-air interconnections); T&W firms incorporate global flows of trade into their operations, through the developing field of global supply chains and supply chain management; rail and trucking carry shipping containers inland to 'dry' ports for storage and distribution (Roso et al. 2009). Dry ports and warehouses surround the Port of LA, allowing for an uninterrupted flow of goods from overseas and local manufacturers; a dry port is utilized as a warehouse for a port's excess capacity. According to Newman (2012), inland/dry port has proximity to at least three million people within 200 miles. A dry port will also include an overall local hierarchy that collaborates in a management plan for the inland port, as well as utilizing government support (Newman 2012). LA County is saturated with intermodal terminals 'dry ports,' trucking and rail terminals that receive inputs from land-borne and airborne containers, and distribute outputs in the form of products to consumers, producers, and other ports, whether land, sea or air.

The Alameda Corridor is a good example of an intermodal connection. As a linkage between a seaport and a dry port, the Alameda corridor facilitates the transport of cargo from the Port of Los Angeles and the Port of Long Beach in "a single, uninterrupted twenty-mile grade separated rail link between the Intermodal Container Transfer Facilities (ICTF) and the Downtown Los

Angeles rail yards" (Jacobs 2007, p. 364). While the two ports compete, they also act as a regional collective, despite political differences between the two metropolitan jurisdictions. This collectivity is accomplished through the transfer of containers through local highways and the Alameda corridor (Jacobs 2007, p. 370).

The Alameda Corridor helps link the dry ports of inland LA County with air (such as LAX) and maritime ports of the San Pedro Bay area. The concept of containerization in maritime, trucking, rail, and to a limited extent, air, has made this transnational and transregional movement of goods more efficient (Levinson 2006). This efficiency is further represented in GCCs, which underlines the global networks that exploit containerization to feed the growth of the T&W sector. Containerization is a multi-staged process, and facilitates intermodal transit, which is defined as "the movements of passengers or freight from one mode of transport to another, commonly taking place at a terminal specifically designed for such a purpose" (Rodrigue 2013).

GCCs can be identified by various features; such as via an input-output structure of production, a territoriality, or geographic configuration, and a governance structure driven by "lead firms" (or "chain drivers"), as well as "institutional context," such as incorporated cities (Gereffi 1994; Bair 2009, p. 9). The T&W sector is integral to the GCC networks. This study utilizes this information, alongside general residence and employment of workers throughout LA County, including the city of Los Angeles. It is the cost-efficiency of GCCs and the networks they support that underlie LA County's and the LA metropolitan area's designation as a 'global port' and 'world city.'

GCCs are an integral aspect of identifying a global city; without the transnational connectivity of worker and global commodity flows, a city (or compatible urban agglomeration)

could only exert influence on a local and regional scale, as in the past. Bonacich and Wilson (2008) underline the necessary condition of international flows in modern just-in-time (JIT) manufacturing and distribution; JIT as relationships between producers and retailers to deliver products as demanded by the consumer (Levinson, 2006; Frazier et al. 1988). Without these global flows, JIT would not be possible; production would still be dominated by local industries with limited labor pools. Through the expansion of GCCs, global cities linked themselves with economic networks that move both product and labor, granting global cities access to a diverse, as well as exploitative labor environment. A global city is an animal of global forces, including a trend towards low-cost, non-union labor; the malleability of international supply and demand creates a geography of broad networks, within which global cities and world cities become primary nodes of specificity.

A global city is defined by Saskia Sassen (2001, p. xix) as represented by "the specificity of the global as it gets structured in the contemporary period." She chooses to emphasize the fact that a global city specifically creates "highly specialized services and financial goods" that exploit global processes for 'wealth creation' (Sassen 2001, p. xxi). Sassen (2012, p. 70) noted that the "implantation of global processes seems to have contributed to sharpening the separation between cities or sectors within cities which are articulated with the global economy and those that are not…", a new form of "urban inequality" exemplified by the growth of the T&W sector. In the global urban hierarchy, the LA metropolitan area is collectively identified as a world city (Sassen 2001), and a global port; the city is well-positioned within the wider economic network of the Trans-Pacific commodity chain. It is a destination for low-skilled migrants heading northward from Central and South America; on the other hand, high-skilled international workers, seek employment in LA's high-tech and creative industries.

LA County's status as a subset of the LA metropolitan global city structures urban space, as multiple firms and individuals agglomerate within its boundaries to maximize their communicative efficacy. This centering of LA as a global port alters its 'internal structure,' as represented by the shift of LA County's industrial base towards non-industrial uses as highlighted by an LA County Economic Development Corporation Report (Hahn et al. 2004). LA County's internal structure is ingrained within a space of flows, through presence of the high-tech industry, a well-developed electronic infrastructure and a financialized core, this integration has allowed the inhabitants of the city significant access to the World-Wide Web and global cosmopolitan culture. LA County is the location of multiple 'nodes and hubs,' exemplified by the linkage between the San Pedro Bay (with major seaports) area and the inner hinterlands of the inland LA County area, the location of numerous dry ports (Castells 1996). The county is the center of a regional conglomeration labeled as LA metropolitan region, within which the T&W sector thrives.

The literature evaluating the demography of firms (particularly the T&W sector), such as Van Wissen (2002), Howrey and Quandt (1968), Esteve-Perez and Manez-Castillego (2002), and Dobrev (2014), focus mainly on scales above that of incorporated cities, such as county or region (Esteve-Perez and Manez-Castillego (2002) focus on the national level via Spain in 1990.) The scale of analysis for this study is the incorporated city; the incorporated city in California is a public corporation, it is a firm in-of-itself (Martin and Wagner, 1978). Private and public sector firms operate within the jurisdiction of the incorporated city, and the services and regulations set down by the incorporated city can influence firm demography.

The Knox-Nisbet Act is an example of such regulation, where economic capacity provided by the T&W sector can influence incorporation. Incorporations must establish a dependable

source of revenue to be considered for incorporation. In terms of subsector, the T&W sector can have differing influences on an incorporation's capacity to be self-sustaining. In California, however, incorporations derive a significant amount of their funding through sales tax (Martin and Wagner, 1978), which Cowen (2014) notes excludes the primary activity of the Warehousing and Trucking subsectors, storage and transportation. Warehouses are not a dependable source of sales tax, hence revenue for the incorporation.

This study also includes demographics as a facet of study; ethnicity factors into GCCs and the concept of Los Angeles, and the Greater LA Area as a global 'port', because of the stratified formal and informal segregation that occurs within areas with a diversity of native- and foreign-born workers. Martin and Wagner (1978) utilize percentage of foreign-born in their evaluation of economic influence of city incorporation, as well as the percentage of non-white residents. This diversity includes local employment networks, which differ per the demographics of places where T&W firms are located. In the City of Los Angeles during 2010 (2015 data currently unavailable), the Hispanic or Latino population was 48.5%, close to the county-percentage in 2015; it can be expected that this percentage has increased slightly since 2010, given that the Hispanic or Latino population for LA County increased from 47.7% in 2010 to 48.4% in 2015 (U.S. Census).

Proximity factors into the residential preferences of low-income workers and ethnic minorities, as they do firms (Allison et al. 2015). A fair number of workers choose to live near family and relation networks, which are utilized by workers to find employment opportunities and by employers as a means of recruiting workers. Segregation centered around "the spatial distribution of employment nodes and nonresidential land uses" has a role in assigning which firms can populate a specific geo-spatial area (Lee et al. 2008) The structure of the T&W

industry depends on spatial distribution, through the creation of input-output terminals. Flows of input-output of products in the T&W sector are facilitated by containerization, which allows efficient flows of products between different intermodal forms of transport, and the advent of GCCs has increased the volume of goods entering T&W terminals.

Methodology

The unit of analysis is T&W firms at the city/place scale, focusing on the Los Angeles-Long Beach-Glendale, CA Metropolitan Division, which is Los Angeles County. This study has compiled demographic information from the United States Census, such as ethnicity/race (2000 and 2010), as well as employment and firm count data from the Employment Development Department (EDD). Employment data is obtained at the incorporated city level; however, the major problem is that for reasons of confidentiality, EDD must suppress employment data, where there are less than 3 employers or if 1 employer makes over 80% of the employment within that incorporation. With the employment data being broken down to the city level, there is a possibility that a proportion of the EED employment data for this study could be unavailable.

This study can extrapolate below county-scale employment and firms from the county-wide estimates, as well as focusing on specific EDD-omitted cities through alternative data sources, such as the U.S. Economic Census. If incorporated areas have a limited number of employers, the study can investigate through utilizing the omitted employment data of the incorporated cities as targets to assess said city through alternative datasets. The EDD data consists of datasets collected on a monthly (for employment) and annual (averages) basis. Industry and firm data in EDD is classified per the North American Industry Classification System (NAICS). The NAICS is “the standard used by Federal statistical agencies in classifying

business establishments for collecting, analyzing, and publishing statistical data related to the U.S. business economy. (EDD)"

The NAICS is updated every five years, to account for the creation and obsolescence of new and old industries, respectively. The data is provided through a joint program with the Bureau of Labor Statistics alongside the EDD and covers all employers who are covered by California unemployment insurance laws. The EDD data, like many other datasets, is not perfect. For example, the EDD does not have the place/city code for every employer, so their data extraction will miss some employers, in addition to missing data due to confidentiality issues. The employer's primary function could change and EDD might not catch it, so the NAICS code will occasionally be wrong. Employers can also move and not inform the EDD. As there are many employers with many job openings and closings on a regular basis, it is hard for the EDD staff to get all the data that they would prefer. However, these firm counts are the best possible approximation of all T&W firms in Los Angeles County.

The 2012 NAICS's definition of Transportation and Warehousing as an industry notes that firms categorized under this industry sector, which is the highest level of industry aggregation in the NAICS, often operate on networks, with their labor and capital spread over large geographical areas (NAICS 2012). The Transportation and Warehousing industry in the County of Los Angeles is emblematic of this definition; goods flow from the Port of Los Angeles and Long Beach, and Los Angeles International Airport (LAX). Los Angeles County is large; per the 2010 U.S. Census, the county is comprised of 4,057.88 square miles of land with 88 incorporated cities and large tracts of unincorporated areas; it also borders Ventura, Kern, Orange and San Bernardino Counties (U.S. Census 2010). While San Bernardino County is

larger than Los Angeles County, the latter is significantly denser with 2,419.6 people per square mile compared with San Bernardino's 101.5 people per square mile (U.S. Census).

The NAICS was developed to classify industry units per their primary production function; it groups activities utilizing similar resources. The NAICS Code utilizes a "Hierarchical Structure" to "Classify Establishments" from the "Broadest Level to the Most Detailed Level:" the first level is Sector, which is represented by a 2-digit number; sectors represent the highest level of aggregation in the NAICS; there are 20 sectors. The second level is Subsector, which is represented by a 3-digit number; sub-sectors represent the next, more detailed level of aggregation in the NAICS; there are 99 sub-sectors. The third level is Industry Group, which is a 4-digit number. Industry groups are more detailed than sub-sectors in the NAICS; there were 713 five-digit industries during 2012. Lastly, the fourth level is National Industry; this is a 6-digit number. National industries are the most detailed level, and represent national level detail in the NAICS; there were 1,065 national industries codified in the NAICS during 2012 (U.S. Census/EDD).

The NAICS is designed to be a dynamic system of industry classification; thus, it is reviewed every five years to determine if any changes are required. The NAICS provides a common standard for statistical analysis throughout Canada, the United States and Mexico; the classification system is explicitly designed for facilitating quantitative assessment of the economic vitality of the United States, Canada and Mexico. The four principles set down in the development of the initial NAICS coding are: (1) NAICS is erected on a production-oriented conceptual framework. This means that 'producing units' that use the same or similar production processes are grouped together in NAICS. (2) NAICS gives special attention to developing production-oriented classifications for (a) new and emerging industries, (b) service industries in

general, and (c) industries engaged in the production of advanced technologies. (3) Time series continuity is maintained to the extent possible. (4) The system strives for compatibility with the two-digit level of the International Standard Industrial Classification of All Economic Activities (ISIC, Rev. 3) of the United Nations (NAICS 2012).

Data Collection

This study will organize this employment and firm locational data through a table comparing the distribution of Transportation, Warehousing & Utilities in Los Angeles County with demographic data, emphasizing ethnic/racial information. Firms in the warehousing subsector can be identified through their NAICS code. The Transportation, Warehousing & Utilities (43-000000) Sector is the highest level of quantitative aggregation in the logistics industry, centered around transportation and warehousing in Los Angeles County. It includes Utilities (43-220000) and Transportation & Warehousing (43-400089). Utilities includes all firms that fall under the Utilities category, whereas T&W includes six sub-codes: Air Transportation (43-481000), Truck Transportation (43-484000), Transit & Ground Passenger Transportation (43-485000), Support Activities for Transportation (43-488000), Couriers & Messengers (43-492000), and Warehousing & Storage (43-493000). The **Utilities** subsector is not directly related to the logistics industry, although its services are often required for operation (i.e. power, water and sewage). The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal. Nevertheless, the NAICS merges Utilities with Transportation and Warehousing; for the purposes of this study, Utilities is omitted from the dataset (U.S. Census).

The overall sector of **Transportation and Warehousing (48-49)** includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and

sightseeing transportation, and support activities related to modes of transportation (NAICS 2012). Establishments in these industries use transportation equipment or transportation-related facilities as a productive asset. The type of equipment depends on the mode of transportation, which are air, rail, water, road, and pipeline. The Transportation and Warehousing sector distinguishes three basic types of activities: subsectors for each mode of transportation, a subsector for warehousing and storage, and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services, and courier services; the Scenic and Sightseeing sector is not included in this study (U.S. Census).

Of note, the NAICS is codified differently by Current Employment Statistics (CES) of the Labor Market Information Division of the EDD, compared with the Quarter Census of Employment and Wages (QCEW) utilized by the Employment and Payroll Group of the EDD. **Transportation, Utilities and Warehousing (43-400089)** is the overarching code established by the CES, with 43 designating the Transportation, Utilities and Warehousing Sector (NAICS 2012). Transportation and Warehousing (T&W) as defined by the QCEW is identified in the NAICS and the first segment of the second part of the code. The subsectors of Transportation, Utilities and Warehousing include Air Transportation, Truck Transportation, Transit & Ground Passenger Transportation, Support Activities for Transportation, Couriers & Messengers, and Warehousing & Storage. For **Air Transportation,** which is coded **43-481000 (or 481),** the NAICS code is identified as 481000, with 48 to 49 being the specific designations in the NAICS of the Transportation and Warehousing Sector. Industries in the Air Transportation subsector provide air transportation of passengers and/or cargo using aircraft, such as airplanes and helicopters. The subsector distinguishes scheduled from nonscheduled air transportation (NAICS

2012). **Truck Transportation** is coded **43-484000 (or 484);** industries in the Truck Transportation subsector provide over-the-road transportation of cargo using motor vehicles, such as trucks and tractor trailers.

Transit & Ground Passenger Transportation is coded **43-485000 (or 485);** industries in the Transit and Ground Passenger Transportation subsector include a variety of passenger transportation activities, such as urban transit systems; chartered bus, school bus, and interurban bus transportation; and taxis. These activities are distinguished based primarily on such production process factors as vehicle types, routes, and schedules (NAICS 2012). **Support Activities for Transportation**, is coded **43-488000 (or 488)**; industries in the Support Activities for Transportation subsector provide services which support transportation. These services may be provided to transportation carrier establishments or to the general public. **Couriers & Messengers** is coded **43-492000 (or 492);** industries in the Couriers and Messengers subsector provide intercity, local, and/or international delivery of parcels and documents (including express delivery services) without operating under a universal service obligation. The **Warehousing & Storage** subsector is coded **43-493000 (493);** industries in the Warehousing and Storage subsector are primarily engaged in operating warehousing and storage facilities for general merchandise, refrigerated goods, and other warehouse products (EDD).

