



Logistics facilities

In the age of technological climate change

by Stewart Rubin

The secular changes taking place in the distribution ecosystem are having a positive impact on logistics properties, in marked contrast to the trials facing U.S. retail. The trajectory of logistics properties — defined as facilities used for the warehousing and distribution of goods — is soaring by any measure. Rents are increasing, vacancies declining and values rising, while industrial REITs outperform other REITs, and logistics and delivery jobs increase faster than total U.S. employment. For the first time in the 25-year history of the Association of Foreign Investors in Real Estate's survey, the industrial category is considered the No. 1 property type by foreign real estate investors.

Logistics demand velocity now exceeds the U.S. economy by a ratio of 2:1, as logistics demand growth, as measured by CoStar Group, approaches 4 percent while U.S. GDP growth is approximately 2 percent. Historically, the relationship was close to 1:1. The main catalyst for excess absorption is e-commerce, which has caused a structural shift in the marketplace. Supply and delivery methods have

been altered. The background for this revolution is the technological climate change that manifested with the advent of the World Wide Web in the 1990s and the subsequent launch of the mobile Internet through smartphones such as the iPhone, which launched in 2007, and tablets such as the iPad, which launched in 2010. The technological change affecting the supply chain also has been accelerated by "big data" gleaned from multiple sources.

Rents rising, vacancy down, values up

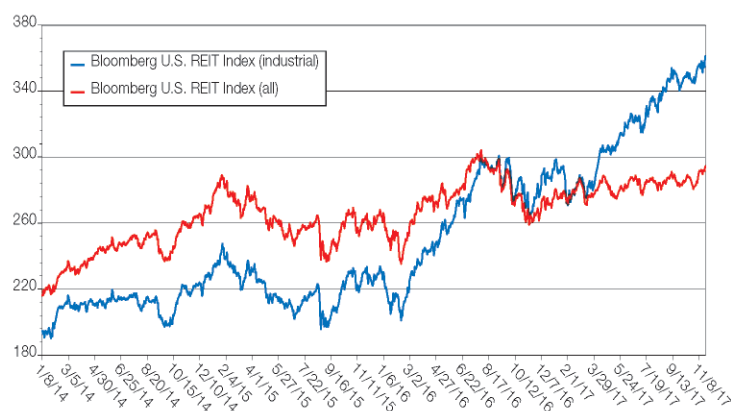
Logistics, which includes warehouse and distribution facilities but not light industrial, experienced an asking-rent increase of 6.9 percent year-over-year for the period ended second quarter 2017, an increase of 23 percent since first quarter 2014, and 32 percent since fourth quarter 2011. The vacancy rate has declined to 6.6 percent from the 13.1 percent recorded in fourth quarter 2010 and is the lowest it has been since 1982, according to CoStar Group data.

Once-shunned older and somewhat inefficient warehouse properties situated close to or within

Change in CPPI through July 2017							
Property type	6-mo.	1-yr.	2-yr.	3-yr.	4-yr.	5-yr.	10-yr.
Office	6.5%	11.1%	15.6%	33.8%	57.7%	77.3%	29.4%
CBD office	10.5%	15.4%	20.3%	42.3%	66.9%	96.4%	71.1%
Suburban office	2.5%	6.7%	10.8%	25.5%	48.4%	59.4%	-2.8%
Industrial	5.2%	8.7%	19.4%	31.2%	55.7%	62.0%	16.5%
Retail	0.6%	-1.6%	5.7%	19.0%	31.1%	52.0%	-3.1%
Commercial	4.6%	7.0%	13.5%	29.2%	49.6%	67.2%	18.1%
Apartment	4.7%	10.1%	24.6%	43.7%	65.5%	86.1%	60.2%
All types	4.6%	7.9%	16.7%	33.3%	54.2%	72.6%	28.7%
Six major metros	7.3%	10.7%	18.5%	37.2%	60.9%	80.9%	52.5%
Nonmajor metros	2.2%	5.5%	15.1%	29.8%	48.4%	65.6%	10.8%

Source: Real Capital Analytics

U.S. REIT performance (all types vs. industrial)



Source: Bloomberg

cities are now in demand as potential “last-mile” distribution facilities. According to CoStar, the vacancy rate for such properties declined to 3.6 percent as of year-end 2016 and contributed to the overall historically low vacancy rate. These locations offer immediate proximity to metro populations via major transportation arteries, which appeal to rapidly growing e-commerce and “last-mile” users. Rents for these types of properties rose 9.8 percent from year-end 2015 to year-end 2016, higher than the 7.1 percent rent growth in the overall logistics market.

Another recent trend is the increase in the number of mega-warehouses, which are facilities with at least 1 million square feet. According to CBRE, from 2010 to 2016, 117 mega-warehouses were built, for a total of 141.2 million square feet. Twenty-nine more facilities are currently under construction. Since 2010, nearly 90 million square feet of these mega facilities has been completed in the top 10 markets. An additional 31.6 million square feet, with 60 percent pre-committments, is under construction and scheduled for delivery by year-end 2018, reports CBRE.

According to Real Capital Analytics’ Commercial Property Price Index, which measures property value appreciation, the industrial sector has

outperformed all sectors except apartments over the past 24 months (see “Change in CPPI through July 2017,” above). Particular buyer interest exists for infill-location portfolios. Some of the older and less desirable properties are now aggressively sought to provide capacity for “last-mile” e-commerce facilitation.

Industrial REITs outperform peers

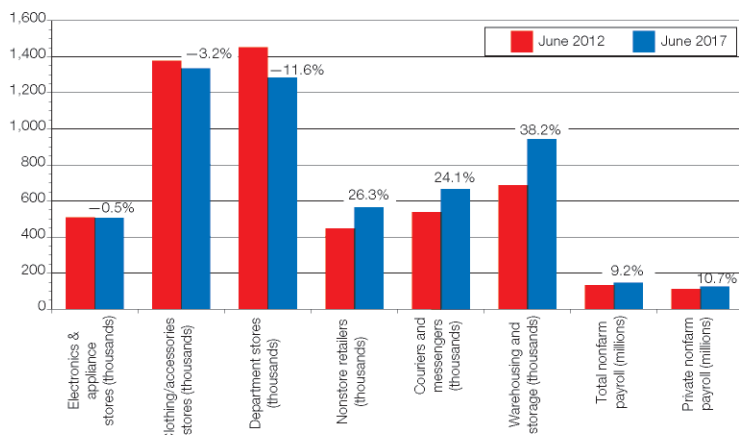
With demand for logistics space on the rise, shares of Prologis and peers such as DCT Industrial Trust and Stag Industrial are outperforming other North American REITs, as well as the broader stock market. The Bloomberg U.S. Industrial REIT index significantly outperformed the Bloomberg U.S. REIT Index over the past year (see chart to the left).

The five largest industrial REITs — Prologis, Duke Realty Corp., Liberty Property Trust, DCT and First Industrial Realty Trust — raised forecasts for 2017 same-store net operating income growth after stronger-than-expected second-quarter results. Their forecasts average 4 percent for 2017, reflecting peak occupancy and continued, stronger-than-expected rent increases, despite supply more closely matching demand. Prologis expects same-store NOI to rise between 4.50 percent and 5.25 percent in 2017.

Jobs associated with logistics are increasing

As a proxy for tracking the migration of product distribution demand from retail to logistics, consider the change in the number of jobs in various sectors. The numbers of warehouse, storage, delivery and nonstore retail jobs are increasing, while several categories of retail jobs decline. Over the year ended June 2017, total nonfarm payrolls increased 1.6 percent and total private payrolls increased 1.7 percent. During the same period, warehousing and storage jobs increased 3.9 percent. Similarly, under the transportation and warehousing category, courier and messenger jobs increased 4.9 percent. In contrast, jobs fell

Job count by sector



Source: Bureau of Labor Statistics

among retailers most exposed to competition from e-commerce, such as the sporting goods, hobby, book, and music store category (-2.4 percent); department stores (-1.8 percent); electronics and appliance stores (-3.9 percent); general merchandise stores (-1.0 percent); and clothing and clothing accessories stores (-1.0 percent). Nonstore retailers (up 5.1 percent) were the best-performing retail category, consistent with the growth of e-commerce and accelerated demand for logistics space. The data was even more definitive over the five years ended June 2017 (see “Job count by sector,” above). According to CBRE, e-commerce fulfillment centers require two to three times as many workers as traditional warehouses. Megawarehouses can employ as many as 1,000 workers. Some newer Amazon.com Inc. facilities have 2,000 or more full-time employees.