For the statistical purposes of the EDD, a business establishment (firm) is assigned one NAICS code, based on its primary business activity. This will be the information that identifies the firm count data obtained from the NAICS. An establishment (firm) is generally a single physical location where business is conducted or where services or industrial operations are performed (e.g. factory, sales office, warehouse, or central administrative office) (NAICS 2012). An enterprise, on the other hand, may consist of more than one location performing the same or

different types of economic activities. Each establishment of that enterprise is assigned an NAICS code based on its own primary business activity (NAICS 2012). The NAICS codes and sub-codes listed above can be utilized in cross-comparisons with employment data also compiled from the EDD. Employment data from EDD can be scaled down to the specific place/city level. Firm count data does not exist for unincorporated regions, but a significant portion of Los Angeles County is already incorporated.

Assessment of Logistics and T&W Subsectors in LA County with GIS Mapping

This study's second analysis will make comparisons between the distribution of Hispanic or Latino regarding industrial employment as well as firm location. With the assistance of the CA EDD, firms are identified through their NAICS code within Los Angeles County. Geographic Information Systems (GIS), alongside ethnicity/racial information, will help spatially visualize the distribution of Transportation, Warehousing & Utilities (43-000000) firms and employment throughout the cities of Los Angeles County.

The last series of tables (Table 1, Table 2 and Table 3) will assess the relationship between percentage of Hispanic or Latino and T&W firm density, the interplay between subsectors and the general state of the T&W sector in LA County, as well as about the wider logistics industry of the United States. The first table reports the simple OLS regression between dependent variable T&W firms, and the independent variable of percentage Hispanic or Latino out of total population within an incorporation. The second table is a county-level assessment of the population of firms within each subsector in LA County. This table will allow immediate subsector comparisons of firms located within incorporations in LA County, excluding firms located in unincorporated areas. A correlation matrix (Table 3) is included using the same subsector firms within incorporated cities across time; the matrix is utilized as an overview of

possible relationships between the subsectors of the T&W sector in LA County.

While these counts will be restricted to the incorporated cities of Los Angeles County, their frequency within specific incorporated boundaries may serve as an interesting comparison with the distribution of ethnic employment and residence, outside the immediate boundaries of the incorporated cities, within the unincorporated areas of Los Angeles County. This territoriality will also be represented through utilization of GIS time-layer comparison in relation to city and county-wide firm count, ethnic employment and subsector distribution from 2006 to 2014. The first two maps draw a general assessment of the county's geographic distribution of incorporations, overlapped with highway access as mapped by the Environmental Systems Research Institute (ESRI).

As global and world cities spill out into their surrounding hinterlands, firm concentration and their logistic networks in the T&W sector continue to influence the distribution of employment in the world/global city's internal regions, such as in Los Angeles County, as exemplified by segregation through employment and persistent labor conflict. Visually, this may be difficult to represent, especially in the southern portions of Los Angeles County with high concentrations of incorporated cities. However, utilizing ethnic and demographic information at the Census Tract level may highlight the distribution of employment centers through concentrations of minority workers, such as Hispanic/Latino workers.

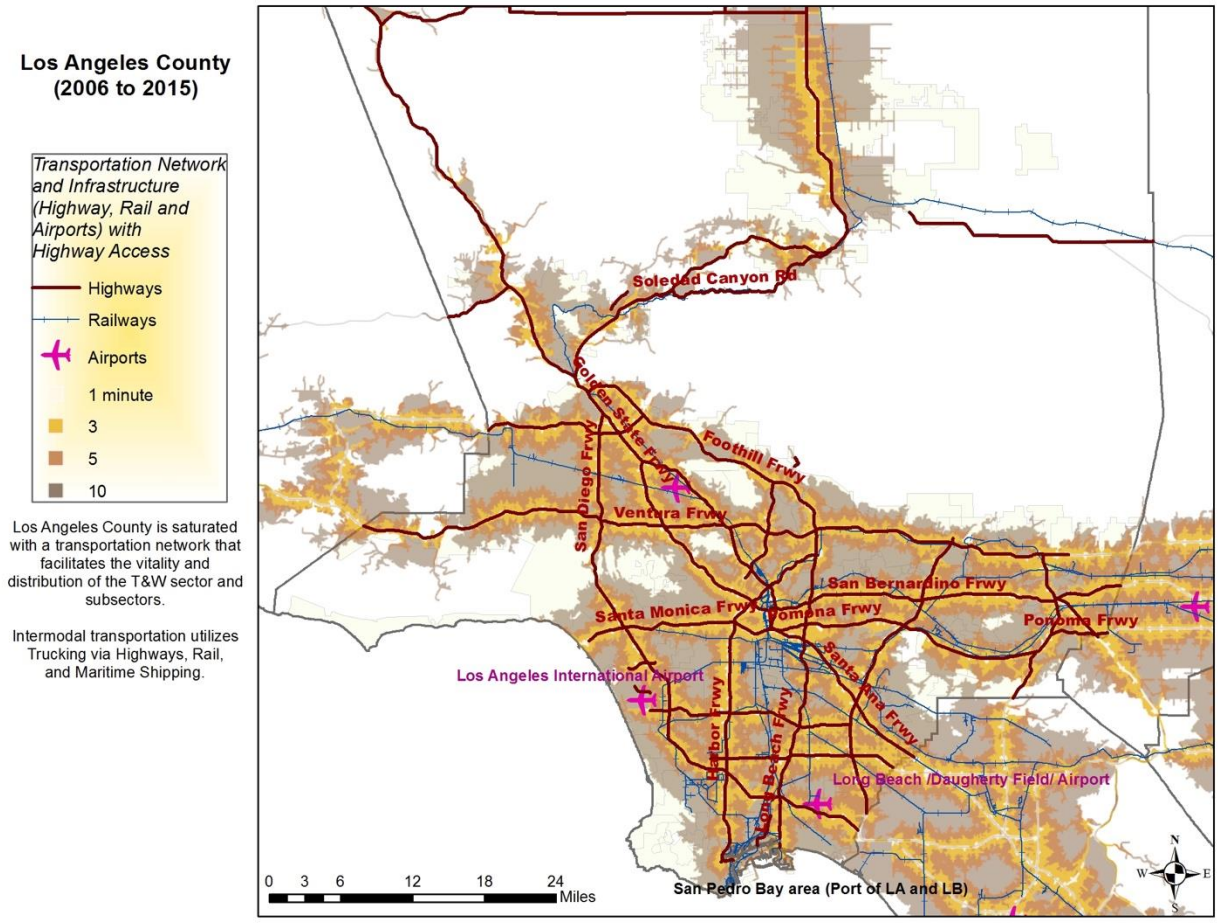
The latter map (on page 44) displays comparisons between the T&W firm density with the percentage of Hispanic or Latino within the total population of an incorporation, as represented by Hispanicity. The map is further supported by a simple OLS regression, utilizing cumulative T&W firm counts of all relevant subsectors into an aggregate T&W measure, as with the first 5 maps. This T&W dependent variable is assessed with the number of Hispanic or

Latino in an incorporation, the results indicate that an relationship exists between firm count and Hispanic or Latino ethnicity.

Data Analysis

Geographical Information System (GIS) Analysis of the T&W Sector in LA County

For the purposes of this study, geographical information systems analysis (GIS) in LA County is centered around the incorporated cities of LA county, and the county's highway network, as displayed in the map below. The map displays the highway and railway networks of LA County, with highway access as represented by distance away from the highways. Three levels are presented in the Transportation Network and Infrastructure map with three minutes, five minutes and finally, ten minutes of travel time from the highway. Railways are represented



on the map, via blue lines representing rail tracks that spider web throughout LA County. The Transportation Network and Infrastructure map displays a concentration of railway lines that gather at LA County's core area, approximately the location of the cities of Vernon and Commerce. This concentration can be identified just under the Pomona Freeway, as labeled in the map. Three major airports are displayed on the Transportation Network and Infrastructure map, Los Angeles International Airport (LAX), Bob Hope Airport just above the Ventura Freeway, and Long Beach Airport. As displayed on the Transportation Network and Infrastructure Map, LA County's transportation infrastructure is heavily invested towards the coast. The highway linkages and rail lines also lead into neighboring Orange County and San Bernardino County.

Change Overtime (2006 to 2015)

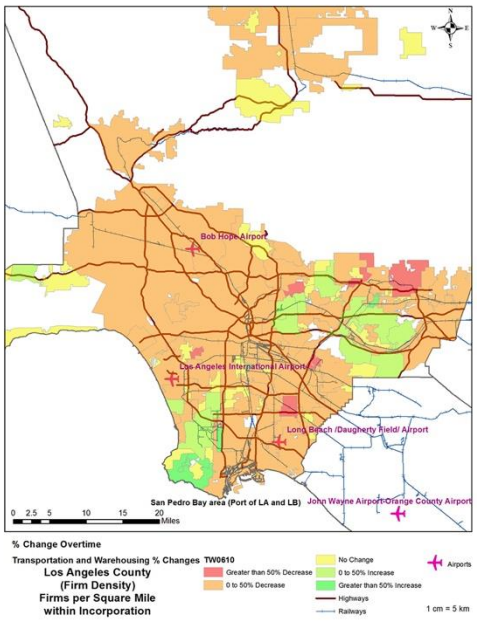
The GIS maps below track percentage change in the population of firms four year intervals from 2006 to 2010, then from 2010 to 2014. The T&W sector is measured by summing up WARE (Warehousing), TRUCK (Trucking), COUR (Courier), RAIL (Rail Transportation), SHIP (Maritime Shipping), AIR (Air Transport) and POST (Postal Service). UTIL (Utilities) is omitted, given its vague interconnection with the T&W sector; PIPE (Pipeline) is also omitted from the T&W cumulative, given limited sample size. In 2008, the 'Great Recession' slammed into the global economy, riding on the coattails of the mortgage crisis in the housing sector, and the collapse of multiple financial instructions. The T&W sector was not spared this economic catastrophe, although it did not collapse to the same extent as the Housing sector. The general pattern on these subsector maps is a % decline in firms in the early periods of 2006 to 2008 and 2008 to 2010; the 2008 Recession is the major event during this period that could explain a decline in the number of T&W firms; the accompanying recovery, a rise in said firms.

The city of LA is the dominant incorporation in LA County; it has the largest absolute number of T&W firms, although not quite as dense as a T&W-dominated incorporation, such as Vernon or Commerce. A cluster of smaller incorporations border the city of LA's southeastern border in the direction of the San Pedro Bay area, including the two incorporations (Vernon and Commerce). The bulk of incorporations are towards the coast; whereas, the inland areas of LA County are dominated by mountainous terrain, areas unsuited for expansive warehouses. As seen previously with highway access (on page 16), there is limited infrastructure and connectivity in the area; despite the proximity of a highway leading out-of-state in the isolated northern incorporations. Nevertheless, the northernmost incorporations did experience subsector demographic shifts during the period of the study, in subsectors other than Air Transport and Maritime Shipping. Given the limitations of minimum sample size for a fair number of subsectors, this study includes maps of the T&W as a collective.

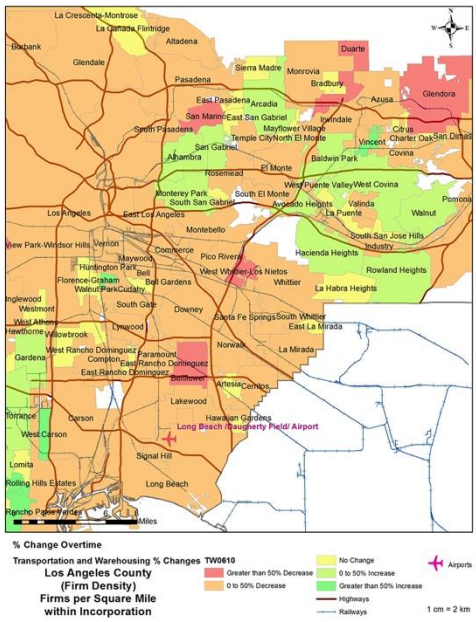
Generally, most subsectors appear to have recovered post-2008; throughout 2008 to 2015, Courier, Trucking and Utility subsectors have consistently increased up to 25% or more in the incorporations closest to the southeast of the city of LA. There are no maps for Transit and Rail subsector overtime changes, as there is an insufficient number of firms to accurately represent any change in the few incorporations that they are located within (most LA County incorporations do not possess a Rail subsector firm, and Transit firms are difficult to establish geographically, due to their broader services and public-sector relationships.)

Within the recovery period of 2010 to 2014, the T&W sector exhibited general increase throughout LA County. For the city of Los Angeles itself, the size of the incorporation makes it difficult to ascertain the influences of logistical points of entry, whether the Port of LA or LAX. The city of Industry is among the locations with the highest percentage increase in T&W firms,

as well as the city of Norwalk, Diamond Bar, and Claremont. The city of Industry is among the special cases of incorporations comprised nearly solely of commercial and industrial uses. As noted in the SPECIFIC map below (page 21), Vincent and Rancho Palos Verdes have experienced a greater than 50% decline in T&W firms.



2006 to 2010 Percent Change in the T&W Sector



Most change in the T&W from 2006 to 2010 is focused on the Eastern and Southeastern areas of Los Angeles County.

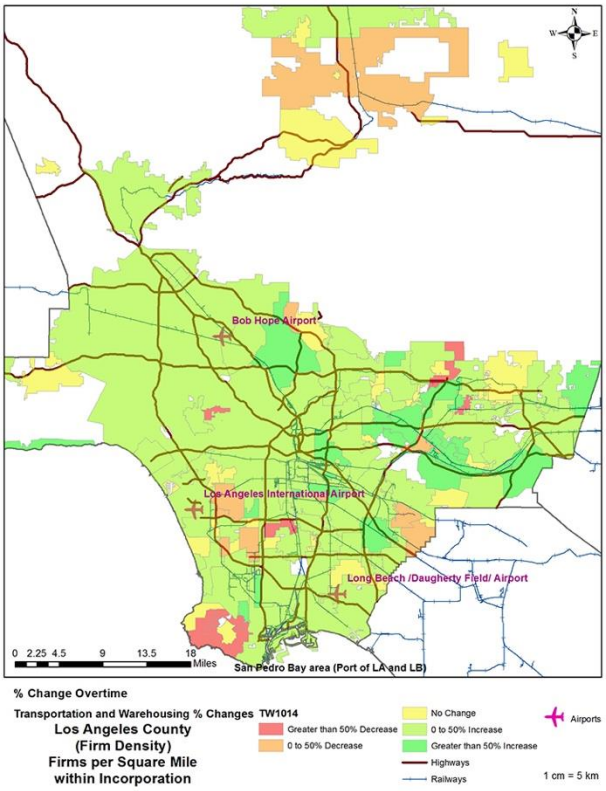
There is a general decline in the T&W sector from 2006 to 2010, although some incorporations exhibit growth, such as Florence-Graham, Vincent and West Carson.