Accelerated demand generation spawned by technological and other changes

The primary demand growth accelerator for logistics space in the past two years has been e-commerce. Secondary generators include population shift and import redirection.

The product distribution ecosystem is evolving, and the gale of “creative destruction” described by economist Joseph Schumpeter has been let loose on physical retail. In his seminal book, *Capitalism, Socialism and Democracy*, Schumpeter wrote, “Capitalism is by nature a form of economic change,” and “the capitalist engine stays in motion to form new consumers’ goods, new methods of production, transportation, new markets, new forms of industrial organization.” Those words describe what is happening to goods distribution, with the added backdrop of almost-unprecedented technological change. Technology is changing the logistics chain from the manufacturing stage to shipping and eventually to fulfillment.

E-commerce requires more space

U.S. product imports are an important driver of logistics demand. The redirection of the way products are delivered to the consumer from physical stores to e-commerce has been the primary catalyst of the change and has resulted in the increased rents, lower vacancies, increased values and outperforming stock prices. When demand gets transferred from physical stores to e-commerce, it does not convert at parity, but rather a ratio that varies by type of good and averages about 1 square foot to 3 square feet. Industrial REITs Prologis and Duke Realty estimate e-commerce requires about three times the amount of warehouse space as physical retail.

Prologis maintains approximately 215 million square feet of warehouse space will be added industrywide in 2017, and 225 million square feet in 2018. Duke posits roughly 300 million square feet of warehouse space may need to be developed from 2017 to 2020 to meet demand from e-commerce alone.

Hosting e-commerce functions requires 20 percent more warehouse and distribution space than used by traditional retail merchants in their warehouses. E-commerce focused logistics needs to accommodate single-packed products, wider product variety, robotics, and more employees than found at traditional retail outlets. Every \$1 billion of e-commerce sales drives demand for 1 million square feet of industrial real estate space, compared with 830,000 square feet of warehouses serving store deliveries, according to Byron Carlock, a partner with PwC.

E-commerce logistics space is used intensely and needs to accommodate large inventories and requires enough space to accommodate more workers than typical logistics space. There also is a heavy concentration of robotics, which is space intensive as well. Amazon announced it plans to open a new 850,000-square-foot, high-tech fulfillment center in Orlando in 2018, for example, and said it plans to add 1,500 full-time employees working alongside various automated Amazon robotics functions to pick, pack and ship small items, such as books, electronics and consumer goods.

E-commerce growth exceeds total retail

The growth rate of e-commerce sales has far outstripped total retail sales since 2000. Online shopping has grown in the United States at an annual rate of approximately 15 percent since 2009, compared with physical store sales growth of 3.5 percent. E-commerce’s share of total domestic retail sales has expanded from 2.0 percent in 2004 to 9.1 percent as of third quarter 2017 (see graph on page 62). This represents more than 50 consecutive quarters of share growth, and the share has not

contracted quarter-to-quarter since the U.S. Census Bureau started tracking the metric in 1999.

These numbers do not reveal the full impact, however. When discounter/dollar stores are excluded, the figure rises to 15.5 percent. The apparel-and-accessories share of online sales to total sales was 18 percent in 2016, compared with 4 percent in 2004. As total apparel category growth was up 2.1 percent in 2016, online sales accounted for 145.7 percent of total apparel and accessories growth, implying physical store sales were down 1.2 percent, according to Deutsche Bank and based on company reports.

JLL estimates 30 percent to 40 percent of demand for industrial real estate has some type of connection to e-commerce. And e-commerce is likely to boost annual demand for industrial space by 20 percent in the next few years, according to Green Street Advisors.

According to Duke Realty, e-commerce constitutes approximately 40 percent of its \$734 million development pipeline. Although e-commerce accounts for less than 15 percent of Prologis' square footage, it is about 30 percent of new development. E-commerce has become so prominent that Prologis' largest tenant, Amazon, occupies about 15 million square feet and represents 3.1 percent of net effective rents, surpassing several third-party logistics providers, transportation companies, The Home Depot Inc. and Wal-Mart Stores. In 2012, Amazon was Prologis' fifth-largest tenant, behind four logistics providers, at less than 1 percent of rent. Prologis' second-largest tenant, DHL Group, occupies 10.4 million square feet and accounts for 1.6 percent of net effective rents. Amazon is also the top tenant for both Duke Realty (4.3 percent of rent) and DCT.

Amazon is in a class of its own

Amazon's mastery of efficiency and data gives it a distinct advantage that smaller players cannot

match. Amazon has made a significant investment and spent years in trial-and-error analysis. Amazon accounted for 43 percent of all online retail sales in 2016, according to a Slice Intelligence study that analyzed more than 4 million online purchases. And Amazon accounted for 53 percent of the growth in U.S. e-commerce sales for the year. Consequently, the online e-commerce giant is a significant demand generator for warehouse space, accounting for more than half the fulfillment centers in the United States, according to Green Street Advisors.

Amazon has more than 70 fulfillment centers in the United States, including 26 that were added in 2016. Amazon began adding bulk distribution fulfillment centers, ranging from 500,000 to 1 million square feet or more, in 1999. According to CoStar Portfolio Strategy, Amazon began building sortation centers averaging roughly 300,000 square feet in certain markets in 2009, followed in 2013 by delivery stations of roughly 100,000 square feet and Prime Now hubs of 50,000 square feet in major population centers. According to Bloomberg Intelligence and based on company 10Q reports, Amazon leases about 97 million square feet in fulfillment and data centers in North America, in addition to the 2 million square feet it owns, almost three times the amount in 2012. Amazon has been adding 15 million square feet per year, and the firm is expected to repeat this for the next five to six years and add a total of 100 million square feet — doubling its size in the next five years.

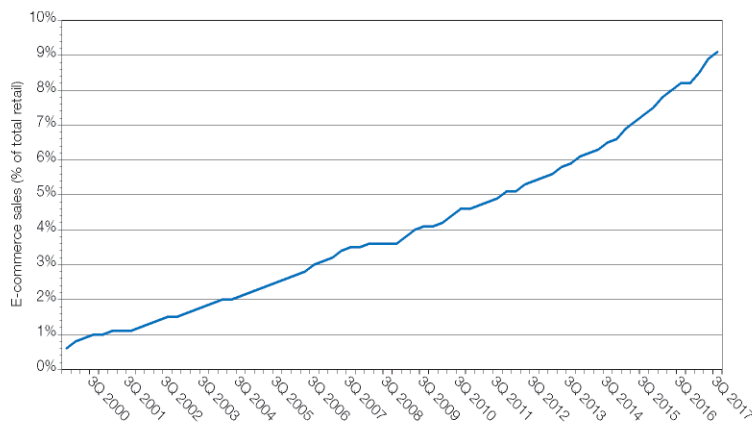
Amazon recently surpassed Wal-Mart as the world's second-biggest consumer electronics retailer. Amazon's apparel sales have grown 294 percent since 2011, and it is now the second-largest apparel retailer. In contrast, department store retailers Sears Holdings Corp. and J.C. Penney Co. have lost a substantial share of apparel sales at -44 percent and -27 percent, respectively.

Other e-commerce users

Other important U.S. e-commerce retailers such as eBay Inc., Wayfair Inc. and Blue Nile Inc. have grown rapidly. E-commerce also has spurred space demand among package delivery companies including United Parcel Service, FedEx Corp. and DHL. FedEx, for example, leases 51 percent of the total Monmouth Real Estate Investment Corp. logistics space, according to company reports.

Traditional physical-store retailers such as Home Depot, Wal-Mart, Best Buy Co. and Macy's Inc. are also aggressively adding warehouse space close to major metro areas to facilitate the growth of their Internet-based businesses. This has led to greater demand for logistics space close to metro areas, as e-commerce participants scramble

Seasonally adjusted e-commerce sales as a share of total retail sales



Source: U.S. Census Bureau

to meet rising consumer expectations for faster delivery times.