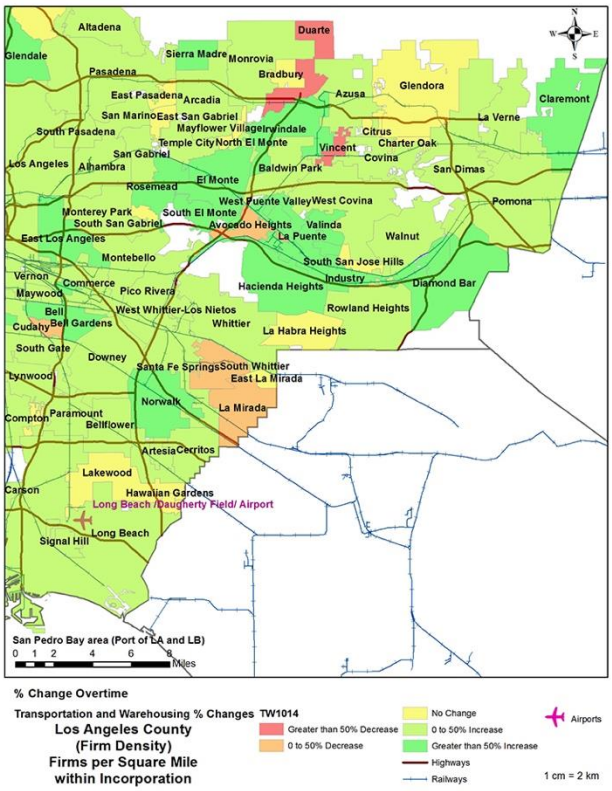
Incorporation appears to spur T&W activity, at least in the sense of providing a legislative environment that creates conditions for firms to move into an area, as well as move out. If incorporations (or what advantages are afforded by a government corporation, as represented by incorporations) did not provide incentives for location, then firm density would be more broadly distributed throughout LA County. The incorporations with greater than 50% increase in T&W firms are located close to the borders of LA County with San Bernardino County (i.e. Diamond Bar and Claremont). In consideration of the logistics of maritime shipping,

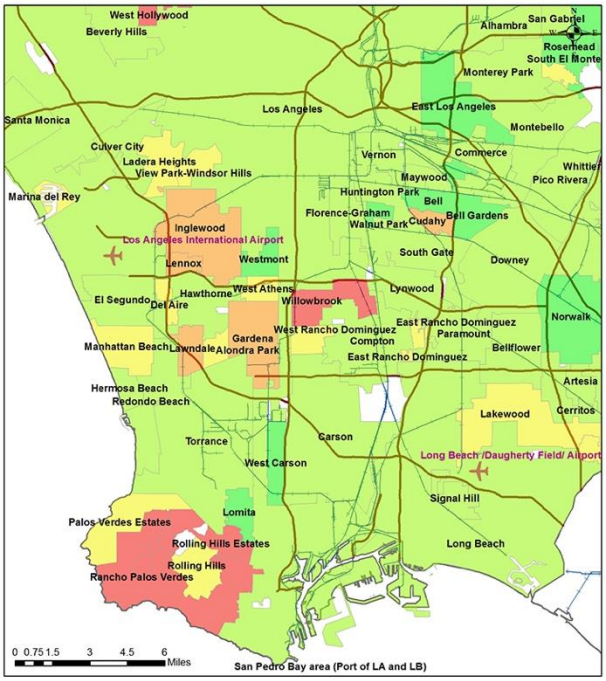
the incorporations of Los Angeles (city) and Long Beach exhibit relatively stable shifts during the period from 2006 to 2010 to 2014. The presence of the maritime ports of LA and LB does not appear to have significantly influenced the variability of T&W firms who choose to locate within those areas. However, this could be expected, given Bonacich and Wilson's (2008) emphasis on the stability of the large-scale logistics firms that own the port terminals.

The city of Glendale is notable for its greater than 50% increase in T&W firms, given its distance from San Bernardino County and Orange County, as well as the Port of LA and LB. Nevertheless, the nearby proximity of Bob Hope Airport provides a point of entry for T&W firms and services close to the city of Glendale. In terms of firm counts, Glendale has TRUCK > 10 and SUP (T&W) > 10, and 0 AIR firms; thus, Glendale may act as an intermodal incorporation, receiving products at Bob Hope Airport and distributing it throughout LA County via highway network. The city of Rancho Palos Verdes experienced a notable shift from 2006/2010 to 2010/2014, the city went from a greater than 50% increase to a greater than 50% decrease in T&W firms; this shift is also of interest considering that Rancho Palos Verdes is a known residential suburb. The presence of T&W firms within this residential incorporation may be of note, perhaps a consequence of the 2008 Recession. Nevertheless, upon closer inspection of the T&W firm count in Rancho Palos Verdes, the population is not all that large; the high percentage in T&W firm shifts representing the entry and exit of a few firms, particularly the SUP (Support for T&W subsector) with < 4 at most.

In terms of T&W firm density across all T&W subsectors, there is a notable pattern of incorporations with high T&W density, a band of incorporations with a T&W firm-to-square-mile between 5.0 and greater. Outside of this band, T&W firm density remained relatively consistent over the 2006 – 2010 – 2014 period. Specific incorporations stand out in the maps







2010 to 2014 Percent Change in the T&W Sector

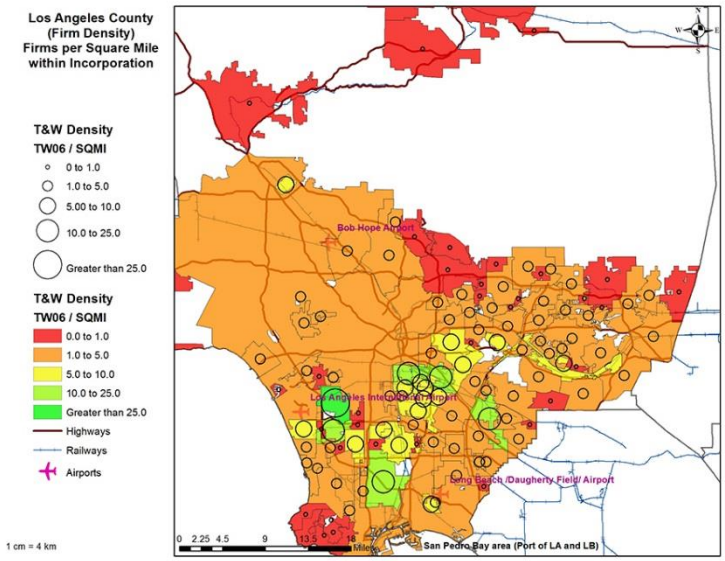
Most change is still concentrated in the Eastern and Southeast areas of LA County.
However, incorporations which had decreased in 2006 to 2010, have percentage increases.

On the other hand, a few previously increasing incorporations have declined, such as Vincent and Rancho Palos Verdes.

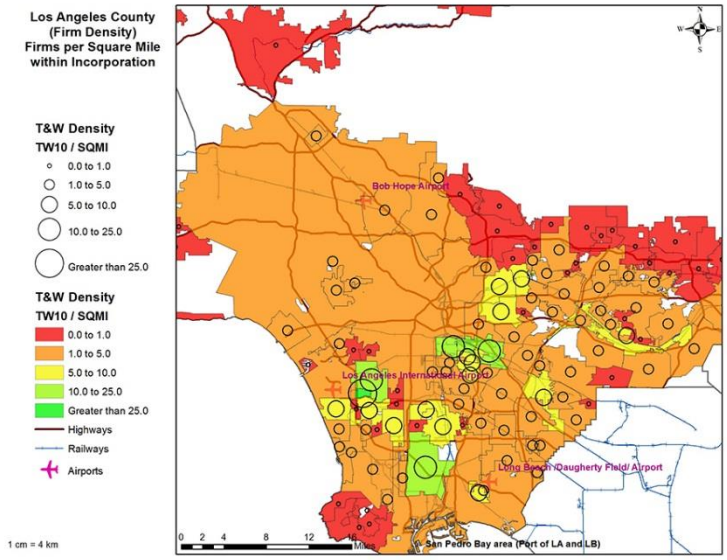
(on page 23 to 25), such as Inglewood and Lennox – which have a firm density of greater than 25.0 (the former in 2006, the latter in 2010 and 2014). Comparisons with the Transportation Network and Infrastructure map highlight the cities of Vernon and Commerce, which are located within a cluster of railways and highways with overlapping access. Industry is an incorporation with a high T&W density with a 10.0 to 25.0 firms per square mile, particularly focusing on the WARE subsector; Industry can be seen to be structured along a highway, which support a focus on the T&W sector.

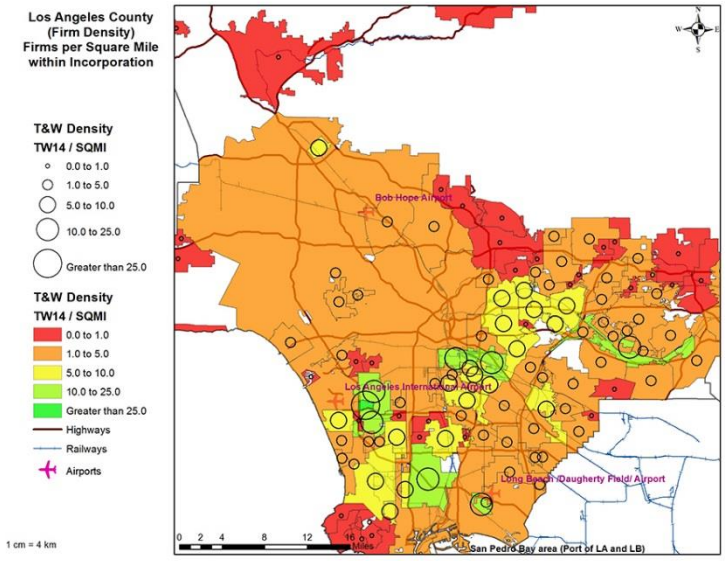
However, these maps highlight a weakness of the former maps on percentage change; some areas, such as Rancho Palos Verdes have extremely few T&W firms. An addition of a single firm can create a greater than 50% increase; on the other hand, a map detailing percentage change can be useful in spotting the intrusion of the T&W sector in new areas. That T&W firms could locate in a primarily residential suburban incorporation, like Rancho Palos Verdes, tells of possible exceptions to purely residential zoning. There is a general pattern in incorporations within LA County, specific incorporations have higher densities than those incorporations surrounding them. Incorporations with 0.0 to 1.0 T&W firms per square mile tend to be on the outer parts of the main metropolitan 'core' of LA County (as displayed page 23). There are a few incorporations in the metropolitan core with 0.0 to 1.0 T&W firms; these areas could be residential incorporations, or incorporations dominated by other industry sectors.

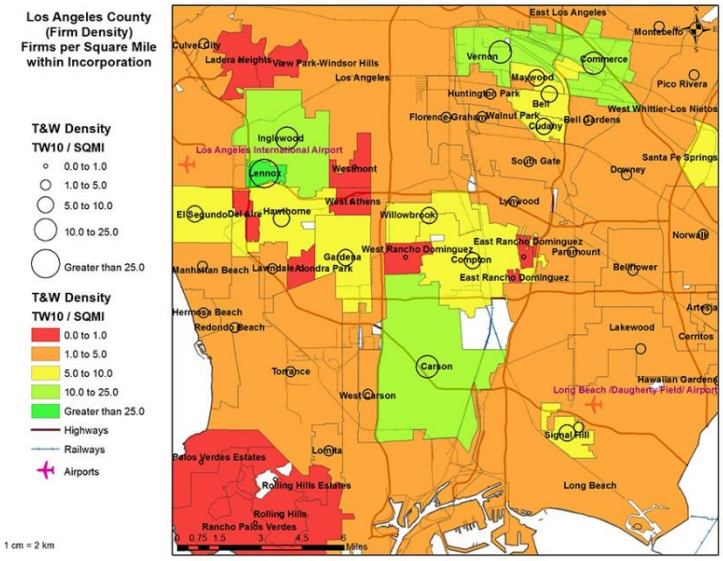
Throughout the 2006 to 2010 period, as well as 2010 to 2014 period, nine incorporations have a T&W firm density of above 10.0 firms per square mile: Vernon, Inglewood, Lennox, Signal Hill, Hawthorne, Carson, Santa Fe Springs, Commerce, and Industry. The incorporations that maintain a T&W firm density above 10.0 across both periods: Vernon, Inglewood, Lennox,



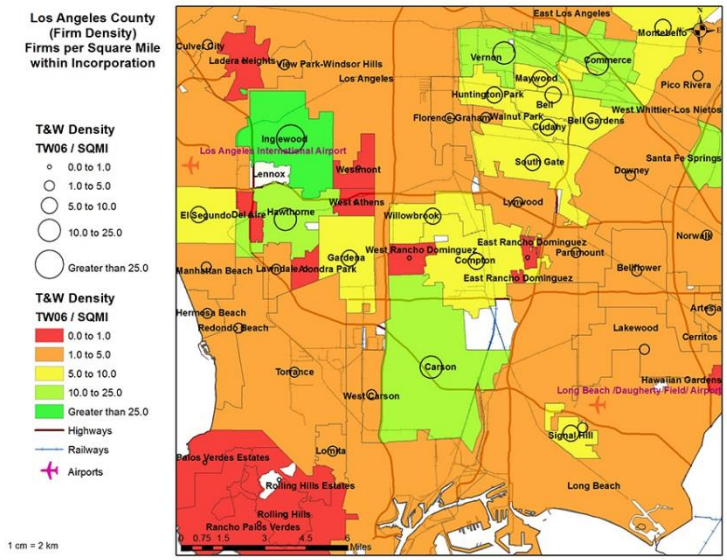
T&W Sector Firm Density (2006, 2010, and 2014)

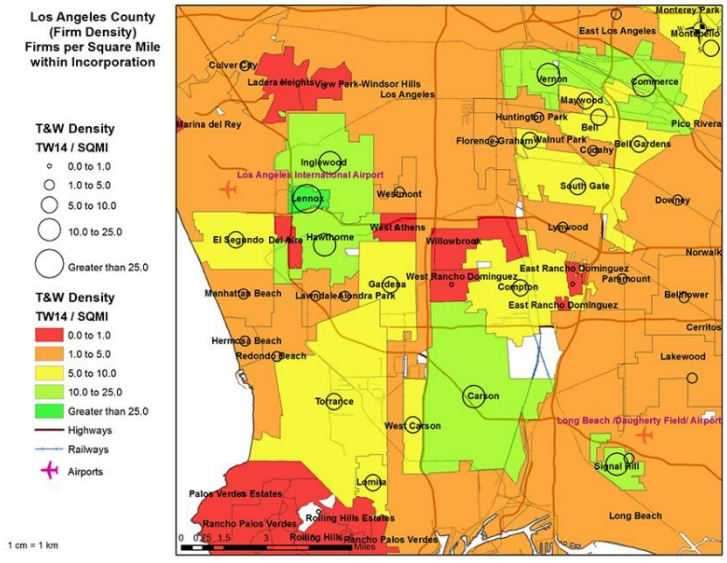




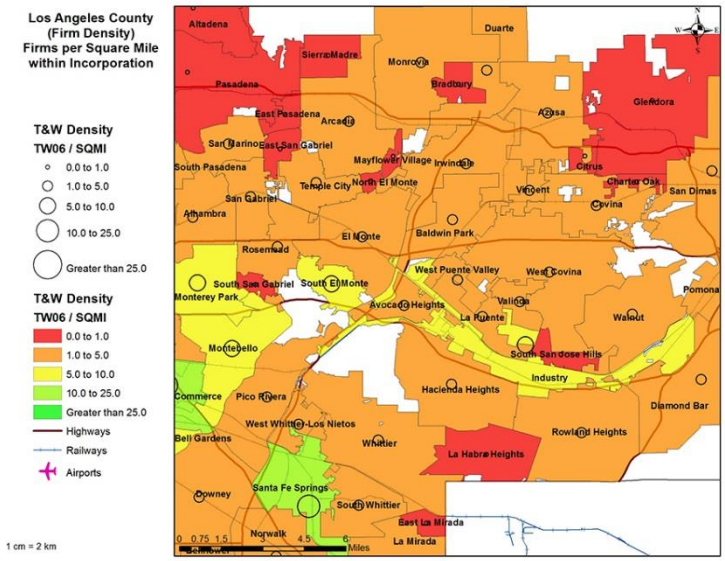


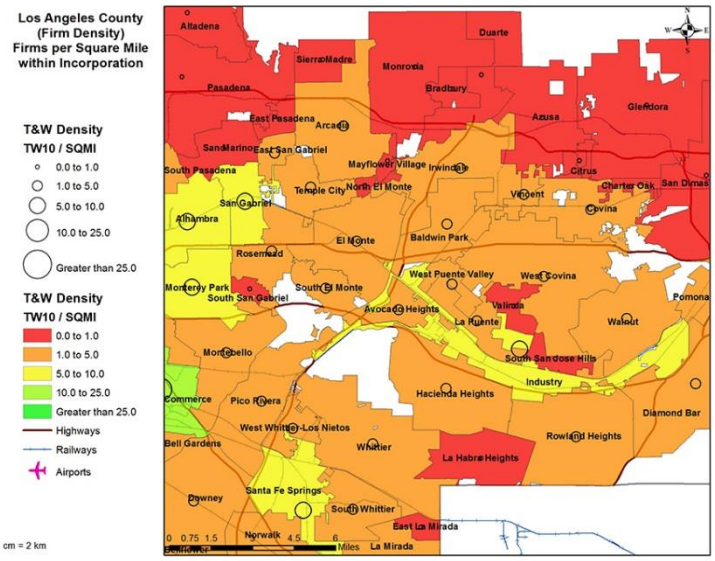
T&W Sector Firm Density FOCUSED (2006, 2010, and 2014)

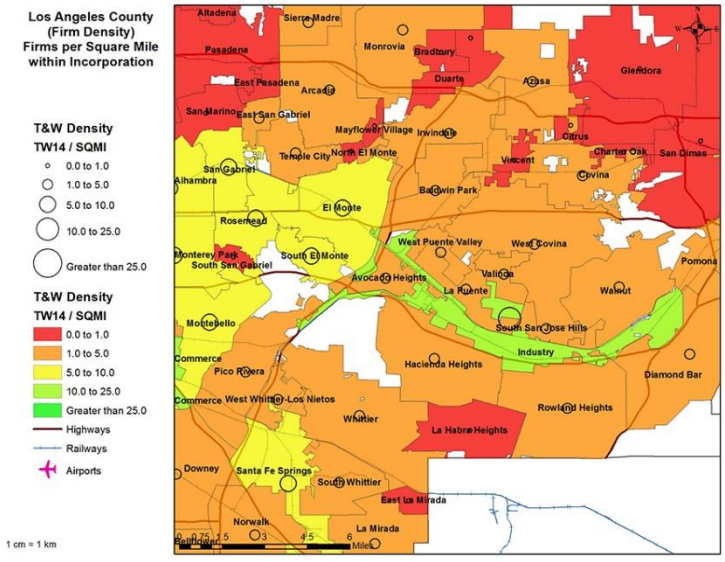




T&W Sector Firm Density FOCUSED (2006, 2010, and 2014)





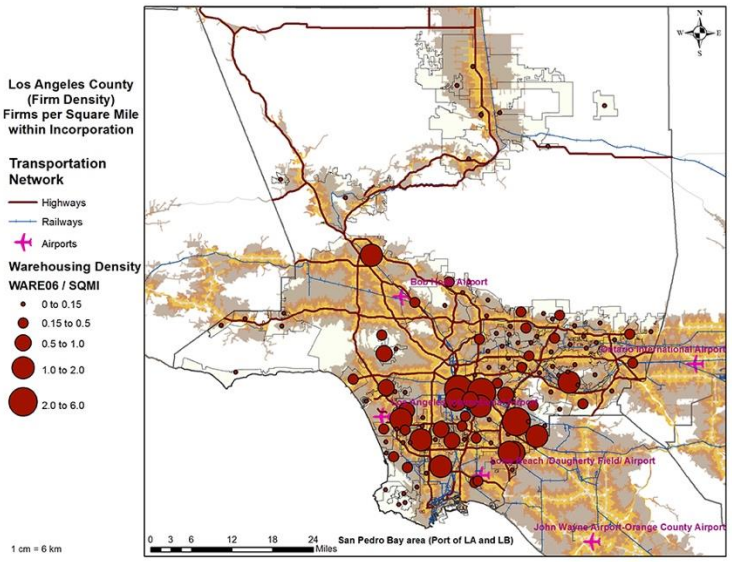


Carson, and Commerce. Signal Hill, Hawthorne, Santa Fe Springs and Industry lost their 10.0 firms per square mile status during 2006, 2010 or 2014. Signal Hill and Industry fell below 10.0 in 2006 and 2010, before rising above 10.0 T&W firms per square mile in 2014. Lennox is a notable outlier among the > 10.0 T&W firms per square mile incorporations: 66.0 in 2006, 53.0 in 2010, and 42.0 in 2014; as noted on page 40 to 42, Lennox is a strong site for the SUP (Support Services for T&W) subsector. The particularities of the SUP subsector allow for denser concentration of firms, compared to other land-intensive T&W subsectors (i.e. WARE.)

Subsector Firm Density (2006 to 2010 to 2014)

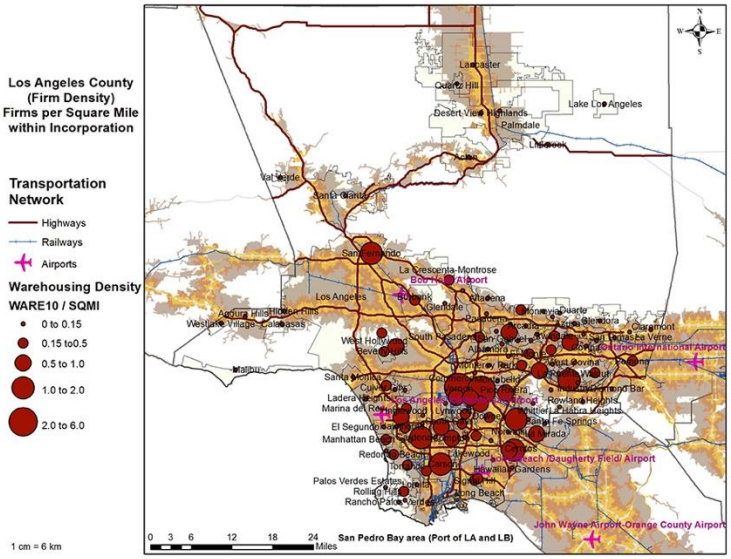
For specific industries, such as Warehousing, agglomeration effects that maximize firm density, intermodal transportation networks, and geo-spatial location are present in LA County. Warehousing (WARE) establishments provide facilities to store goods; they do not sell the goods they handle. They also take responsibility for storing and securing the goods. They may further provide a range of services, referred to as logistics services, related to the distribution of goods. Logistics services can include labeling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick and pack, price marking and ticketing, and transportation arrangement. However, establishments in this industry group always provide warehousing or storage services in addition to any logistic services. Furthermore, the warehousing or storage of goods must be more than incidental to the performance of services, such as price marking (NAICS 2012).

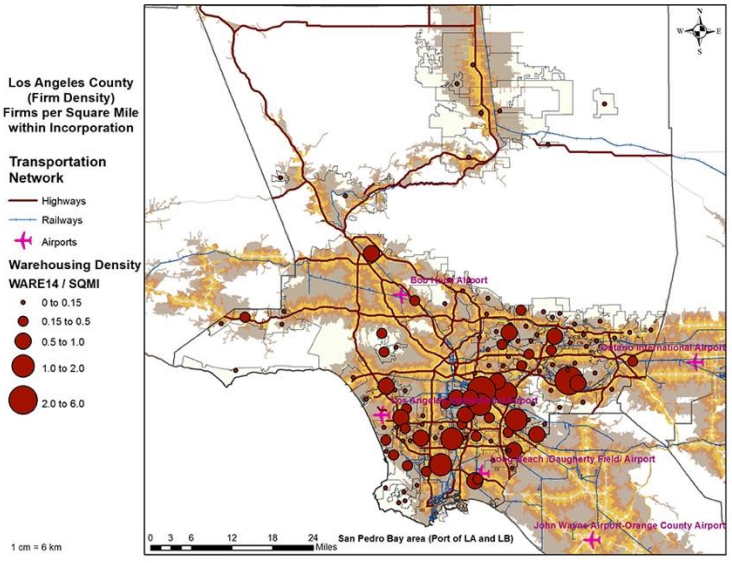
Most warehousing firms are concentrated in the middle and southeast of LA County. These firms cluster around freeway access points that lead towards the port of LA and LB, as well as into other counties. The city of LA has the most warehousing firms; however, the high number is spread out over the city of LA's larger square mile of incorporated jurisdiction. Warehousing



Warehousing Subsector (WARE) Density [Firm per Square Mile] from 2006 to 2010 to 2014

Warehousing Firm Density is heavily concentrated in the 'core' of LA County. This 'core' is located in the region with among the densest overlapping highway access.





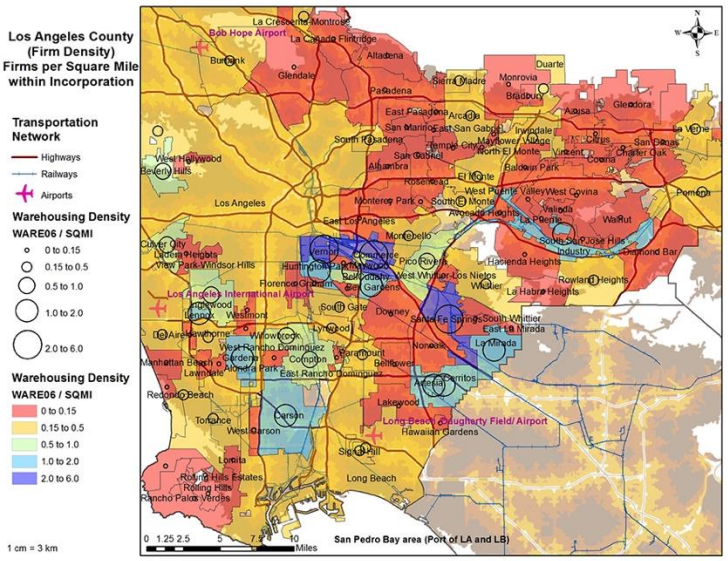
From 2006 to 2010, density declined within select incorporations.

However, the general trend of WARE firm density highlights a healthy 'core' centered around the incorporations of Vernon and Commerce.

density is thickest towards Orange County and the port areas; surprisingly, the city of LB is not as dense in Warehousing sector firms as expected, contrary to the presence of the Port of LB, as an entry and exit point for goods flowing through the Pacific GCCs. The incorporations with the highest Warehousing sector firms (to incorporated city area per square mile) highlight potential points of agglomeration and signify the presence of inland (hence, dry ports). On the other hand, their locational advantages could be a side effect of incorporation specialization; warehousing firms located in these incorporates could have pushed out other firms, leaving little room for economic diversity.

For WARE, three incorporations in LA County stand out: the cities of Vernon, Commerce and Industry. Vernon and Industry are incorporations with a surprisingly few inhabitants, only a total population of 112 and 219 individuals respectively (U.S. Census). In addition, these inhabitants reside within 29 housing units for Vernon and 73 housing units for Industry. In contrast, the city of Commerce has a total population (estimated as of 2015 from ACS) of 13,081 individuals, residing within 3470 individual housing units. Nevertheless, the city of Vernon contains > 20 WARE subsector firms, alongside > 20 TRUCK subsector firms. The city of Industry contains > 20 WARE subsector firms, > 30 TRUCK subsector firms, and > 25 SUP subsector firms. Commerce has > 20 WARE subsector firms, although > 30 TRUCK subsector firms (EDD). Bonacich and Wilson (2008) highlight the large space requirements of the WARE industry, it would explain the low amounts of housing units within these incorporations.

The trucking sector is highly correlated with the Transportation Support and Courier sector, which is reasonable, given the very similar roles that Trucking shares with the former two sectors in the movement of goods. The subsector is subdivided into general freight trucking and

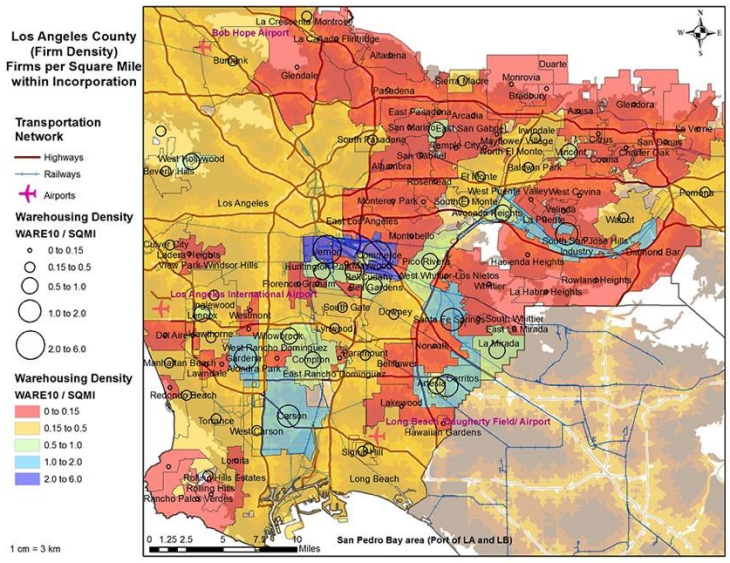


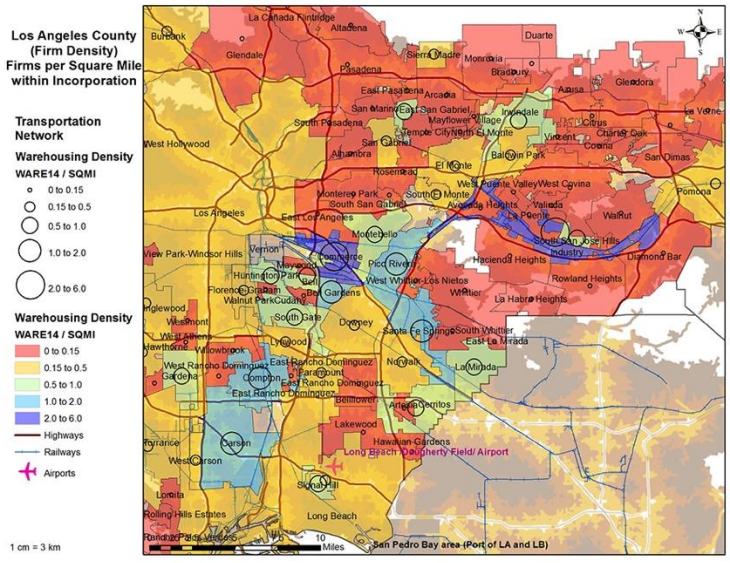
Warehousing (WARE) Firm Density [Firms per Square Mile within Incorporation] - FOCUSED

Density is highest in Vernon and the city of Commerce. The City of Industry is also a incorporation with a high density of WARE firms per square mile.

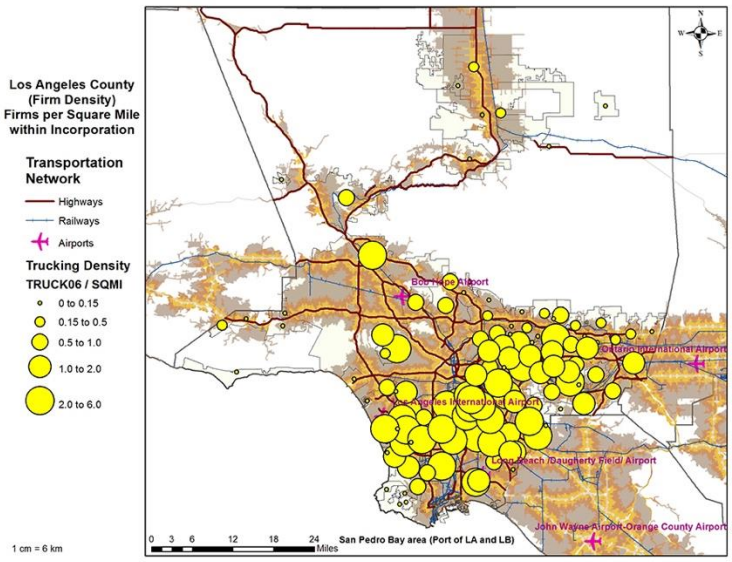
The City of Industry, Commerce, and Vernon are incorporations known for a high proportion of commerical and industrial uses, and limited residential zones.