Although the recent surge in warehouse take-up is a result of e-commerce expansion, traditional sources of demand are still very important. Space users include end retailers, wholesalers, transportation companies and manufacturers. Industries include automotive, building supplies, medical devices, food and clothing. These traditional users have contributed to demand and also are playing a role in the new e-commerce world.

The entire nonperishable center of the supermarket is exposed to e-commerce as much as any other retail sector. The perishable periphery (i.e., meat, poultry, dairy, produce) is less exposed for now, but things are changing. Amazon's recent purchase of Whole Foods Market gives access to densely populated, high-income areas and potentially "last-mile" delivery centers. Amazon is already in the grocery e-commerce market with its AmazonFresh and Amazon Pantry platforms. AmazonFresh is currently available in 21 U.S. metro areas, including cities in California, New York and Washington. Aldi Inc. has teamed up with Instacart Inc. to compete for the online user. Instacart already has partnerships with grocers such as Wegmans Food Markets, Publix Super Markets and Ahold Delhaize. Fresh Direct, Wal-Mart and Safeway Inc. are offering or testing home delivery.

At this point, only about 1 percent to 3 percent of the roughly \$1.5 trillion U.S. grocery industry has moved online. This is below the penetration rate achieved in countries with more concentrated populations, such as the United Kingdom at 5 percent and South Korea at greater than 10 percent. This signifies potential exists for increased e-commerce share. Even a 1 percent to 5 percent increase would result in significant logistics space demand.

Third-party logistics providers

It takes significant scale for a retailer to manage its own online fulfillment, and many smaller retailers are turning to third parties to handle this for them. Others outsource the task to Amazon, which then boxes the goods in an Amazon box.

According to Prologis, third-party logistics providers account for about one-quarter to one-third of its customer base. 3PLs are becoming very important to smaller merchants because duplicating the infrastructure, logistics and data of larger players is expensive. Big data accelerates delivery time, and this has benefitted large players such as Amazon. To compete, Wal-Mart, Costco Wholesale Corp., Kohl's Corp. and The Kroger Co. have decided to team with Alphabet Inc.'s Google Express. Google contributes its data and technology advantages. Other third-party distribution companies, such

as Shipt and Instacart, are employed to share the costs of processing online orders.

Smaller disruptive trends

Although nothing is directing the shift in geographic demand more than the rise of e-commerce, other slower trends are shifting geographic focus, including population redistribution and the slow shift from Pacific ports to Gulf and Atlantic ports. Consumption is the main driver of logistics real estate demand. Accordingly, the relative size and growth of markets is most closely correlated with the amount of consumption within each respective market. The shift of the U.S. population to the South and West should increase demand in those markets.

East Coast ports have gained 1 percent per year in market share over the past five years. There is reason to believe this shift will continue. The shift of the U.S. population to the Southeast and Southwest should increase demand at Gulf Coast ports such as Houston, New Orleans and Tampa, Fla., as well as the East Coast ports of Savannah, Ga., and Hampton Roads, Va. According to a report from CBRE's David Egan, the East and Gulf coast ports accounted for nearly all of North America's cargo volume growth in 2015. According to CBRE, the West Coast's market share dropped to 52 percent of all twenty-foot equivalent unit (TEU) volume in 2015, down from 54 percent in 2014 and 57 percent in 2010 (see table on page 66).

The reasons for the eastward shift are (1) the desire to be closer to consumers, (2) West Coast labor strife, and (3) ultimately, the widening of the Panama Canal.

China became a member of the World Trade Organization in December 2001. It then began exporting goods to the United States at an accelerated rate. Naturally, based on geography, those exports went chiefly to the large West Coast ports of Los Angeles and Long Beach, Calif. Goods were then taken by train and/or truck to distribution centers in Dallas/Ft. Worth and Chicago. Two-thirds of the shipping was coming from the western half of the United States, whereas 67 percent of consumption was happening east of the Mississippi River. Gradually, a certain share of imported goods was redirected to Gulf Coast and East Coast ports.

Another factor is the West Coast ports of Los Angeles and Long Beach have a history of labor strife. In 2014, labor action at Los Angeles/Long Beach ports caused delays of imports and contributed to some redirection of imports to Gulf Coast and East Coast ports.