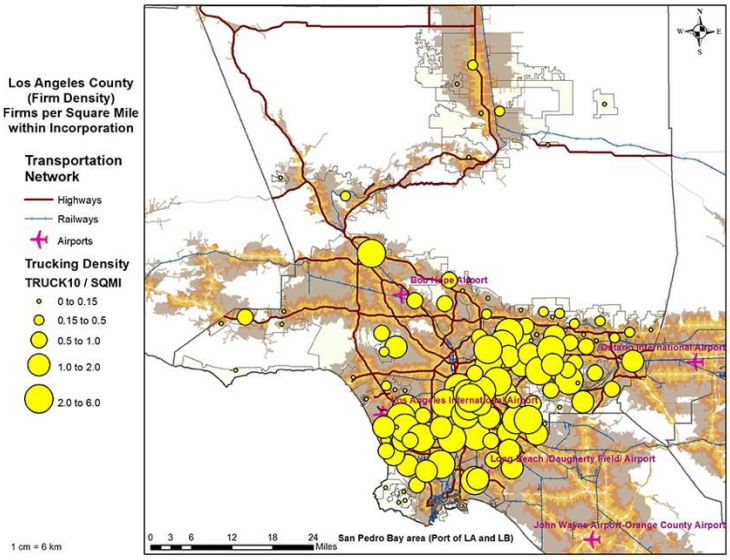
Missing data for Vernon in 2014. However, other incorporations remain consistent. WARE firm density in Industry has increased since 2010.





Trucking Subsector (TRUCK) Density [Firm per Square Mile] from 2006 to 2010 to 2014



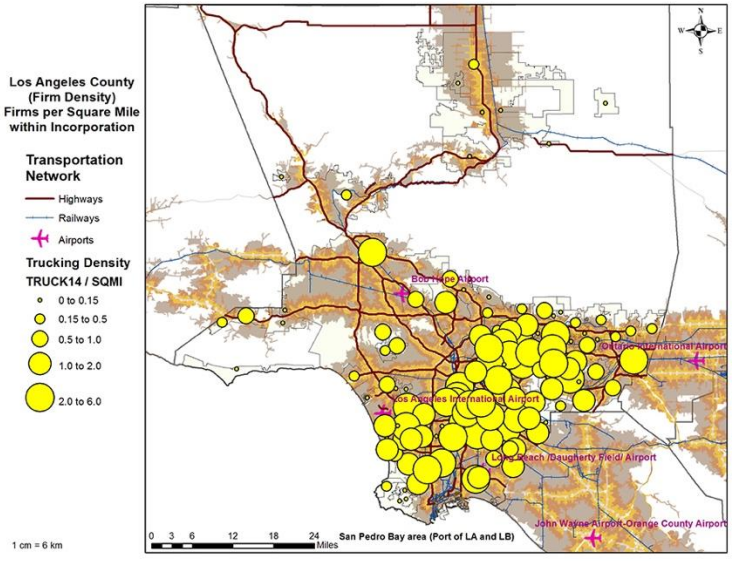


Trucking Firm Density is the thickest in Eastern and Southeast areas of LA County.

Compared with the WARE subsector, the TRUCK subsector is far more saturated throughout LA County's 'core.'

Trucking (TRUCK) firm density is highest within the region where highway access is the densest.

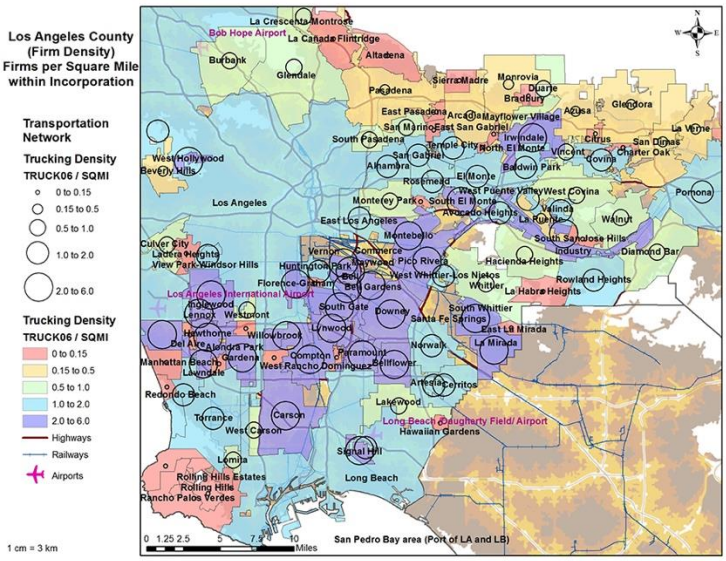
This is reasonable, considering that highways are the physical linkages of the TRUCK subsector.



specialized freight trucking. This distinction reflects differences in equipment used, type of load carried, scheduling, terminal, and other networking services. General freight transportation establishments handle a wide variety of general commodities, usually palletized, and transported in a container or van trailer. Specialized freight transportation is the transportation of cargo that, because of size, weight, shape, or other inherent characteristics requires specialized equipment for transportation, such as refrigerated cars (NAICS 2012).

Distribution-wise, trucking firms are about equal to warehousing firms in their location of choice; rather than locating near the edges of LA County, these firms are clustered around the same areas where warehousing firms are densely clustered, as well. Trucking firm density is most populated to the east of LA County. Again, the city of LA has the highest absolute number of trucking firms, but they are better distributed throughout LA's incorporation. Trucking is an industry that is dispersed locationally, considering the ease of containerization and its influence on land-borne transit. However, Trucking subsector firms still require a physical location to coordinate and distribute trucks to locations where their services will be in demand. There is a band of incorporations with greater than 2 firms per square miles, alongside the eastern and southeastern border of the city of LA. Rather than focused on a specific incorporation or a small cluster, TRUCK subsector firms are saturated throughout the urban 'core' of LA County. TRUCK subsector firms remain dense throughout the band of < 2.0 to 6.0 firms per square mile throughout 2006 to 2010 to 2014. As one moves away from this band, TRUCK firm density declines; an interesting pattern signifying incorporations having impact on firm density.

The Trucking subsector of the T&W industry in 2012, follows along the same density scales as Warehousing subsectors, as well as overall locational. These firms are located within incorporations at the county's jurisdictional core. There is a cluster of incorporations with dense

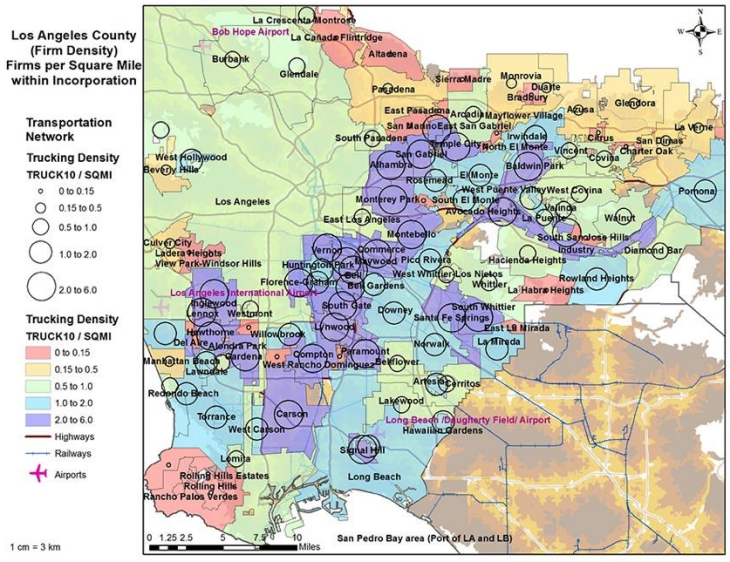


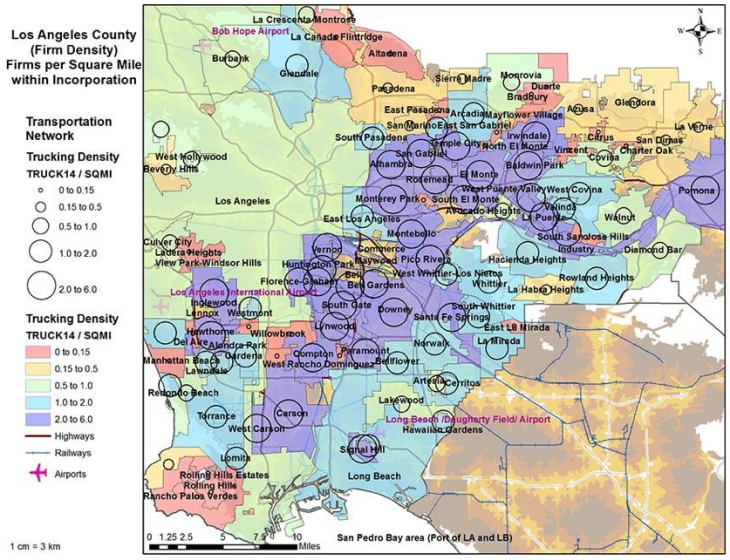
Trucking (TRUCK) Firm Density [Firms per Square Mile within Incorporation] - FOCUSED

There is a band of incorporations with dense TRUCK subsector firms, running from Carson and Del Aire to Irwindale and Industry.

The TRUCK subsector is notable in that individual contractors could be defined as a single firm, which consist of a fair proportion of TRUCK subsector firms (Bonacich and Wilson, 2008).

The EDD data utilized in this study, employs unemployment registration as means of determining the presence of a firm.





Trucking firm concentrations in the eastern part of LA County, these firms serve the interchange between LA County and the dry ports of San Bernardino County.

For other subsectors, such as Transit subsector firms, the bulk of firm density is located within the urban core of LA County; of interest, the incorporations with the highest density of transit subsector firms are located close to tracts with a high percentage of below-poverty level households.[1] For subsectors with a smaller firm footprint, such as Transit and Public Transportation, Air Transportation and Maritime Transportation, their locational density could be seen to be relatively self-explanatory. Air Transportation firms tended to locate around the three major airports of LA County, and Maritime Transportation firms tended to located near the San Pedro Bay area. There are exceptions to the rule, such as a single Maritime Transportation firm in South El Monte; nevertheless, very few of the inland incorporations with SHIP (Maritime Transportation) firms exceed 1.

Concentration of transit and public transportation firms are reliably located along major freeway points, as expected for this T&W subsector. Interestingly, there are no transit or public transportation firms, as registered by the EDD, in the city of LB. The city of LB is home to the port of LB and freeway access is present within the incorporation that makes the absence of transit firms notable. There are relatively few transit and public transportation firms per land area, which can be expected given the predominance of the public sector in the industry. Transit and public transportation firms often possess local monopolies, serving large regions of the county, while basing their mother hubs within city incorporations, such as in the city of Los Angeles, and Anaheim. Of note, there are no transit or public transportation firms located in the northern-most incorporations of LA County, despite the presence of a freeway with access

[1] Appendix A: 55 - 56

points. Generally, those incorporations are located far from the 'dryports' of central LA county; transit and public transportation do signify the presence of employment networks that can bring workers to firms.

Air transportation firms are generally restricted to areas with airports; however, they are a valuable linkage in the intermodal network of the T&W sector. Air transportation firms are better concentrated in the city of Los Angeles, with specific air transport-dense incorporations located in the southwest and central parts of the county – primarily near the Pacific coast. This can be expected, given the importance of priority air transport from Asia, as well as the presence of international airports, such as LAX. As noted in the NAICS, Air Transportation includes both the transport of goods and passengers; it can be assured that once air transport has successfully delivered their cargo and/or passengers to their destination, other intermodal means of transit, whether trucking or shuttle, will be present to deliver their contents to their next destination. Maritime firm density in 2012 is expectedly located close to San Pedro Bay, to the Ports of LA and LB. Freeway access goes along these incorporations where maritime firm to incorporation area is densest/ The Postal sector is relatively limited in scope, the primary firms involved in the Postal sector are related to the United States Postal Service (USPS), as well as semi-private firms (such as Fedex or UPS); as expected, firms in the Postal subsector also exploit the freeway network. Utility firms are a part of the overarching Warehousing, Utility and Transportation NAICS code. Much like Trucking and Warehousing, utility firms concentrated in the same incorporations of the inland LA County area. These Utility firms handle general infrastructure maintenance and construction that lumps them technically with logistical transportation firms.

The Courier subsector is a growing component of the T&W sector, given the growing presence of distribution centers (DCs) and their role in modern logistics (Bonacich and Wilson,

2008). Distribution centers often are utilized as warehouses, but a true DC is treated mainly as an exchange house for products. Intermodal transit brings in products from land-, air- and sea-borne transport and at these DCs, the products are separated and transferred to trucking or rail for distribution throughout the county, and nationally. The Courier subsector overlaps with Trucking and a fair amount of other T&W activities, especially the Postal subsector. Courier services and the goods that they transport may originate in the U.S. but be delivered to another country and can be described as those that may be handled by one person without using special equipment. This allows the collection, pick-up, and delivery operations to be done with limited labor costs and minimal equipment. Sorting and transportation activities, where necessary, are generally mechanized. The restriction to small parcels partly distinguishes these establishments from those in the transportation industries. The complete network of courier services establishments includes the firms that perform intercity transportation as well as contracted establishments that perform local pick-up and delivery; messengers are incorporated within the Courier subsector, whether through automobile or bicycle (NAICS 2012).

Messengers, which usually deliver within a metropolitan or single urban area, may use bicycle, foot, small truck, or van (NAICS 2012). Understandably, courier firms concentrated along the highway network; many courier firms locate within a few minutes of the highway system. Maritime shipping firms are densest near the Port of LB and LA, as expected. Again, they utilize the concentrated highway access of central and southeast LA County for distribution. For the location of Warehousing and Courier Industries, firm concentration within incorporation is densest within the urban center of LA County. Coincidently, it is notable that that incorporations with highest firm-to-land area density can often be found in the tracts with mid-

to-high percent poverty.[2] This can be explained by the influence of warehouse sector development on local communities that employ vast tracts of cheap land for storage and distribution. These tracts are the dry ports, locations of heavy T&W sector concentration, where large numbers of intermodal transit firms interact in county-wide extensions of international GCCs.

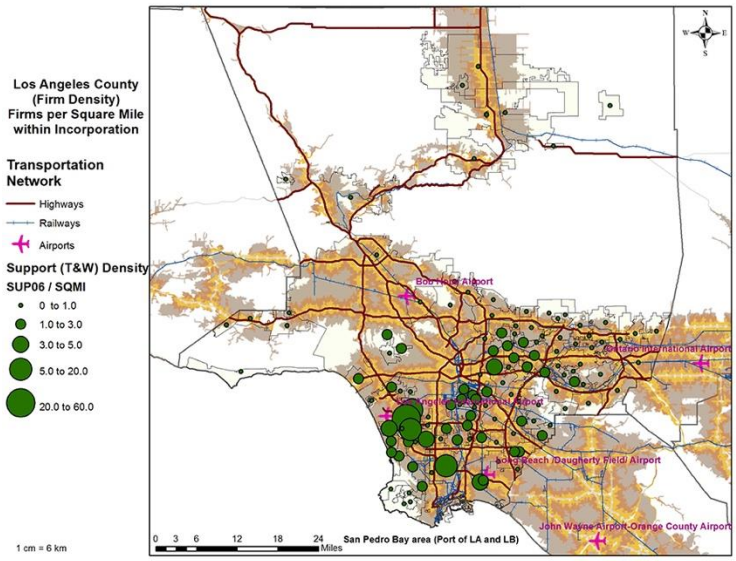
Warehouse firms per square mile density are highest within incorporations that are located near census tracts with a high percentage of individuals below the poverty line. The T&W sector appears to overlap with tracts and incorporations with a notable number of census tracts with a high percentage of individuals below the poverty level. The firm density of Maritime subsector firms and Air Transportation subsector firms are overlapped with percent Poverty.[3] Maritime subsector firms are expectedly closer to the San Pedro Bay area, although there are Maritime subsector firms located inland in LA County. These are the dry ports, locations that facilitate the storage of waterborne trade goods, as well as coordinating intermodal transfers between T&W subsectors and Retail. Air Transportation subsector firms are better distributed, focusing within incorporations with local airports; these incorporations do not have many housing units (because of airspace noise pollution). There are below-poverty level tracts close to concentrations of air subsector firms, these might be areas exposed to air noise pollution. Utility and Support subsector firms are dense within the same incorporations as Warehousing and Courier subsector firms; they also line tracts with a high percentage of below-poverty level households.[4] There is a logistical core for the County of LA, beyond the official incorporated city of Los Angeles. The T&W industry is a profitable sector, and given the requirements of the

[2] Appendix A: 55-56
[3] Appendix A: 55-56
[4] Appendix A: 55-56

Knox-Nisbet Act, the high density of firms to land area would signify a justifiable revenue source for city incorporation. This is despite the presence of tracts with a high percentage of below-poverty level households near or within specific incorporations; commercial and industrial presence provides greater tax revenue than residential-heavy tracts. The Support (T&W) subsector includes a wide array of establishments, including air traffic control services, marine cargo handling, and motor vehicle towing. This subsector incorporates the supporting elements of the logistics sector, including long shoring at the Port of Los Angeles and air traffic control, for both passenger and transport air traffic (NAICS 2012).