The 2016 Panama Canal expansion allowed for larger ships to pass through the canal and enabled ships to deliver goods from Asia to the

Most active ports, 2015

Port	Loaded inbound TEUs* (domestic or foreign)	Port	Loaded inbound and outbound TEUs* (domestic or foreign)
Los Angeles	4,064,075	Los Angeles	5,526,289
Long Beach, Calif.	3,635,894	Long Beach, Calif.	5,172,498
New York and New Jersey	3,247,436	New York and New Jersey	4,613,058
Savannah, Ga.	1,619,417	Savannah, Ga.	2,824,529
Port of Virginia	1,064,947	Port of Virginia	2,003,703
Tacoma, Wash.	926,217	Houston	1,753,047
Oakland, Calif.	846,476	Oakland, Calif.	1,656,440
Houston	844,768	Tacoma, Wash.	1,646,508
Charleston, S.C.	835,706	Charleston, S.C.	1,551,578
San Juan, Puerto Rico	590,696	Seattle	1,072,946

*TEU = Twenty-foot equivalent unit

Source: U.S. Army Corps of Engineers

Gulf and East coasts, and thus closer to consumers. The New Panamax-size ships capable of carrying 12,000 standard-size shipping containers are more than double the size of the existing Panamax ships, which can carry 5,000. Many U.S. East and Gulf coast ports are in the process of upgrading or have already upgraded in anticipation of the widening of the Panama Canal. The improvements include dredging and deepening channels and installing very large cargo cranes to accommodate larger ships. The Port of New York and New Jersey could not accommodate larger ships because the Bayonne Bridge on the approach to the port was too low. The Bayonne Bridge was raised in September 2017, and the port can now receive larger ships.

Not all the ports are ready for the larger ships, however. Savannah is the second-largest port on the East Coast and offers direct interstate highway and rail access to Atlanta and the growing southeastern United States. The Savannah Harbor Expansion Project will deepen the 18.5-mile outer harbor to 49 feet at mean low water, and the Savannah River channel to 47 feet; dredging is expected to be completed in 2020. The Port of Houston has experienced growth in container volume in the range of 10 percent annually for five years. In addition, it is expected to benefit from an expected increase in petrochemical exports from Gulf Coast ports, as the United States is on the verge of becoming a consequential crude oil exporter. PortMiami, which has spent \$1 billion on dredging and other improvements, is ready to handle larger ships.

The increased capacity of the expanded Panama Canal eventually should result in larger Asian export ships shifting to East and Gulf coast ports. Data reported since the Panama Canal expansion was completed in 2016 has revealed no immediate eastward migration; however, as East Coast ports

complete their adjustments to accommodate larger ships, shipping share allocation should continue to shift. Both the ports and the population shift should benefit Southeast, Gulf and Texas cities.

Conclusion

The main engine of logistics space growth and value appreciation is the rapid expansion of e-commerce sales. Multiple junior growth engines are benefiting certain logistics markets, including shifting population and import reorientation, which together emphasize the distribution of goods to major population centers. Warehouse distribution facilities are exposed to the entire supply chain, resulting in a high level of tenant diversity. Markets with diverse demand drivers and substantial local consumption should continue to do well. Future change catalysts may include driverless trucks and cars, the thawing of the Arctic Passage, and the impact of further automation.

The distribution ecosystem is evolving in the shadow of technological climate change. Transformation is built into the DNA of trade and distribution, and has been for millennia. This evolution is so integrated into anthropological and sociological history that it seems it is part of nature itself. This recalls the observation of Roman emperor and stoic philosopher Marcus Aurelius in "Book 6" of *Meditations*: "Observe always that everything is the result of change, and get used to thinking that there is nothing nature loves so well as to change existing forms and make new things in their likeness." ❖

Stewart Rubin is senior director at **New York Life Real Estate Investors**, an investment group within NYL Investors, a wholly owned subsidiary of **New York Life Insurance Co.** This article is an abridged version of a white paper published in 2017. The full paper can be accessed at <https://www.newyorklife.com/content/dam/nyl-cms-dotcom/pdfs/rei/Logistics-Facilities-in-Technological-Climate-Change.pdf>.