The Support (T&W) subsector is notable (as represented in the differing scale on page 40 and 42, compared to previous maps for WARE, TRUCK or COUR) for having significantly more firms per square mile than WARE, TRUCK or COUR. Being auxiliary firms to land- and capital-intensive segments of the T&W sector, SUP firms do not require as much firm per square mile as the other T&W subsectors do. The SUP (Support for T&W) subsector in LA County is densest within incorporations near LAX. The city of Inglewood has consistently maintained < 100 SUP firms, although the subsector within the incorporation appears to have declined since 2006 (from 180 to 116 SUP subsector firms). Demographically, Inglewood has an estimated population of 111,666 individuals in 2015, with 50.6% individuals identifying themselves Hispanic or Latino. Far more than the firm heavy/low population incorporations for WARE and TRUCKING incorporations such as Vernon or Industry. There are approximately 38,429 housing units within the incorporation of Inglewood, despite the high firm-per-square-mile density of the SUP sector.

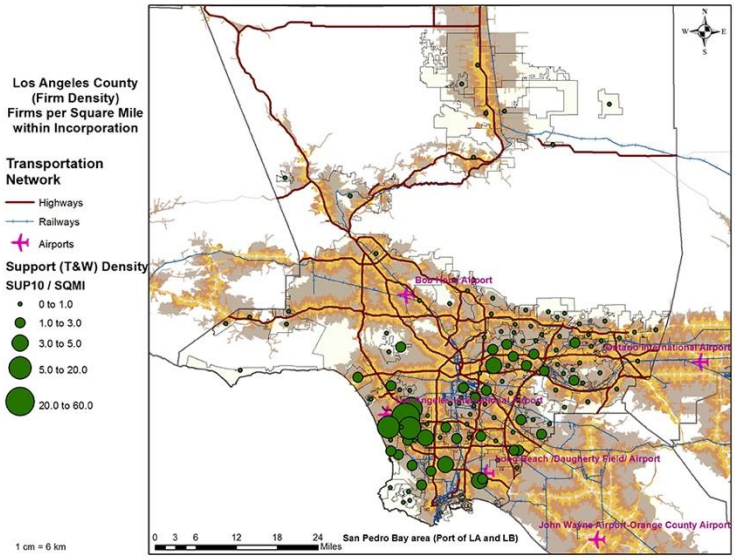
The incorporation of Carson maintained a stable firm count around 100, during the 2006 to 2010, then 2010 to 2014 period. There are an estimated 93,281 individuals residing within

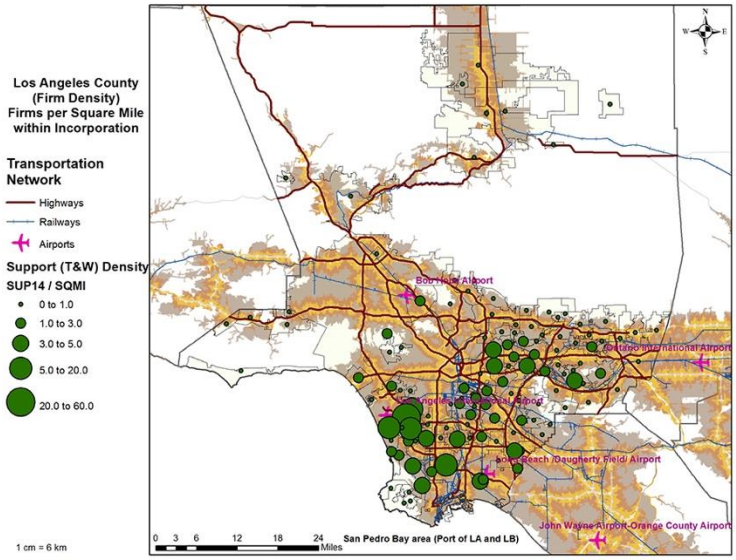


Support (T&W) Subsector (SUP) Density [Firm per Square Mile] from 2006 to 2010 to 2014

The Support (T&W) subsector is located in the Southern areas of LA County.

SUP firms do not appear to condense significantly within similar incorporations as the WARE subsector.





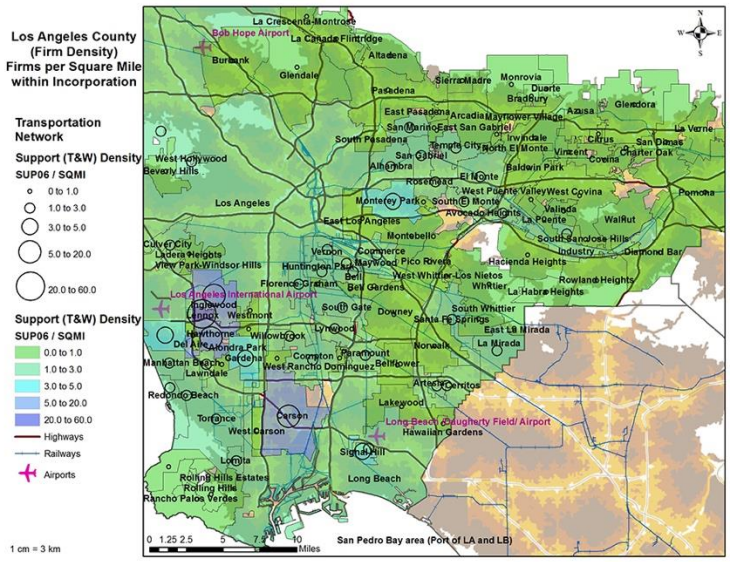
SUP subsector firm density does not appear to have changed significantly across time.

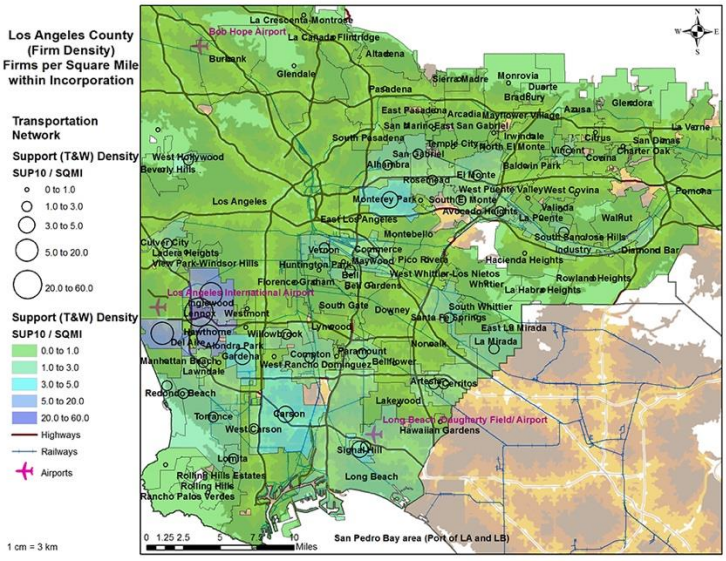
SUP subsector firm density is higher than WARE, TRUCK or COUR, with as many as 60 firms per square mile within an incorporation.

Carson in 2015, with 38.6% of those individuals identifying themselves as Hispanic or Latino. Carson has approximately 26,226 housing units in 2015, compared to the limited housing unit options of Industry and Vernon, is of note, despite Carson's < 100 firm count. Both the incorporations of Hawthorne and Lennox possess < 30 SUP subsector firms, although Hawthorne's firm count has proven stable overtime (hovering around 30 firms from 2006 to 2014), whereas Lennox declined from < 60 SUP subsector firms in 2006 to < 30 SUP subsector firms in 2014.

Hawthorne has an estimated population of 88,451 individuals in 2015, residing within 29,869 housing units. In contrast, Lennox has a population of 22,753 individuals in 2010 (since ACS estimates for 2015 do not exist). Compared with the 52.9% Hispanic or Latino of Hawthorne, or the 50.6% (Inglewood) or 38.6% (Carson), Lennox is nearly 93% Hispanic or Latino. Lennox is comparable with the commercial/industrial heavy incorporations of Vernon or Industry, although not at quite the same scale, since Lennox maintains relatively modest 5,487 housing units, compared to nearby Inglewood or Hawthorne. Lennox has a SUP sector employment of 417 individuals in 2006, 262 in 2010 and 190 individuals in 2014. The SUP sector in Lennox is in apparent decline, fitting with the declining number of firms in the SUP sector, despite the high density of SUP firms in Lennox; thus, Hispanic or Latino workers in Lennox may be involved with another T&W subsector or industry. Hawthorne has a stable SUP employment, from 580 employees in 2006, 460 employees in 2010, and 688 employees in 2014; the number of employees in Hawthorne exceeds those of firms in Lennox, an indication of distinctions within the SUP sector between the two bordering incorporations. Finally, Carson has a large employee base for the SUP sector with 1931 employees in 2006, 955 employees in 2010 and 2,168 employees in 2014; this is expected, given Carson's < 100 SUP subsector firms.

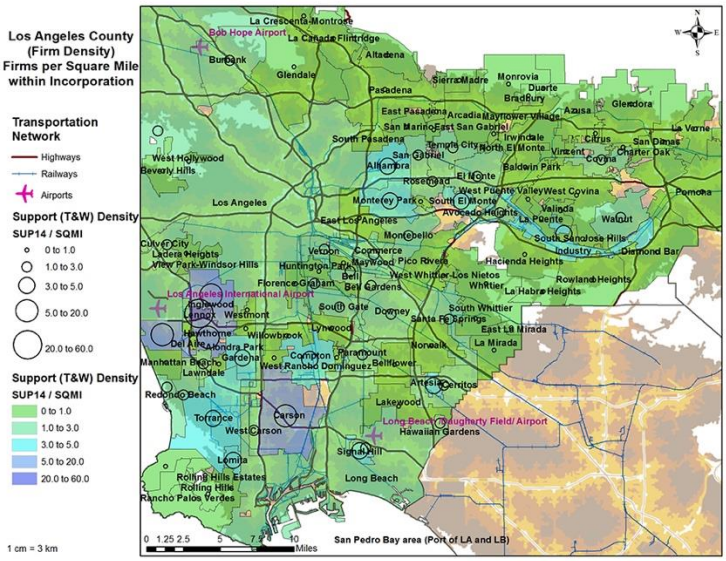
Support (T&W) (SUP) Firm Density [Firms per Square Mile within Incorporation] - FOCUSED





Support (T&W) subsector firms are densest in the southern and 'core' areas of LA County.

Compared to WARE, COUR, and TRUCK, SUP (T&W) has more firms per square mile.



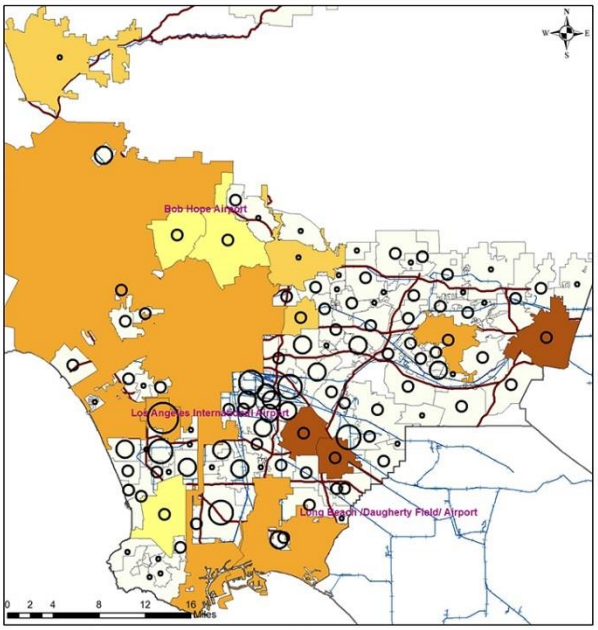
Support (T&W) dense incorporations, such as Carson, Inglewood and Hawthorne are located next to transportation centers, such as Los Angeles International Airport (LAX) and Signal Hill to Long Beach Airport.

Hispanic or Latino Percentage with T&W Density

This study utilizes data from the ACS 2006, and five-year ACS for 2010 and 2014. The 2006 ACS is a one-year estimate, five-year ACS data for 2006 is unavailable. Hence, there are incorporations with unavailable estimates in 2006; nevertheless, a general pattern could be spotted in the limited 2006 map of Hispanic or Latino individuals, where two incorporations with more than 55% Hispanic or Latino is near incorporations with greater than 5.0 T&W firms per square mile. This pattern becomes more salient in 2010 and 2014; where the cluster of incorporations with greater than 5.0 T&W firms per square mile also has a population demography with greater than 75% Hispanic or Latino individuals. In 2014, there is a range of missing values for the cluster of high T&W density incorporations; however, the general pattern of percentage of Hispanic or Latino individuals appears consistent with the map in 2010. There is evidence of a positive association between T&W firm density and percentage of Hispanic or Latino individuals, as displayed by the maps on page 45. More testing will be required to ascertain this relationship between percentage of Latino and Hispanic with T&W density, although Allison et al. (2012) note the prevalence of Latino or Hispanic workers among the low-skill labor force utilized by T&W firms.

Of the T&W-dense incorporations with > 10 T&W firms per square mile, four incorporations have greater than 75% percent Hispanic or Latino: Vernon, Lennox, Santa Fe Springs, and Commerce. Nearly half of T&W-dense incorporations have greater than 75% Hispanic or Latino, although it can be reasonable to assume that there are other confounding variables involved in the relationship between T&W firm density and percentage of Hispanic or Latino individuals. Areas with heavy T&W concentrations may contain a notable amount of pollution, given their location near areas of highway access and railway presence.

Percent Hispanic or Latino and T&W Firm Density

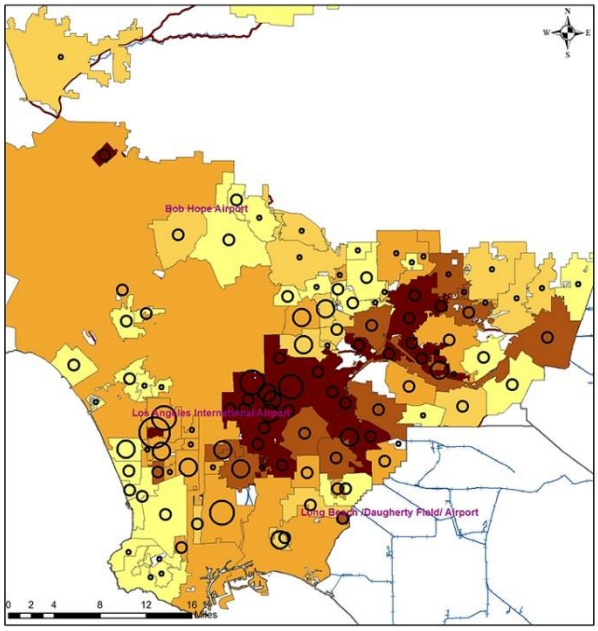


Los Angeles County (Hispanicity) with T&W Firm Density (2006)

T&W Density
TW06 / SQMI
0.0 to 1.0
1.0 to 5.0
5.0 to 10.0
10.0 to 25.0
Greater than 25.0
Transport & Warehousing Sector

Estimate; Hispanic or Latino: / Estimate; Total:
0 to 25% Hispanic or Latino
25% to 35% Hispanic or Latino
35% to 55% Hispanic or Latino
55% to 75% Hispanic or Latino
Greater than 75% Hispanic or Latino

1 cm = 4 km

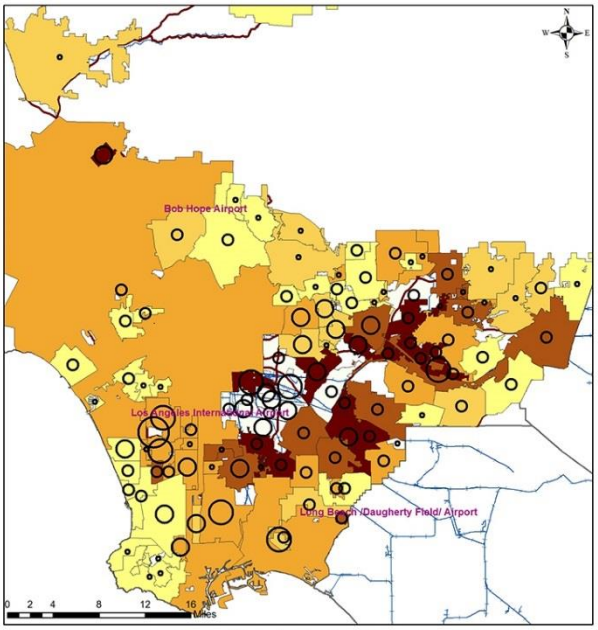


Los Angeles County (Hispanicity) with T&W Firm Density (2010)

T&W Density
TW10 / SQMI
0.0 to 1.0
1.0 to 5.0
5.0 to 10.0
10.0 to 25.0
Greater than 25.0
Transport & Warehousing Sector

Estimate; Total: - Hispanic or Latino / Estimate; Total:
0 to 25% Hispanic or Latino
25% to 35% Hispanic or Latino
35% to 55% Hispanic or Latino
55% to 75% Hispanic or Latino
Greater than 75% Hispanic or Latino

1 cm = 4 km



Los Angeles County (Hispanicity) with T&W Firm Density (2014)

T&W Density
TW14 / SQMI
0.0 to 1.0
1.0 to 5.0
5.0 to 10.0
10.0 to 25.0
Greater than 25.0
Transport & Warehousing Sector

Estimate; Total: - Hispanic or Latino / Estimate; Total:
0 to 25% Hispanic or Latino
25% to 35% Hispanic or Latino
35% to 55% Hispanic or Latino
55% or 75% Hispanic or Latino
Greater than 75% Hispanic or Latino

1 cm = 4 km

Data obtained from the American Community Survey (ACS).
2006 ACS data incomplete for Places, does not include non-city areas. .
Hispanicity data collection varies per year, since the ACS is a sample survey of incorporations with greater than 20,000 residents.

Particularly, Vernon and Commerce (which are located within the Hispanic or Latino heavy 'core' of LA County) are two incorporations with heavy railroad presence within their boundaries.

Table 1
Simple OLS Regression of T&W firms with Hispanicity

YEAR	T&W Firms = constant + HISP(year)	
2006	Multiple R-squared: 0.9167,	Adjusted R-squared: 0.9161
	F-statistic: 1387 on 1 and 126 DF, p-value: < 2.2e-16	
2010	Multiple R-squared: 0.8936,	Adjusted R-squared: 0.8928
	F-statistic: 1059 on 1 and 126 DF, p-value: < 2.2e-16	
2014	Multiple R-squared: 0.9038,	Adjusted R-squared: 0.9031
	F-statistic: 1184 on 1 and 126 DF, p-value: < 2.2e-16	

Source: U.S. Census utilizing ACS 2006, 2010 and 2014.

Table 1 utilize a simple OLS regression between the dependent variable of firm counts with the independent variable of Hispanic or Latino within an incorporation. The results are consistent with the discussion on page 44, as well as the pattern of percentage Hispanic or Latino on the maps on page 45. The adjusted R-squared, (or coefficient of determination) which signifies how much an independent variable (HISP06, HISP10, and HISP14) explains the variance in the dependent variable of T&W firm count (TW06, TW10, and TW14). The adjusted R-squared in 2006 is 0.91, as in Hispanic or Latino within an incorporation explains approximately 91% of the variance of T&W firms in 2006 (89% in 2010 and 90% in 2014). This means that the variability of Hispanic or Latino populations within an incorporation influences T&W firms; shifts in the variability of the percentage of Hispanic or Latino in an incorporation can underline the availability of minority workers across the three time periods. All three simple OLS regression models have < 2.2e-16 p-values, signifying statistical significance; representing the viability of the model. The relationship between T&W firms and percentage of Hispanic or Latino individuals within an incorporation, proposed on page 41 to 42, appears to be supported by the simple regression model.

Brief Assessment of the Logistics Industry in the United States

The logistics industry in the United States has grown overtime, although the national ranking of the US has remained relatively consistent within the past decade. The timeline displayed in Table A occurs within the same period as this study from 2006 to 2015. Of note, according to the World Bank, the US ranks approximately the same on the Logistic Performance Index in 2016, as it did in 2007 – before the 2008 recession (Rank 10 in 2007, Rank 10 in 2016) (World Bank). The logistics industry, and T&W sector has recovered from the 2008 recession, although the industry in the US still does not rank consistently in the top 10, if at all (especially for international shipments (19 in 2006/19 in 2016) and timeliness (11 in 2006/11 in 2016)). The competence of the logistics industry in the United States is ranked 8 in 2006, declined to rank 11 in 2010 (after the 2008 Recession), before rising again to rank 8 in 2016 (World Bank).

County-Level Assessment of Subsector Firm Distribution

Table 2 – Sector Firms within Incorporated Cities in Los Angeles County

SECTOR FIRMS	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WAREHOUSE	393	416	422	380	346	405	402	388	390	379
TRANSIT	368	390	418	415	359	462	464	512	545	542
TRUCKS	1718	1825	1774	1646	1427	1676	1601	1699	1787	1892
SUPPORT	1567	1617	1579	1543	1440	1619	1585	1639	1694	1674
SHIPPING	49	50	47	51	49	61	60	69	76	77
POSTAL	13	15	14	16	16	19	17	18	26	25
PIPELINE	22	23	14	15	14	28	28	29	25	27
PLANES	177	183	190	175	155	169	166	168	175	178
COURIERS	482	466	417	373	323	439	427	446	441	471
UTILITY	213	211	144	142	128	196	195	203	210	211
RAIL	3	4	4	4	2	2	2	1	1	0

Table 1 above shows the absolute distribution of T&W subsectors in LA County from 2006 to 2015. Trucks and Support Subsector firms consist of most of the T&W firms in LA County, which is understandable given that the highway system is the primary means of logistical distribution throughout LA County. The bulk of firms in the Trucking subsector are in the city of LA, although the large land area of the city spreads out the subsector within the

incorporation. In addition, the Trucking sector has larger amounts of independent contractors, as well as semi-independent cooperatives, that share work from the intermodal logistics industry. SUPPORT (SUP or the Support for T&W subsector) is the next highest T&W presence in LA County. As displayed earlier in the T&W density maps, the SUPPORT subsector is concentrated around the city of Lennox and Inglewood. For a future study, it would be interesting to obtain data on the distribution of firms per census tract, and compare firm count in the tracts with the wider incorporation.

For T&W subsectors, such as SHIPPING, POSTAL, PIPELINE, PLANES, TRANSIT and RAIL, the lower numbers of firms are represented by the monopoly (and/or oligopoly) power of these firms within their jurisdiction of dominance. For SHIPPING, PLANES AND RAIL, these subsectors are located within incorporations that contain infrastructure of relevance. The jurisdiction of dominance is the incorporated city, such as the city of Los Angeles or the city of Long Beach. For some firms, such as transit, a single entity, such as the Los Angeles Metro, their area of operation can cover the entire county. Others, such as Rail, are specific to a few incorporations; in 2015, there are no RAIL firms listed within the incorporations in LA County. RAIL traffic still exists, it is possible that another subsector now operates the rail lines, but does not list RAIL as it primary business.

Table 3 – Correlation Matrix for Sector Firms within Incorporated Cities in LA County

Column	WAREHOUS	TRANSIT	TRUCK	SUPPOR	SHIPPIN	POSTA	PIPELIN	PLANE	COURIER	UTILIT
WAREHOUSE	1									
TRANSIT	0.059078286	1								
TRUCKS	0.570333616	0.4916925	1							
SUPPORT	0.469410349	0.8286133	0.828635	1						
SHIPPING	-0.13417347	0.9583124	0.422592	0.7740468	1					
POSTAL	-0.21710939	0.8744726	0.390674	0.6783378	0.92796218	1				
PIPELINE	0.233128737	0.6717353	0.357829	0.7199372	0.71646868	0.495718	1			
PLANES	0.734898589	0.0508144	0.813863	0.4541484	-0.1091021	-0.08198	-0.1303056	1		
COURIERS	0.596913572	0.3872301	0.805551	0.77702	0.38472444	0.208645	0.67900212	0.544999	1	
UTILITY	0.360194684	0.498251	0.62237	0.7815928	0.57251792	0.400854	0.85807667	0.201439	0.90569584	1
RAIL	0.423516917	-0.763657	-0.1053	-0.459206	-0.8843021	-0.79904	-0.6400003	0.429311	-0.195486	-0.430451

Table 3 displays correlation coefficients for the T&W sector within Incorporated Cities in Los Angeles County from 2006 to 2015. The SUPPORT firms have strong relationships with TRANSIT and TRUCKS firms; this makes sense, considering that SUPPORT firms are focused on providing infrastructure and services to the TRANSIT and TRUCK subsectors. SHIPPING firms are strongly correlated with TRANSIT, while POSTAL firms have strong correlation with TRANSIT and SHIPPING; SHIPPING, TRANSIT and POSTAL firms are responsible for the movement of products and people, especially information for the latter.

PLANES firms (as in air transportation) have strong correlation with TRUCKS, and COURIERS with TRUCKS, as well; this may be representative of the role of intermodal transit. UTILITY firms have a strong correlation with COURIER firms; this might be explained by the reliance of COURIER firms on a well-kept transportation infrastructure. Surprisingly, RAIL firms have a negative relationship with SHIPPING firms; perhaps with the establishment of the Alameda Corridor, the increased efficiency of rail-to-inland terminal also eliminated redundant intermodal RAIL firms.

Limitations

The limitations of this study are the initial exclusion of unincorporated segments of Los Angeles County, the nature of the Transportation and Warehousing Sector in a global hub, such as LA County. The EDD obtained firm count data that is the focus of this study is restricted to the incorporated cities of Los Angeles County. Per the EDD, firm count data in the unincorporated areas of LA County is unavailable. Firm count is also restricted to city size, as any smaller scale of aggregation would be inefficient to collect; therefore, the study chose to focus on incorporated cities in LA County. It may be possible to extrapolate unincorporated areas of Los Angeles County by obtaining the total count of T&W firms in LA County,

subtracted from the total count of T&W firms in the EDD data. However, the data would not be geographically assigned to places, it would be improbable to make direct comparisons with ethnic demographic data (unless the study disaggregates EDD firm count data to the county/metropolitan division level). Moving the scale from incorporated cities to the county/metropolitan division level would eliminate the specificity, and hence the advantages of the incorporated city EDD firm count data. In addition, the study will also have to account for the variations in NAICS definitions overtime (which is already accounted for in the EDD data for incorporated cities in Los Angeles County.)

Another limitation of the study is the nature of the T&W sector in the County of Los Angeles; LA County borders Orange County and San Bernardino County, supported by the area's regional airports, such as John Wayne Airport. While firms may locate within the incorporated cities of LA County, it is not certain that they exclusively serve the residents of their County. While in the transportation category, public and mass commuter transit firms may focus on a region of the county, local logistical firms in the T&W sector serve cross-county communities throughout Southern California, as well as global communities (considering GCC theory and the county's 'world city' status). The exclusion of unincorporated areas mentioned previously also contributes to potentially confounding influences of the T&W sector, as T&W firms located within incorporated cities in LA County would also serve nearby unincorporated areas. Nevertheless, where T&W firms choose to locate may also determine the extent of their influence on nearby employment demographics, particularly among minority groups and their social networks. The presence of T&W firms within incorporated cities in LA County may have an impact on nearby census tracts of unincorporated areas, especially in consideration of ethnic employment in the T&W sector.

For the variables of the percentage of Hispanic or Latino within an incorporation's population, a limitation could be found in the ACS data employed for comparison. Five-year estimates for the 2006 ACS are unavailable, thus, this study utilized the one-year ACS for 2006. While limiting, this was done to ensure that the periods for the study (2006, 2010, and 2014) remains consistent, especially so T&W firm density can be compared with percentage of Hispanic or Latino. This limitation spills over into the simple OLS regression model between dependent variable, T&W firm counts and the independent variable, the number of individuals identifying themselves as Hispanic or Latino within an incorporation. It can be acknowledged that the 2006 ACS data has a wider margin of error than the 2010 to 2014 five-year ACS data for Hispanic or Latino. However, the comparison between 2006, with the latter two datasets in 2010 and 2014, can strengthen the validity of the 2006 ACS Hispanic or Latino dataset.

Future research could investigate whether the core-periphery pattern exhibited by the T&W sector is a product of industry clustering, or a consequence of the necessity of shared infrastructure. The rise of online retailers and distribution centers has made old warehouses sites of significant retail activity, although these DCs may not currently qualify as such. The prevalence of Hispanic or Latino residents within T&W-dense incorporations may be of concern; the T&W sector is known for its broad usage of space (especially the WARE subsector), leaving little room for residential units; some T&W-dense incorporations, such as Vernon and Industry, lack sufficient house units for a self-sustainable population; instead, these cities obtain workers from other nearby incorporations. Thus, is there a unique attribute of Hispanic or Latino residents that reside within a T&W-dense incorporation? Or is there an attribute of the T&W sector that attracts Hispanic or Latino residents (such as jobs as proposed by Allison et al. (2013), and Bonacich and Wilson (2008))?

Implications

The T&W sector is a key component of Los Angeles County and the Greater LA Area's status as a global port, as well as a world city. Los Angeles County and the LA metropolitan region is not contained within its core city of Los Angeles; it is distributed throughout the incorporated and unincorporated cities of the county in the Los Angeles-Long Beach-Glendale metropolitan division. It is one scale below the Los Angeles-Long Beach-Anaheim, CA metropolitan statistical area (MSA), which represents the statistically acknowledged sprawl and density of the world city. Within Los Angeles County, enclaves of low-income and immigrant labor agglomerate in formal and informal employment networks that provide a cost-efficient labor pool for low-skilled industries, such as the T&W sector. Many of these laborers are part-time seasonal workers, which facilitates cost-efficiency and the flexibility necessitated by containerization and current JIT manufacturing practices (Allison et al. 2013).

The findings and implications of this study are threefold: 1) the T&W sector (and industry) in LA County is a diverse industry that incorporates firms (and uses) that go beyond the stereotypical warehouse and/or dry port; port (and node) access contributes, but the foundation of the T&W sector in LA County is the coastal-oriented agglomeration of highways, railways, and other transportation networks present within a definitive concentration in the county, linked up with the wider metropolitan region (and nation). 2) there is a notable band of core incorporations in LA County with high T&W sector firm density, this signifies the possibility of jurisdictional legislation that encourages the concentration of the T&W sector within key incorporations. 3) these T&W-dense incorporations include jurisdictions with a lack of housing or residential development, despite the relative high percentage of Hispanic or Latino individuals residing within these industrial- and commercial-dense incorporations. Given the implications of 2),

industrial- and commercial- friendly jurisdictional legislation may be inhibiting worker capacity (especially low-income and low-skilled workers) for residing close to their place of work. In addition, the structure underlined in 1), the T&W sector and the jurisdictions where the sector is densest (such as Vernon and Industry), appear to exploit the formation of the transportation network in LA County towards wider economic (and GCC-based needs) over the needs of residents (and hence, potential commuters.)

The presence of the T&W sector reaffirms LA County's status as a subset of a world city, as a player in the global economy. The T&W sector not only serves the global port's hinterlands, but also Los Angeles County's core areas, whether through distribution of products via stores or delivery, or via full-time and part-time employment opportunities. The city of Los Angeles is only a component of the wider world city that is Los Angeles County - the city has spilled over into its hinterlands – of which itself is a subset of the Greater LA area. The logistical impact of Los Angeles County and its incorporated cities are no longer confined within the arbitrary boundaries of place as defined by the Bureau of Labor Statistics or the U.S. Census. Los Angeles and the LA metropolitan area are themselves, a world city, in terms of the managerial centralization involved in its creation; it is also a global port by its function in the GCCs spanning the Pacific and through railways and trucking within North America.

The Port of Los Angeles/Long Beach and LAX are part of a wider system of dry ports and terminals throughout Los Angeles County that define the County as a global port. It is an intermodal centroid of sea, land and air logistics located within a command hub that attracts job seekers from a variety of demographic groups. Low-waged job seekers settle down near their places of employment, whether in ethnic enclaves or low-income housing; where these workers settle will influence their present and future employment prospects (Allison, 2015). As a global

port, Los Angeles County is a terminal for intermodal interchange between T&W capital and labor - the input-output of products and employees.

Planners in Los Angeles County can utilize the findings of this study to track the distribution of T&W firms within their cities, as well as neighboring incorporated cities. Regional planners of Los Angeles County in the southern California area can use comparisons of aggregate T&W firm counts to anticipate the direction of input-output flows between the highly-networked T&W sector in the localized region, particularly the Los Angeles-Long Beach-Anaheim, CA MSA. GIS layering of firm count frequency with ethnicity in the T&W sector can facilitate identification of the spatial distribution of specific ethnic groups in the T&W sector, such as Hispanic or Latino. This will allow planners to communicate and interact with local communities, while staying informed of employment prospects in the community. Thus, planners can target their economic development policies towards maximizing the skillset of the community.

In addition to utilizing the skillset of the local community, T&W firm concentrations could also inform planners of possible detrimental influences on the environment. The T&W sector has a notable number of negative externalities, such as air and noise pollution. T&W firm density can be indicative of high concentrations of overlapping transportation infrastructure. Incorporated cities with high T&W firm counts compared with other nearby incorporated cities could serve as markers for in-depth analysis. Such future analysis would include the positioning of commercial and industrial zoning utilized for the T&W sector relative to their position and proximity to residential areas, contributing to studies by Newman (2012) and Allison et al. (2015). Los Angeles County is developing as a global port, as a world city, and as a central GCC node; as migrations bring new workers to the City of Quartz (Davis 1990) and global flows bring

products to Los Angeles, the Transportation and Warehousing Sector will remain a key source of employment.

Conclusion

The T&W sector in LA County is a fascinating segment of the Greater LA area. Allison et al. (2013), Bonacich and Wilson (2008) and Sassen (2001; 2012) highlight the importance of logistics in the LA marketplace, through the county's position as the centerpiece of the Greater LA area; Levinson (2006), Cowen (2014) and Bair (2009) proport the necessity of efficient transportation networks that minimize producer-to-consumer and producer-to-warehouse/DC transfer of commodities in the T&W sector. Each subsector fulfills a role in the vitality of the T&W sector although specific incorporations (such as Vernon and Industry) weigh higher compared with other incorporations county-wide.

The high percentage of Latino or Hispanic individuals within these specified high-density T&W incorporations, and the significant relationship between percentage of Latino or Hispanic with T&W density, highlight an interesting ethnic component of the sector in LA County, as noted by Allison et al. (2013; 2016). Future studies can expand on this dimension, specifically regarding the influence of specific subsectors on ethnic demography, as many of these subsectors (WARE and SUP) concentrate within incorporations with a high percentage of Latino or Hispanic individuals (and workers).

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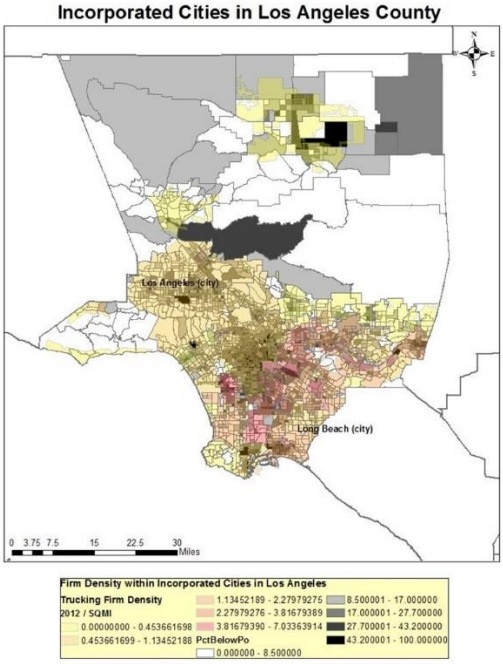
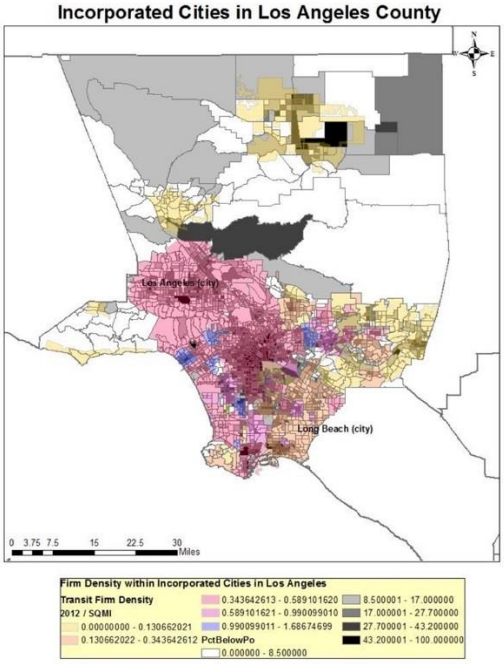
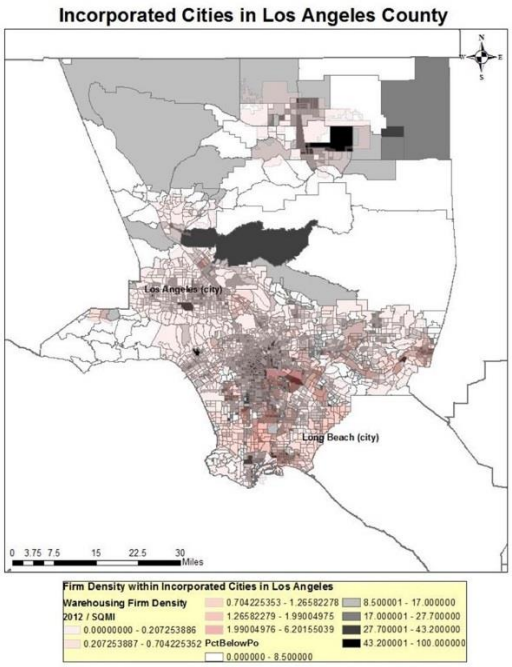
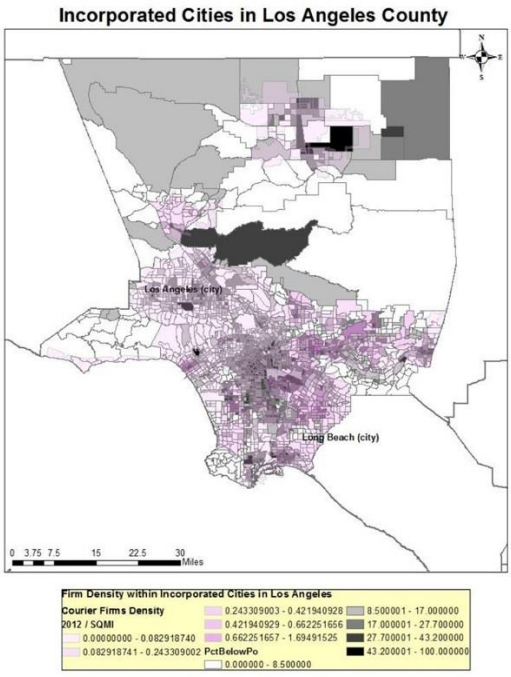
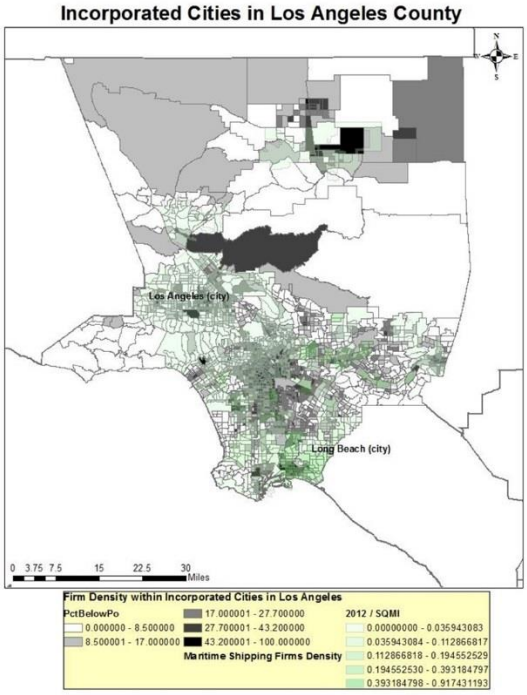
APPENDIX A: Density to Percent Poverty in 2012

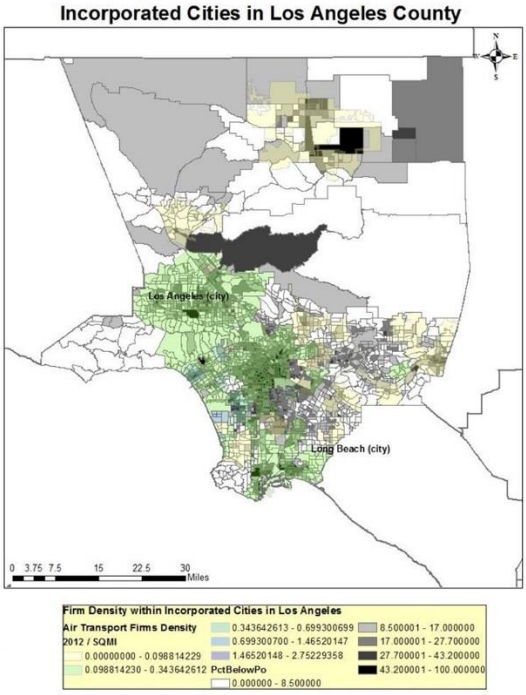


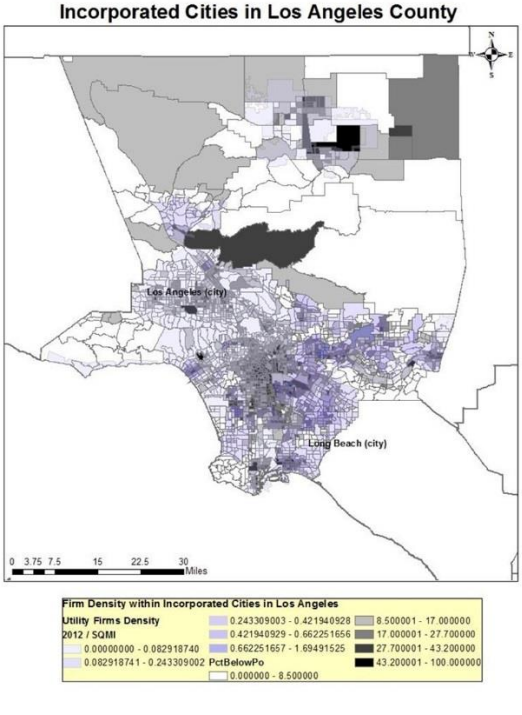


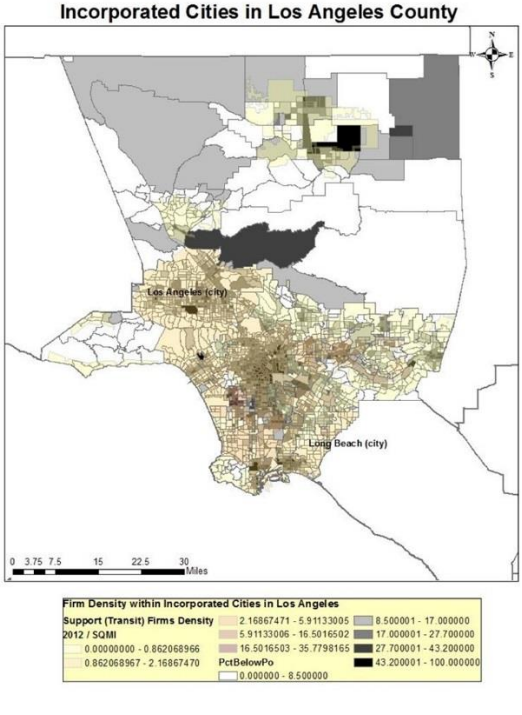





Incorporated Cities in Los Angeles County
Los Angeles (city)
Long Beach (city)
0 3.75 7.5 15 22.5 30
Miles
Firm Density within Incorporated Cities in Los Angeles
PctBelowPo
0.000000 - 8.500000
8.500001 - 17.000000
17.000001 - 27.700000
27.700001 - 43.200000
43.200001 - 100.000000
Maritime Shipping Firms Density
2012 / SQMI
0.00000000 - 0.035943083
0.035943084 - 0.112866817
0.112866818 - 0.194552529
0.194552530 - 0.393184797
0.393184798 - 0.917431193


Incorporated Cities in Los Angeles County
Los Angeles (city)
Long Beach (city)
0 3.75 7.5 15 22.5 30
Miles
Firm Density within Incorporated Cities in Los Angeles
Air Transport Firms Density
2012 / SQMI
0.00000000 - 0.098814229
0.098814230 - 0.343642612
0.343642613 - 0.699300699
0.699300700 - 1.46520147
1.46520148 - 2.75229358
PctBelowPo
0.000000 - 8.500000
8.500001 - 17.000000
17.000001 - 27.700000
27.700001 - 43.200000
43.200001 - 100.000000


Incorporated Cities in Los Angeles County
Los Angeles (city)
Long Beach (city)
0 3.75 7.5 15 22.5 30
Miles
Firm Density within Incorporated Cities in Los Angeles
Utility Firms Density
2012 / SQMI
0.00000000 - 0.082918740
0.082918741 - 0.243309002
0.243309003 - 0.421940928
0.421940929 - 0.662251656
0.662251657 - 1.69491525
PctBelowPo
0.000000 - 8.500000
8.500001 - 17.000000
17.000001 - 27.700000
27.700001 - 43.200000
43.200001 - 100.000000


Incorporated Cities in Los Angeles County
Los Angeles (city)
Long Beach (city)
0 3.75 7.5 15 22.5 30
Miles
Firm Density within Incorporated Cities in Los Angeles
Support (Transit) Firms Density
2012 / SQMI
0.00000000 - 0.862068966
0.862068967 - 2.16867470
2.16867471 - 5.91133005
5.91133006 - 16.5016502
16.5016503 - 35.7798165
PctBelowPo
0.000000 - 8.500000
8.500001 - 17.000000
17.000001 - 27.700000
27.700001 - 43.200000
43.200001 - 100.000000